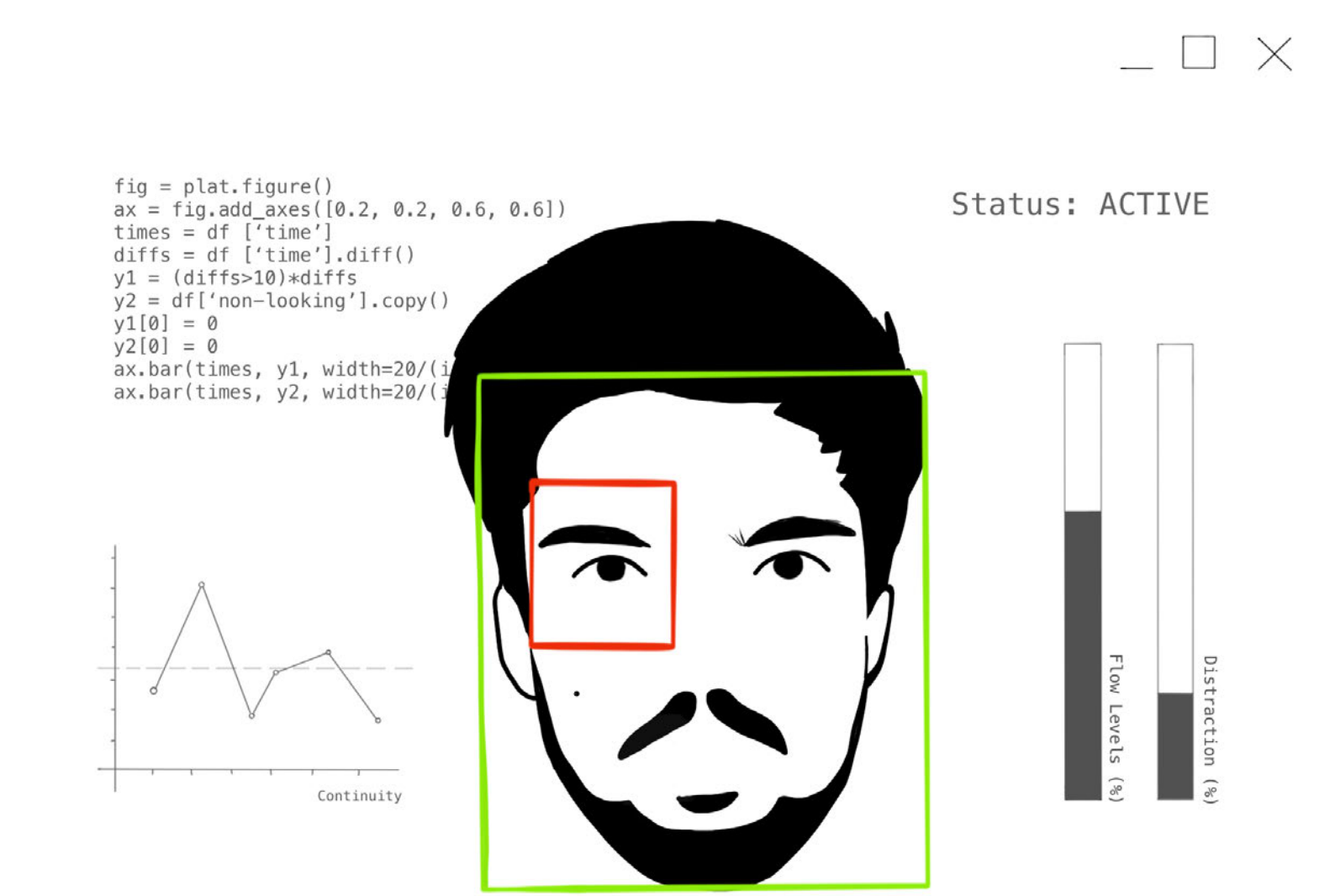

THE THEORY OF FLOW

Improving Human-Computer Interactions

Derek Lomas - Henk Crone - Michiel Knoppert

Simon Immerzeel

Special thanks to everyone who has helped me with the load of this project during the last months:

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Finally, to my parents, because it is thanks to them that I have made it this far.

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1.

THE START

Abstract

This project presents the study of flow (perfect focus) as a possible solution to the modern decrease in attention span, especially in young professionals. To solve this, an app was created, FlowTrain, which learns from the user's productivity patterns and advises on the ideal moments to work on tasks to maximize flow output. The result is integrated into the window UI and is focused around the creation of a conditioning ritual to reduce phone use and the limitation of distractors during working moments.

INTRODUCTION

THE COMPANY

Dell is an American multinational computer technology company that takes care of development, sales and repairs of computers and related services. Within Dell, Dell Experience Innovation (DEI) focuses on the development of new and innovative ideas, as well as their construction, within Dell's future vision to impact the growth of the industry. In doing so, DEI has found innovation in partnerships with big brands such as Alienware, Google and Nike.

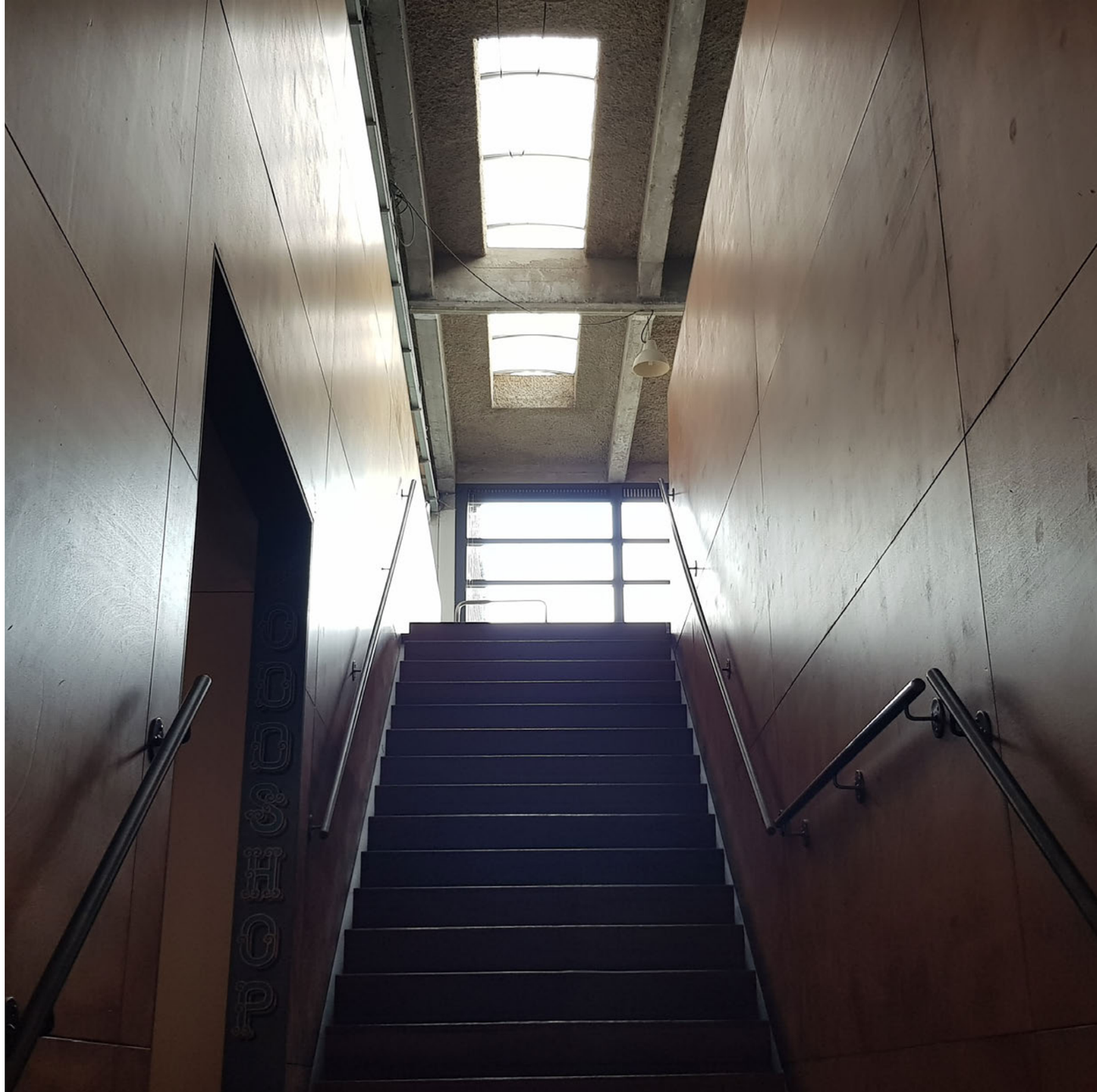
With its homebase in Austin, Texas, and 8 offices around the world, DEI consists of a multidisciplinary team whose focus is to gain better understanding of the trends that shape the world and how these can be applied to the technology scene with the new up-and-coming technologies. DEI Amsterdam is specialised in future-focused design and prototype development.

THE CHALLENGE

As initially stated by Michiel Knoppert, head of the DEI Amsterdam department: "Can we design computer interactions in such a way that they connect us to the world around us rather than isolate us. Can we make computers part of our everyday physical lives rather than locking us behind screens. Can they help put us back in touch with others. Can compute be healthier (less static, more diverse activities, less screen, etc)".

This was later re-stated as: "The aim is to address the problem we face today with the growth of mental health problems caused by an increase in technology use. Designing a system or product that prevents and/or treats technological health in the future (circa 2025)."

This is of course a vague starting point. To make it clearer, a first look into technology and mental health is needed. This will give a path through which a better understanding of the factors that influence mental health, productivity and abusive use of technology.



TECHNOLOGY IN HISTORY

Technology /tekˈnplədʒi/, early 17th century; stemming from the Greek tekhnologia 'systematic treatment', from tekhnē 'art, craft' and -logia 'study, interest' is defined as follows:

"Scientific knowledge used in practical ways in industry, for example in designing new machines"
(New Oxford American Dictionary, 2020)

According to this definition, technology starts with the first stone knife made by bashing a hard stone against flint, or with the mixing of berries to make finger paintings in caves around 73.000 thousand years ago. Since the start of humanity there has been an underlying consensus to improve our lives and facilitate everyday tasks when the opportunity or the idea arose. Fire, the wheel, forging, aqueducts, domes, concrete, the printing press, the steam engine, computers, paper clips... These are all applications of technology that have molded society into what we know today. Although the meaning of this word is extremely old, its use didn't start to become "mainstream" until 1860 when the Massachusetts Institute of Technology (MIT) used the term as title of its draft charter: "Objects and Plan of an Institute of Technology". This was later expanded during the second industrial revolution (1870).

Nevertheless, it isn't until the end of the 20th century that the impact of technology started to become apparent on our mental health. Mainly due to the introduction of new devices that allowed us to work from the comfort of our own homes, such as the Kenbak-1: the first personal computer released in 1971 ("Computer History Museum," n.d.). From this moment on, modern technology saw an exponential increase in use and capabilities. The introduction of the laptop (1981), the World Wide Web (1991) and the rise of the smartphone since the early 2000's, amongst others, start to paint the picture of the problems and benefits provided by technology in modern society. These inventions, together with the cultural and political situation of many countries have contributed to a rise in mental health disorders during the last couple of decades (Columbia University's Mailman School of Public Health, 2017).

According to modern technology users...

"In everyday context, technology is all related to the electric and mechanical sciences, and mechanical is even pushing it at the moment."

"We call technology everything related to the digital world, to electricity, to the Internet... technology, right?"

"Anything you don't immediately understand is technology"

"Technology is that which allows us to make things"

"Technology is anything which changes anything dramatically: experiences, processes..."

MENTAL HEALTH

"Emotional, behavioral, and social maturity or normality; the absence of a mental or behavioral disorder; a state of psychological well-being in which one has achieved a satisfactory integration of one's instinctual drives acceptable to both oneself and one's social milieu; an appropriate balance of love, work, and leisure pursuits." (Hazell, 2000)

There are three parts to the understanding of mental health. The first one relates to the neural connections of our brains, there is a genetic component to how prone a person is to develop a mental condition. The second one follows a cognitive pattern, through certain types of inputs during our youth, mental problems can develop later in our life. The third one is the day to day: an excessive use of our prefrontal cortex, amygdala and brain stem can lead to burnout, depression or chronic tiredness. It is a combination of these three that generate what we know as mental illnesses ("Mental Health Conditions | NAMI: National Alliance on Mental Illness", 2020)

According to the Journal of Abnormal Psychology (2019), more U.S. adolescents and young adults are suffering from mental illness now compared to the 2000's, depression (increase of 52% from 2007 to 2017), serious psychological distress in the 30 days prior between 2008 and 2017 (from 7.7 percent to 13.1 percent respectively) and suicidal thoughts or other suicide-related outcomes increased 47 percent from 2008 to 2017 (from 7.0 percent to 10.3 percent). Nevertheless, there is no significant increase in adults for the corresponding time periods, showing even a decline in mental stress after the age of 65 (Twenge J. et al., 2019).

It is important to note that this increase in mental health disorders, especially in the youth, could be due to an increase of help-seeking behaviour. Nevertheless, current reports state that not only has the amount of cases increased but also the severity levels (Hunt and Eisenberg, 2010).

Level	Adverse Factors	Protective Factors
Individual attributes	Low self-esteem	Self-esteem, confidence
	Cognitive/emotional immaturity	Ability to solve problems & manage stress or adversity
	Difficulties in communicating	Communication skills
	Medical illness, substance use	Physical health, fitness
Social circumstances	Loneliness, bereavement	Social support of family & friends
	Neglect, family conflict	Good parenting/family interaction
	Exposure to violence/abuse	Physical security & safety
	Low income & poverty	Economic security
	Difficulties or failure at school	Scholastic achievement
	Work stress, unemployment	Satisfaction & success at work
Environmental factors	Poor access to basic services	Equality of access to basic services
	Injustice & discrimination	Social justice, tolerance, integration
	Social & gender inequalities	Social & gender equality
	Exposure to war or disaster	Physical security & safety

Table 1: WHO risk factors for mental disorders

When referring to mental health, it is common to think of the resulting illnesses such as depression or suicidal thoughts. Those are usually the result of a cluster of problems that arise earlier such as low self-esteem, communicating difficulties, substance abuse and loneliness amongst others (see table 1).

For this particular project, and considering the client, the interest lays in the risk factors involving the use of technology such as smartphones, computers and smart wearable devices. This means that the focus will revolve around the risk factors one finds amongst technology users between 15 and 30 years old: attention deficit, anxiety and stress, decrease in social interactions, loneliness, tiredness and the loss of personal identity.

ATTENTION

"Attention (to something/somebody) the act of listening to, looking at or thinking about something/somebody carefully; interest that people show in somebody/something." Oxford Learner's Dictionary.

Attention depends on motivation and emotion. It is the selective focus towards a specific stimulus, filtering, rejecting and inhibiting unwanted information. It is an arousal. There are multiple types:

- **Focused attention**: ability to give a differentiated answer to specific sensorial stimuli.
- **Sustained attention**: ability to maintain a behavioral response through a repetitive and continued activity during a fixed period of time.
- **Alternating attention**: ability to change the focus of attention from one stimulus to another, displacing it between tasks that require different cognitive responses.
- **Selective attention**: Ability to maintain a specific response to a stimulus in spite of the presence of multiple distracting stimuli.
- **Divided Attention**: ability to respond simultaneously to multiple stimuli and/or demands during the performance of a task.
- **Exclusive Attention**: ability to attend to one stimulus while excluding another. Higher cognitive cost.

The current neuropsychological model presents the global theory of the working brain as a composition of three constant co-active processes described as: Attention system, Mnestic (memory) system and Cortical activation system. These systems are what generate what we understand today as "focus" (Lurija, 1997).

Out of the list presented before, the most interesting for this project are alternating attention, also known as "multitasking" and divided (simultaneous) attention. Especially with the first one, research shows that multitasking can greatly reduce the speed at which tasks are performed and increase the amount of mistakes (Farmer & Matlin, 2019). Attention is divided into different tasks and one has to switch focus quickly from one to the other to perform them. On the other hand, simultaneous attention involves uninterrupted attention to several activities occurring at the same time, generating a response to multiple stimuli. The latter is especially observed in indigenous communities and is an innate ability to keen observers (Posner, 1980).

PERSONAL IDENTITY

"Who or what someone or something is. The characteristics, feelings, or beliefs that distinguish people from others."
Oxford Learner's Dictionary.

The excessive use of technology has driven the development of "self" into a separate plain, developing what we call digital identities. It is through these that we start to compare our true self to the fictitious development of digital portrayals, inflicting lasting damage on the way we perceive ourselves and our surroundings. According to current research, social media appears to be reshaping the way college students develop a social identity and may be the leading cause of increase in mental problems during these years (Dalton & Crosby, 2013).

SOCIAL RELATIONS

"The way in which two or more people, groups or countries behave towards each other or deal with each other." (Relationship).
Oxford Learner's Dictionary.

There has been a drastic change in the way humans communicate due to a change in our cultural behaviour and new advances in technology. For most, technology has allowed us to stay in touch through long distances and difficult times, nevertheless, it has also allowed us to isolate ourselves under the pretext of being "connected".

This problem can be explained in two ways. The first one relates to intergenerational communication. Technology allows us to stay within our generational circle without increasing contact with the elders. This has a negative effect on the older population, generating a rise in elder loneliness. Secondly, it creates an excuse to avoid social contact. Where in the past there was no alternative to go out to buy your groceries, now everything can happen from the comfort of your own couch. It is important to address these new forms of communication as potential detrimental factors to society and come up with new ways of maintaining face-to-face contact (Antonucci, Ajrouch and Manalel, 2017).

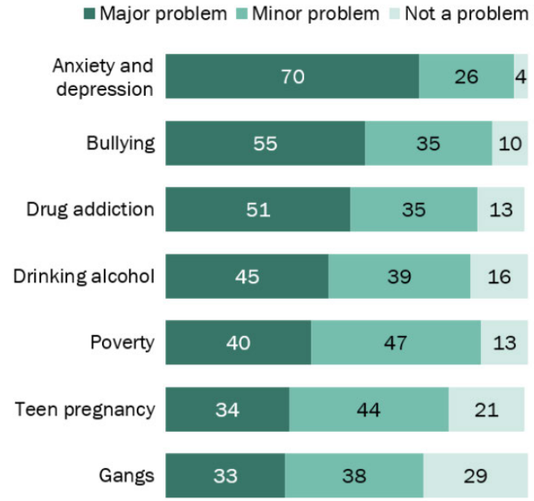
STRESS & ANXIETY

"Stress, pressure or worry caused by the problems in somebody's life."
"Anxiety, the state of feeling nervous or worried that something bad is going to happen." Oxford Learner's Dictionary.

It is not out of place to say that anxiety and stress have been more and more present in the media as one of the biggest problems new generations are facing. This is due to both an increase in the problem because of new socio political situations, future perspectives and the effect of technology on society as well as an increase in mental health awareness and help-seeking behaviour.
Since 2007, the release of the iPhone, there has been a visible increase in perceived stress, loneliness and decrease of social interactions. Since anxiety feeds on doubt, the public judgment of social media and the isolation from people and feelings has led a whole generation to deal with an increase in depression and chronic anxiety cases (Hendriksen, 2020). There is no solution at the moment to tackle this problem. Nevertheless, more and more information is being collected every day to better understand what leads to anxiety from a psychological perspective and which factors are leading the attack on the mental health of the world's youth (see Table 2).

Anxiety and depression top list of problems teens see among their peers

% of teens saying each of the following is a ____ among people their age in the community where they live



Note: Share of respondents who didn't offer an answer not shown.
Source: Survey of U.S. teens ages 13 to 17 conducted Sept. 17-Nov. 25, 2018.
"Most U.S. Teens See Anxiety and Depression as a Major Problem Among Their Peers"

PEW RESEARCH CENTER

Table 2: PEWRC, Anxiety and Depression analysis amongst teens

By Benjavisa Ruangvaree

TARGET GROUP

According to the research presented in chapter "Mental Health", the groups most affected by an increase in amount and severity of mental diseases are adolescents and young adults. This would set the range between 15 years old (end of hormonal development) and 30 years old (end of increasing neural connectivity). This is also the same range of "young professionals", people who are still learning the best ways to work efficiently within their professions.

This allows for two things: firstly, this range is the one that logs the most time on technological devices, secondly, it is also a malleable target group, as in, their work methodology is still being developed and may be more prone to use innovative devices to seek an effect on their mental well-being.

PERSONA

Name: Tommy

Age: 22 years old

Occupation: University student, Law

Marital Status: Single

Hobbies: Drawing, vlogging, photography.

Tommy spends on average 10 hours a day looking at screens, six for work and at least four on his phone. This time is spent endlessly scrolling through Instagram and Reddit and communicating through WhatsApp. He has a close group of friends but they barely see each other since they are all really busy with their studies. Although Tommy would like to see them more often, he is okay with talking to them on social media on a daily basis.

