network

Final Bachelor Project **Jelle Wories**

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INTRODUCTION

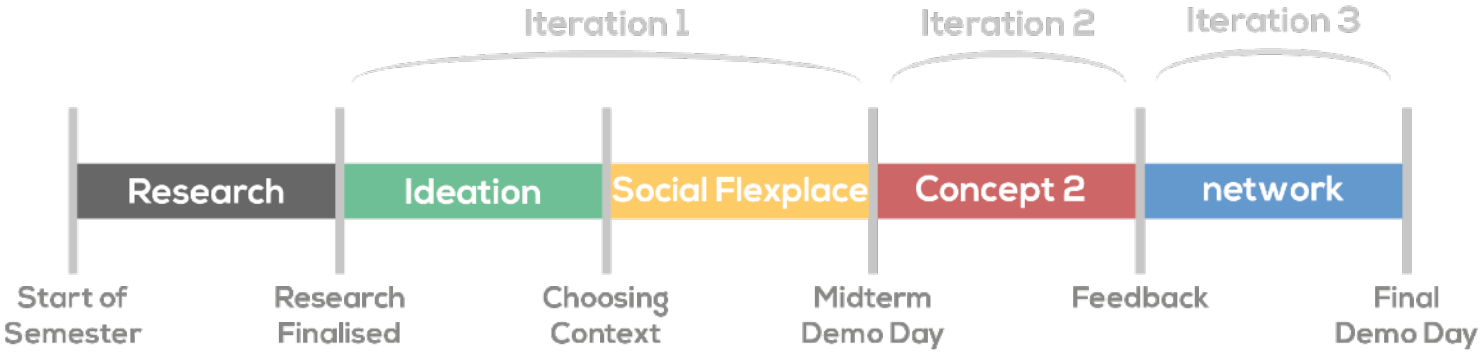
We see a growing trend in working at flexible offices, like Seats2Meet. People go there to work on projects, but mostly to meet people who can help them. Although online check-in systems exist, people often don't show up after making reservations, making the system unreliable.

Network is a physical check-in system, connected to an online platform, allowing you to meet the right people more easily. Mark people as "interesting", and you will get notified via the device whenever they enter the office, so you can go and find the person you are looking for.

Visitors have a better networking experience. Businesses know exactly what expertise is present at the flex office next door.

This report elaborates on the concept and the preceding process, reflecting upon it, as well as suggesting future developments.

PROCESS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Research
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Start of Semester
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Midterm Demo Day
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RESEARCH | CONTEXT MAPPING

To gain insights into the office context, a context mapping study was performed at the company Cordis Automation at the High Tech Campus. Context Mapping is a technique that combines cultural probes and a generative method. A context mapping consists of three sequential phases: sensitizing using cultural probes (Gaver et al., 1999), a (generative) group session, and analyzing the data.

A pilot version of the sensitizing study was created, using activity books as cultural probes, to estimate the time needed to finish each day's activities and to check if the tasks and questions given would generate insightful conclusions. The pilot version was then distributed in the project group and used for three days.

Sensitizing phase

The results and experiences from the pilot study were implemented in a final three-day working study using activity booklets. These booklets were distributed over four participants of different functions within the company.

Each day, the participants were asked to do different activities, like sketching their workplace, light sources, lighting controls, etc. With these steps, the booklet triggered a deeper understanding of the context, starting with environment, lighting and concluded by control over the lighting in the environment. All days included a clock figure in which participants were asked to indicate their location with a colour and their mood with emotion stickers.


ACTIVITY
BOOK
This booklet belongs to:
enno Beuting

RESEARCH | CONTEXT MAPPING

Group Session

The group session was useful in two aspects. Firstly, all questions could be asked to clarify the answers given in the activity booklets. Secondly, the meeting was held in their office environment and therefore the perfect opportunity to compare the office layout with the answers/sketches we got during the working study.

Since all of the participants had some trouble envisioning modern or improved lighting, some probes were needed to get fruitful results. Halfway through the meeting it was decided to eliminate the creation session, and instead fuel the discussion further. Examples of existing lights, installations and architecture were given to give an idea of the possibilities.

Left: group session at Cordis Automation

RESEARCH | CONTEXT MAPPING

Analysis

After carrying out the context mapping interview, we took the notes and recordings we obtained and sat down to analyze the data. After listening to the interview in its entirety and writing down notable quotes on post-it notes, we organized said notes into categories which we identified as being important or recurring themes. This affinity diagram allowed us to more clearly see relationships between our participant's comments. The categories were: Multi-User Interfaces, Control, Automation, Convenience, Awareness, Quality of Light, and Miscellaneous or Funny quotes (see picture on page 13).

"I was thinking of a small square where you can flip one side or the other to control the lights, now wouldn't that be perfect?"

The most interesting conclusion was that users in the office context are very satisfied with the lighting in their office, as long as there is enough light, and a simple on/off switch seems like the best controller to them. Because of how incredibly busy modern professionals can be, conditions in the workplace are very quickly accepted or settled for as other tasks demand users' attention; unless something is drastically wrong, the environment quickly fades into the background and has more of a subliminal effect on users. That being said, a design solution that is distracting or cognitively demanding, would be an unwelcome distraction. Users are skeptical about complex design solutions, and them having to change the lighting at all. Users were however also skeptical about automation or all-encompassing design solutions that do not show the potential or ability to adapt to their specific needs.


never
office without windows
8:19
don't want to know how automation works
10:20
no
shadows
17:15

RESEARCH | CONTEXT MAPPING

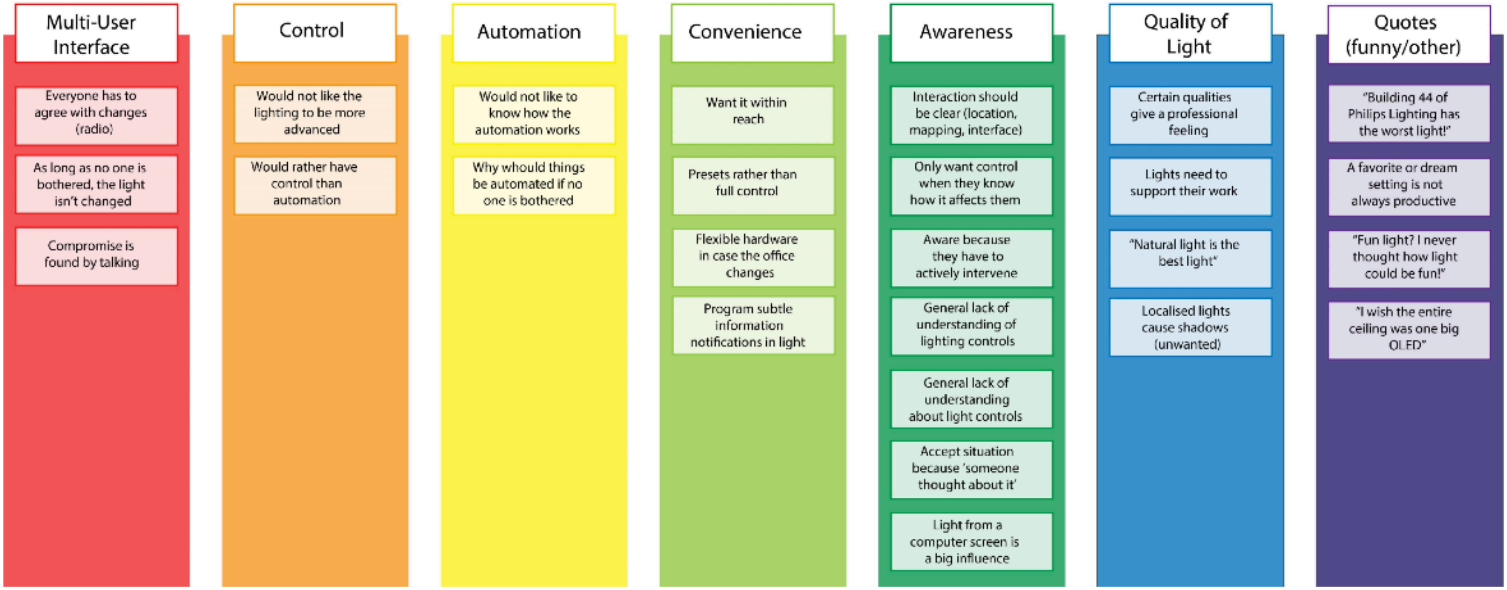
Analysis

On qualities of light, our participants commented: Light should not be too localized, as this causes irritating shadows and glare; light should be even and without pronounced differences. The color temperature of light should not be too warm, as it becomes too comfortable for a work environment. Natural light is often preferred, but again only if it is not direct.

