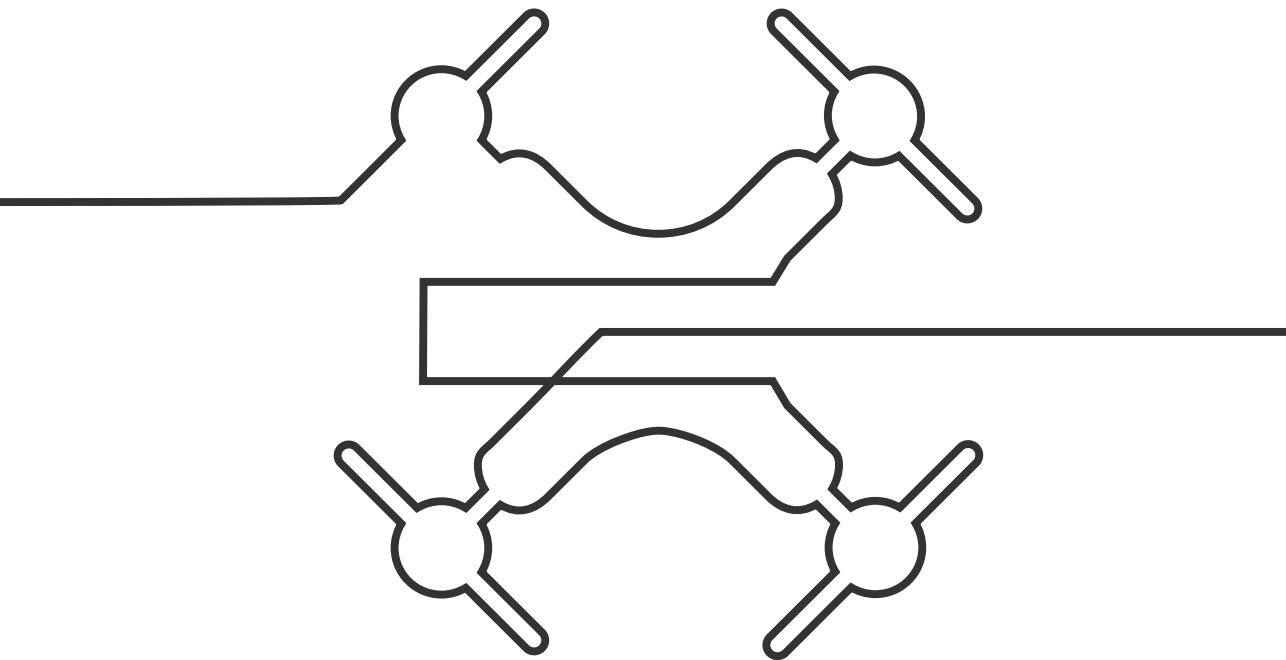# RED PIMIENTO TO CONSUMER

A Bachelor Thesis by Mendel de Kok

RED PIMIENTO TO CONSUMER

BACHELOR THESIS INDUSTRIAL DESIGN ENGINEERING

AUTHOR
Mendel de Kok
S1315862

MENTORS
Pepijn van Passel
Jeroen Beeloo

CLIENT
Red Pimiento
Vijzelgracht 53 B
1017HP Amsterdam
The Netherlands

EXAMINATORS
Matthijn de Rooij
Arie Paul van den Beukel

DATE PRESENTATION
23-08-2016

UNIVERSITY OF TWENTE
Faculty of Engineering Technology
Industrial Design
The Netherlands

DATE PUBLICATION
14-08-2016

PAGES THESIS
110

SUPERVISOR
Luuk Akkerman

PAGES APPENDIX:
160

"TO INVENT, YOU NEED A GOOD IMAGINATION AND A PILE OF JUNK."

Thomas A. Edison

PREFACE

The thesis report before you is my final bachelor assignment, called 'Red Pimiento to Consumer'. The assignment was commissioned by the design agency of Red Pimiento, and gave me the honour to develop a product for Red Pimiento to sell on a consumer market. This paper was written as part of my graduation from the bachelor study Industrial Design Engineering.