When working, Tommy feels time goes by extremely slow, he has to write reports, read endless texts and transcribe laws, this can sometimes be tedious and repetitive. He also has a side gig three times a week doing data input for his father's company.

On a normal day, once he lays in bed, Tommy feels tired and a bit unproductive, even if he did accomplish a bunch today, couldn't he have done more? - Isn't there a way to improve the way I go about my study and job to feel better about the time I put into it? - He asks himself.

TESTING PERCEPTION

THE AIM

In order to better understand what the public's perceptions are around current mental health concerns and the way people interact with technology on a daily basis, as well as finding the most relevant risk factors for mental health, a first test was set up. "This, together with an evaluative form and post-research interview allows for a selection process within the perceived risk factors, stress, loneliness, addictive behaviour, attention, tiredness and self-esteem, to create a path for future product development.

What impact does the user perceive due to the use of technology?

METHODOLOGY

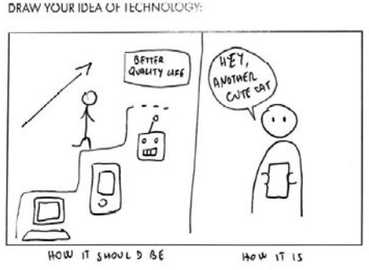
This test was divided in three stages. The first one was an initial round of open questions with multiple people to determine what people considered relevant in relationship with their own use of technology and their mental health. Based on this first step, a qualitative package was made (see Image 1). This package allowed for the users to log in their screen-watching time every day for a full week while also logging how they felt on that specific day. In total, 24 people participated in this test, on top of the 30 people that participated in the preliminary interview. The last stage was a post-research discussion with those available to further look into their logs and what made them choose for one factor and not another.

RESULTS

After all the booklets had been analyzed, there was one risk factor that remained consistent in all of the ones that spent their week working (not on vacation): attention decrease. During the days of increased screen viewing time, two things happened, the users reported feeling worse at the end when stress was high and they saw increased attention span problems consistently throughout their work week, especially during intensive screen usage days.

CONCLUSION

Although the formatting of the booklet did generate some confusion, most of the participants filled it in correctly. This allows for validation for the next step. Considering the fact that Dell is already interested in attention as a risk factor and that the perception of the common tech user also worries about it we can safely state that the upcoming point of focus for this project will be learning more about focus and how to influence it.



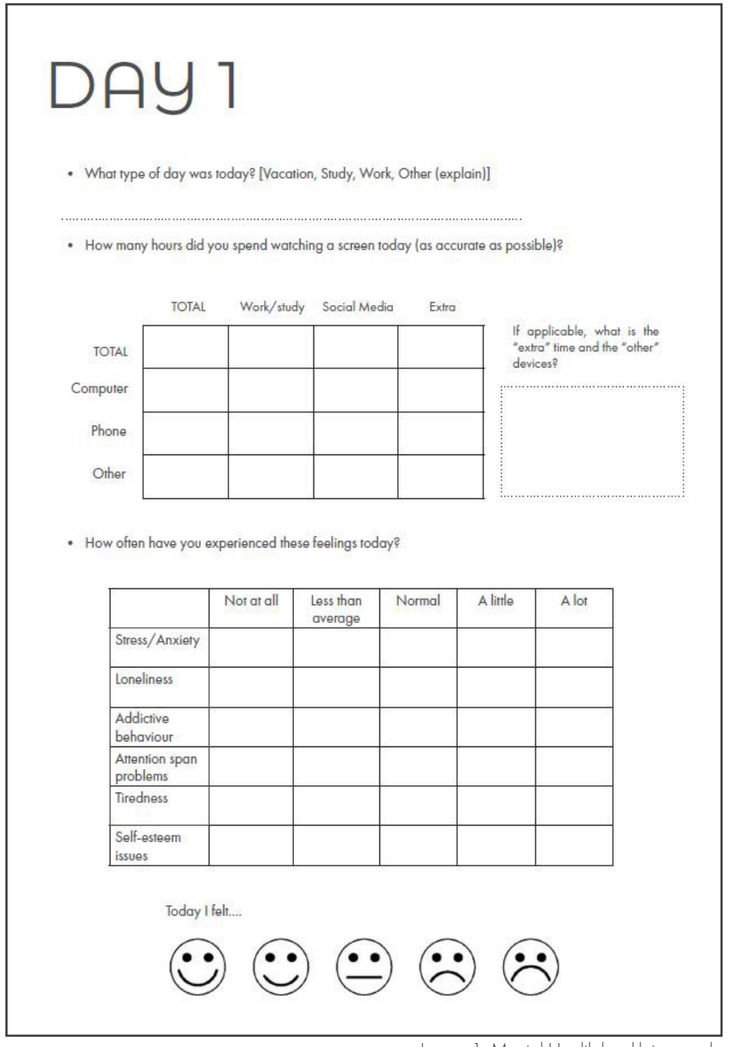


Image 1: Mental Health booklet example

HARMONY

"A state of peaceful existence and agreement"
(New Oxford American Dictionary, 2020)

The study of focus is not new, it is a derivation of the development of the inner "self", the search for harmony, according to history's biggest philosophers. In order to better understand the origins of this term, it was important to dive into the past of this particular concept and how it has evolved into what we know today as "mindfulness". This analysis set a base for later research into the development of attention.
In today's world, we commonly use "harmony" as the definition of a combination of chords or notes that generate a pleasant sound, a musical term. Nevertheless, this idea stems from the classical eras, its use can be traced back to the classical greek teachings and the eastern life philosophies. During the European Scientific Revolution, the term was coined by mathematicians to better understand the world of physics, defining the vibration and energy of the elements through oscillatory theory. Finally, the concept of harmony has been used as a synonym of "healthy" by the spiritual health world, which has given it a feeling of nonsensical value, diminishing the fact that this term has been used since 600 B.C.

CLASSIC GREECE

Although initially used to define the field of music, harmony was used by the early philosophers to reflect on the path to "Eudaimonia" (happiness or blessedness). Pythagoras first used the term in his early teachings (~520 B.C) to define the relations between numbers, oscillations and musical or geometric elements. He defined harmony as the "unification of a multifarious composition and the agreement of unlike spirits". Numeric harmony was applied in numerous fields to find balance and relations between separate elements, settling what would become the early Pythagorean school of thought (Vamvacas, Cohen, Gavroglu & Renn, 2009). This inspired another philosopher, Plato, drawing on the words from Socrates, to present his theory of the soul (~400 B.C.). In this theory, Plato introduces the idea of "psychic harmony" as the balance between three entities that govern our lives: the logos (logical mind), the thymos (emotion, spiritedness) and the eros (desire) (Jones, Wirth & Schwartz, 2010). This idea was later on developed by Aristotle to explain the nature of memories and dreams and their effect on the human mind, setting the heart as part of the basis of conduct).

THE EAST

Parallel to the classic greek philosophers, a similar school of thought started developing in the eastern culture. China, India and Japan all presented different takes on the same search of balance and harmony. In China, Lao Tzu (6th century B.C) presents the following of the "Dao" (the Way) as the path to perfection by becoming one with the unplanned rhythms of the universe, finding inner balance. This idea originated the philosophical school of Daoism, which would later be adapted by Confucius to present the ideal balance in harmony within society and not only oneself. This was afterwards represented with the dueling values of the Taijitu, the Yin and Yang.

EUROPE

Although the early concept of harmony in Europe can be traced back to the idea of *Musica Humana* (human music, the harmony between body and soul) in the 6th century B.C., (music theorist and philosopher Boethius), it wasn't until the 17th century A.C. that the concept started to take form with Descartes (1596-1650) and his dualistic position, where the body reacted to the different states of the soul, being able to alter a person's behaviour or temperament through the agency of the nerves (Palisca, 2007).
Robert Hooke (1635-1703) later postulated that the universe consists of differently sized particles in constant vibrational motion that either cohere at the same pitch frequency or repel each other due to different frequencies. Similarly, the human body also resonates with its environment. This leads to the theory of music pleasantness and harmonious congruence, *Musica Instrumentalis.* (Gouk, 2017)

FLOW

Within the concept of harmony, one term kept popping up as current use for the idea of absolute focus: perfect attention. Together with the client we decided to look into flow as the possible new direction of the project.

The state of flow is a mental singularity (Dietrich, 2004). It is an altered state of consciousness in which you exist in one single moment, the here and now. You lose the sense of self. This is due to a reduction of the higher cognitive functions, augmenting neural connectedness. This is not necessarily related to higher creative functions, but to the possibility of amplifying the brain's capability to extract itself from the moment and enter a state of deep focus (Csiksentmihaly, 1990).

The flow is comparable to a set of doors in our mind. These doors can only be found when we are not looking for them and will only open for those who create the ideal situation to access the other side. The way Csikszentmihalyi defines this idea is. From a practical point of view, the flow can be best perceived in those who have a specific performance score, such as professional athletes and e-sports fanatics, the final personal score shows the amount of "flow". Now true flow cannot yet be measured. The current theory relates flow to a specific mental state, and, therefore, a measurable brainwave.

"Flow is the way people describe their state of mind when consciousness is harmoniously ordered, and they want to pursue whatever they are doing for its own sake." (Csikszentmihalyi, 1990)

This begs the question. If we can see flow in sports, why shouldn't we be able to see it in the way we carry out our daily tasks? Wouldn't it be better to exploit the flow and train it to a point where we can reach the peak of productivity? The answer is easy, of course. Nevertheless, the tasks one performs while under pressure on a basketball course are not comparable to those we perform in front of a computer. Muscle memory can tell a professional to fake right and go left since the situation has been trained 10.000 times. Typing on a computer, although having muscle memory to correctly use the keyboard does not predict the next word or sentence, it is a reaction-free activity and therefore harder to evaluate.

So, how do we measure flow in work? If we agree upon the fact that the easiest way to see flow at the moment in sports is by looking at individual statistics and the actual game, why don't we do the same for work? If we choose a specific activity, let's say, typing, and measure the productivity outcome based on specific measurements we should be able to see if someone has a more or less productive day. Furthermore, we can add influencing factors to evaluate the user's response in their results such as visual or guided meditation, music or physical activity.

Now this is easier said than done. First of all, starting from the choice of typing as activity, an experiment has to be set to determine how people type (baseline) and then add influencing factors to try and find change.

LIMITS

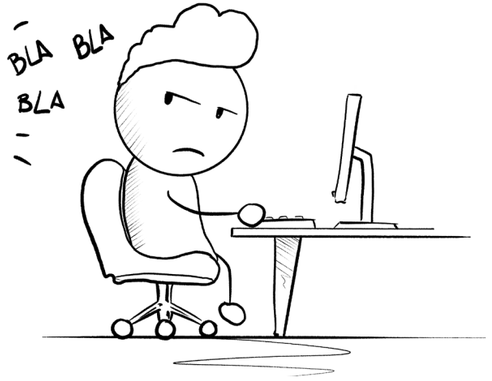
Flow is a very tricky state to measure. There is a myriad of factors influencing this state of mind. There is a set of conditions one has to check before even considering entering a state of flow. According to Mihaly Csikszentmihalyi, you are never going to find flow the first time you perform an activity, nor the second, nor the tenth. Getting into the zone requires you to activate the subconscious part of your brain, the very nature of this action requires you to not think about what you are doing, not trying. This leads to the second limiter: you can't enter the zone when you want to enter the zone, emphasis on "want". This is an active thought that activates the prefrontal cortex, the part of your brain that should be almost inactive in a state of flow. Finally, the environment and the time influence enormously your ability to fully focus (see Image 2).

INFLUENCERS

Certain techniques are used by professional athletes and flow-connaisseurs to improve their ability to enter this state. Music, visualization techniques, meditation, rituals, preparation of the environment... These are some of the best known ways to influence the finding of the gates of focus. Nevertheless, these have not been quantified due to the ethereal nature of flow. Is it possible to design and quantify an impact on focused productivity? This is further discussed in chapter ("Test 2").

DISTRACTORS

While there are ways to increase our probabilities of finding flow or the next best thing, there are many more ways to be kicked out of it. We can classify these in internal and external factors. The internal factors would relate to our physical state and our mental state: predisposition, tiredness, hunger, need to go to the bathroom... On the other hand, the external distractors are related to environment, external presence and sound, compliance of the tools in hand, music changes... It is in the second group that we may find the most impactful advice to improve the way people struggle to find flow.
Proper preparation, the right setting, the right music, telling your coworker Mike that you want to work for the next hour without interruptions, turning off notifications on your phone and many other things are consistent preparation factors to avoid distractors.



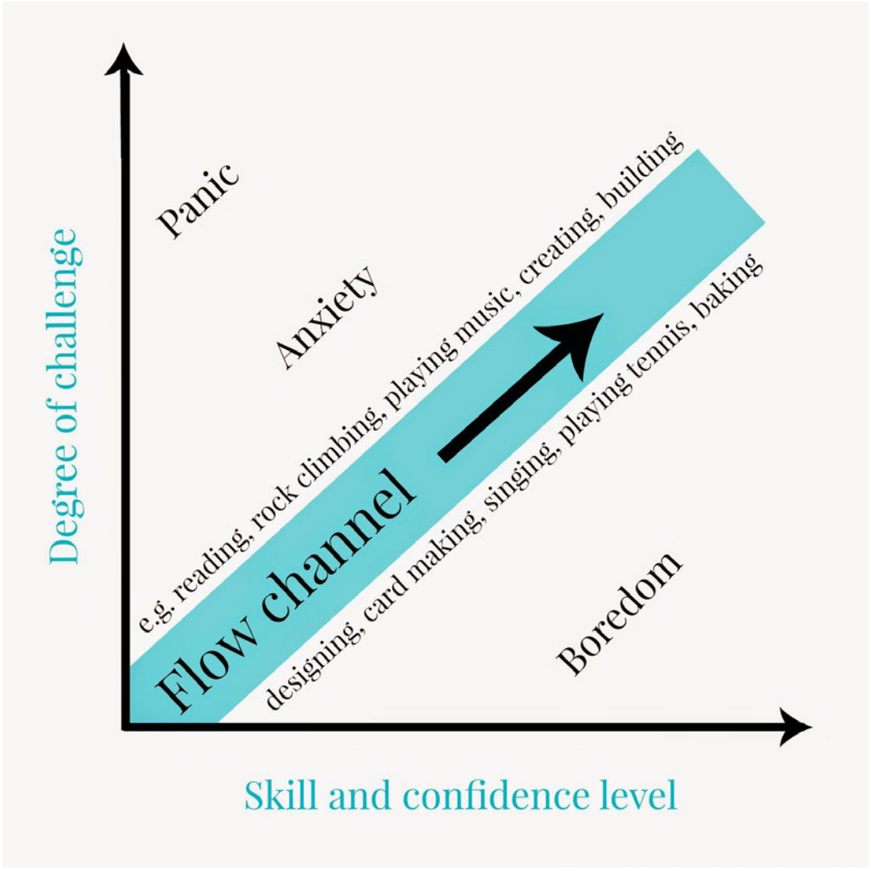


Image 2: Definition of Flow by Mihaly Csikszentmihalyi

2

TESTING

```
def log_bar_plot(df):
    fig = plt.figure()
    ax = fig.add_axes([0.2, 0.2, 0.6, 0.6])
    times = df['time']
    diffs = df['time'].diff() * 1000
    ax.plot(times, diffs, 'bo')

    plt.yscale('log')
    plt.title('Time between activity')
    plt.ylabel('time difference (ms)')
    plt.xlabel('time (s)')
    plt.xlim(0, info['time'] * 60)
    plt.savefig(CONTINUITY_GRAPH)
    plt.close()


def bar_plot(df):
    fig = plt.figure()
    ax = fig.add_axes([0.2, 0.2, 0.6, 0.6])
    times = df['time']
    diffs = df['time'].diff()
    y1 = (diffs > 10) * diffs
    y2 = df['non-looking'].copy()
    y1[0] = 0
    y2[0] = 0
    ax.bar(times, y1, width=20/(info['time'] * 60), color='b')
    ax.bar(times, y2, width=20/(info['time'] * 60), bottom=y1-y2, color='r')

    plt.title('Typing and looking stops')
    plt.ylabel('stop time (s)')
```

Now that the direction has been specified as the research of flow (perfect focus), a set of tests had to be conducted to see if it is a measurable value. Is it possible to tell if someone is productive when working on the computer? Can we give a value or score to focus? Are there additional elements in play which could be affecting the output of our work?

TEST 1 - JOURNALING

THE AIM

The aim of this study was to generate an information feedback loop to better understand the presence of influencers and distractors in relation with the flow. To do this, the activity of typing was chosen to set a computer related element in play and see how people interact with it and their environment while working. As typing goes, the test subjects were told to start journaling for five days, elements would be added to see their impact on this task.

METHODOLOGY

35 people between 20 and 30 years old were asked to participate in this experiment. Due to the ongoing quarantine situation and the overall mental situation of the population, only seven participated actively and five sent one-off results which were taken into account as base-measurement for the rest.

All of the participants were asked on the first day to journal for 20 minutes in a typing-timer website. They were given advice on how to best journal and told that what they typed didn't matter since it could not be recovered, they were also told to record themselves while typing (webcam). After the first day, half of the participants were asked to do five minutes of visual meditation (presented on the computer screen) before the start of the test.

RESULTS

The data gathered from this test resulted in two graphs and a video file. The first one (see graph 'Delta') shows the typing continuity, timing between keystrokes (ms). The second (see graph 'Typing Stops') filters out any typing break longer than three seconds. This can be then compared to the video file to see what was the cause of the break. The seven participants participated in this experiment for four days before it was interrupted.

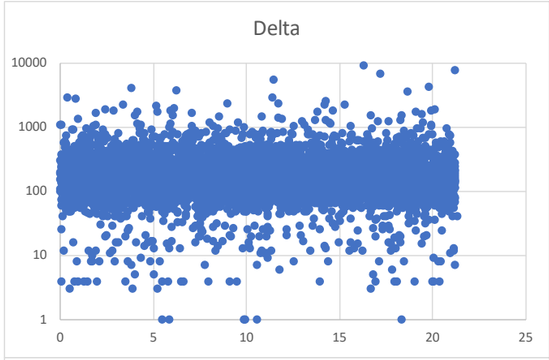
THE PROBLEM

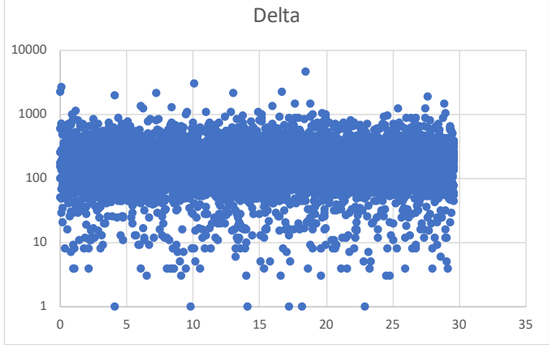
The reason this experiment was discontinued was because of the lack of impact any change in direction had. Adding influencing factors (meditation) or distractors (turning on phone sound) did not influence the results gathered in the graphs. All test subjects were able to maintain focus for 20 minutes while being recorded. Even those that showed discontinuities in Delta did so only to retype something or read something previously written. The only instances of distracting factors were computer notification (two instances) and repositioning due to bad posture (six instances). Meditating did not show any quantitative change in performance, although users reported feeling more at ease while typing.

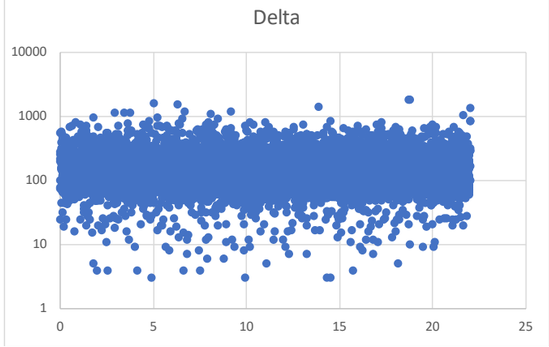
CONCLUSION

A new test has to be set up to study longer sessions of work, ideally in the background so people can focus on what they are doing.