On lighting system controls, they posited: There should be a clear mapping between interfaces and what lights they control. Controls should be consolidated, and not scattered about the office space. They expressed some resistance to interfaces that are too complex or advanced, as they place too high of a cognitive load and work is already demanding enough. Lastly, they said controls should distinguish themselves by not being part of the object itself, but a separate locus of interaction.

The above findings are paraphrased from a small sample group's responses. They therefore should not be rigidly adhered to, but they go a long way in familiarizing designers to this design space or context.

Right: Affinity Diagram for the Context Mapping Analysis


Multi-User Interface
Everyone has to agree with changes (radio)
As long as no one is bothered, the light isn't changed
Compromise is found by talking
Control
Would not like the lighting to be more advanced
Would rather have control than automation
Automation
Would not like to know how the automation works
Why whould things be automated if no one is bothered
Convenience
Want it within reach
Presets rather than full control
Flexible hardware in case the office changes
Program subtle information notifications in light
Awareness
Interaction should be clear (location, mapping, interface)
Only want control when they know how it affects them
Aware because they have to actively intervene
General lack of understanding of lighting controls
General lack of understanding about light controls
Accept situation because 'someone thought about it'
Light from a computer screen is a big influence
Quality of Light
Certain qualities give a professional feeling
Lights need to support their work
"Natural light is the best light"
Localised lights cause shadows (unwanted)
Quotes (funny/other)
"Building 44 of Philips Lighting has the worst light!"
A favorite or dream setting is not always productive
"Fun light? I never thought how light could be fun!"
"I wish the entire ceiling was one big OLED"

IDEATION & CHOOSING DIRECTION

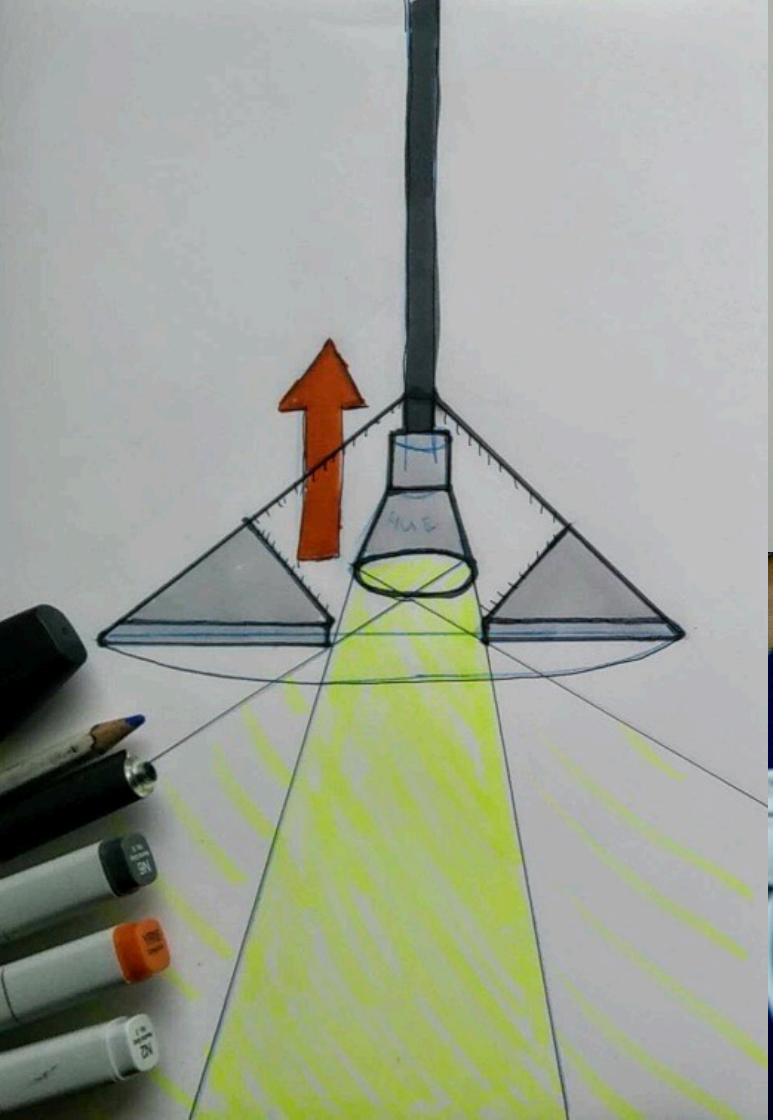
After the context mapping study, I started brainstorming on concepts for the office context. This varied from lighting armature designs (left picture), to thinking from interactions with the lamp (top right), to playing around with some Philips Hues (bottom right). This range of ideas was way too broad, because I lacked a clear goal or direction, so I got the advice to start by choosing a clear context and setting up a design goal.

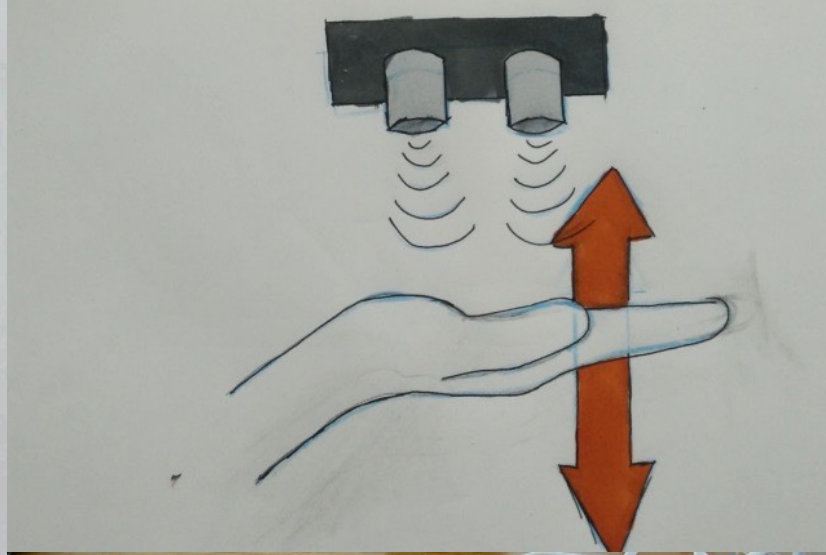
The main finding of our context mapping was that people are very skeptical about having to change the light with anything other than a regular on/off switch, and that controlling the light should be as effortless as possible. This is why I chose to pursue a design that gives more incentive to use the lighting interface.

I chose to work for the context of flexible offices, spaces where you can rent/get a place to work for a couple of hours. I found out that the most important reason people come here, is to meet new people who can help them with their work.

Adding this up to the research findings, I chose to give more incentive to using a lighting interface by integrating it with something that would stimulate and support social interaction in flexible offices.

Right: Idea generation





THE SOCIAL FLEXPLACE

CHECK IN | SET YOUR LIGHT | MEET NEW PEOPLE

CONCEPT 1 | THE SOCIAL FLEXPLACE

Based on the talks I had with people at Seats2Meet (one of many flex offices), and on the context mapping research, I made my first concept, the Social Flexplace.

The Social Flexplace is an online social platform that lets you claim a workspace with an application, on which everyone has their own profile. You can indicate wether you're available to talk or not, and can set and create presets for the light on your desk using the application. (interface on page to the left)

With the Social Flexplace, you can quickly see if there is someone present with the required knowledge and wether this person is available to be interrupted.

Left: the ''Social Flexplace'' Concept poster for midterm demo day

DESIGN OBJECTIVE

To design a lighting platform for flexible workplaces that stimulates social interaction.