Together with my supervisor at Red Pimiento, Luuk Akkerman, I have walked through the course of the past three months, which has been far from monotone and unvarying. Luuk has been an excellent guide, instructor and mentor, for which I am very thankful. With the help and advice of Luuk, the assignment developed into an extended and comprehensive project which has given me endless freedom to employ all the knowledge I have learned during my bachelor about designing and the design process. Moreover, I have learned strikingly more things from Red Pimiento and its employees on this subject, as well as on personal level.

While I spent my time at Red Pimiento, my university mentor Pepijn van Passel has regularly given me prudent and professional feedback, for which I am thankful. I also want to thank Jeroen Beeloo, for taking this task over and showing his confidence in me; Lennard van der Meij for his sincere feedback and much appreciated opinions; Arjan de Kok, for his sound advice during the process and for proofreading this whole thesis; and last but not least, André Dye, for giving me this opportunity and for his honesty, certainty and enthusiasm in my results.

Mendel de Kok

ABSTRACT

BACKGROUND

Red Pimiento is an industrial design agency that produces accessories for technical products, such as camera-bags, straps and cases, for the Business to Business (B2B) market. Red Pimiento now wishes to enter the Business to Consumer (B2C) market with new product accessories of their own. The goal of this assignment was to design a product proposal that is appropriate for the consumer market. This proposal should suit Red Pimiento's repertoire and respond to an unsaturated and growing product market.

APPROACH

A diverging and converging approach is used. First, the scope of possible design directions is diverged by exploring emerging markets. After this the results are converged into one market option. This market is then diverged into multiple product options, of which two options are finally chosen to be elaborated. One of those two options was developed into production.

RESULTS

Research showed that the drone consumer market is the most suitable business to consumer market to step into. This market showed good potential for new product accessories. The two accessories chosen to elaborate upon are: (1) a game set for unprofessional drone racing and (2) a backpack for drones. The backpack for drones were elaborated into full production guidelines and is currently in test production.

CONCLUSIONS

By using the chosen approach a consumer market was selected that appears to be the most suitable market for Red Pimiento to step into. The assignment has guided Red Pimiento towards the B2C market and Red Pimiento has chosen to produce the designed accessories, as well as the other accessory ideas. For entering the market, however, eventually structural changes to Red Pimiento's business model, in terms of technological research and human resources, may be required.

ABSTRACT
- DUTCH VERSION -

ACHTERGROND

Red Pimiento is een industrieel ontwerp bureau dat technische product accessoires, zoals camera tassen, bandjes en hoezen levert aan andere bedrijven (business-to-business). Op dit moment wenst Red Pimiento om de consumentenmarkt in te stappen (business-to-consumer) met eigen nieuwe product accessoires. Het doel van deze bachelor opdracht was om tot een goed product voorstel te komen dat geschikt is voor de consumenten markt. Dit voorstel moet bij Red Pimiento's repertoire passen en inspelen op een onverzadigde opkomende productmarkt.

AANPAK

Een divergerende en convergerende aanpak is gebruikt. Eerst is de speelruimte van de mogelijke ontwerp richtingen vergroot, door onderzoek te doen naar opkomende markten. Daarna zijn de resultaten geconvergeerd naar één marktoptie. Deze markt is gedivergeerd in verschillende product opties, waarvan twee opties verder zijn uitgewerkt. Één van de twee opties in ontwikkeld voor productie.

RESULTATEN

Onderzoek toonde aan dat voor Red Pimiento de drone consumenten markt de meest geschikte markt is om in te stappen. Deze markt bleek veel potentie te bieden voor introductie van nieuwe product accessoires. De twee accessoires die voor deze markt zijn uitgewerkt zijn: (1) een drone racing pakket (voor non-professionals) en (2) een rugtas voor drones. De rugtas voor drones is uitgewerkt in volledige productie richtlijnen en is inmiddels in test productie.