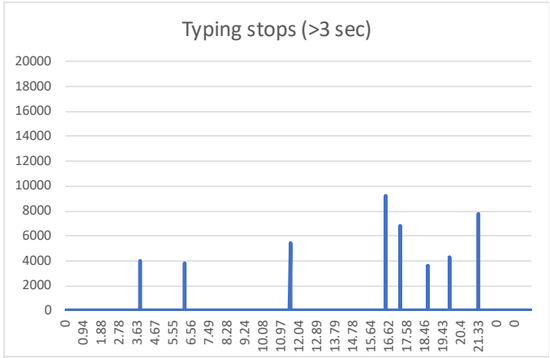
RESULTS ACROSS 3 DAYS FOR ONE SUBJECT



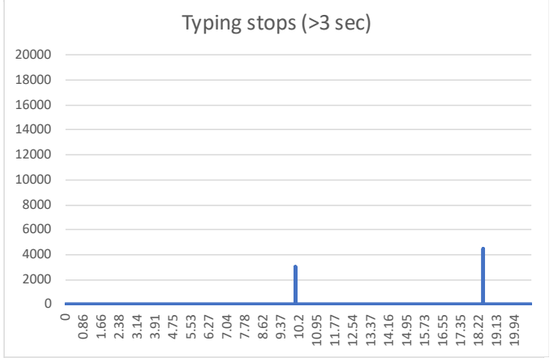




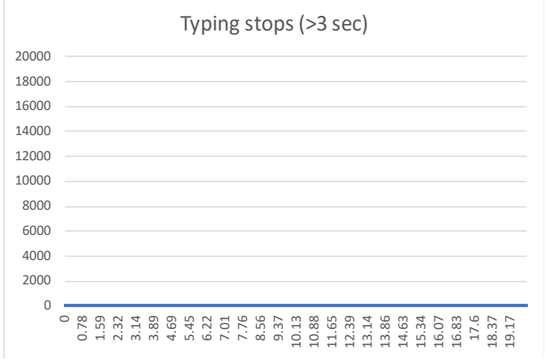
DAY 1



DAY 2



DAY 3



```
def log_bar_plot(df):
    fig = plt.figure()
    ax = fig.add_axes([0.2, 0.2, 0.6, 0.6])
    times = df['time']
    diffs = df['time'].diff() * 1000
    ax.plot(times, diffs, 'bo')

    plt.yscale('log')
    plt.title('Time between activity')
    plt.ylabel('time difference (ms)')
    plt.xlabel('time (s)')
    plt.xlim(0, info['time'] * 60)
    plt.savefig(CONTINUITY_GRAPH)
    plt.close()


def bar_plot(df):
    fig = plt.figure()
    ax = fig.add_axes([0.2, 0.2, 0.6, 0.6])
    times = df['time']
    diffs = df['time'].diff()
    y1 = (diffs > 10) * diffs
    y2 = df['non-looking'].copy()
    y1[0] = 0
    y2[0] = 0
    ax.bar(times, y1, width=20/(info['time'] * 60), color='b')
    ax.bar(times, y2, width=20/(info['time'] * 60), bottom=y1-y2, color='r')

    plt.title('Typing and looking stops')
    plt.ylabel('stop time (s)')
    plt.xlabel('time (s)')
    plt.xlim(0, info['time'] * 60)
    ax.legend(labels=['Typing stops > {} s'.format(MAX_COMBO),
                      'Looking stops > {} s'.format(MAX_EYE_COMBO)])
    plt.savefig(STOPS_FILE)
    plt.close()


def window_list(df):
    w_df = pd.DataFrame(columns=('start', 'end', 'window'))
    diffs = df['time'].diff()
    for row in df.index[1:]:
        if diffs[row] - df.loc[row, 'non-looking'] > MIN_READING_TIME:
            w_df.loc[w_df.shape[0]] = [df.loc[row-1, 'time'], df.loc[row, 'time'], df.loc[row, 'window'
    w_df.to_csv(WINDOWS_FILE, index=False, header=True)


def get_initial_info():
    info['name'] = input('What is your name?: ')
    info['age'] = eval(input('What is your age?: '))
```

TEST 2 - SELF-PACED STUDY

THE AIM

Much like Test 1, the aim of this study was to generate an information feedback loop to better understand the presence of influencers and distractors in relation with the flow. The main difference being the amount and type of information gathered to reach such conclusions.

THE CODE

To be able to test everything a code had to be written that performed the background activities and data analysis to gather the needed information. In essence, this code was meant to be an improved version of the typing timer used in Test 1, it would count time in between keystrokes and calculate continuity and stops automatically, while breaking the limit of the website and working on the background, allowing the users to work on whatever they needed to do. Furthermore, the opportunity arose to add an eye-tracker to the code as well as a tab-tracker, which allowed for more complex data to be assembled.

The code was written in Python, despite my knowledge of coding in general, my knowledge of this particular language was basic. Therefore, additional help from Marc Asenjo (IT graduate, MST) was needed to build the code. The reason why python was chosen above a language I could work on best is its malleability and the possibility of using pre existing libraries to implement things such as the eye-tracker. These elements would have to be coded from scratch if, let's say, C++ had been used.

As of this moment (15th of July 2020) the code consists of 330 lines divided in three elements: variable declaration, functions and libraries (declaration). The variables allow for specific things to be measured, such as time, typing speed, eye-presence and activity amongst others. The functions create the data for the graphs and final data-dump, as well as controlling the end conditions of the program. Finally the libraries allow for the executable to function as well as the camera add-ons for the eye-presence-tracking (not the same as sight-tracking).

THE RETURN

The results of this program are similar to the ones from Test 1. Two graphs, the first one plots typing speed (continuity) and the second one presents the stops. Nevertheless, considering the fact that work sessions can be as long as one wants, the filter has been raised to typing stops of 10 seconds. On top of that an additional marker has been added to mark whenever the user looks away from the screen for more than five seconds after not typing for 15. This generates three states of focus (or work): fully active, looking at the screen and typing, semi-active, reading from the screen without typing and inactive, looking away from the screen (or away). On top of this, the user can notify his starting state of mind as well as the desired length of the work session (active camera time). At the end of the session, additional short questions are asked to determine the changes in perception of their mental state as well as if they did or did not feel they achieved a state of flow.

METHODOLOGY

Five people used this program for two months on and off. On top of that I (the designer), have been experimenting it on myself while writing this report. The software was mainly used to record long writing sessions but it has also tracked coding, statistical analysis and even drawing. The subjects were asked to use the program as often as possible with weekly reminders and check-ups for constants in their work-flow (distractors). They had full control over the results and did not have to share the recordings. They were also briefed on how to read the data provided by the software since it has not been made user-friendly yet.

RESULTS

As mentioned before, the program returns a series of graphs analyzing gaze, activity and tab activity as well as subjective answers to evaluative questions post-work. After two months, over 100 hours of recording had been made amongst all the subjects (me included). This information was evaluated by the subject that had produced it and the important findings related to distractors and self-improvement were relayed back.

The main points to look at are the continuity graph and the gaze activity graph. This, combined with the tab activity and a subjective analysis of the actions taken can lead to an accurate read of the productive time spent in front of the computer

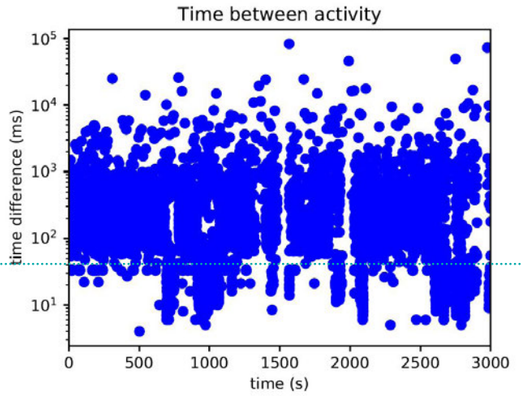
ANALYSIS

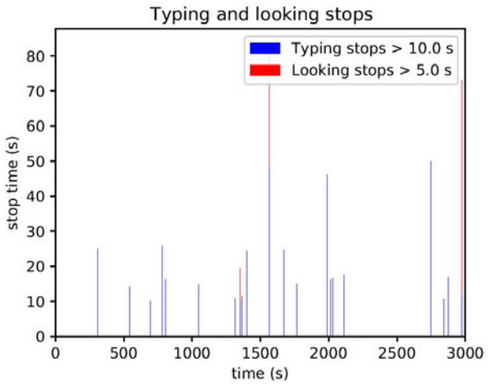
The first sessions revealed that this software is capable of reading focused attention and discerning ideal work moments in a day based on the resulting graphs on activity and gaze analysis. An example of this can be seen on the right, the morning and night graphs for continuity and gaze are compared to see that there are less breaks during the night session, as well as a big reduction in gaze separation.

Two additional elements can be discussed as points of interest for future analysis. The retraction rate and the natural disattention rhythm. There is a fictional line in both continuity graphs that marks the natural separation between two keystrokes. All the points beneath this line indicate a key remained pressed for multiple character instances (backspace). The data showed that an increase in subjective productivity during a work session translated into a reduced amount of the backspace key, there was more determination when writing. This can also be seen in between the examples on the right: the night session shows a reduction in backspace use once a rhythm has been found while the morning session (less productive) remains constant. The second point is the natural work rhythms. People have a tendency to feel a dip in motivation after 30-40 minutes of work (as can be seen on the right). Further experimentation would be needed to determine the impact of these rhythms on flow and to see if there is a way to avoid their effect.

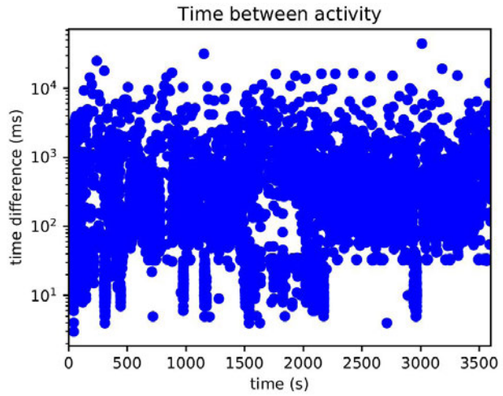
RESULTS FOR ONE DAY OF ONE SUBJECT

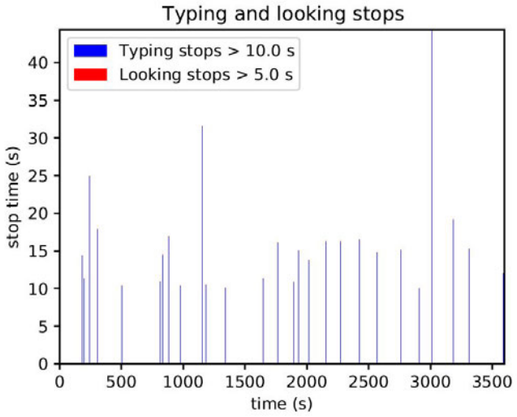
Morning





Night





3.

EARLY DESIGN

This phase of the project focused around the conceptualization of a design that would tackle the problem: how do we increase flow? To do this, different design methods were used to come to a final idea together with the client. The Blocker is a system that works together with the software to learn from the user's work patterns and suggest flow moments (flow blocks) to increase efficiency and productivity.

WHAT DO WE KNOW?

The stage is set. This is a complicated topic with a lot of factors that are constantly switching depending on the variables that surround the nature of the work we are trying to perform. It is important to know which things are going to be taken at face value and which are going to be simplified in order to make the right decisions for the client. Although there are plenty of elements that will be researched further if needed, some early assumptions can be made.

Thanks to Test 2, we now know there is a way to measure productivity in front of a computer. Furthermore, if an AI software was developed we could quantify Flow states and implement a learning methodology to reinforce them. It is however unclear if any specific visual or meditative aid (see chapter harmony) is more helpful than another to facilitate focus. This is because the preferences switch between users; some prefer music and others prefer silence, some like to work in public spaces and others need a silent room. There are however some constants that can be taken into account as a simplification of reinforcement methodologies, even if we can't be 100% certain of their efficiency in a wide spectrum of consumers.

- Limiting the topic and time of a task helps with focus
- Working for blocks of two hours (max) is healthy.
- Eliminating distractors helps the user to maintain focus for longer periods of time (mainly calls, emails and phone notifications. Pop-ups.)
- The user has to want to do the task, otherwise there can't be flow.
- The user must have a certain level of expertise with the task at hand.
- Productivity/focus can be measured.
- The most effective way to train Flow is through information, if the user learns about his/her work patterns, flow may be more easily induced.

Based on this, early ideas can be put on paper to better determine, together with the client, what the direction of the resulting design should be.

EARLY DESIGN

Once the scene was set and a basic understanding of flow had been acquired, it was time to start designing. The first step in every great design is to find references. An analysis of the existing products related to flow (in some way or another) was made to get an idea of different impact possibilities. Amongst these, there are three that are worth mentioning:

- Mindset : a headphone developed as a kickstarter initiative that was meant to be able to read the EEG frequencies in your brain to reflect your state of focus while you worked, improving flow training. Although the idea is original, the product never took off due to a lack of consumer support and product malfunctions. This product is no longer for sale.

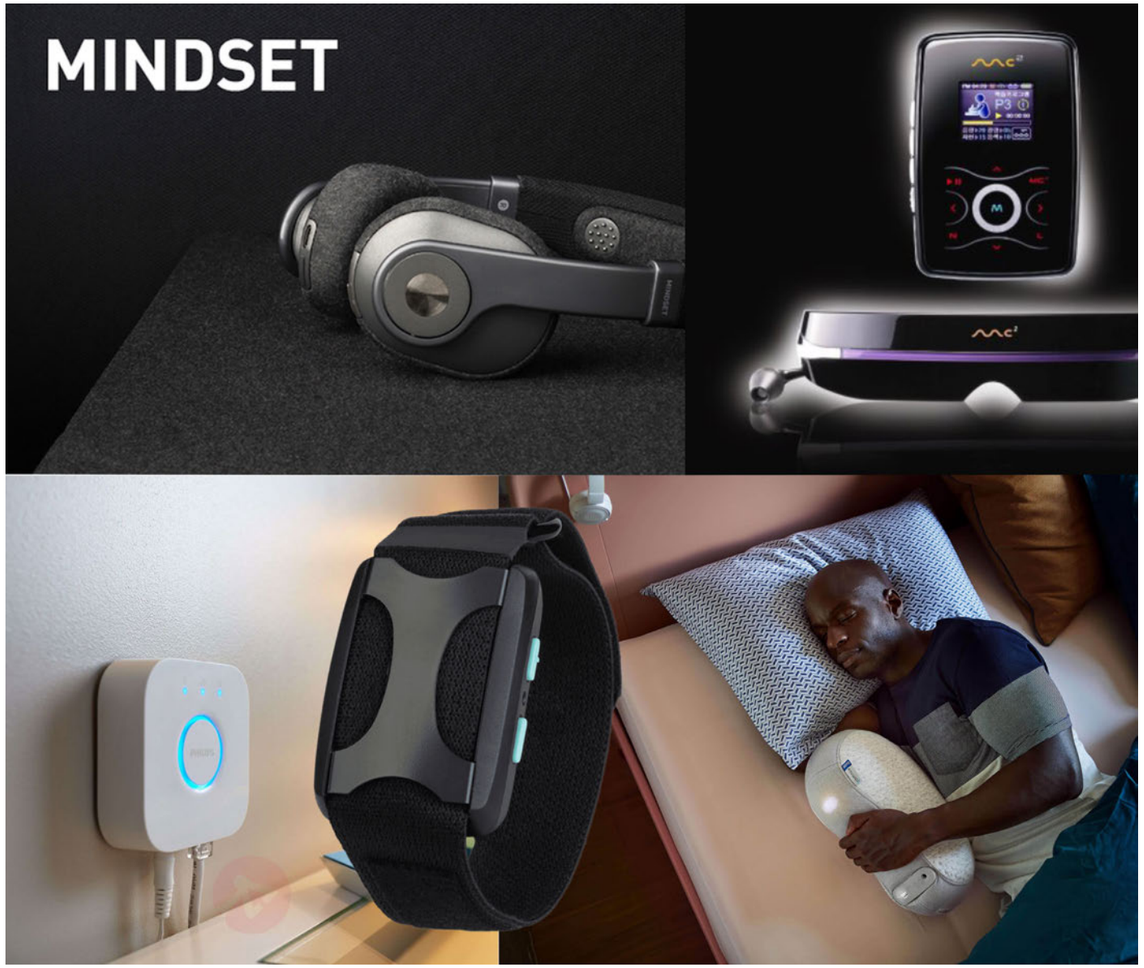
- Philips HUE: the well known brand of smart LED lights is not a direct contender in the race of flow. Nevertheless, it did attract my attention because of its high personalization rate and the additional use for focus increase. Giving the user the ability to set the tone for a work session is extremely important for the correct development of flow.

- Somnox: this i robot aims to improve sleep by tracking patterns and generating influence pulses at specific times during the night. It is a mixture of data analysis and physical support which leads to the 'training" of sleep.

These products give us a glimpse into the possible outcomes of this project. The mix of positive reinforcement, measurement and training show very efficient results in the field of focus. These serve as a reference for future applications of flow creating products. While keeping this product in mind, the next step is to sketch out possible product ideas to create a feeling of direction and come to an agreement with the client for future steps.

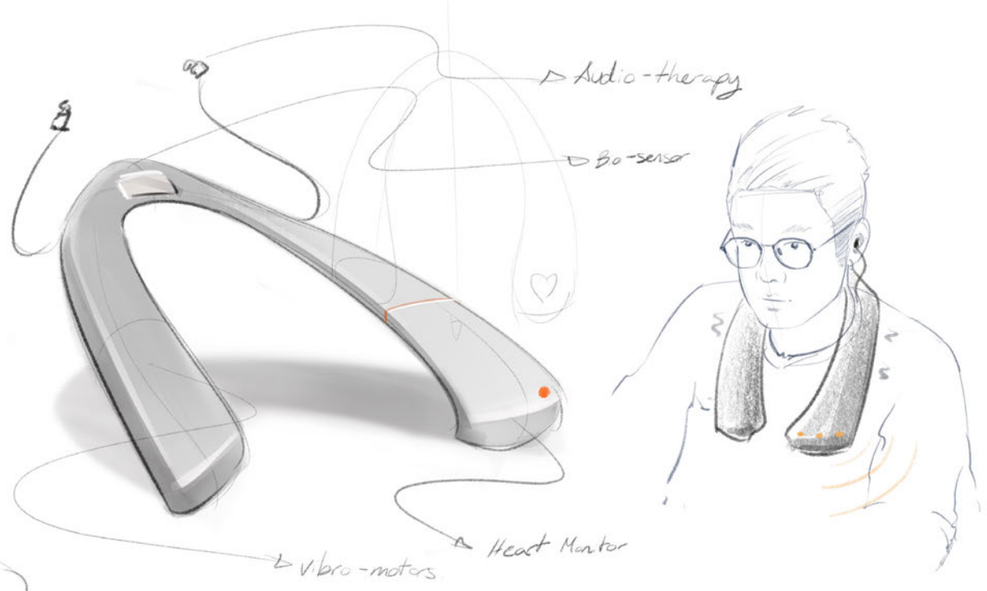
This process started with a brainstorming session through which many different ideas are put onto paper (see next pages). These were then filtered and improved to create a set of ideas through which value propositions could be discovered. These preliminary ideas show a wide range of products focusing on the influence on the user's mind in order to improve flow. The main point of focus for these was modifying the setting, modifying the state of mind and/or reflecting the user's performance for improvement.

Four ideas were shown to the client to gain a direction for the next steps: the necklace, robocop, saloon and stone (it is important to name the ideas to improve communication with the different parties). The aim here was to be creative and avoid limiting the possibilities of products that could be categorised as "within the box".