Evaluation | Midterm Demo Day

At the midterm demo day, I showed my concept using the picture on the page to the right as poster, and the 3 posters to the right. I had set some goals and made a plan, I wanted 2 more iterations before the end of the semester, and to acquire some skills in the process. I pointed out the potential of the context I was working in, and presented my first concept.

Feedback included (among others): integrating the concept of lighting and social stimulation, by investigating how light can be socially inviting, that I should think about giving people an incentive to check in and out, some problems that I had not thought about like more people using the same table, considering a central interface and some practical advice, on application building software etc.

The thing that stood out most for me was that someone stressed the strength of having a physical object to control, as it is much more inviting to interact with it. Because my whole concept was based upon giving incentives to invite people to interact with the light, I thought this was a good point.

Right: presentation posters for midterm demo day

FLEXOFFICES

Growing demand for **freelancers, entrepreneurs** and **independent contractors**. They look for a place to meet others to enhance creativity.

Flexible workplaces | Personal service
Social network environment

CONTEXT

FLEXPLACES IN EINDHOVEN

Regus · Evoluon · iGluu · S2M · Nanoos · TRIBES

FLEXIBLE WORKPLACES

THE GOAL

Design a **lighting platform/service** for **flexible workspaces** that stimulates **social interaction**

THE PLAN

Research into flexplaces
Meet with Philips
Skills: Processing & 3D modeling

Develop 1st concept & test
- Validate concept

Develop 2nd concept & test
- Validate with prototype

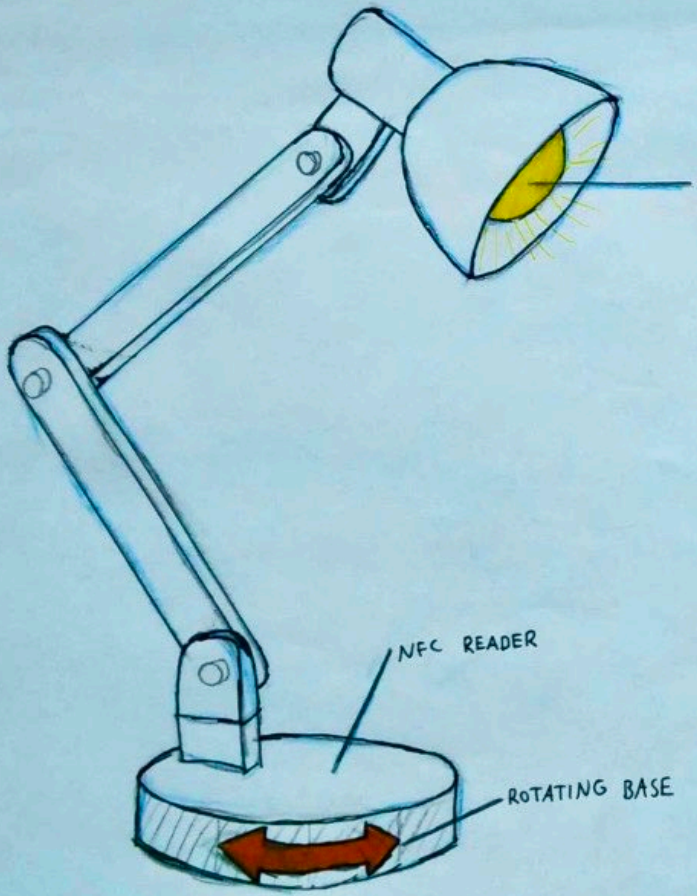
ITERATION I

31 okt. - 4 nov. research & concepts
7 nov. - 11 nov. skills training
14 nov. - 18 nov. development
21 nov. - 25 nov. validation & iteration

PLANNING

ITERATION II

28 nov. - 2 dec. development
5 dec. - 9 dec. development
12 dec. - 16 dec. validation
19 dec. - 23 dec. demo day prep



CONTROL LIGHT
- ROTATE BASE FOR PRESETS
- CHANGE PRESETS WITH BUTTON

CONCEPT 2 | PHYSICAL INTERFACE

The new concept involved a physical lighting interface, still combined with an online social platform. Every desk would have a device to check in or out using NFC tokens, and rotate the base to select presets for their lighting. Their would be one button for extra interactions like selecting and adjusting presets. This preset information would get stored online as your personal preferences, and remembered for next time you check in.

This could both be a desk lamp with integrated device (picture on page to the left), or as a stand-alone device that controls whatever lighting is involved on your workplace. I imagined that there would be a central server in the room that would receive all information and control all lights (Philips Hues for instance) remotely.

Left: Concept sketch

Evaluation | Experts, peers and future users

After having worked out the concept to a presentable format, I took a day to gain feedback on it. I went to the flex office seats2meet to speak to future users and present my concept, and did the same with peers, coaches and experts at the faculty. I reminded them about the situation without my concept, the situation they had explained to me earlier, where people whom you find interesting make reservations so you go there too to meet them, but then they don't show up. I presented them my concept and the new situation where this problem is solved, and asked for feedback.

The main finding from all this feedback, which came back in almost every conversation, was that controlling the light was merely a side function. This was when I decided, in close consultation with my coaches and other experts at the faculty, to focus on the core of the concept, the social platform, and adjust my design objective accordingly.

OBJECTIVE UPDATE

To design a ~~lighting~~ platform for flexible workplaces that stimulates social interaction.

FINAL CONCEPT

NETWORK

Network is a check-in system for flexible offices, connected to an online social platform, allowing you to meet the right people more easily.

Every workplace in the office will have a physical check-in device, which is also used for notifications. When you arrive at your workplace, simply check in using your token and you will be registered as present at the particular office.

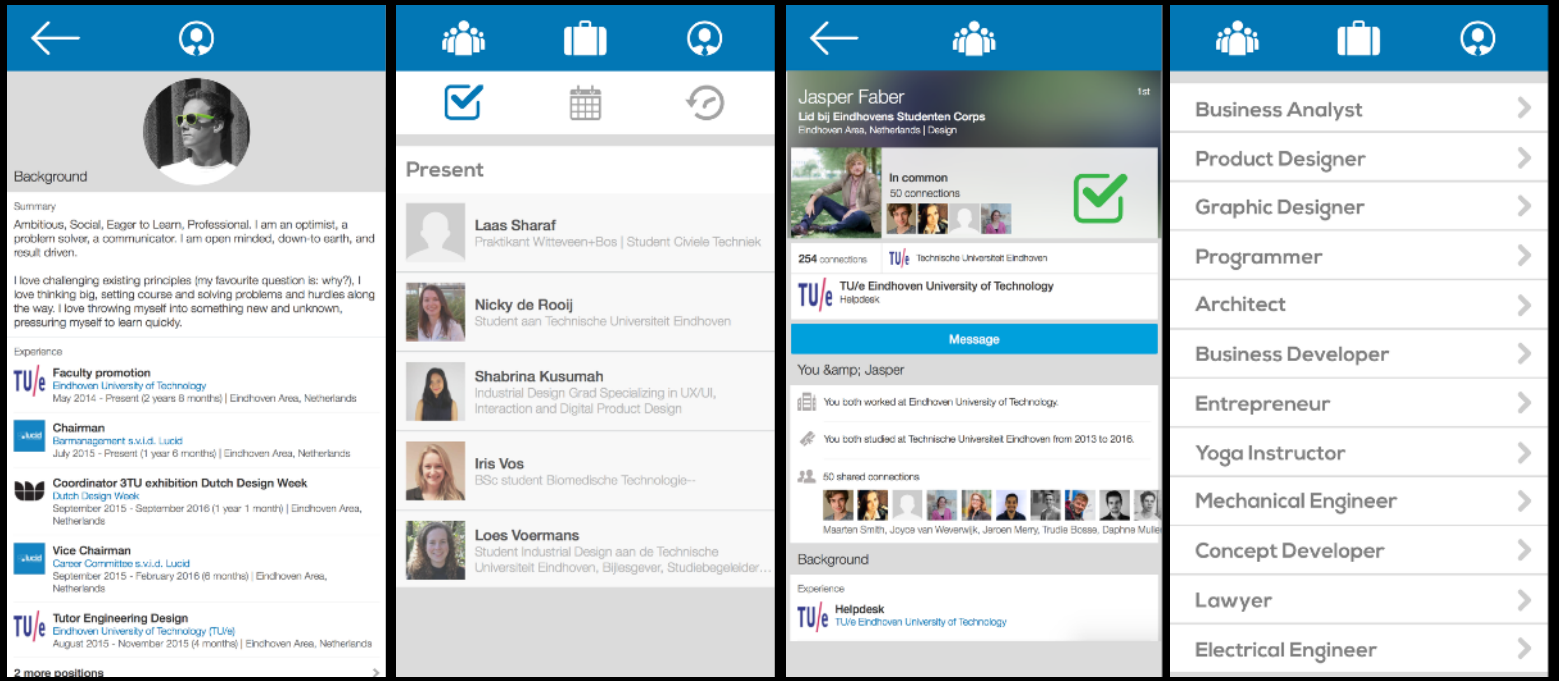
Now, it’s time to get your phone out to start the app.