CONCLUSIE

Door het gebruik van deze aanpak is een consumentenmarkt gekozen die het meest geschikt lijkt te zijn voor Red Pimiento om in te stappen. De opdracht heeft Red Pimiento richting de business-to-consumer markt geleid, en Red Pimiento heeft ervoor gekozen om de ontworpen accessoires, evenals de andere accessoire ideeën, te produceren. Echter, om succesvol de consumentenmarkt in te stappen, zal Red Pimiento uiteindelijk waarschijnlijk structurele veranderingen in haar huidige bedrijfsmodel aan moeten brengen, met het oog op technologisch onderzoek en personeelszaken.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

INTRODUCTION

THE BACHELOR ASSIGNMENT

The company Red Pimiento is an industrial design agency that delivers Business to Business (B2B) accessories such as bags, cases, straps, packaging products and other product accessories. For some examples see image 1 on the right hand page. Red Pimiento wishes to enter the Business to Consumer (B2C) market with a new product of their own. Therefore, the goal of this assignment was to design a product proposal that is appropriate for the consumer market. The product should suit Red Pimiento's repertoire and respond to an unsaturated and growing product market. This description is a compact summary of the assignment. The original, and more extended description can be found in appendix A: "Action plan".

Red Pimiento has tried to enter the consumer market before and has had some ideas on how to achieve this and with which products. However, these attempts have so far failed to succeed. That is why the company chose to not provide many guidelines and directions for this assignment. By not doing so, they would not influence the direction of my research. I would be able to come up with my own ideas for what market Red Pimiento could enter as to what product(s) would suit this market. Though this choice of excluding information left me somewhat in the dark, it did lead to new unheard options and ideas.

I reached my final advice of entering the drone market, after performing research on Red Pimiento as a company and investigating market opportunities. The next few pages will explain the whole development of this project, since it has been far from a 'standard' design project.


IMAGE 1: PRODUCTS OF RED PIMIENTO

A WALKTHROUGH

The bachelor's assignment goal has been reached in 5 steps, illustrated on the left. The report is build up in the same chronological way as the illustration and the summation below. Every colour links to its own chapter. These chapters contain the following content:

- First an analysis of RED PIMIENTO as a company is performed.
- After that, the view is broadened by means of a MARKET RESEARCH on potential markets.
- To narrow the assignment down again, the product category of DRONES IS CHOSEN.
- After that, a RESEARCH ON DRONES is carried out.
- In order to develop ACCESSORY OPTIONS, a exploratory research and brainstorm is documented.
- Which finally narrows down to the DEVELOPMENT OF ACCESSORIES and concept realisation of two concepts
  - concept one: GAMES FOR DRONES
  - and concept two: a DRONE BACKPACK

The report is build up this way because the course of the project has been somewhat complicated, and did not follow one design process. Although the main focus has been on research and ideation, the Drone Backpack concept has been completed into a production-ready product •

MARKET
RESEARCH

CHOOSING
DRONES

ACCESSORY
OPTIONS

ACCESSORY
DEVELOPMENT

RED PIMIENTO

DRONE
RESEARCH
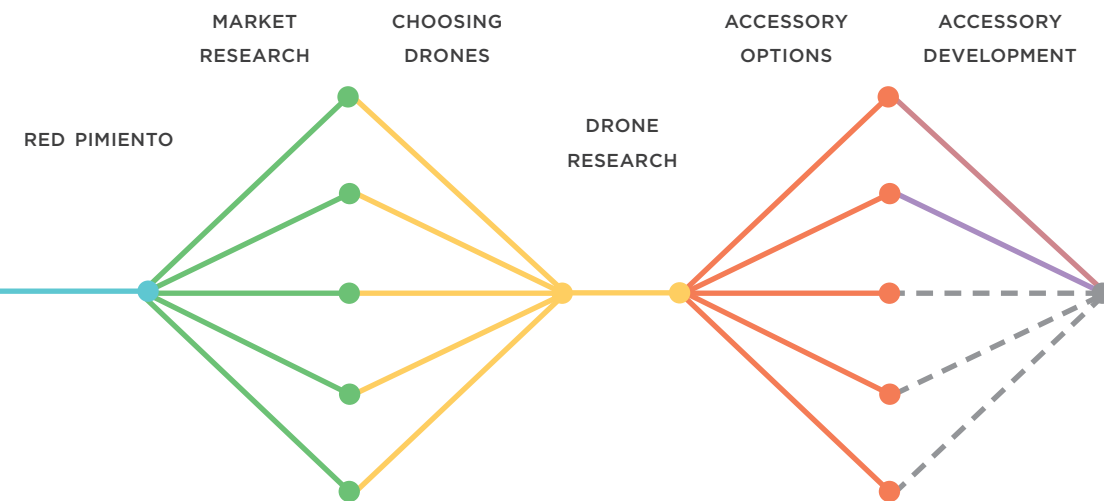
CHAPTER 2

RED PIMIENTO

RED PIMIENTO

This chapter is about Red Pimiento as a company, about their identity, their products and their vision. It is a summary of a full company research. The goal of this chapter is to grasp the knowledge that is already available and for providing background on deciding on a product proposal that meets Red Pimientos repertoire and is suitable for Business to Consumer. The full research can be found in appendix B: "About Red Pimiento"