THE NECKLACE

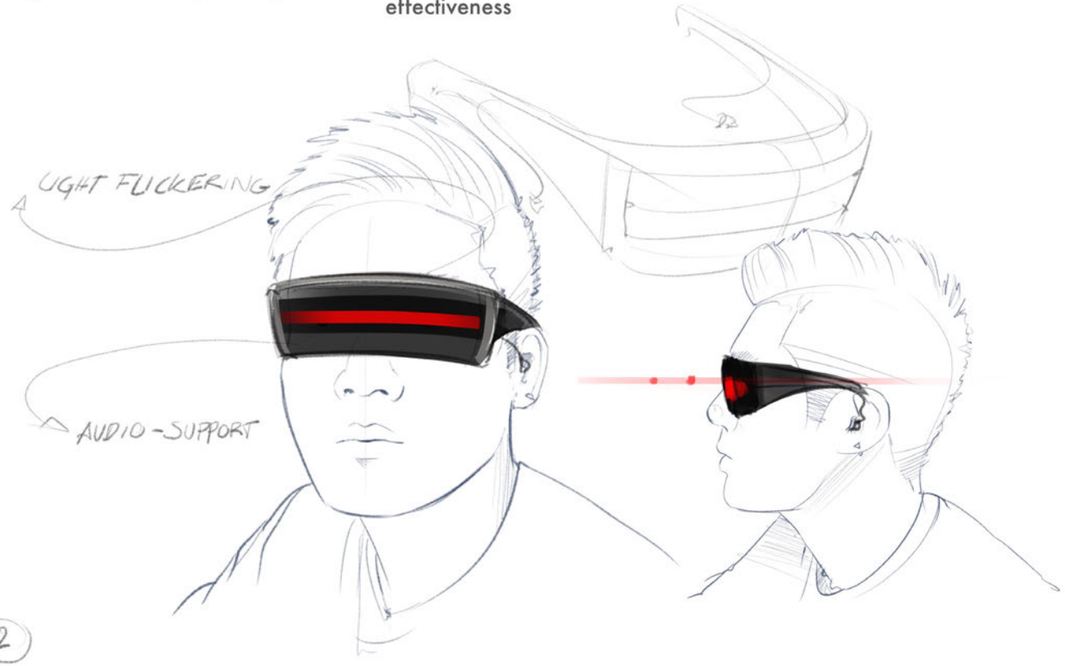
Wearable smart device that tracks and influences heartbeat rhythms to induce calmness and improve focus



1

ROBOCOP

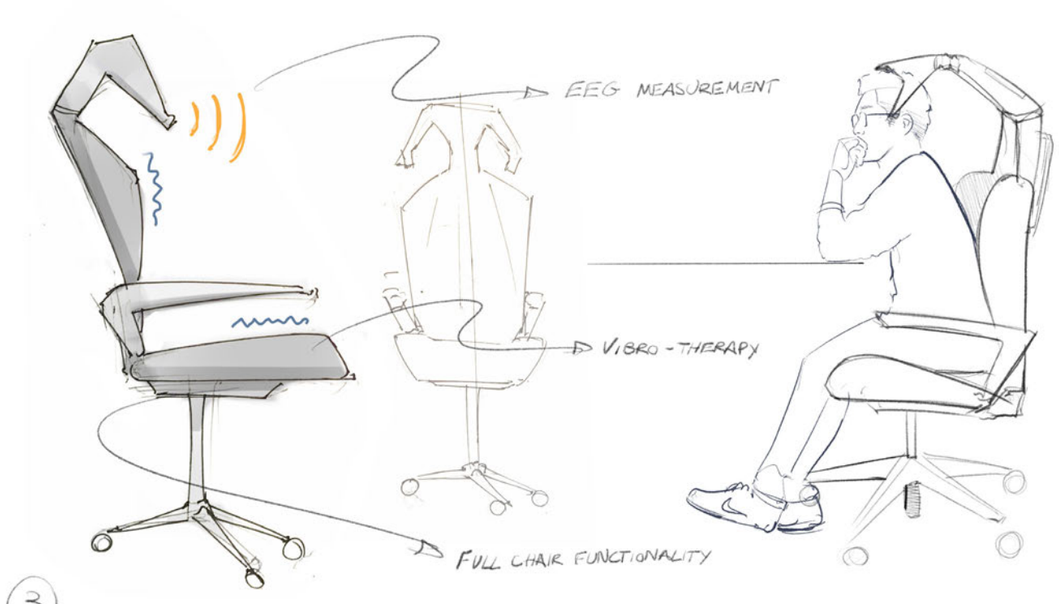
Light therapy to induce specific states of mind during a "working" window of time. Addition of sound therapy to increase effectiveness



2

SALOON

Office chair that r mental state and reacts accordingly to ensure optimum work-performance.



3

STONE

A paperweight product that displays your emotional state to train the mind to better react to stress and improve focus

4

VALUE PROPOSITIONS & DECISIONS

To better determine a direction for the design and analyze possible wants and needs of the consumer, a series of value propositions were created. To do this, the value proposition canvas was used together with the business canvas and additional advice taken from TU Delft SPD (Strategic Product Design) master students (Javier Poves & Joris Schouten). These were then filtered and illustrated to further discuss with the client which steps would have to be taken to further develop the product and make a final decision on the relation between the different elements (physical and virtual). These value propositions were an extension of the first selection of ideas with a further exploration on consumer needs and expectations.

Image 3: Minimalistic Daily Routine

There are four critical moments in the work process of the selected persona (see image 3). Morning ritual and preparation (1), focused work (2), focus loss due to tiredness or distractors (3) and the break (4), the last one being variable but needed. From a Flow perspective, the resulting product should focus on improving points 2 & 3 while reinforcing the need for 1 & 4.

From this, four categories were created which illustrate the possible paths to take for the final design: environment, analysis, mindfulness (or personal improvement) and work-aid. The environment influence product focuses on the alteration of the environment while working to facilitate the access to flow in any situation.

The second category would be the analysis, in other words, the "dashboard-like" representation of your performance while you work. This category had peaked the interest of the client in previous meetings and therefore was held in high consideration. It revolves around the idea of performance reflection to induce a sense of self-improvement by means of rewards and progress elements. These are meant to keep the user engaged in his task and evaluate actions taken in front of the computer. This would also take this project towards a UI/UX design field to further analyze how the data would be displayed and how the user would interact with it.

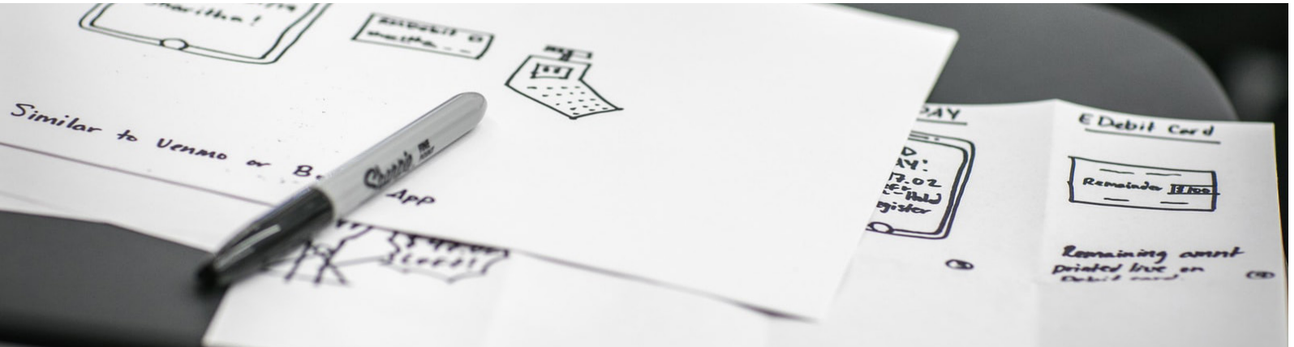
Thirdly, another direction to focus on was the improvement of the "self" by paying special attention to the elements that bring mindfulness to the user. These would improve his/her mental state and prepare them for an increase of flow-filled work sessions. This possible path of design can be perceived as a supporting role for one of the other three as there is a big possibility that any product created within one or more of the other categories will have the need for a ritual or mindful process to improve flow. Because of this, a list was made containing the most relevant methods to enforce and stimulate flow (see chapter "Flow Library"). This will then serve as additional tools for the design of the final selected path.

Finally, the last category would be the "secretary" or work-aid. Inspired by the comments of the client, this path focuses on the control of the distractors (mainly virtual media) to allow for an ideal situation to enter flow. This means control over ideal work times (or work-blocks) and access to distractors such as pop-ups, calls, notifications... Most of which should be regulated to avoid exiting Flow inadvertently. Metaphorically, this would work around the idea of "everyone deserves a secretary", a third party whose job is to make things as easy as possible for the user and regulate the ideal moments to maximize potential.

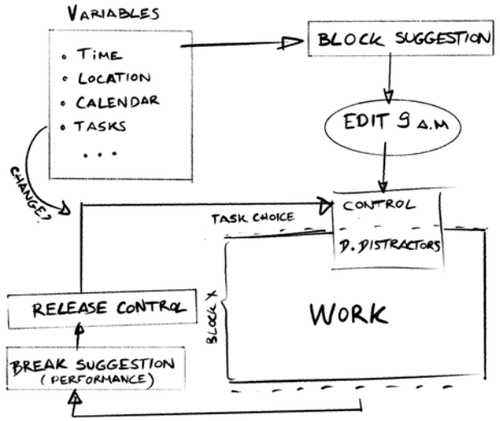
These four paths were discussed extensively with the client and developed into a series of possible products that better fit the value propositions and the interest shown by DELL based on previous ideas. These were then taken into consideration in a brainstorm session that would determine the next steps to follow.

The main points to take into consideration were the following:

- The client was particularly interested in the quantification of Flow as a minimum value result for this project. What was described as "the Dashboard". This would be an extension of the software designed for Test 2.
- Controlling distractors should be an option open for the user since the variables of working location and setting are too dependant on the user.
- Physical or virtual, the product should minimize the actions needed by the user to enter the Flow, it should be unobtrusive.
- The product should incorporate stimuli to reinforce a state of Flow.
- The product should be of technological nature to better fit DELL's portfolio.



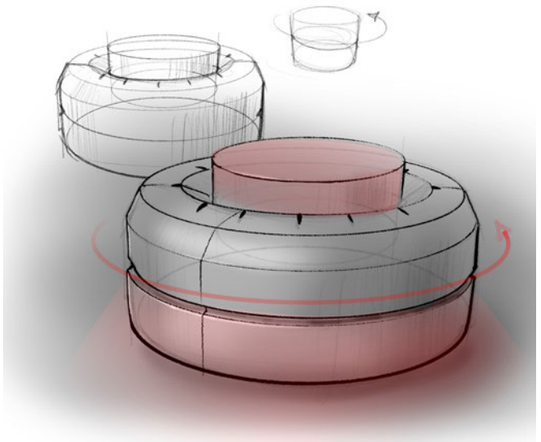
The Blocker



These considerations, together with the client's decisions, lead to the selection of the following ideas as leads for the next steps of the project. The first and main one was a derivation of the work-idea category: the Blocker (see image above). A system that regulates work-blocks in the day, based on calendar and planning, to ensure ideal work situations for flow creation. This product would learn from the user through use and actively suggest moments to fulfill due tasks. During the performance of the tasks, an improved version of the software designed for "Test 2" would be used to evaluate productivity levels and support the product to detect ideal flow moments and settings as well as block incoming distractors. This product would be virtual (application) and would have the possibility of including an external physical product to further support the flow method.

What would this physical product look like? Based on the methodologies analised in the "Flow Library", a device could be created to support the program and facilitate the creation of a ritual. A possible solution for this would be the "Tomato" (see image below). In essence, it is a glorified egg-timer based on the idea of the pomodoro method. Nevertheless, additional features could be added such as environment awareness for distractors (avoiding conversations with other people when in Flow) and avoiding the need for a device (such as the telephone) which is a distractor in itself. This initial idea has a turn timer and a big red button to state that one wants to enter flow. Decisiveness. A LED ring indicates the state of flow of the user. At this stage, the focus will remain with the Blocker, nevertheless, adding a physical product could be a possibility down the line.

The Tomato



FLOW LIBRARY

As part of the client's wishes, as well as of general interest for future application in this project, a list of every documented flow stimuli was compiled and categorised. This list classifies the different ways a design could influence the user into entering a more ideal state of mind to access flow, either through a specific method or by using a tool.

MEDITATIVE

- Visual: meditation through the use of guiding videos or images.
- Auditive: meditation with support of a coach or guru (headspace style)
- Personal "Self": user determined, voluntary, meditation

RHYTHMIC

- Light: variable light frequencies and patterns to induce specific mental states
- Sound: specific pitches and tone frequencies to induce specific mental states
- Vibro-tactile: specific vibration frequencies to support the creation of haptic feedback and mental calmness.
- Resonance-profiling: documentation of brain response to different frequencies of stimulation

METHODOLOGIC

- Firewall: reduction of incoming distractors to facilitate focus
- Pomodoro: technique to improve focus by splitting work into timed 20 minutes blocks.
- Flowtime: record working times to self-evaluate and improve working times
- Natural rhythms: the application of natural work rhythms (blocks of 1.5h) to maximize work output and efficiency
- Engagement: change in the variables of the job to modify the challenge to increase engagement

ENVIRONMENTAL

- Ritual: implementation of a ritualistic experience to train the access to flow
- Location: modifications to the location where the work takes place to maximize flow output
- Group-Flow: the interaction with other people performing the same task can improve the ability to access flow
- Tools: changing the tools can disrupt the comfort-zone, increasing the challenge and allowing for a new opportunity to enter the flow.

FLOW METHOD

The most efficient way to access flow without tapping directly into the user's brain is to train our brains into developing an easier entrance to flow. Meditation and mindfulness have proven to be an efficient way to improve cognitive output and focus through an increase in grey-matter connections (Last, Tufts & Auger, 2017); this is of course after months of repetition. Since we cannot expect the users to meditate for 15 minutes every day, the best next thing is to extract the value out of meditation and apply it to everyday tasks. Meditation is the action that leads to the development of a conscious mind, the understanding of our own thoughts. It is fairly simple on paper: focus on one thing at a time, if you lose focus, realize that something made you lose it and recover it. That's it. What if we applied the same principle to work in order to maximize flow? Since flow is a state of absolute focus, we can assume that training our focus will make us more susceptible to enter a flow state of mind.

To do this we can follow a simple method any time we want to get work done:

- You have time to work and you know what you want to work on. Think about what you want to achieve in the time that you have.
- Set a timer (15-120 minutes) and set a clear goal for the selected amount of time (ex. I want to write the introduction of my report).
- Start the timer and turn your phone so the screen faces downwards
- Focus on your work. If you feel you are losing focus do not worry, it is normal. Just stand up, take 5 deep breaths, sit down and continue with your work.
- Once the time is over, reflect about what you have accomplished to see if adjustments are needed in terms of goal or time setting.
- Take a quick break and repeat the process

PRODUCT DEVELOPMENT RESEARCH

COMPETITION

The idea of a task planner, motivator and timer is definitely not new. Although the Blocker has a lot of additional features (added deep learning mechanism), when comparing it into the existing market, there are a couple of companies that could be considered "competitors". Firstly, the meditation apps. These are meant to improve the user's mental state to achieve inner harmony. The most well know ones at the moment (15th of July, 2020) are Calm and Headspace. Both subscription based products with upwards of 30 million downloads and 1 million paying users.

Secondly, there are task planning apps and organizers. The best known products in this category are Todoist (third party task extractor), Trello (task organizer), and Google Tasks. These apps offer slightly different services revolving around the same principle: helping the user organize their life.

HEADSPACE

Calm

Trello

todoist

These two categories mark a base for the aim of this project. After the decision was made to further develop the design of the Blocker (especially the app form), it was important to determine which elements would set it apart in a market saturated with "self-development" applications. The added value, compared to the apps mentioned before, is found in the personalized approach thanks to the underlying software, active while we work, developed for Test 2. If there is one element that none of these apps have is the ability to measure productivity.

Some of them can be linked to health apps or devices such as smart watches to better link the personal development to a physical state (sleep, stress...). Although this element could be added to the Blocker, further down the line, the main measurement capabilities for this product revolve around the use of the computer and the interaction with the user. By maintaining focus on the interactive and measuring part of the Blocker we can ensure the creation of a personal value to the app which will distinguish it from the competition.

Finally, considering the current state of the market and DELL's approach to the creation of software, the Blocker could become one of two options: a standalone piece of software, subscription based and independent from any hardware or an integrated element in a new DELL product (such as the Tomato). More research should be conducted before making a final statement on this decision.

CREATING A HABIT

"Something that you do often and regularly, sometimes without knowing that you are doing it." (Cambridge Dictionary, 2020)

We're creating a habit. The goal is to make a system that learns from the user by means of repetition, displaying performance and encouraging improvement. As discussed previously, flow is a matter of practice. The goal is to create voluntary, high-frequency engagement. To do this, the Hook Model was used, as presented in the book "Hooked: How to Build Habit Forming Products" by Nir Eyal, this model focuses on the creation of customer habits to encourage product use.

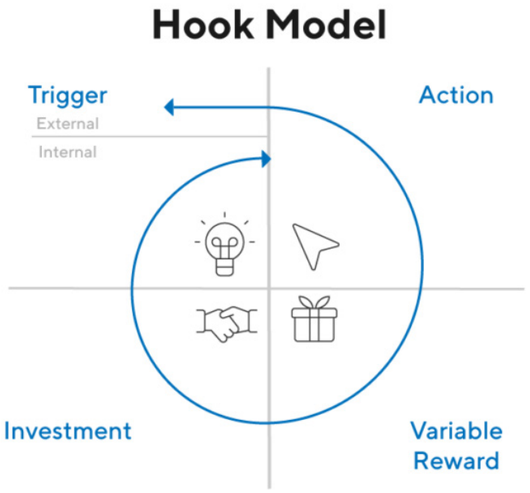


Image 4: The Hook Model by Nir Eyal

This model presents four stages (see image 4): the Trigger (1), the Action (2), the Variable Reward (3) and the Investment (4). The Trigger represents the need, either internal or external from the user to engage in the desired activity. In our case, the cue to engage in Flow. The Action, on the other hand, represents a specific behaviour executed by the user in anticipation of a reward (this is what initiates a ritual). Thirdly, the Variable Reward is the solution to the need of the user because action has been taken. In this case, the most likely type of reward will be the "Reward of the Self": personal gratification in the form of self-realization (Eyal, 2019). Finally, the investment is what improves the product in the future. Variable design will maintain the interest of the user to come back for more.

If this model is applied to the idea of the "Blocker", taking into consideration that the main source of habit-forming potential would come from UI/UX design, these stages will be mainly visual with the exception of the action, which has to be physical (pressing a button, changing the state of the product, moving a component...). The questions that will lead to a better habit will be: What's the internal trigger (i.e., what customers want or need)? What's the action? What's the reward? How do you increase customer engagement with the product in the future? The application of this system is further discussed in chapter "First Iterations - Results" where the habit is formed by means of iterative design and user testing.

GAMIFICATION

"The practice of making activities more like games in order to make them more interesting or enjoyable" (Cambridge Dictionary, 2020)

Considering that the aim is to create a dashboard of flow, which will be used as part of a habit and will be presented in the form of UI/UX design, it became increasingly clearer that the aim is to create a multi-platform application that will support what could be defined as the "flow method". This means that the theory of gamification can be used to support the habit-creation element of the app.

During this unprecedented quarantine I caught myself spending a lot of my down-time playing the new Nintendo game: Animal Crossing New Horizons. This is a life-simulator presented in a cartoonish (some would even say childish) way. No goal, no apparent reward and no way of losing. Yet, for some reason, it is an extremely captivating game. This can be quantified by the fact that it has accomplished Nintendo's sales expectations for a year in just under a month ("Japanese Charts: Animal Crossing Overtakes Smash Ultimate To Become Switch's Best-Selling Game", 2020). How come this game, which has no particular aim, has been able to attract and maintain the attention of so many consumers (of such a wide range of ages) around the world? Although this example might seem weird to most, this is the perfect visualisation of what gamification for habit can do if used correctly.

Gamification has proven to be an effective tool to raise engagement and brand loyalty when used in non-game context. In essence, gamification is a way to achieve a target behaviour in a non-obtrusive way. The user is "tricked" into motivating himself to finish tasks, report results and come back to the product for more based solely on design queues. According to recent studies on design for "ongoingness" based on gamification, there are certain steps that can be followed to ensure a more engaging experience without breaching the ethical line of game-addiction (da Rocha Seixas, Gomes & de Melo Filho, 2016), (Won, 2018), (Rapp, 2017). These were used in the design of the app and can be summarized in four relevant points:

- Personalized design, making the app feel like it is a reflection of your progress and your being helps immensely with the idea of maintaining interest in the users.
- Avoid the presence of daily challenges or daily rewards. Frustration through failure is one of the biggest reasons to drop a habit.
- Giving positive feedback instead of negative for specific app use makes the users less prone to a feeling of punishment for using the app on their own terms.
- Add different goals or activities to modulate the perception of the user regarding the pacing to avoid boredom.

4.