THE APPLICATION

Using the application, you can see who is present at this particular office (next page, middle left picture), who has made reservations for a workplace later that day, and a list of all people who have ever visited the office in question. You will have your own profile in this application (far left), which can be synchronised with LinkedIn. You can also search for people based on their Area of Expertise (far right).

On people's profiles, you can mark them as ‘’interesting’’ (middle right) so when this person checks in, you will get a notification on your device, so you can go and find the person you are looking for.

When you're done, just pack up your stuff and check out!



Several screens from the application interface

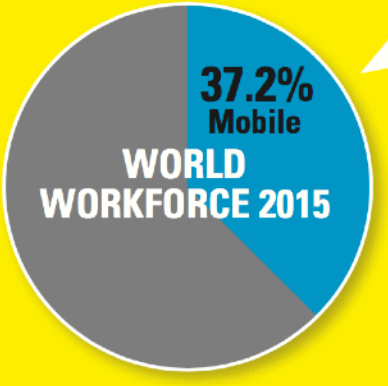
By 2015, the world's mobile worker population will reach

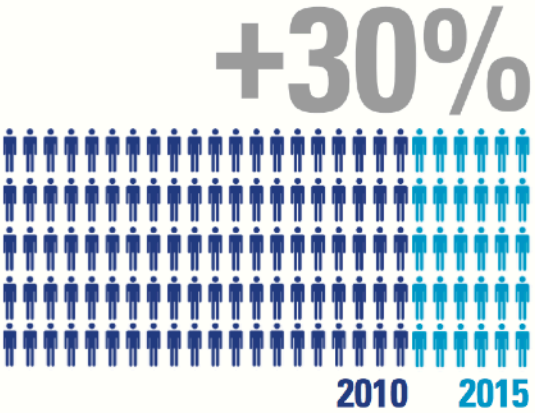
1.3 billion,

or 37.2% of the total workforce. That is another

300 million

mobile workers on the planet compared to 2010





AMERICAS

182.5 mil → 212.1 mil

EUROPE, MIDDLE EAST, AFRICA

MOBILE WORKERS
2010-2015

186.2 mil → 244.6 mil

ASIA PACIFIC

629.6 mil → 877.3 mil

= 10 million mobile workers

THE BUSINESS

We see a growing trend in the world's mobile working population and the correlating trend of working at flexible offices, like Seats2Meet. People go there to work on projects, but mostly to meet people who can help them. As work becomes more flexible and communication more mobile, the office is turning into an increasingly complex and even abstract concept. In the past years, the mobile worker population has grown tremendously, as a result of the new ways of working and the rise of the freelancer.

"Everyone knows the legend that innovation starts in a garage, but sooner or later we all grow up and need a place to work."

-Tom Kelley, IDEO (2001)

I would start a company that responds to this trend, called Network Systems. We will install and run the Network System at flexoffices for free. The Network application will be free to download and the token to check in will also be available for visitors of flexoffices for free.

Left: future projection from IDC (2012). Source: http://www.businesswire.com/news/home/20120105005455/en/Mobile-Worker-Population-Reach-1.3-Billion-2015

THE BUSINESS

Everything for free, cool! Now… how do we do that?

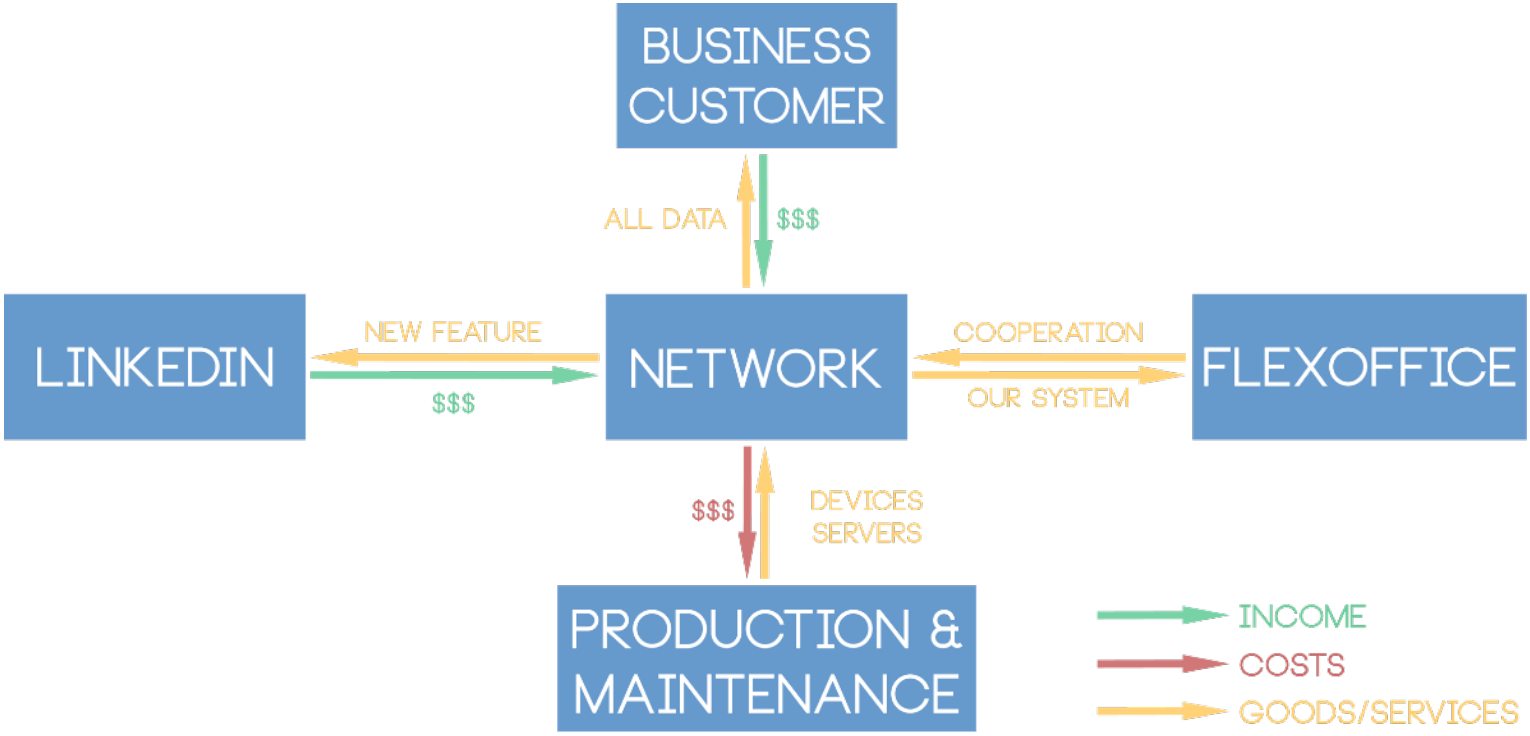
First of all, we will offer special subscriptions to companies (business customers), who will get access to all relevant data and exclusive features; where to find people with the right expertise, where these people have been, recommendations, etc., in order to approach them, recruit them, you name it.

Second, we will enter a partnership with LinkedIn, who will be able to offer an extra feature ‘’where to find him/her’’ to all profiles, which they will pay us for.