RED PIMIENTO

Red Pimiento is a rapidly expanding international marketing- and industrial design agency. Their expertise lies in added value marketing and specialised in trade marketing concepts for retail. Their concepts are developed end-to-end: They execute the whole design process form idea-development to production, packaging and marketing. At this moment, their market is focused on business to business products and marketing. Table 1 on the right contains a summary of Red Pimiento as it is functioning now as a Business to Business company.

RED PIMIENTO'S STYLE AND EXPERTISE

Though Red Pimiento is a product design agency, product-characteristics of Red Pimiento's work are not representative for the company style. This is because they have to adopt the style of their clients, in order to design products for them. Because of this, any product style-characteristics found in their repertoire, should not be

BRAND ANALYSIS	TARGET AUDIENCE	COMPETITORS	EXPERTISE
	Businesses interested in brand- and product accessories and marketing materials. Canon, Nikon, Logitech, HP, Heiniken, Loréal Paris, Phillips, Samsung, UE, Sonos, SennHeiser & Microsoft		• Added value marketing • Trade marketing concepts for retail • End-to-end product development • Packaging and point-to-sale

BRAND IDENTITY	ESSENCE	CORE IDENTITY	EXTENDED IDENTITY
	To design, manufacture and present end-to-end product accessories and create a story around it.	• Fast service • End-to-end service • Custom design • Value adding	• Efficient • Creative • Customer satisfaction • Adaptable • International network

PRODUCTS	COMPANY	SYMBOL
General: • Large-scale • Industrial manufactured • Custom • High-quality Products and product accessories: • Bags, cases & covers • Straps and clips • Mounts Marketing materials: • Banners • Brochures • Packaging	Reasons for being: Combining of tasks that otherwise would take lots of effort and planning by client Person: The product range and end-to-end service that Red Pimiento offers build the persona. The brand itself fades into the background Positioning: International	Name: • Red Pimiento Symbols: • Red pepper • Red and white letters RED⟩PiMiENTO Spice up your Products Slogan: • Spice up your Products

VALUE PROPOSITION	OTHER
Functional benefits • All-inclusive service • Custom designed • Product differentiation Emotional benefits • Client focus: Client influences and evaluates result • Value adding: Market value increased though story telling	Product-characteristics of Red Pimiento's work are not representative for the company style, because they have to adopt the style of their clients to design products for them. Red Pimiento's three main weaknesses are: Online presence, Technology and Human Resources.

TABLE 1: SUMMARY OF RED PIMIENTO AS A B2B COMPANY

directly transferred into a representation of Red Pimiento. However, based on the research from the previously mentioned appendix B, some statements about their style and knowledge can be made.

PRODUCTION TECHNIQUES
First of all, Red Pimiento has lots of experience with designing bags, hard- and soft cases, sleeves and other protection- and carry accessories. It has become part of their expertise. Next to that, they have a lot of knowledge on materials and production techniques, such as: making water-resistant accessories, making durable products and using high-end materials. If Red Pimiento chooses to design their own accessories they should definitely use this knowledge.

TARGETED DESIGN
Beside this, Red Pimiento often designs accessories for new products, that either have to be for a specific target group, or for a large and general target group. They know how to address different kinds of target groups, which may be a focus. For a large and general target group it also means that they can design accessories that look both neutral and relatively modern. Knowing how to address a large target group is important when designing their own product line.

MARKETING
And lastly, Red Pimiento has wmarketing and graphic design departments, which can also be used for marketing their B2C product line.

RED PIMIENTO'S WEAKNESSES

Every company has its own weaknesses to balance its strong sides. So does Red Pimiento. From my company research I have observed there are three main weaknesses: (1) Their online presence, (2) Technology and (3) Human Resources.

1: ONLINE PRESENCE
Red Pimiento is present online, they have a website and can be found. But be that as it may, they do not have an online webshop, their website contains basic information only and they do not have experience in marketing themselves through social sharing media.