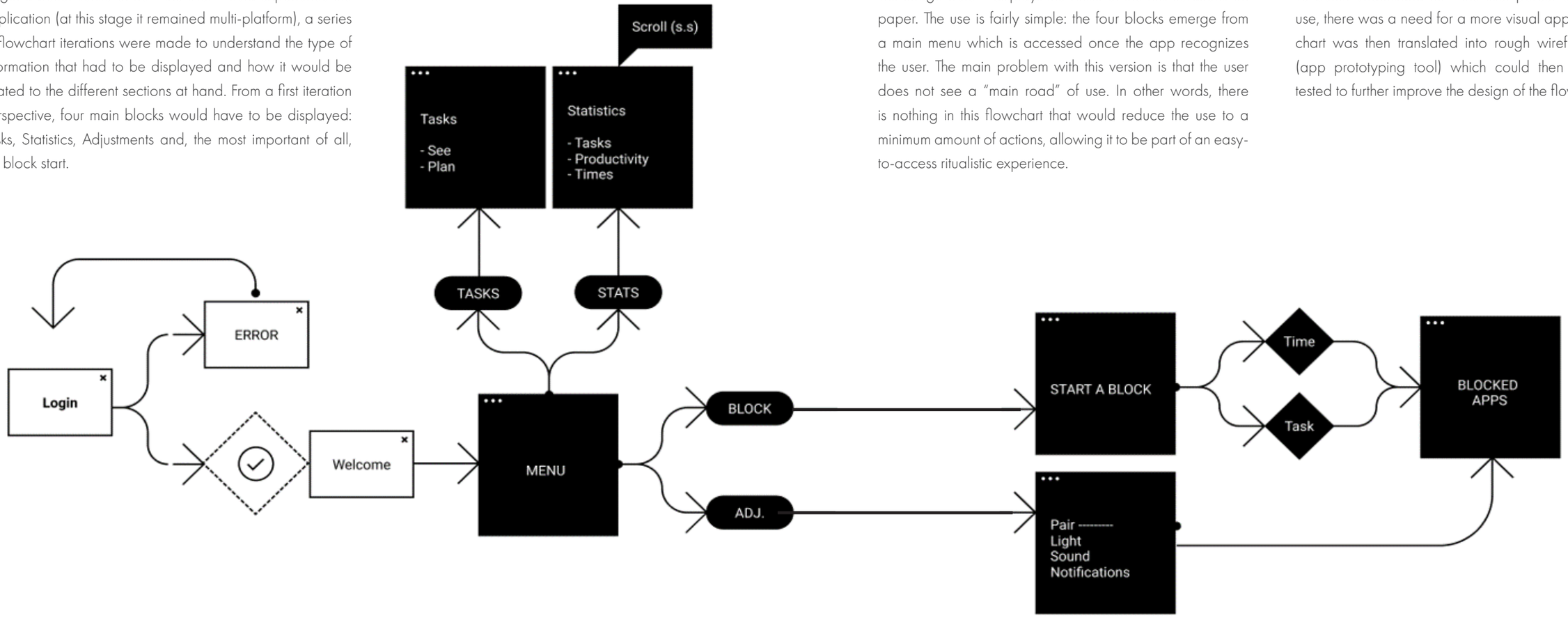
FLOW TRAIN

This chapter focuses on the development of FlowTrain, previoudly known as the Blocker. It presents the design steps followed between idea and final product. Although this is not the end of the project, it does set a clear foundation based on all previous research before diving further into the product development and market placement.

FIRST ITERATIONS

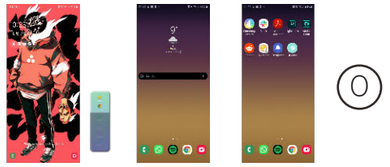
FLOW CHART

To get a better sense of how the user would experience the application (at this stage it remained multi-platform), a series of flowchart iterations were made to understand the type of information that had to be displayed and how it would be related to the different sections at hand. From a first iteration perspective, four main blocks would have to be displayed: Tasks, Statistics, Adjustments and, the most important of all, the block start.



The image below displays the result of the first iterations on paper. The use is fairly simple: the four blocks emerge from a main menu which is accessed once the app recognizes the user. The main problem with this version is that the user does not see a "main road" of use. In other words, there is nothing in this flowchart that would reduce the use to a minimum amount of actions, allowing it to be part of an easy-to-access ritualistic experience.

To better understand how the user perceives these steps of use, there was a need for a more visual approach. This flow chart was then translated into rough wireframes in Figma (app prototyping tool) which could then be individually tested to further improve the design of the flow chart.



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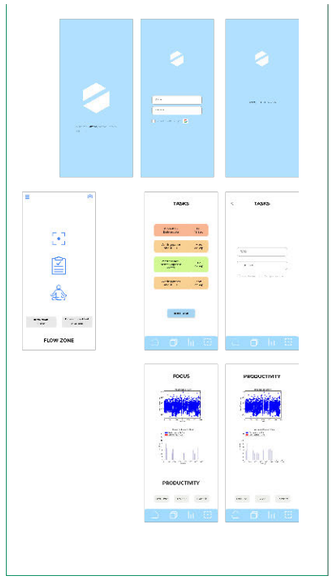
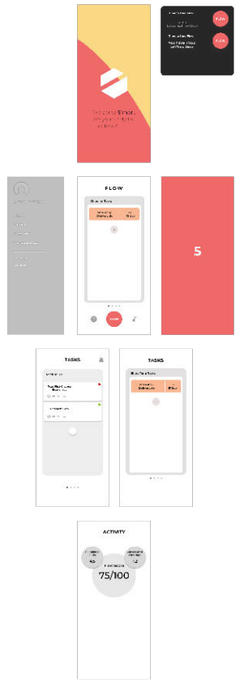


1



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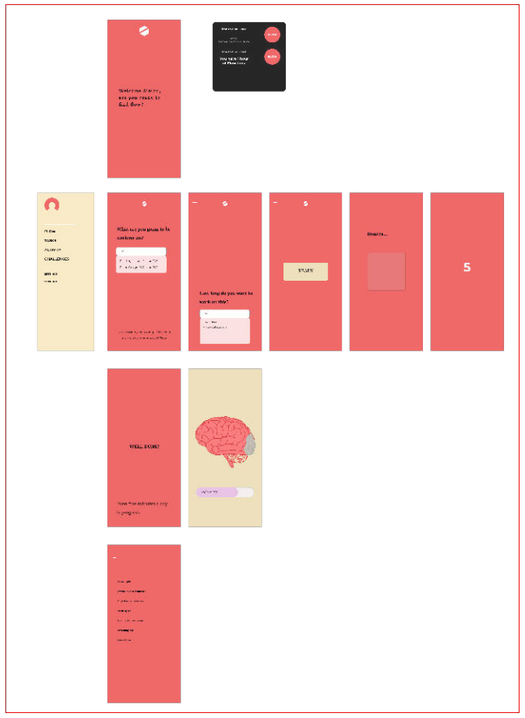


3

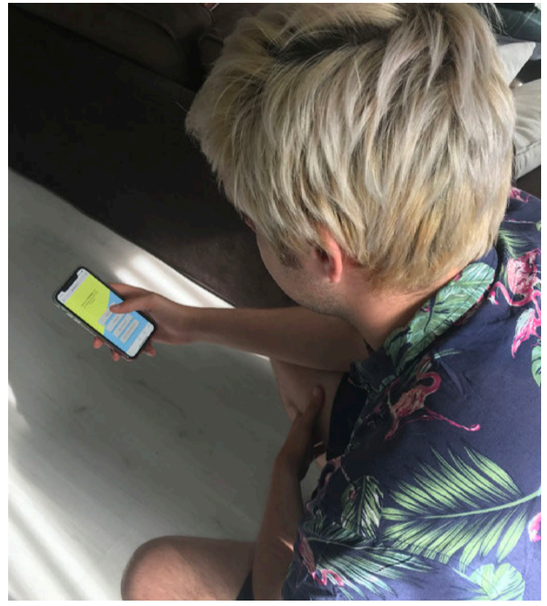
WIREFRAMES

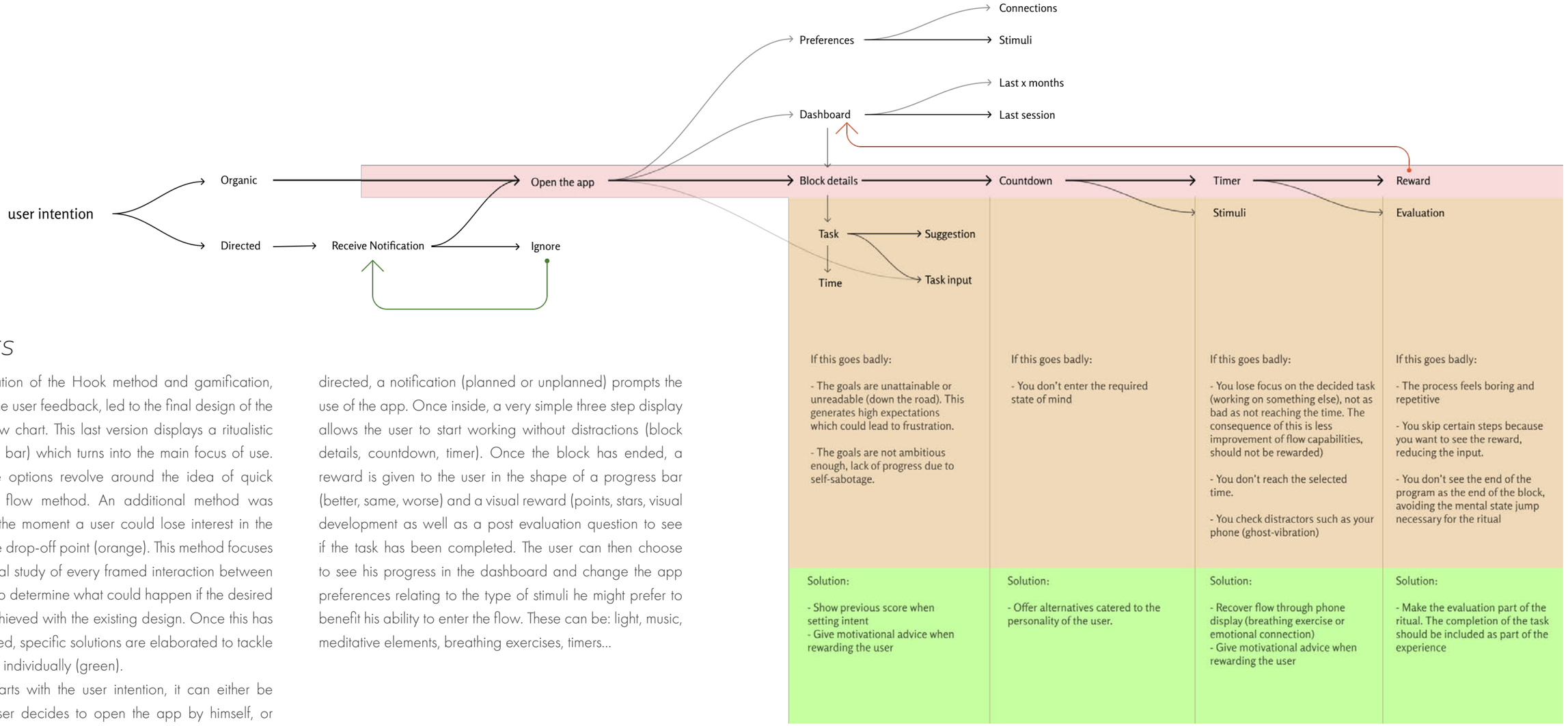
The visualisation iteration is split into four different sections. Section 0 illustrates the access to the application from a phone screen (in this case android). There was a possibility to implement a lock screen action such as an application silencer, which would allow the users to affect the influence of distractors very easily by "silencing" specific apps. Further design for this section remained simple and unchanged, logo and styling of the app will be discussed later on.

On the left, section 1 presents the first visualisation of the early flow chart. Without diving too deep into the graphic aspect of the app, the idea was to show the use-flow of the different screens to potential users to test the ease-of-use of the design. Through the creation of a closed information iterative loop, adjustments were performed to this initial design based on the comments of real target users. Approximately 10 people (8-12 per round) supported the process and gave feedback on the dubious design queues.

This led to the second version (2), the main difference being the streamlining of the access to the actual start of the flow-block. The most important part of this design is for the user to be able to decide to work, perform a minimum amount of actions and start. The implementation of a notification was added to inform the user of the ideal moments to start working on specific tasks and add an easy access to the app from any screen. These changes were also implemented into the flow chart to allow for specific interaction study between the elements.

The third version of this process (3) was the result of another testing round together with the implementation of the Hook Model. Stimuli and rewards were added to support continued app use and the ritualistic experience was added to the start of the process: countdown, breathing exercise or decisiveness button depending on the preferences of the user. Once this step was completed, the flow chart was updated to further look into problematic sections of the design and the first steps towards app graphic design were taken.





RESULTS

Further application of the Hook method and gamification, together with the user feedback, led to the final design of the application flow chart. This last version displays a ritualistic approach (red bar) which turns into the main focus of use. The rest of the options revolve around the idea of quick access to the flow method. An additional method was used to study the moment a user could lose interest in the application, the drop-off point (orange). This method focuses on the individual study of every framed interaction between app and user to determine what could happen if the desired effect is not achieved with the existing design. Once this has been determined, specific solutions are elaborated to tackle these problems individually (green).

The process starts with the user intention, it can either be organic, the user decides to open the app by himself, or directed, a notification (planned or unplanned) prompts the use of the app. Once inside, a very simple three step display allows the user to start working without distractions (block details, countdown, timer). Once the block has ended, a reward is given to the user in the shape of a progress bar (better, same, worse) and a visual reward (points, stars, visual development as well as a post evaluation question to see if the task has been completed. The user can then choose to see his progress in the dashboard and change the app preferences relating to the type of stimuli he might prefer to benefit his ability to enter the flow. These can be: light, music, meditative elements, breathing exercises, timers...

GRAPHIC DESIGN

METAPHOR

The first question when designing a graphic language for an application is: what are we trying to transmit to the user? In this case, there was a need for a message, how do we transmit the idea of flow visually? The answer to this question was found on a morning run during a particularly stressful part of this project, I had just lost my train of thought. Then it hit me, our thoughts are already represented metaphorically by the idea of a train which has the ability to switch tracks if needed. A moving train, in this case, is the equivalent of a focused thought, in other words, a moving train is a train in flow.

COLOR PALETTE & FONT

The chosen colors for any application are incredibly important to transmit particular feelings. In this case, flow, much as mindfulness, comes from a sense of calmness and peace. There needs to be a sense of balance, little contrast and muted tones to avoid distractions. For this reason, a monochromatic palette was chosen in desaturated sunset tones for the main feeling of peace and relaxation together with two cold grays for details and text. The different brightness in tones can be used to create a sense of depth in the app which supports the feeling of "diving" into the experience. The preliminary font of choice is Charter, this was subject to changes depending on later design steps. The idea was that fonts with serif tend to be related to a sense of elegance, confidence and trustworthiness. This, together with the contrast in detail between font and graphic art results in a pleasant visual style.

TRANSITIONS

To further support the experience, the different layers of the design should be able to move in a parallax motion (displacement or difference in the apparent position of an object viewed along two different lines of sight). This is made to accentuate the sense of "traveling" when the train is in motion, which will only occur once the user starts focusing.

DEVELOPMENT IDEAS

Additionally, some early ideas were sketched out on how to link the graphic metaphor to the concept of creating a habit-worthy app (as discussed in page 47). For instance, the idea of the trains could be extended to the reward at the end of the work block in the shape of different train stations depending on performance, as will be discussed later. The train could also come to a halt (due to a bridge pass opening) if the user checks his phone during a flow session. Finally, the tasks could also be displayed in some way related to train maps, since every new train track is a different task and the final station is achieved upon completion of the task.

The rewards for this application should be visual and not necessarily relate to the need for daily use or point accumulation. Flow is not a competition. Because of this, a visual evolution should be displayed the more you use the app. This can be done through changes in the background, color patterns or train evolution (from steam engine to bullet train).

RITUAL, REWARDS & RETURN

RITUAL

This has been said before, but flow is a really difficult state to achieve. Unless we get access to the user's brain, there is no fast way to ensure this ethereal mentality. Based on the research that has lead the project to this point, a method was created to ensure the training of flow through time (see the Flow Method).

There is a catch. The goal was to have the users participate in recurring work sessions supported by the method and the software to ensure Flow enhancement. This requires user engagement with the app (Flow Train) for longer than the usual month that people tend to dedicate to self-improvement apps. As discussed before, the answer lays in the use of the Hook method, increasing app features to maximize engagement and create a habit for returning users. Nevertheless, this is not enough. Even the best of designs can be forgotten if it doesn't become part of a daily routine. For this purpose, it was imperative to put a loss of focus on the creation of the correct ritual that can be ingrained in the users actions.

Based on the principles of associative psychology, as well as conditioning, the aim being to associate an action to a reward. This becomes exceptionally efficient if it is something we already relate to. Since the aim of this app is to improve flow by minimizing distractors and teach the user to control focus, it seems only fitting that the ritual should be related to both statements. What does one do when he really wants to focus? Within the target group, it's becoming increasingly common to hide the phone since it is part of the natural daily distractions. This over-use of the phone has lead to addictive behaviour, over-attachment. This translates as unwarranted phone checks and cognitive drain resulting in an increase in the impact of the phone as a potential distractor during working hours, just by laying in front of us (De-Sola Gutiérrez, Rodríguez de Fonseca & Rubio, 2016) (Ward, A. F. et. al., 2017).

This led to the application of a motion into the Flow Method to achieve two things, the reduction of cognitive drain and the disassociation of endorphin release with phone checks. To do this, one action has to be taken: Just turn your phone face-down. Thanks to this, the users are able to show decisiveness and time selection through the computer and put the phone aside to indicate that work starts. On top of this, if the phone is turned while working, negative feedback can be given (negative emotion) to associate the use of the smartphone during flow time with a negative repercussion if it is turned too early.

This action can also be related to the distraction silencing directed by the software. Turning the phone upside down locks all apps and unwanted programs, initiating a focused block of work. By doing this, the user is inadvertently conditioned to disassociate him/herself from the use of the phone as part of the work methodology. This reduction in distractions coming from notifications and ghost-checks should augment the Flow output in the long run.

As last step for the ritual, a self-reflective moment is implemented to have the user think about his work-efficiency. This data is later used to support the software when calculating productivity.

REWARDS & RETURN

As part of the hook method, rewards had to be created to increase engagement levels and ensure return of the users. There is a fine ethical line when designing a reward system for an app. Make it excessive and it may lead to addictive behaviour or app abuse. An example of this would be the apps of the style of Candy Crush, filled with daily challenges and timers that make you return every couple of hours for more levels. This is the opposite of what we are trying to achieve: returning the control to the user. If, on the other hand, the rewards become irrelevant, not enough engagement has been created and the app would fall in the endless pit of unused self-improvement apps.

To avoid this, the reward system is made visual. It evolves with use and the need to return to the app comes from a place of curiosity and sense of improvement instead of need. Two steps are followed to achieve this: progress and evolution. The result of every session is shown immediately at the end in the most basic way, you did better, same or worse than last time. That's enough for the user to feel progression. The second step is the evolution through use. This is achieved through visual design implementations such as the evolution of the train on the track (see image 4) or changes in the landscape. The more the app is used, the bigger the changes. This is meant to generate curiosity and a sense of personalization "that is my train of thought on my landscape". This sense of propriety will lead the users to return with more ease in the long run.

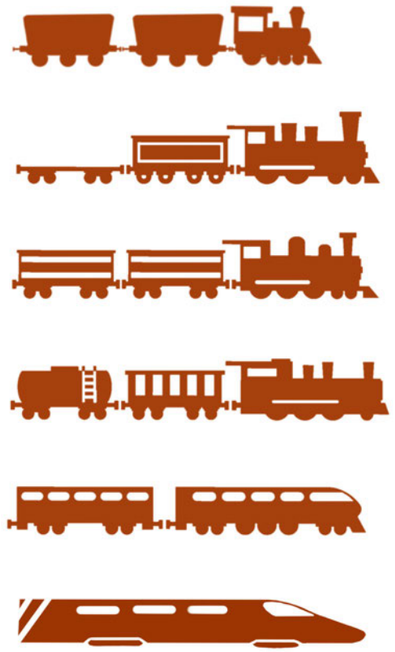
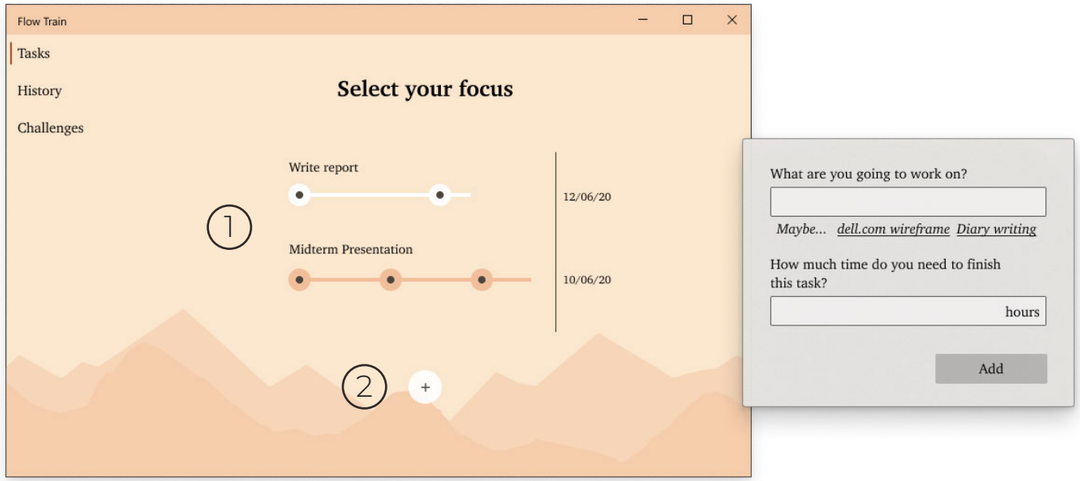


Image 4: Train Evolution as Visual Reward

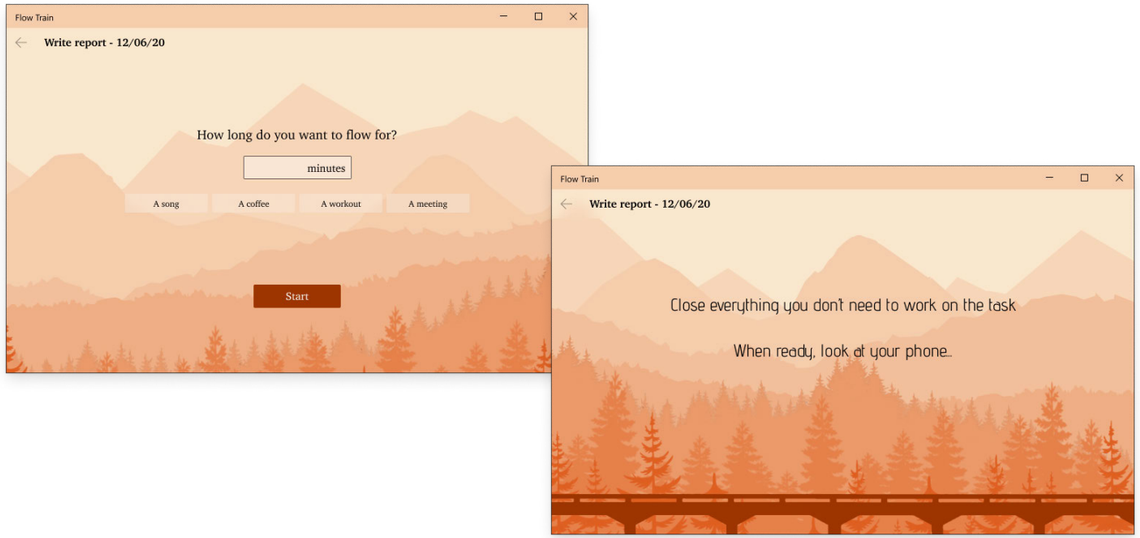
COMPUTER START

TASKS



This screen welcomes the user when he decides to start working. As seen in the flowchart, this is the first ritual step once the user has shown the first signs of desire for flow by opening the app. The components are therefore very simple: ongoing tasks (showing progress) (1) and adding a task (2). The first one is designed to resemble the stops in a metro-map. Every new line is the representation of a started task, every dot is a completed session. To the right, the deadline for the task as determined by the user, the color of the line indicates the urgency of the task. With this method, a 5 hour task can be split into multiple flow-blocks which are visualised as "train rides". If the train moves, there is progress.