The value of the system increases with increased amounts of existing data. This is why we offer the system for free to both flexoffices and users. This way, we can create large user groups (and lots of data) very quickly because of the low try-out thresholds, which adds to huge credibility of our business. For flexoffices, the threshold to give our system a try is very low, since they can offer an entirely new feature to their customers at no cost at all, and the same goes for users of the system.

Flexoffices can offer their visitors a new feature for free. Visitors have a better networking experience. Businesses know exactly what expertise is present at the flex office next door.

Right: business model network systems


BUSINESS CUSTOMER
ALL DATA
$$$
LINKEDIN
NEW FEATURE
$$$
NETWORK
COOPERATION
OUR SYSTEM
FLEXOFFICE
$$$
DEVICES SERVERS
PRODUCTION & MAINTENANCE
INCOME
COSTS
GOODS/SERVICES

THE TECHNOLOGY & MECHANICS

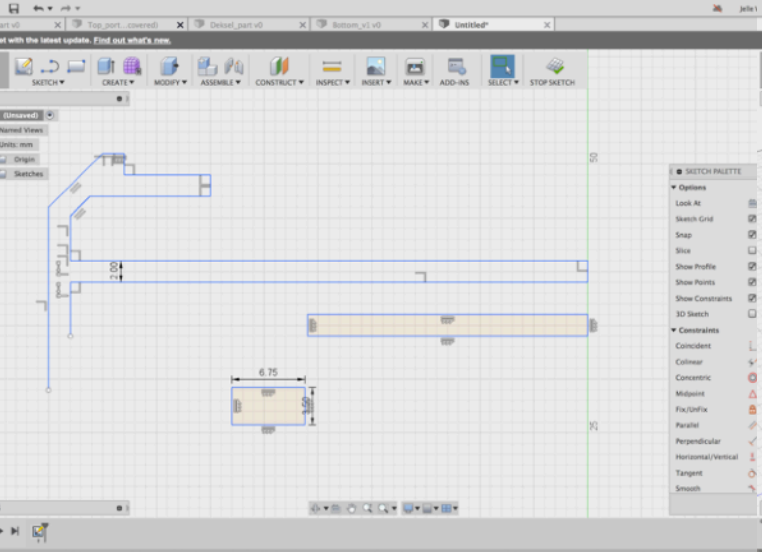
3D modelling & printing

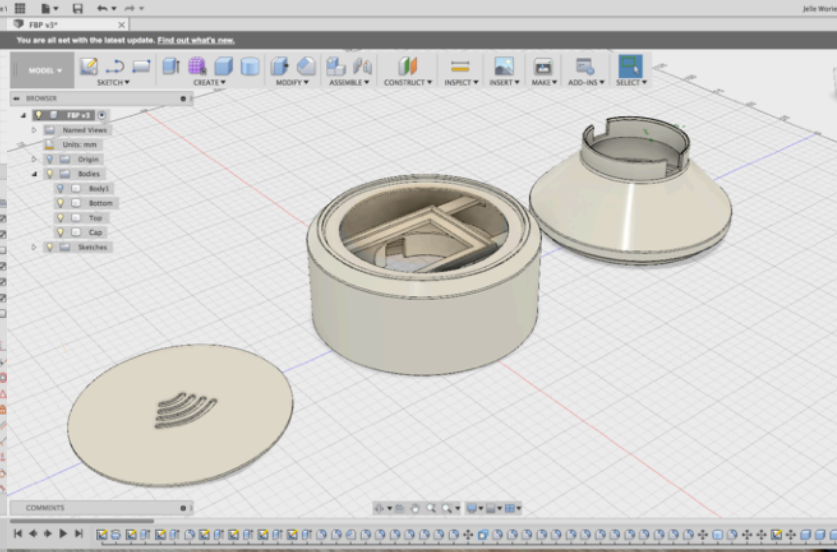
The physical module exists out of 3 parts, the bottom, the top, and the cap. The shapes of these parts was too complex for injection moulding and hand-making, so I decided to have it 3D printed. The model was made in Autodesk Fusion 360, exported to STL and printed using a state-of-the-art professional 3D printer (Objet Connex 350), using VeroWhitePlus material, a rigid opaque photopolymer.

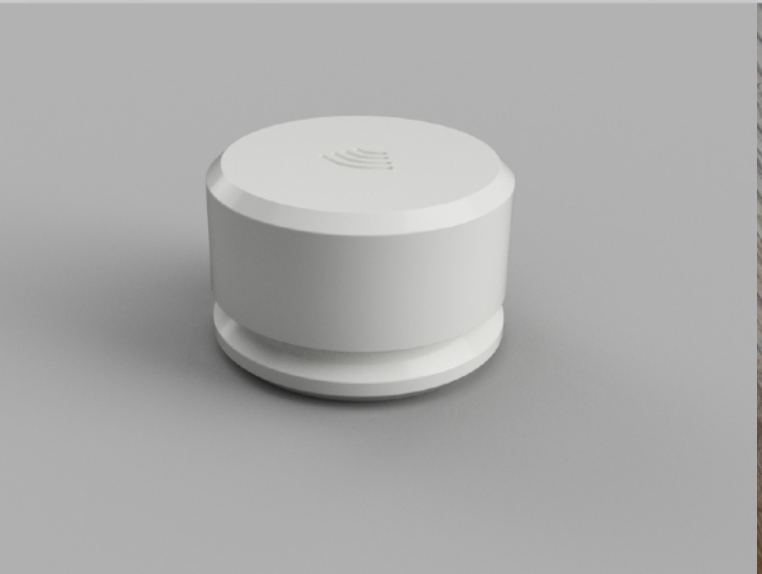
There were a few complications with printing the parts. Because of the complex structure, a lot of support material was needed to print it. Also, because of the 45 degree angles in the models, there was a risk of printing material hanging loose when using regular home 3D printers. All these problems would not be applicable when using selective laser sintering or printing with resins, but these techniques were not available to me in short notice.

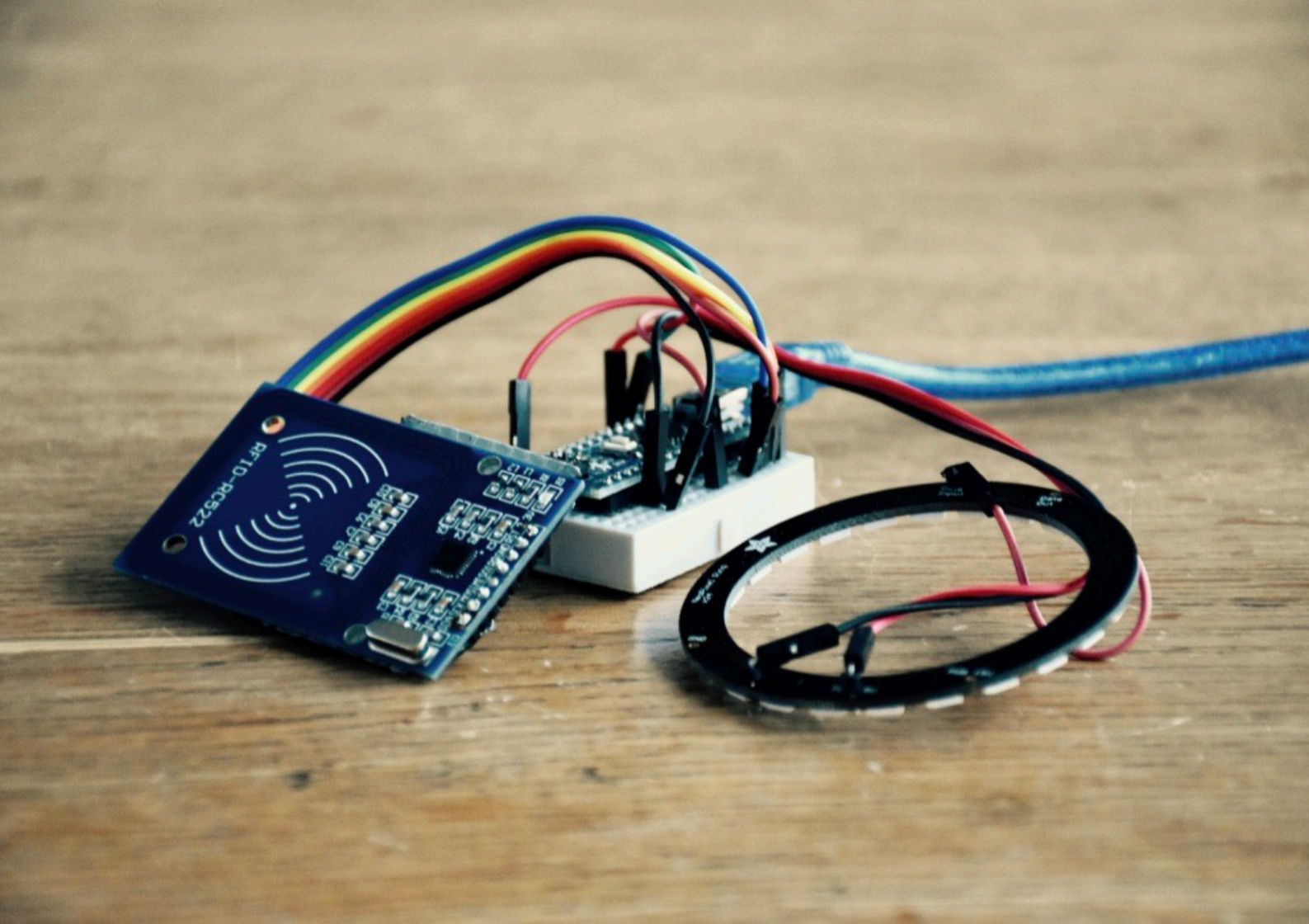
I learned a lot about 3D printing because I had never done this before, and applied knowledge gained in electives about mechanical engineering to my design, like using standing edges and rounding for mechanical strength.

Right: 3D modelling & printing process


Untitled*
SKETCH
CREATE
MODIFY
ASSEMBLE
CONSTRUCT
INSPECT
INSERT
MAKE
ADD-INS
SELECT
STOP SKETCH
SKETCH PALETTE
Options
Look At
Sketch Grid
Snap
Slice
Show Profile
Show Points
Show Constraints
3D Sketch
Constraints
Coincident
Collinear
Concentric
Midpoint
Fix/UnFix
Parallel
Perpendicular
Horizontal/Vertical
Tangent
Smooth
6.75
5.00
50
25

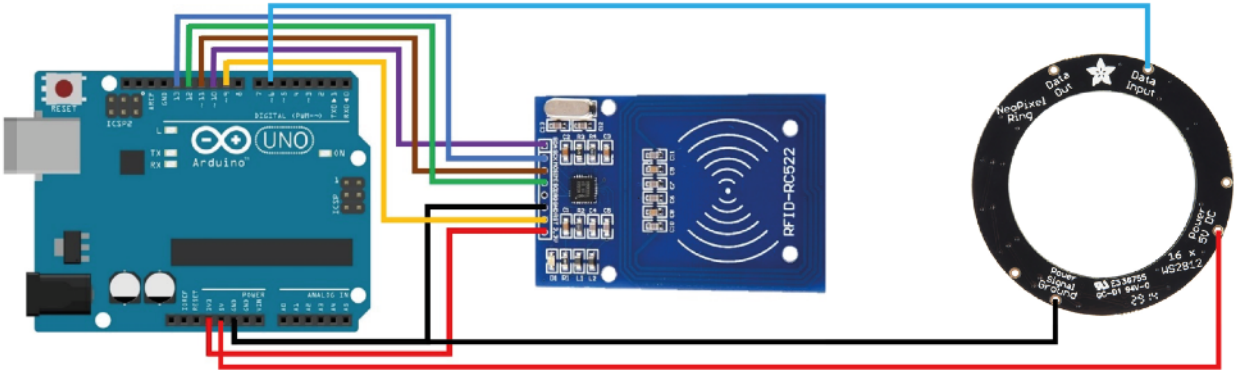

FBP v3*
You are all set with the latest update. Find out what's new.
MODEL
SKETCH
CREATE
MODIFY
ASSEMBLE
CONSTRUCT
INSPECT
INSERT
MAKE
ADD-INS
SELECT
BROWSER
FBP v3
Named Views
Units: mm
Origin
Bodies
Body1
Bottom
Top
Cap
Sketches
COMMENTS




RF10-RC522

Parts used

- RFID reader (MFRC522)
- Microcontroller (Funduino Nano 3.0 Atmega328 5V 16MHz)*
- Adafruit Neopixel Ring (24 x 5050 RGB LED)
- Breadboard, wiring and resistors



*Wiring scheme depicts a different Arduino. Coding of the microcontroller was done using Arduino (see appendix XX for the lines of code)

Left: electronics used in the network demo day demonstrator

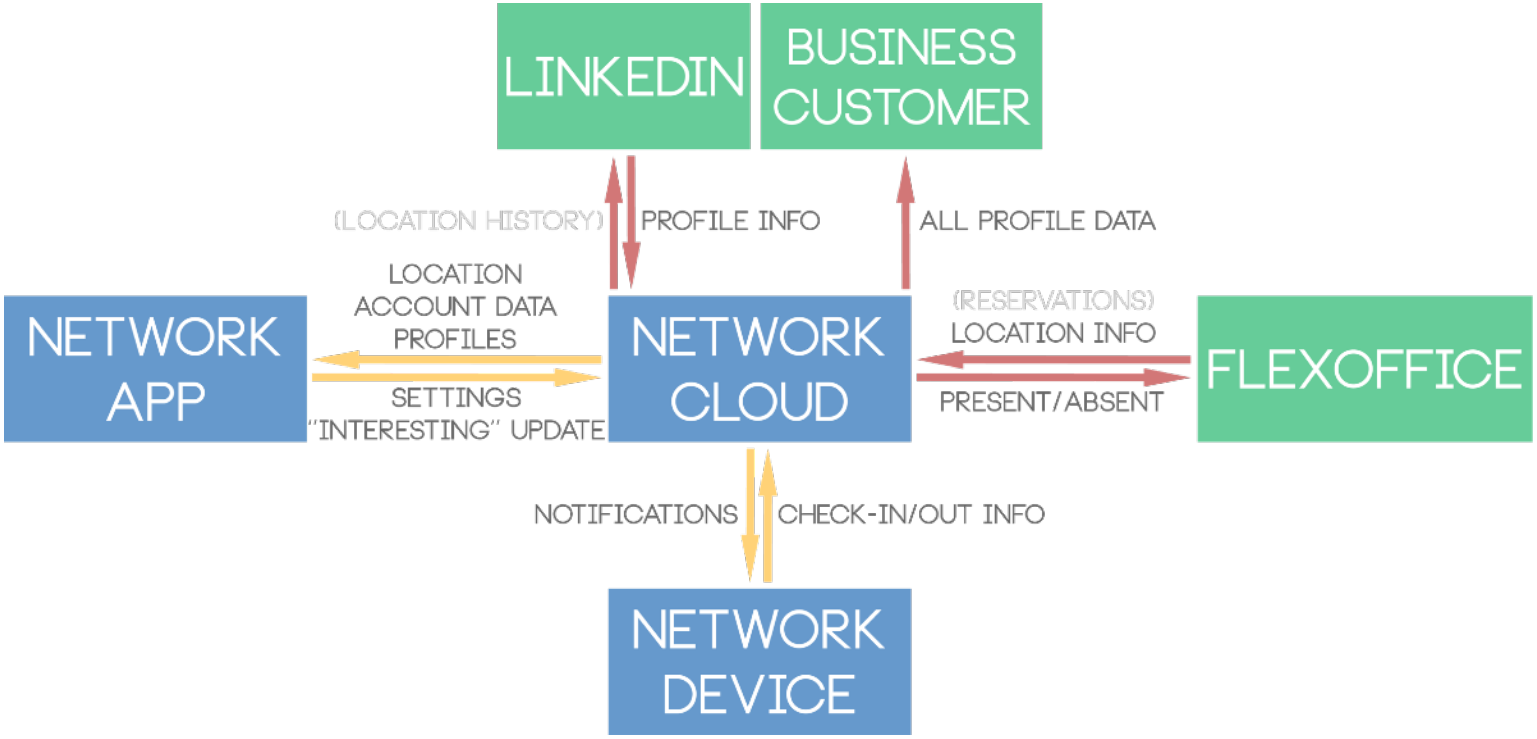
Since the value of the concept lies in generating and selling data, I thought it best to explain this using a data flow scheme, as seen on the next page.