The second part of this main screen is the possibility of adding a new task. In this early version of the design, this can be done by clicking the plus and interacting with a pop-up screen which shows two items: name of the task (which can be filled with a suggestion from google calendar) and the expected time needed to fulfill the task (in hours). Once the task is added, it will appear as a new starting line in the main screen (1). This can then be selected to start a session of flow.



TIME

Once the task has been selected, the screen moves down with a parallax effect to show more of the landscape. The next ritualistic step for the user, once the task is chosen, is to determine how long he wants to find flow for. Since flow is a flexible state of mind, it makes no sense to eject someone from the zone by beeping at him after exactly x minutes. To avoid this, the user is given the option of pre-created blocks of time with a 10 minute flexibility rate. For instance, the user could choose to flow for a lunch worth of time (1 hour ± 10 minutes). By combining this with a light alarm instead of sound (ex. Reducing screen brightness) we can ensure the user will remain in focus past the hard hour if he/she has found flow.

By clicking start, the user is then directed to the last screen in this first part of the ritual: the silencing. To ensure that the amount of distractors is reduced, the user is instructed to close everything not pertinent to the task at hand (a.k.a. YouTube, e-Mail...) This creates a selective block which is put in place once the next step is completed in the user's phone. This silencing also takes care of incoming notifications and calls depending on the user's preferences, again, to maintain the user in control of the outcome, giving a sense of freedom.

PHONE USE

PREPARATION

The top indicates the task as presented in the application and/or extracted from the calendar of choice (connected to the software). This improves the mental image the user creates of the steps to take. The same way a runner would visualize the course before the bang.

This phrase is meant to aid the user into entering the second mental state required to improve flow. Calm visualization. There are different ways to achieve this so this could be changed depending on the user's preferences.

Turning the phone is a crucial part of this ritual. The aim is to make use of psychological conditioning to relate the detachment of the phone as a distractor to the endorphin release in the user's brain upon receiving a reward. This indication gives control to the user on the start of the session.

The train is the visual representation of progress through every stage of use. Therefore, it starts moving when the user enters this stage, indicating the idea of a "start".

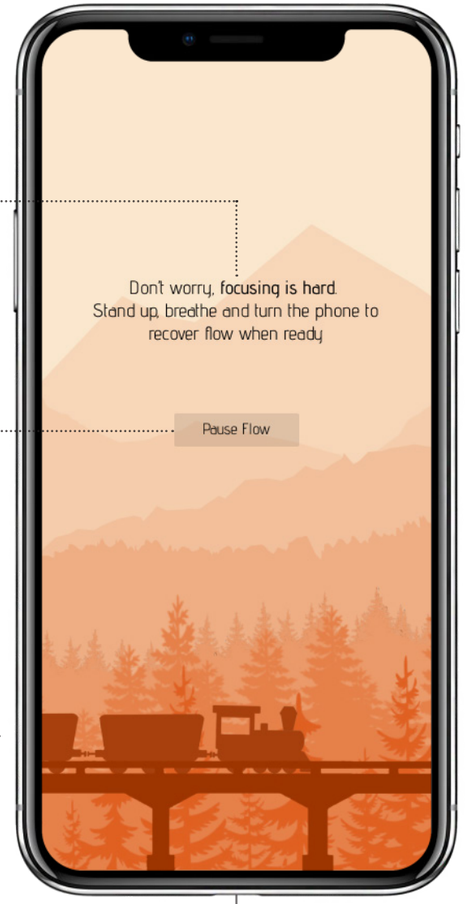
Once ready, the user flips the phone around, blocking any unopened app and starting to focus. The phone remains face down, unless the user choses otherwise, until the end of the session.

PHONE CHECK

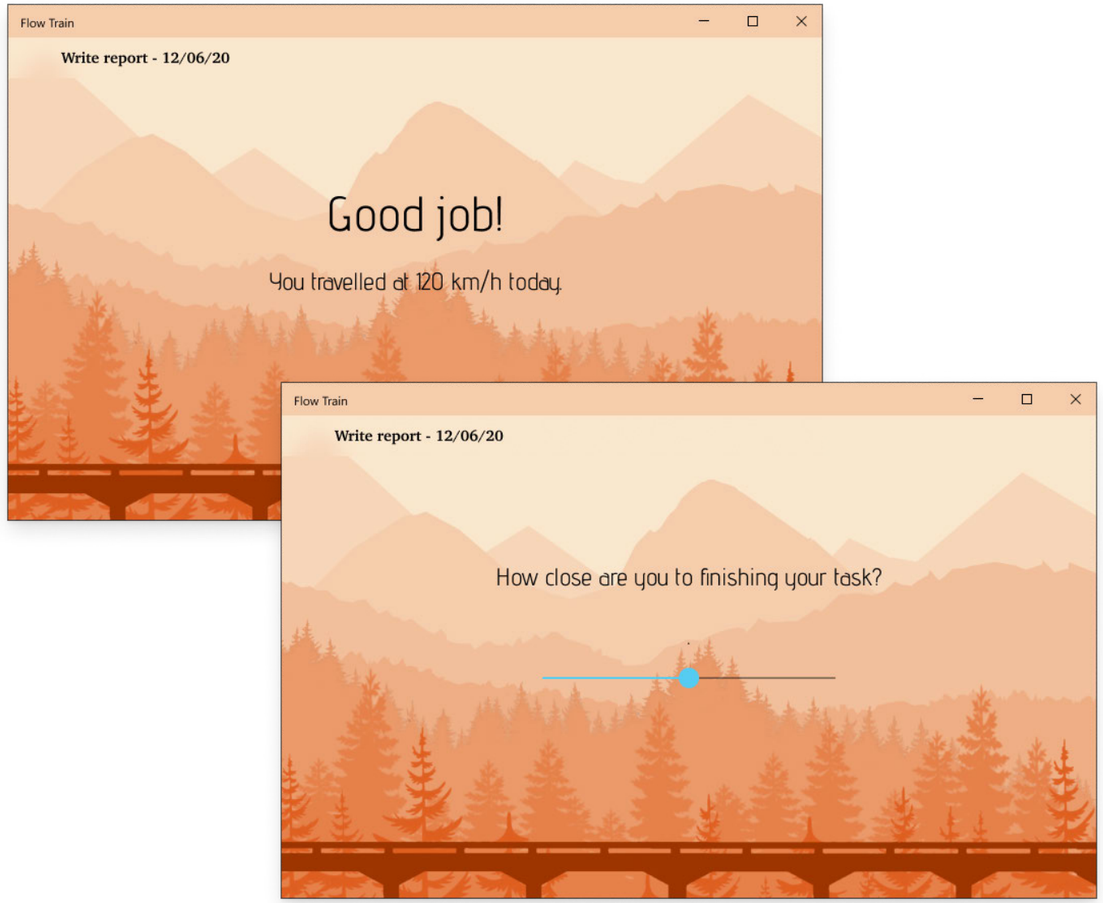
Positive reinforcement. One of the main causes for people to drop a habit is frustration due to lack of improvement. By reassuring the user that everyone can slip we can ensure a more positive take on a second try in order to recover flow.

Although we are trying to inadvertently train the user, it is important for him to remain in control. Giving the option to take a break (but allowing for him to return) is therefore imperative.

The positive reinforcement and advice can be combined with disappointment visual queues to further develop the psychological conditioning. In essence, stopping the train, you lost speed. "Because you checked your phone, your progress came to a halt.... Pity".



If the user checks his/her phone before the session ends...



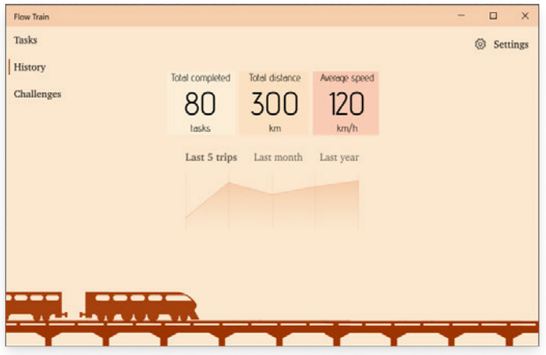
END OF SESSION

PROGRESS

To keep the user engaged, it is important to create a sense of progress. Once finished, three elements come into action: instant progress analysis, evaluation and reward. In this case, the progress is related to visual queues. During the task setup, the user is asked to engage for a flexible amount of time. This can be translated into a distance to maintain the metaphor (one minute is one kilometer). Out of the full session, only a percentage is fully engaged (flow time). If we see this as a measure of traveled distance in a specific amount of time (time input/flow time), we can return a speed as a measure of performance, the more you focus, the faster you travel.

The evaluation is subjective. The user is asked how far they are from completing the main task. It is easier for someone to say: "I'm 80% done with this", than it is to measure specific times. The blue dot is set at the point the task was left and, based on previous performances, the software is able to measure productivity based on task-completion rate as a component of flow-time. This is then used for the task planning visual and the history scores.

The reward is a two-part component. The first one is immediate, a pat on the back. "Good job!" would be written after a successful session, but this could vary depending on the actual performance. The second part is displayed in the dashboard. The data is compiled and added to the overall score of the user's evolution. A visual sense of progress through an easy to read chart and a growing evolution tied to the sense of return based on the improvement of the train was added.



DASHBOARD

After the evaluation, the user is sent to the dashboard, a history compilation of the evolutionary scores. This page displays the achieved milestones such as the unlocked train (level), the total completed tasks, traveled distance (work hours) and average speed (flow efficiency). These scores can be checked for the last five sessions, last month and last year to get a full sense of progress through time.

Once done, the user can choose to start a new session or access the parameters to better influence his environment and state of mind to find Flow. There is also the possibility of adding challenges in the future to further engage the user into returning to the app.

5.

RE-DESIGN

After creating the base for FlowTrain, a more professional design approach was applied to ensure ideal product-consumer interactions and easy access to the market. This led to the use of the windows UI to redesign the app in an integrated style with additional features such as the multi-desktop instance and the activation/deactivation of apps based on the user's needs.

REFLECTION

FINAL PRODUCT

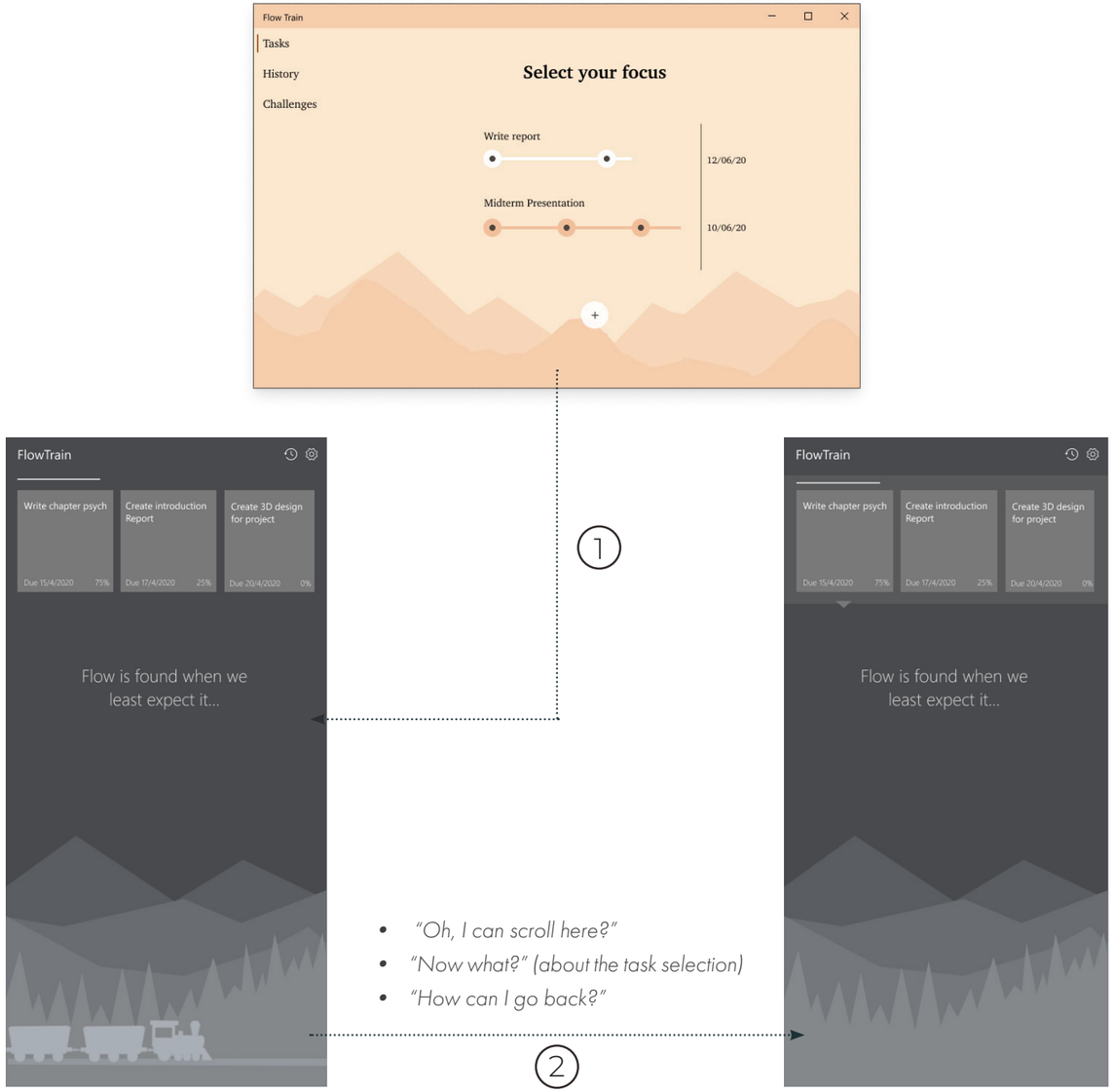
Let's take a small break. This process has taken me to a final point, which was presented during the green-light meeting. There was a start, research on a broad topic, a focus into flow, more testing, design, iterations and a result: FlowTrain. This is the point in the project where I can say I have a clear result. An app meant to improve our focus and the way we interact with technology throughout a normal work day. Nevertheless, this is again just a start. A concept has been created which has all the elements from the research and should work as intended.

There is one small caveat: it lacks the human factor. At this stage, it is a carcass (which was prettier in still form than in a moving app, if I may say so myself) filled with a lot of separate elements that reinforce the core value of the product. These are bound together by the train metaphor, a metaphor that was quickly discarded by the client right after green-light. Because of this, in the last weeks of the graduation, a design overhaul is required. The concept is clear, the workflow is there, now we have to answer the question: how do we produce this? Now we take a step back and try and make a cohesive, beautiful, working package that could be produced by DELL in the near future and would actually return value to the company and the user.

NEXT STEPS

One of the first things that I learnt right after presenting the app for the first time to the client is that it usually doesn't work to extrapolate a graphic still image into a flowing, working app. Or, at least, it is extremely difficult. Instead, I should take the core values of that design: colors, ratio, and value to apply it to something more subtle, less artsy. Because of this, the first darling to be killed was the train, followed by the app's position in the computer. The client proposed trying a windows UI integrated approach to the app in order to make its use more seamless and approachable.

I can hear you thinking, wasn't the train the whole point of the app? Wasn't it supposed to be the cohesive metaphor that bound the values of flow together? Much like the current state of the app, the train is but a carcass that holds the elements that make the app work together. The conditioning, the ritual, the breathing... These will remain as part of the new design, reinvented. The next steps are all about looks and interaction. Making a beautiful experience that will entice the users to keep on applying it to their lives. To do this, we go back to the whiteboard.



WINDOWS UI

FIRST ITERATIONS

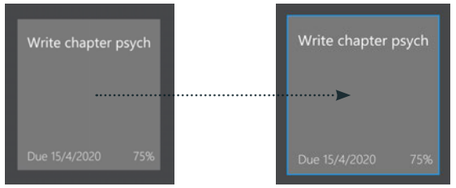
As mentioned before, the client had expressed an interest in seeing how this app would look if we were to integrate it into the windows UI. This meant that the app would be accessible from the bottom-right widget panel available in all windows computers. In terms of design, it presented a problem and a possibility. The problem would be to adapt a wide design to a more narrow form to maintain the computer UI. On the other hand, it presented a possibility to adapt the graphic design to an existing interface with existing interactions.

The design was fit into a 1:2 ratio frame (see step 1 to the left), keeping all the elements and adding new ways to present them. The complete redesign for this iteration can be seen in Appendix A. The train metaphor was extracted to make the idea more subtle, as well as implementing new interactions that allowed the user to navigate the app faster. From this point on, the design needed a recurrent feedback loop where all new interactions could be tested by test subjects to validate the human component. "Is it clear that you can scroll here? How do you feel in this part? Do you know where to go next?" This method was applied to quickly test any variations in the app and apply the user's comments to redirect the design in a more human way. By doing this, the interactions could be tweaked to a point where the questions that were being given delivered the expected answers.

FEEDBACK LOOPS

To test these little interactions, recurring zoom calls were planned with friends and family where a basic rundown of the app was presented through figma and PowerPoint. During these sessions, a variable set of questions was asked in order to get a better understanding of which design cues were actually being understood. This form of subjective feedback, recorded in dialogue, was then taken into consideration when changing the design and creating new iterations.

The most common concerns from the users revolved mainly around the actual flow of the app. Not being able to find a button, or understand that something is a button, means that the easy ritual is broken due to poor design. This affects the feeling of the users towards the use of the app as well as hindering the progress. Special attention was given to the creation of new use-queues that separated static information elements from interactive elements such as buttons and scroll-bars as displayed below (mouse-over queue).



NEW PROCESS

Having the new design be part of the Windows UI allowed for additional features that had not been discussed before, such as the “Desktop Instance”. This element allows windows users to create different desktop instances within one active account, with different open apps. Once the user is done with their activity, they can recover a previous desktop instance to return to what they were doing before, like a save point in a video-game.