The blue sections belong to our company, the green sections are partners and/or customers. The *Network Device* sends check-in/out data to the *Network Cloud*, which recognises your location, and sends this, plus your profile data and the profiles data of other people at that location to the *Network Application*. The application is used to mark people as ‘’interesting’’ and update your settings, both get send to the cloud. When an ‘’interesting person’’ checks in, this information will get sent to the device.

Profile data can be retrieved from LinkedIn, a possibility is also a new function for LinkedIn; ‘’where to find him/her’’ using location history, more on that in the next chapter about future developments. Flexoffices send information on their location to the cloud, and they will get information about who is present at the office.

Business Customers get all the information that is available in the cloud, giving them acces to a rich data base of where to find the right people.

Right: data flow network systems


LINKEDIN
BUSINESS CUSTOMER
(LOCATION HISTORY)
PROFILE INFO
ALL PROFILE DATA
LOCATION
ACCOUNT DATA
PROFILES
NETWORK APP
SETTINGS
"INTERESTING" UPDATE
NETWORK CLOUD
(RESERVATIONS)
LOCATION INFO
PRESENT/ABSENT
FLEXOFFICE
NOTIFICATIONS
CHECK-IN/OUT INFO
NETWORK DEVICE


NETWORK

EVALUATION | DEMO DAY

People were quite positive about the concept and the demonstrator. The demonstrator looked very good (see page to the left), worked flawless, and communicated the idea very well. I got the feedback that the concept is also very feasible, which is what I had in mind during the process so that was good, and received a possible invitation to present my concept to several companies in the first few months of 2017.

Feedback also included that now I brought the concept back to it's core, it would be very interesting to see what features can now again be added to it. I had a very interesting conversation with several PhD'ers on an internet of things system where information on your desired lighting, climate control, favourite type of coffee etc. is retrieved whenever you check in at a workplace. The idea of coming full circle and reintegrating lighting control in the concept is a nice idea.

One of the future plans will definitely be to look into what else can be displayed or controlled using the device.

Left: Demo Day setup, as featured on the ID Facebook page

FUTURE DEVELOPMENTS

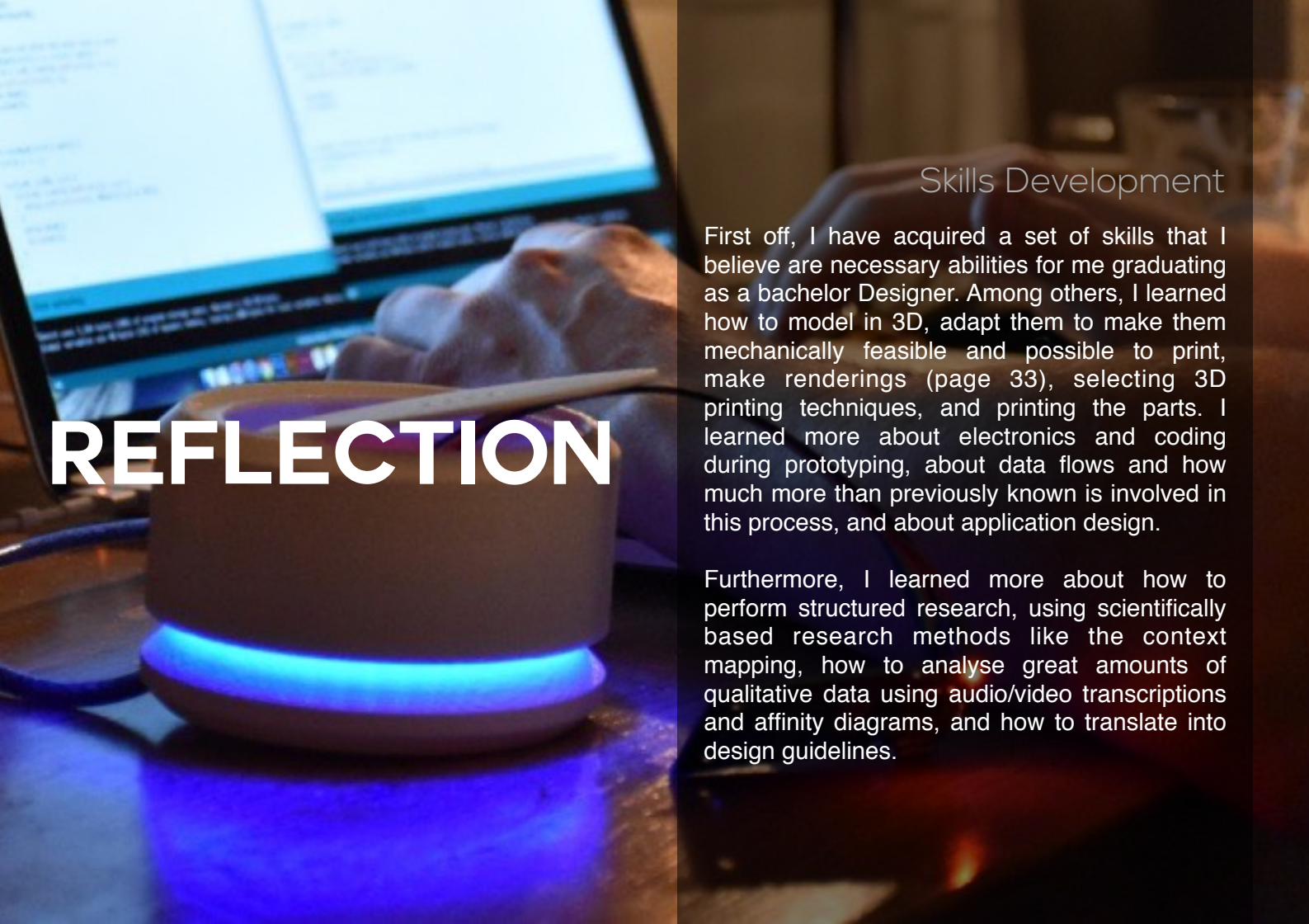
FUTURE DEVELOPMENTS

Business Case

First of all, I would like to improve, detail, and validate the business case. Approaching companies to find out what exactly is needed in the ‘’business customer’’ package to make it attractive for them, and looking into the financial feasibility of the business model. Next to the generic business aspects that still have to be specified, like channels, core activities, branding, etc., it would also be interesting to see what possible partners could contribute to the business model.

Adding features

As pointed out at the demo day, it would be very interesting to see what features can be added to the concept now that is has been stripped down to it’s core feature; the check-in system. Looking into a possible internet of things, everything is connected-concept is definitely cool, although I am afraid that this might disrupt the simplicity of the concept which I believe to be one of it’s strengths. These assumptions have to be tested and validated.



REFLECTION

Skills Development

First off, I have acquired a set of skills that I believe are necessary abilities for me graduating as a bachelor Designer. Among others, I learned how to model in 3D, adapt them to make them mechanically feasible and possible to print, make renderings (page 33), selecting 3D printing techniques, and printing the parts. I learned more about electronics and coding during prototyping, about data flows and how much more than previously known is involved in this process, and about application design.

Furthermore, I learned more about how to perform structured research, using scientifically based research methods like the context mapping, how to analyse great amounts of qualitative data using audio/video transcriptions and affinity diagrams, and how to translate into design guidelines.

But most of all, I learned a lot about myself during my final bachelor project. The biggest lesson I learned is that I am definitely a team player. I'm more productive in a team, more motivated, more structured, and I don't like working on my own. I struggled tremendously with the lack of direct feedback from teammates, and the

Over the years, I noticed that I am a natural leader in teams. Structuring and giving direction to a team, motivating and coordinating it are things I am, and have become very good at. I'm good at separating essentials and inessentials, and directing all efforts towards the essentials. So I'm good at the bigger picture and making big decisions, but when it comes to details like actually making cultural probes (or report writing for that matter), I often find myself being impatient and wanting to take new steps forward instead of thinking about details, which is not always a good thing.

Having said that, I struggled quite a lot with setting direction and goal on my individual process, because of the lack of direct feedback, which you would get in a team. Without the direct feedback, the process can quickly become abstract and feel subjective, and this is when I tend to lose myself in doing things that are less abstract, but sometimes also less relevant, hence delaying my design process because I don't get around to the more abstract aspects (i.e. ideation). This, in combination with my ambition to perform ever bigger and better at everything and my inability to say ''no'', caused me to have a rain check on my desired results from time to time and rethink my strategy.

Overall, I am happy with the result so far, and look forward to taking the next steps.

ACKNOWLEDGEMENTS

dr. ir. H.A. (Harm) van Essen *Assistant Professor at the Department of Industrial Design*
Coaching on the project and it's direction.

prof. dr. ir. L.M.G. (Loe) Feijs *Professor at the Department of Industrial Design*
Coaching on overall personal development and development as a designer.

K. (Karin) Niemandsverdriet *Doctoral Candidate at the Department of Industrial Design*
Helped me set up some user tests and provided valuable feedback throughout the process.

P. (Patrick) Duis *Growth program manager 3D printing at DSM*
Taught me a lot about 3D printing and different methods to do so.

C. (Chet) Bangaru *Education and Research at Department of Industrial Design*
Was of great help with 3D modelling & printing.

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APPENDIX

APPENDIX 1: ARDUINO CODING

```
// Example sketch to read the ID from an Addicore 13.56MHz RFID tag
// as found in the RFID AddiKit found at:
//   http://www.addicore.com/RFID-AddiKit-with-RC522-MIFARE-Module-RFID-Cards-p/126.htm

#include <AddicoreRFID.h>
#include <SPI.h>
#include <Adafruit_NeoPixel.h>
#include <SoftwareSerial.h>

#define    uchar    unsigned char
#define    uint     unsigned int

#define PIN 6                //output pin for Neopixel Ring

uchar fifobytes;
uchar fifoValue;

AddicoreRFID myRFID; // create AddicoreRFID object to control the RFID module

/////////////////////////////////////////////////////////////////////
//set the pins
/////////////////////////////////////////////////////////////////////
const int chipSelectPin = 10;
const int NRSTPD = 5;
int x;

//Maximum length of the array
#define MAX_LEN 24

Adafruit_NeoPixel ring = Adafruit_NeoPixel(24, PIN, NEO_GRB + NEO_KHZ800);

void setup() {
  Serial.begin(9600);                    // RFID reader SOUT pin connected to Serial RX pin at 9600bps

  ring.begin();
  ring.show();            // Initialize all pixels to 'off'

  delay(2000);


  // start the SPI library:
  SPI.begin();

  pinMode(chipSelectPin, OUTPUT);              // Set digital pin 10 as OUTPUT to connect it to the RFID /ENABLE pin
  digitalWrite(chipSelectPin, LOW);       // Activate the RFID reader
  pinMode(NRSTPD, OUTPUT);                  // Set digital pin 10 , Not Reset and Power-down
  digitalWrite(NRSTPD, HIGH);

  myRFID.AddicoreRFID_Init();
}
```

```
void loop()
{

  uchar i, tmp, checksum1;
  uchar status;
  uchar str[MAX_LEN];
  uchar RC_size;
  uchar blockAddr;        //Selection operation block address 0 to 63
  String mynum = "";

  str[1] = 0x4400;
  //Find tags, return tag type
  status = myRFID.AddicoreRFID_Request(PICC_REQIDL, str);
  if (status == MI_OK)
  {
    Serial.println("RFID tag detected");
    Serial.print("Tag Type:\t\t");
    uint tagType = str[0] << 8;
    tagType = tagType + str[1];
    switch (tagType) {
      case 0x4400:
        Serial.println("Mifare UltraLight");
        break;
      case 0x400:
        Serial.println("Mifare One (S50)");
        break;
      case 0x200:
        Serial.println("Mifare One (S70)");
        break;
      case 0x800:
        Serial.println("Mifare Pro (X)");
        break;
      case 0x4403:
        Serial.println("Mifare DESFire");
        break;
      default:
        Serial.println("Unknown");
        break;
    }
  }

  //Anti-collision, return tag serial number 4 bytes
  status = myRFID.AddicoreRFID_Anticoll(str);
  if (status == MI_OK)
  {
    checksum1 = str[0] ^ str[1] ^ str[2] ^ str[3];
    Serial.print("The tag's number is:\t");
    Serial.print(str[0]);
    Serial.print(" , ");
    Serial.print(str[1]);
    Serial.print(" , ");
    Serial.print(str[2]);
    Serial.print(" , ");
    Serial.println(str[3]);

    Serial.print("Read Checksum:\t\t");
    Serial.println(str[4]);
    Serial.print("Calculated Checksum:\t");
    Serial.println(checksum1);

    Serial.println(x);

// Should really check all pairs, but for now we'll just use the first
    if (str[0] == 246)                    //You can change this to the first byte of your tag
by finding the card's ID through the Serial Monitor
    {

      if (x == 0)
      {
        Serial.println("\nHOIHOI!\n");

        chase(ring.Color(0, 255, 0)); // Green
        ring.show();
        x = 1;
      }
```

```
else if (x == 1)
    {
      Serial.println("\ndoei!\n");

      chase(ring.Color(255, 0, 0)); // Red
      ring.show();
      x = 0;
    }
  }

   else if (str[0] == 135) {            //You can change this to the first byte of your tag by
finding the card's ID through the Serial Monitor
    Serial.println("\nHEEYHEY!\n");
    delay(2000);
    chase(ring.Color(0, 0, 255)); // Blue
    chase(ring.Color(0, 0, 255)); // Blue
    chase(ring.Color(0, 0, 255)); // Blue
    chase(ring.Color(0, 0, 255)); // Blue
    chase(ring.Color(0, 0, 255)); // Blue
    //theaterChase(ring.Color(0, 255, 255), 50); // Blue
    ring.show();

  }

  Serial.println();
  myRFID.AddicoreRFID_Halt();      //Command tag into hibernation

  if (x == 0)
  {
    for (int i = 0; i < ring.numPixels(); i ++) {
      ring.setPixelColor(i, 0, 0, 20);
      ring.show();
    }
  }
else if (x == 1)
  {
    for (int i = 0; i < ring.numPixels(); i ++) {
      ring.setPixelColor(i, 60, 80, 80);
      ring.show();
    }
  }
 }
}
```

```
////////////////////////////////////////////////////////////////
//Defining states and phases
////////////////////////////////////////////////////////////////


// Fill the dots one after the other with a color
void colorWipe(uint32_t c, uint8_t wait) {
 for (uint16_t i = 0; i < ring.numPixels(); i++) {
   ring.setPixelColor(i, c);
   ring.show();
   delay(wait);
 }
}

//Theatre-style crawling lights.
void theaterChase(uint32_t c, uint8_t wait) {
 for (int j = 0; j < 50; j++) { //do 10 cycles of chasing
   for (int q = 0; q < 3; q++) {
     for (uint16_t i = 0; i < ring.numPixels(); i = i + 3) {
       ring.setPixelColor(i + q, c);  //turn every third pixel on
     }
     ring.show();

     delay(wait);

     for (uint16_t i = 0; i < ring.numPixels(); i = i + 3) {
       ring.setPixelColor(i + q, 0);      //turn every third pixel off
     }
   }
 }
}



static void chase(uint32_t c) {
 for (uint16_t i = 0; i < ring.numPixels() + 4; i++) {
   ring.setPixelColor(i  , c); // Draw new pixel
   ring.setPixelColor(i - 4, 0); // Erase pixel a few steps back
   ring.show();
   delay(40);
 }
}
```

APPENDIX 2: DEMO DAY POSTER

SCAN FOR
EXPLANATORY FILES

NETWORK

We see a growing trend in working at flexible offices, like Seats2Meet. People go there to work on projects, but mostly to meet people who can help them. Although online check-in systems exist, people often don't show up after making reservations, making the system unreliable.

Network is a physical check-in system, connected to an online platform, allowing you to meet the right people more easily. Mark people as "interesting", and you will get notified via the device whenever they enter the office, so you can go and find the person you are looking for.

Visitors have a better networking experience. Businesses know exactly what expertise is present at the flex office next door.

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