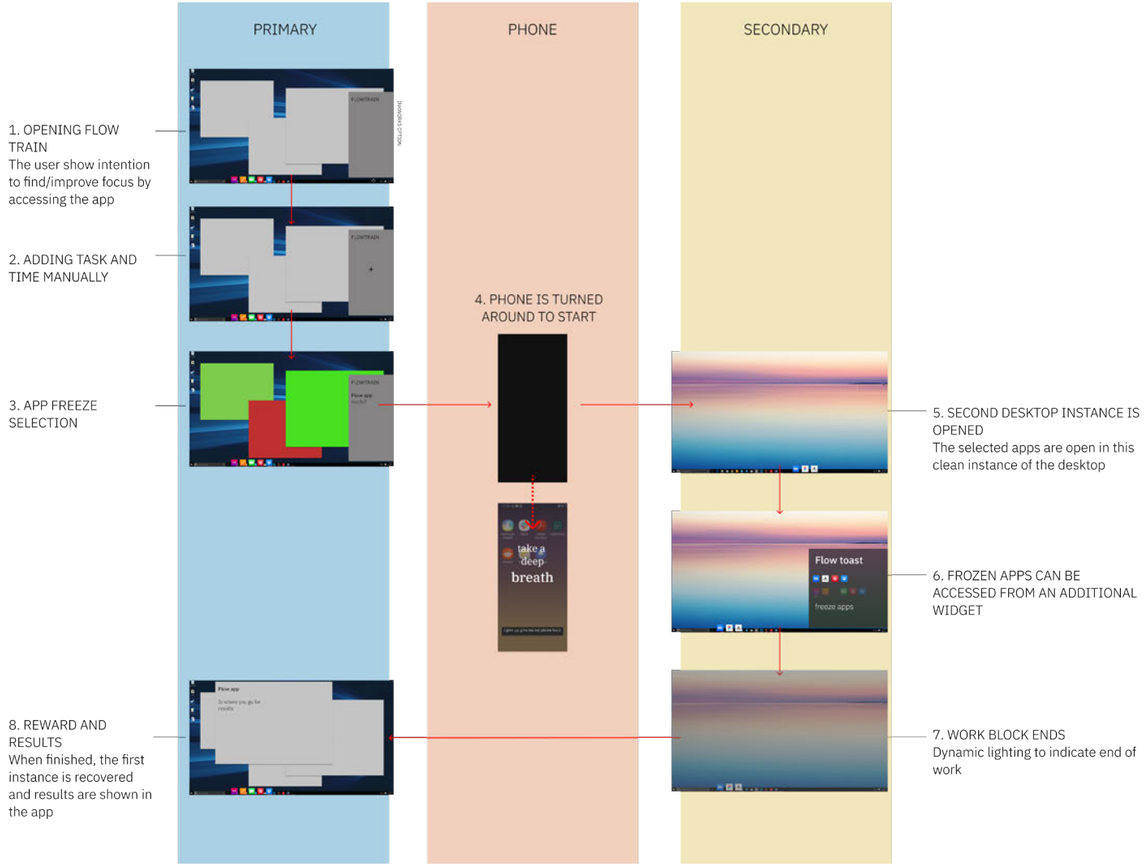
Keeping this in mind, a new process was developed around the same flowchart from page 55. While roughly keeping every step, a few additions were implemented to improve the user interaction. From this point on, the desktop in which we can access the app and start the process, as well as check our progress will be called “primary desktop”. The desktop in which the tasks will be performed and the app will be working in the background will therefore become the “secondary desktop”. The last element remains the same, the phone, which will still show the elements of disappointment and conditioning, as well as support to return to flow.

The idea behind this change is to have two separate locations, the first one is well-known, cluttered and filled with distractors. The second one is focus-driven, sober and controlled by the software. When in the secondary desktop, the users will only have access to the apps they need for their selected task and will be prompted to return to the primary desktop when the session ends.

A reward is due, the user has completed a session (with a varying degree of success). After reporting progress on the task, access to the dashboard is granted, where the results and progress of the last sessions is displayed. By making it a point of showing the impact of the session (positive or negative), the user can do something with the feedback. This is necessary for the engagement and continued use of the app.

The dashboard displays the results for the last session, overall focus improvement for the last week-month-year as well as past activity. The main goals should also be displayed in a clear and concise way for easy access, such as: completed tasks, flow score and reduction in distractions. This should provide a clear overview of the information collected by the software without becoming too technical.

Much like with the previous version, if the user feels the urge to check his phone (which is blocked the moment a session is started), the same feeling of disappointment will be reflected: “it’s okay, take a deep breath, you can recover your phone if you want to give up”. This idea is maintained to positively impact the psychological conditioning of the user, reducing the need for a dopamine rush from notifications and the dreaded ghost vibration syndrome (checking your phone without any prompted input, vibration or notification).



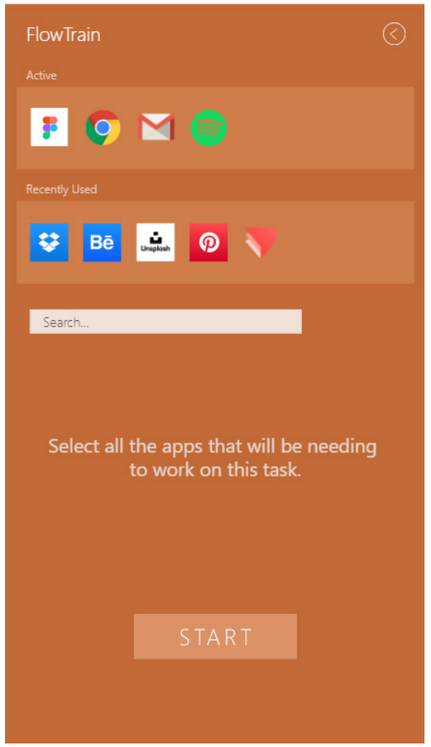
REDESIGN

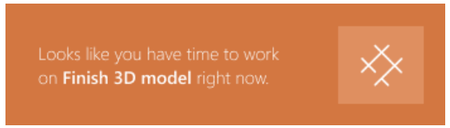
WINDOWS PANEL

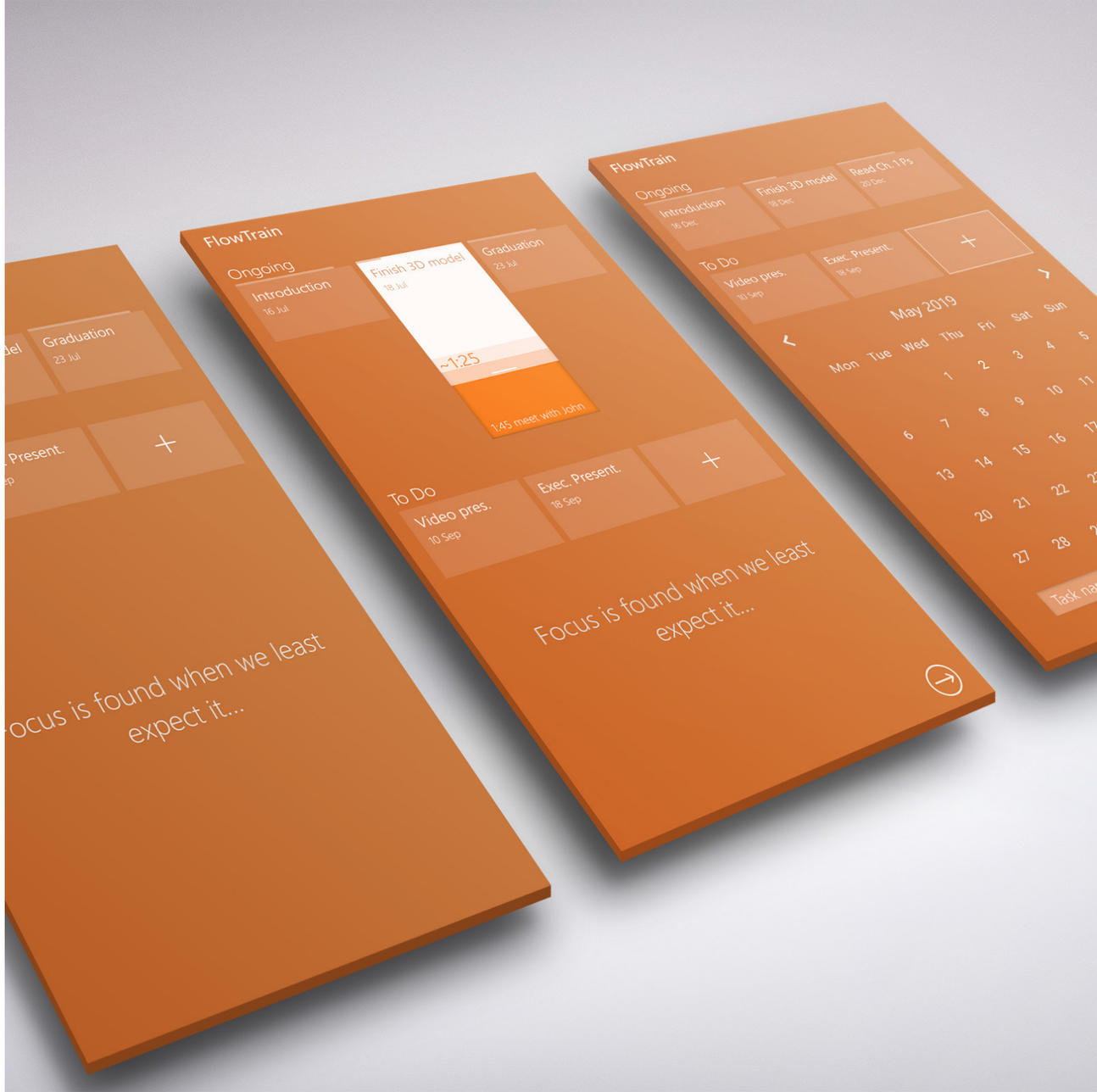
The redesign of the windows panel was inspired by the chosen leading color orange together with the preexisting windows UI toolkits. This is the result of multiple feedback loop sessions as well as the design support from the design team at DELL. This panel gives you easy access to the first steps of the ritual: choosing a task, time and starting. On top of this, it also allows the user to manually add a task and select the specific apps needed for the task at hand before jumping to the second desktop instance.

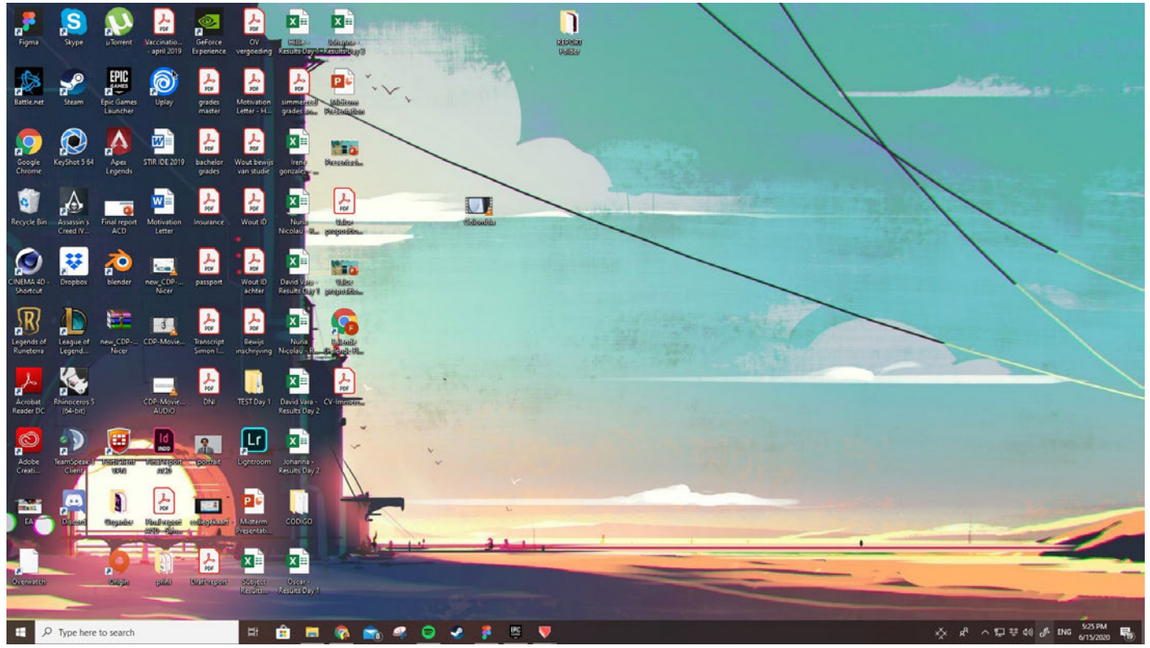
In a way, this is the bridge between two parallel moments, one where we're chaotic and unfocused and the other, sobre and filled with flow potential. Because of this, it was important to minimize the steps needed to access the next moment. All interactions have been optimized for ease-of-use as well as clear and obvious use-queues. A button has to look like a button.

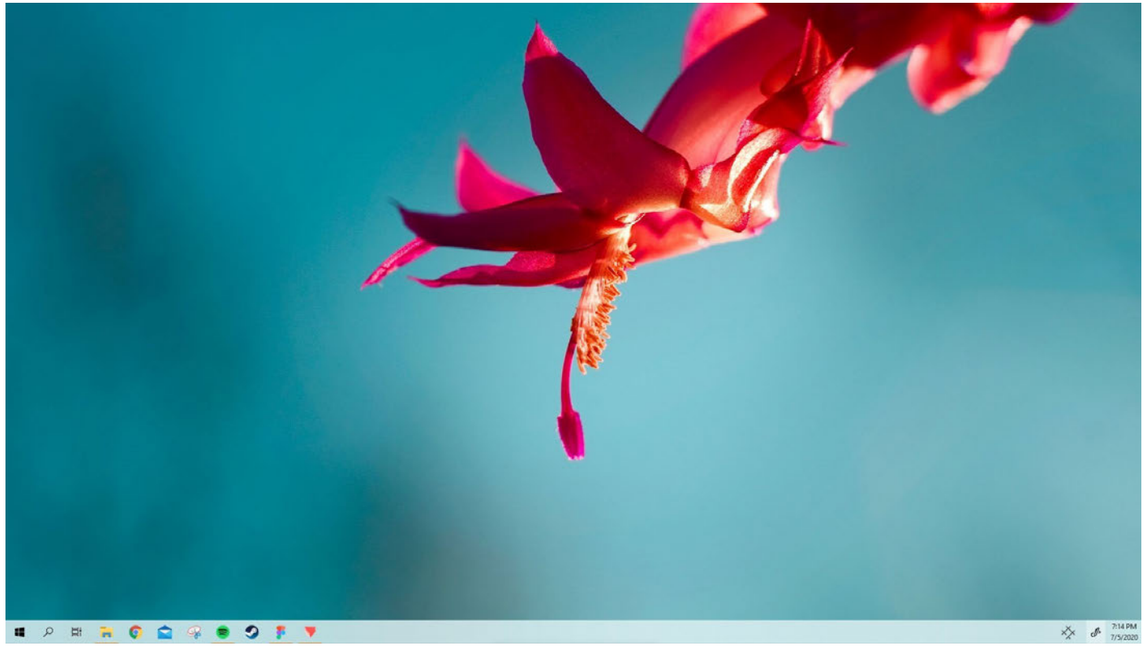
This panel is connected to you calendar through a windows integrated system as well as a third party planner such as Todoist (or any app which can read and detect tasks within other applications such as slack, gmail or icalendar). These tasks are relayed to FlowTrain and displayed in the panel as well as the app for easy access. The notifications based on the deep learning algorithm to plan flow blocks are relayed through a windows toast, which also grants access to the panel.











The primary desktop is cluttered, filled with everything the user has accumulated, and, even if it isn't so, it still grants access to everything the computer has to offer. From this instance the user can access the starter panel for FlowTrain as well as the dashboard. Once a task, time and apps are selected, the user is sent to the secondary desktop.

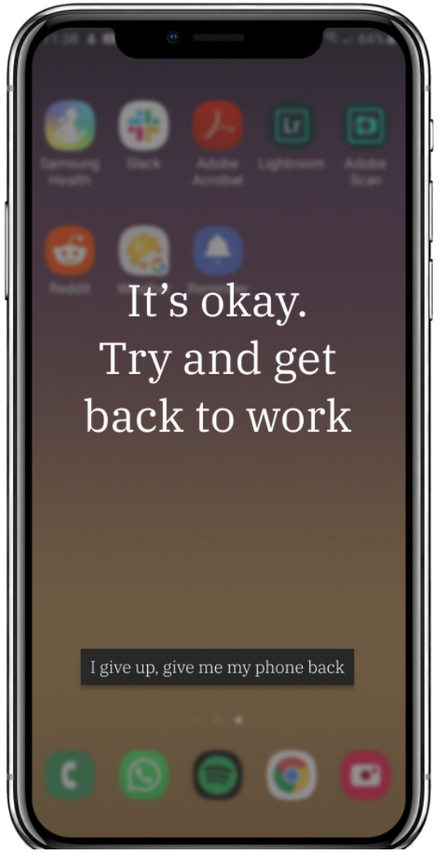
The secondary desktop is controlled by the software and only offers access to the apps selected by the user before the start of the session. If the user decides he/she needs an additional app, it can be unfrozen by clicking on the bottom right logo. Once the session finished, the screen brightness is progressively reduced to mark the end of flow.

PHONE DISASSOCIATION

As it stands right now, the human brain is being conditioned to associate the action of checking our phones (or even a simple sound or vibration) to the release of dopamine due to a need for attention and human contact. This is a problem for the simple reason that craving the dopamine rush distracts us from what lays in front of us. We have become multi-tasking machines, able to receive and read multiple inputs at the same time without bringing any of them to full fruition. This is the opposite of what is needed to achieve flow.

To combat this, and as mentioned in chapter "Phone Use", if the user checks his phone while using FlowTrain access to his apps will be denied and a message will appear, prompting him to try and recover focus. The aim is to disassociate the positive behaviour from the constant phone-checks and re-associate a new, negative feeling; especially while working or trying to focus. You have checked your phone, while knowing that it is blocked, while having decided to commit to focus, you should feel disappointed. It is this feeling of disappointment in oneself that is going to be associated with turning your phone around.

A reassuring message, the option to give up (control) and rehabilitation in the form of breathing exercises or visual meditation for those strong at heart. These elements are designed to try and recover focus while retraining the user into avoiding the various psychological inputs generated by the technology around us.



DASHBOARD, TASKS & PREFERENCES

A new app was designed to host the dashboard information, which is in essence a collection of the user's progress, encrypted into a personal account. The minimalistic design displays three elements related to progress (last session, activity and focus progress) and four core values which represent overall achievements (completed tasks, ongoing tasks, average focus and reduced distractions). This information is updated every time the user finishes a session so he/she can see immediately if there is an increase or decrease in these values. The dashboard can also be accessed from the FlowTrain panel.

This design allowed for the additional display of a task overview page. The third party app, as well as the manual addition of tasks come together in a simple overview of the ongoing, to do and completed tasks. These are classified in order of urgency and completion. Selecting any of the tasks prompts the opening of the panel to start working.

As mentioned before, the whole point is to recover control over technology to be able to work efficiently. With this in mind, the settings allow the users to tailor the experience to their own preferences. Starting a playlist upon opening a new task, switching the visual breathing exercises to audio queues, changing the things that can or cannot be blocked... Although the app will always offer the recommended settings, it important to maintain the user at the center of every decision.

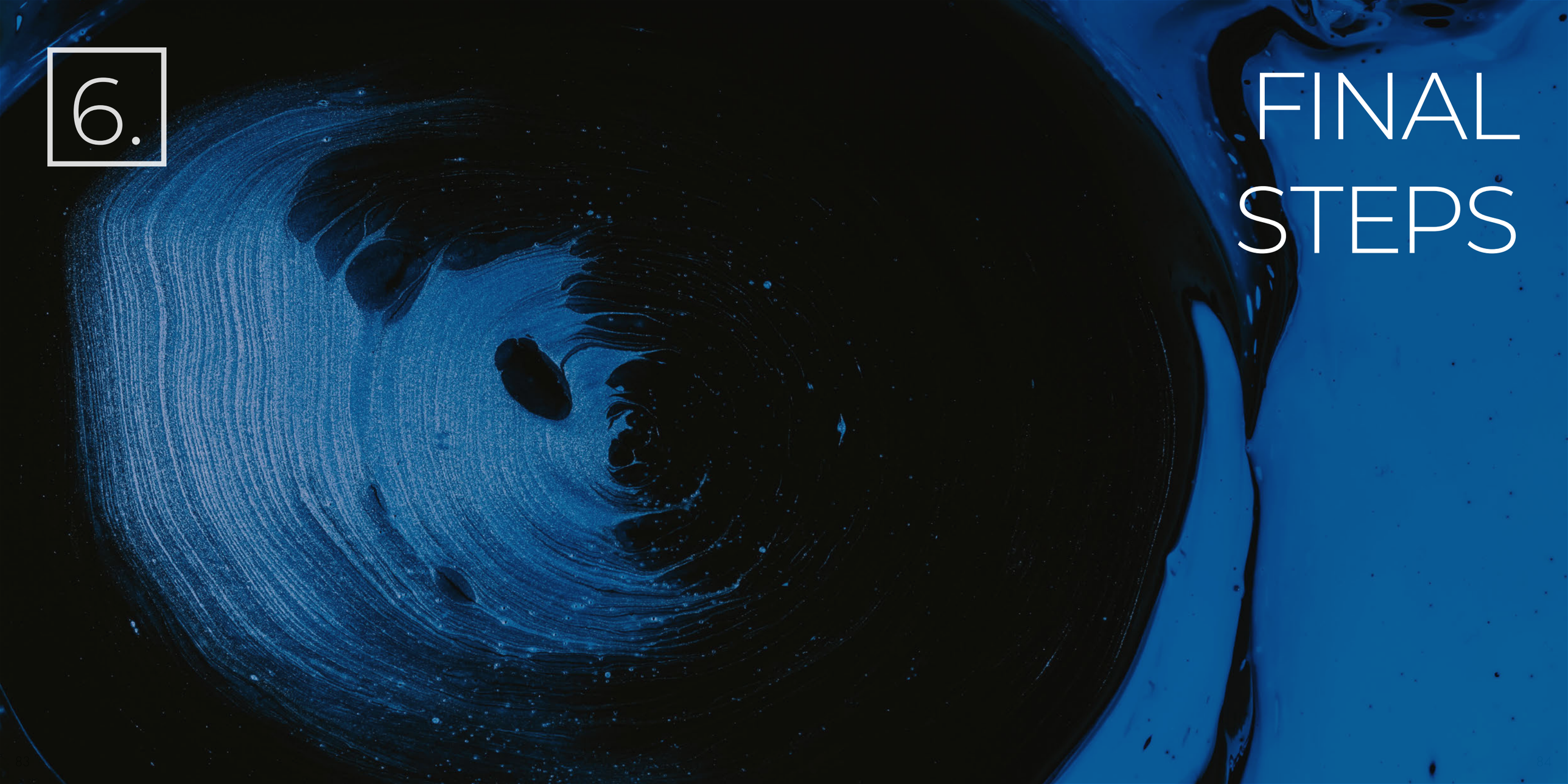
Block upon start

E-mail notifications
Pop-up alerts
Mobile Notifications
Calls

Stimuli

Breathing Exercises
Countdown
Ambilight
Music Upon Start

The list of preferences (settings) depends on the devices connected to FlowTrain. If, for instance, the user has access to an Alexa device or has Pilips HUE installed at home, the system could make use of them to facilitate state transition or block notifications. The settings also allow for control of the flow experience, considering not everyone has the same preferences when trying to focus. This is important to maintain a sense of control over the technology.



6.

FINAL STEPS

WHAT NOW?

NEXT STEPS

This is far from finished. The thing about UI/UX design is that it can always be updated, improved, reinvented with a simple patch. Even if a point has been found where the product could hit the market, there is always room for improvement. In this particular case, the major points that could be researched further is the task planning and detection capabilities of multiple third party companies that could present a fruitful partnership for DELL (my personal recommendation for this would be Todoist, as explained in chapter "Windows Panel").

Another element of interest is the creation of the deep learning element for the software coded at the start of the project. As it stands, the code can only gather information. It is upt to the tester to analyze it and draw conclusions. Ideally, an AI could be programmed that was taught to learn from the productivity patterns for every user, tailoring recommendations and work plans.

Finally, the possibility of translating FlowTrain into a physical device (as mentioned in chapter "Value Propositions & Decisions"). This would allow for the app to tap into the environment control (distractors) as well as training the development of Flow in additional activities outside of the computer bounds, such as painting or reading a book. The development of such a device is tied to the success of the app as an early product. DELL will not invest in the development of a physical device without proof of success from FlowTrain, so this development would be for further down the line.

CONCLUSION & REFLECTION

This project, from my perspective, shows a lot of potential. There is a chance here to create a product that could have a real, positive impact on people in need of focus. With the right support, FlowTrain could become the perfect mix between the most used apps in the field of mindfulness and task control. This is all I wanted. To create something with meaning while learning along the way. I would lie if I said that this was a breeze, that I could do this again in the same situation. The lockdown and corona did take a toll on me and my work, but I am happy to see that I was able to rise to the opportunity of creation and deliver something I'm actually quite proud of. I can only hope to impress the right people and keep on learning while doing it.

As a final highlight, I would like to mention the three thing I've had to learn the hard way during the past 100 days of work. Firstly, to kill your darlings. This is not something new, but the speed and stakes of this project had me changing the design way faster than I was used to. Adapting to the wishes of the client while balancing the advice of your mentor and chair is something that is learnt. Secondly, to be less stubborn about my own designs. I do still feel that a lot of the ideas I presented had great potential, but learning that the people around you are trying to help, while having more extensive knowledge on their specific topics, means that letting go is sometimes necessary. Thirdly, "il dolce far niente", if I hadn't learnt to appreciate doing nothing I would have gone crazy because of the sheer pressure one puts on oneself. Chill.

GLOSSARY

Method

1. You have time to work and you know what you want to work on. Think about what you want to achieve in the time that you have.
2. Set a timer (15-120 minutes) and set a clear goal for the selected amount of time (ex. I want to write the introduction of my report).
3. Start the timer and turn your phone so the screen faces downwards.
4. Focus on your work. If you feel you are losing focus do not worry, it is normal. Just stand up, take 5 deep breaths, sit down and continue with your work.
5. Once the time is over, reflect about what you have accomplished to see if adjustments are needed in terms of goal or time setting.
6. Take a quick break and repeat the process

Software

The software runs in the computer and is meant to be as hidden as possible. Working from the background, it measures the parameters needed to determine the productivity value of the user. This allows for an approximation into flow.

- States of focus: Active (eyes+keyboard/mouse), Reading (eyes on screen), Present (sitting but not looking), Away (AFK, Away From Keyboard)
- Typing continuity: Keystrokes per minute
- Typing decisiveness: correction rate through multiple writing sessions
- Task completion rate: post evaluative subjective rating
- Tab activity: work-related focus evaluation
- Distractors: Phone, Conversations, Fidgeting...
- Activity away from goal (tabs)
- Calendar: Tasks+times
- Notification block
- App block

Application

The app supports the methodology to maximize flow: Method+Software=flow. In this case the method is meant to train our minds to find flow more easily in the long run. It works on the computer and phone.

- Task decisiveness
- Task Deadline (ex. Midterm report)
- Expected time investment (ex. 40 h)
- Task block focus (ex. Write chapter 1)
- Time decisiveness: flexible time blocks to allow for a variable block-end-time.
- Ritual: Turning device/Decisiveness + countdown + breathing (based on chosen parameters)
- Positive/Negative reinforcement: method adjustments to maximize flow
- Method tips: advice on how to maximize flow
- Ongoingness parameters: visual support and rewards to maintain engagement
- Planning task times: directed user intention
- "Block" reminders: notifications during down time to prioritize productive moments
- Evaluative parameters
- Calendar bidirectional communication with external parties (aka. Google Calendar, iCalendar...) for task input and suggestion.

Computer

Basic Interaction to minimize distractors.

- Task and time input
- App selection
- Calendar tracking
- Screen related stimuli (ex. Screen brightness, flow notifications...)
- Flow recovery process (based on software, light changes to notify about flow state)

Phone

Minimal interaction to avoid psychological conditioning into using a distracting device.

- Ritual experience (turning upside down to start)
- Flow queues: breathing+negative reinforcement upon distraction

Physical device

Adds an additional experience to the method in order to improve the training of flow and open the possibility of different Flow scenarios.

- Ritual experience (turning upside down to start)
- Haptic feedback for positive and negative reinforcement
- Time input
- Volume controller
- Space Flow awareness (avoid human distractions)
- "Ambilight" Flow exit
- Light as stimuli queue
- App lock (also when not working on the computer)

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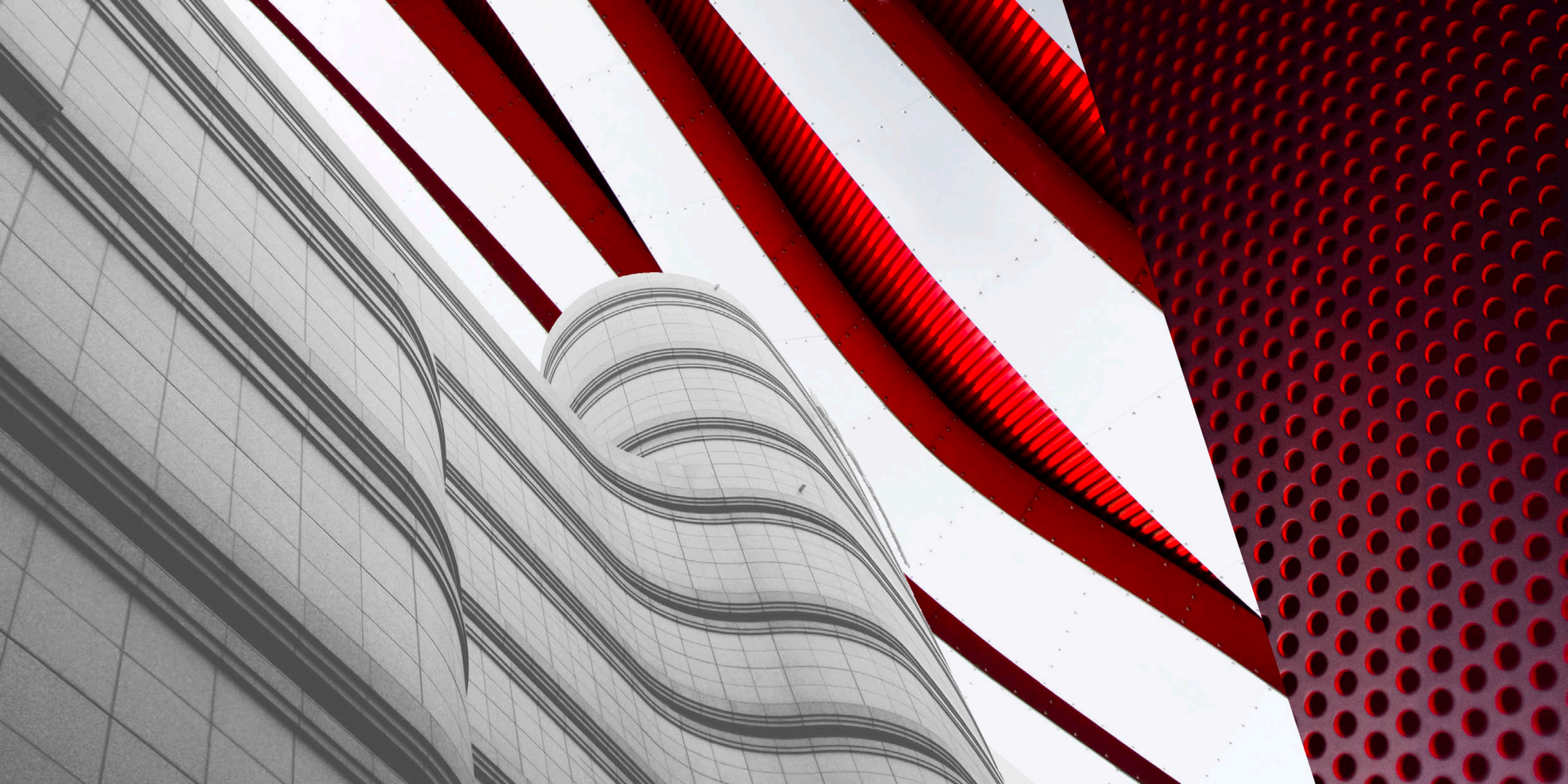
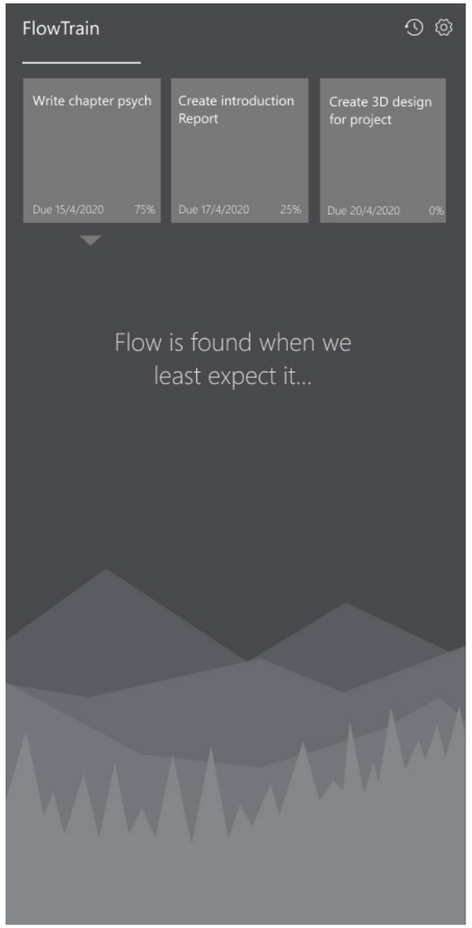
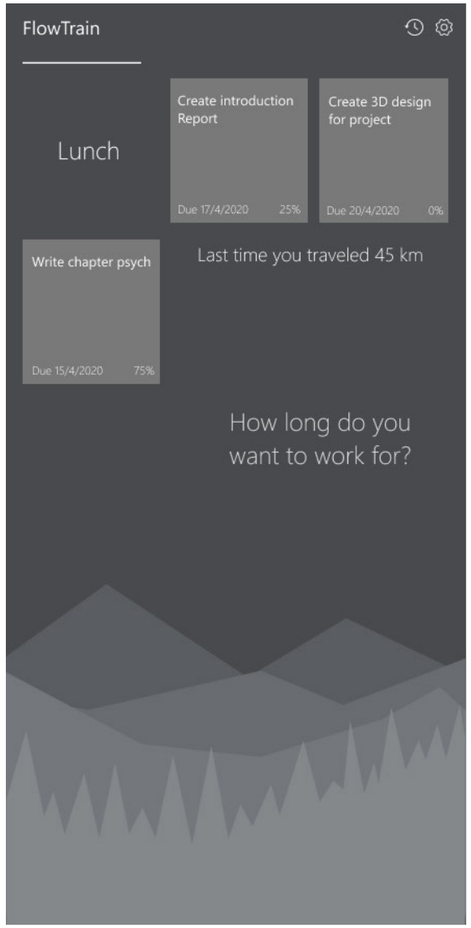
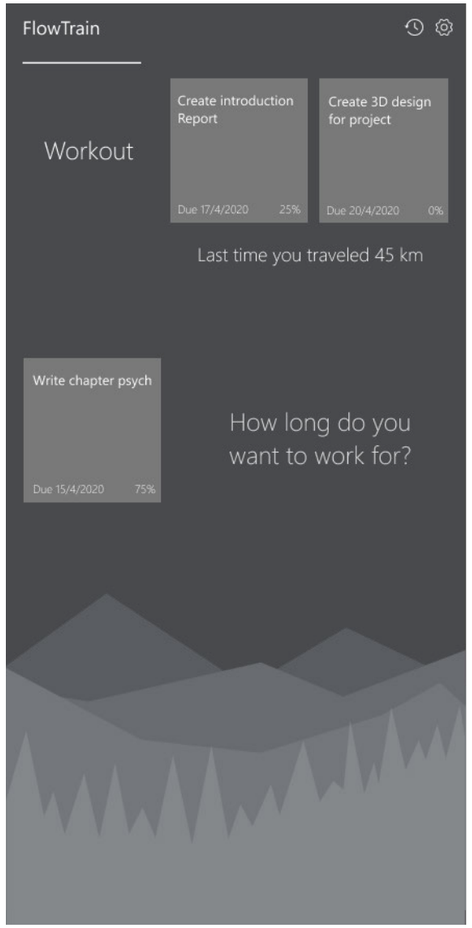
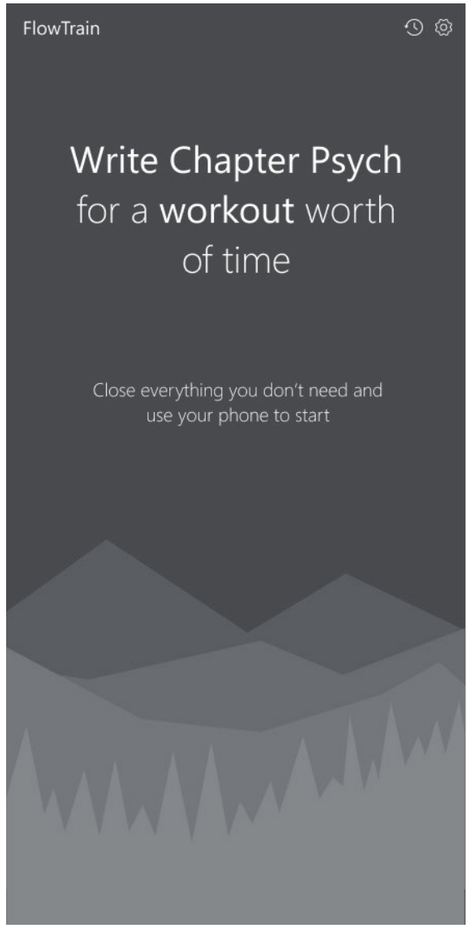


APPENDIX A

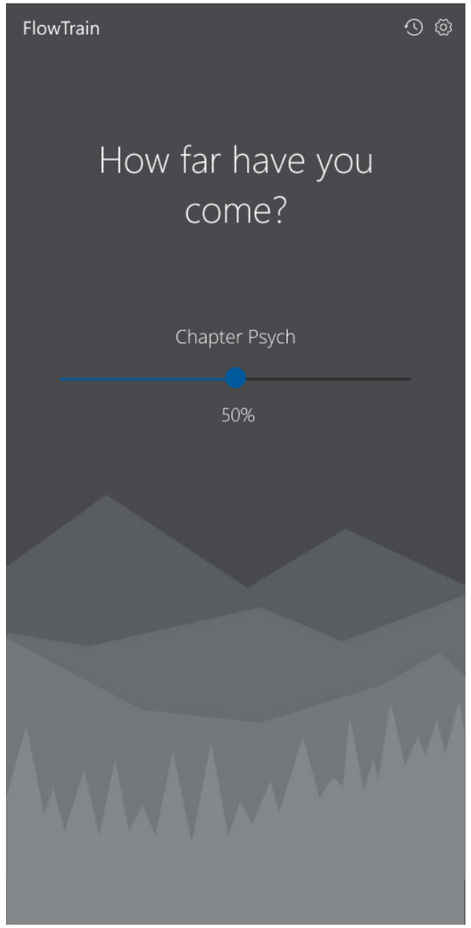

FlowTrain
Write chapter psych
Due 15/4/2020 75%
Create introduction Report
Due 17/4/2020 25%
Create 3D design for project
Due 20/4/2020 0%
Flow is found when we least expect it...


FlowTrain
Lunch
Create introduction Report
Due 17/4/2020 25%
Create 3D design for project
Due 20/4/2020 0%
Write chapter psych
Due 15/4/2020 75%
Last time you traveled 45 km
How long do you want to work for?

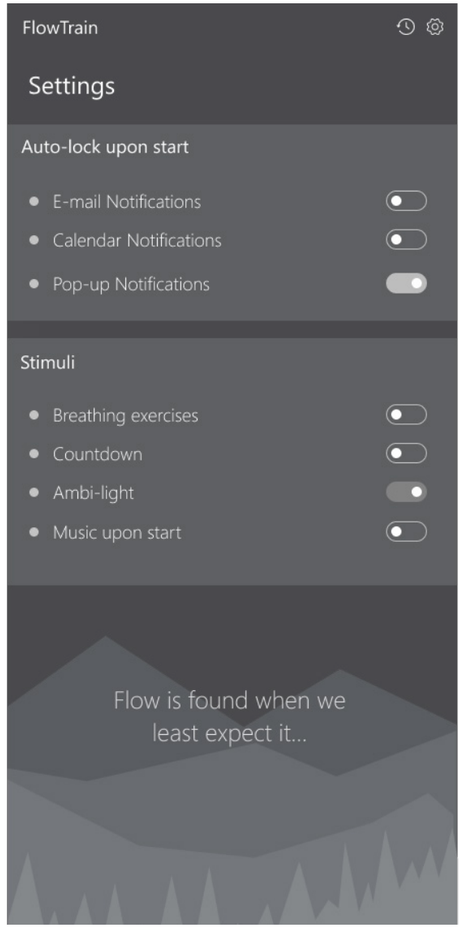

FlowTrain
Workout
Create introduction Report
Due 17/4/2020 25%
Create 3D design for project
Due 20/4/2020 0%
Last time you traveled 45 km
Write chapter psych
Due 15/4/2020 75%
How long do you want to work for?


FlowTrain
Write Chapter Psych for a workout worth of time
Close everything you don't need and use your phone to start


FlowTrain
WELL DONE!
60↑
km
Flow is a marathon, you took another big step towards perfect focus.
100 km/h avg.


FlowTrain
How far have you come?
Chapter Psych
50%


FlowTrain
History
Lvl. 2
Completed Tasks
80
Tasks
Traveled Flow Kilometers
345
km
Average Speed
215
km/h
300 km/h
Avg. km/h


FlowTrain
Settings
Auto-lock upon start
E-mail Notifications
Calendar Notifications
Pop-up Notifications
Stimuli
Breathing exercises
Countdown
Ambi-light
Music upon start
Flow is found when we least expect it...