2: TECHNOLOGY
Evidently, Red Pimiento uses design programs and technology as such to realise their products, which they are skilled in. But this is not the weakness in technology I am referring to. Though it is a minor weakness, they do not contain knowledge on how to incorporate technology in their own designed products. For example, making smart products by incorporating electrical circuits in them.

3: HUMAN RESOURCES
Another weakness concerning a future production in Business to Consumer is a shortcoming of human resources. There is not a department dedicated to developing consumer products, what is more, there seems to be a lack of time and human resources to do anything extra at this moment. However, this may change when the definite choice of entering the consumer market is made.

PASTS & FUTURES

After having researched and documented Red Pimiento's identity as a Business to Business company, the question of how they can position themselves as a Business to Consumer company still remained. Therefore, a meeting with the CEO and my supervisor was arranged. The main topic of this meeting was: with what sorts of products would Red Pimiento want to position itself on the consumer market?

RED PIMIENTO'S IDEA DEVELOPMENT OF B2C

A few years ago, the idea started. The initial idea was based on the fact that they produced all kinds of product accessories, but several clients were not interested in a whole set of accessories. If Red Pimiento would create their own line-up of accessories, they could decide for themselves what to design. Ideally they would design accessories for the electronic market. These accessories could be designed to carry and protect electronic products such as tablets, camera's and cellphones.

But the idea was not immediately executed, resulting in a lot of competition entering the potential market. So the new idea was to invent something different. Attention then turned to the extreme sports. At that moment, the extreme sports market was emerging and opportunities for suitable bags and accessories arose. For instance, GoPro camera's were emerging and needed accessories. Extreme sports is still an interesting market, but it is no longer a very new and emerging and, again, competition has also entered this market.

The next idea was to combine technology and accessories. For instance;

gps trackers could be embedded in accessories. If you lose your wallet, or a camera with camera bag, this can be located by gps. It could be a good idea, but, there may be better ideas. Moreover, as stated before, technology is no expertise of Red Pimiento and creating a cohesive line-up could prove to be difficult.

The most recent idea is a bit different, but could work well. At this moment, Red Pimiento is designing accessories for UE, a brand for portable outdoor speakers. Red Pimiento has designed a whole line-up, but he brand does not wish to sell a whole line-up of accessories themselves. However, they would not mind if Red Pimiento would do so for them. Red Pimiento could sell these products in stores by using UE's brandname. All profit would go to Red Pimiento.

This most recent idea could work, but the downside to it is that Red Pimiento can not use a private brandname. Creating and selling their own product-line with their own (new) brand is more appealing. Apart from that, Red Pimiento already has got these designs, so there would not be much left for me to do in this bachelor assignment. They reckoned they could make use of this project better by assigning me to come up with a different idea.

SUB-CONCLUSION

At this stage, Red Pimiento is open for developments in any possible direction. Therefore a new brainstorm session will be executed. The goal of this is to come up with a number of product ideas ready to enter the market. This will mainly be done by thinking of emerging products and product markets, of a focus on a target group within these markets. For instance, maybe the gaming market could use a new accessory, or there might be accessories missing for women.

CONCLUSION

Product-characteristics of Red Pimiento's work are not representative for the company style, but the products are representative for their expertise. As a Business to Business company, Red Pimiento has an essence, an identity and a value proposition, but as a Business to Consumer company this can be different. For the latter, Red Pimiento will become a brand with a new identity, essence and value. They will need to have their own brand-style, line-up, symbol and target audience. For this new company brand, a new product market will need to be addressed.

From the conversation with the CEO and my supervisor, a general issue could be derived concerning Red Pimiento's timing. Though all idea's mentioned by the CEO were good ideas on it's own, the problem is that they did not put them through in time and ended up being too late. Putting such an idea through is easier when the first step has been made.

It became my task to perform this first step. I will provide a ground for the brand in the rough. Even if the product itself will not turn out to be a success; later designs for new emerging products could be developed and could prove their success. Red Pimiento has plenty of product design- and development experience for this.

To get a better idea of possible products and markets, a short exploratory market research will be done. During this market research the range of this bachelor assignment will broaden, after which a market will be chosen and accessory options will arise •

RED PIMIENTO

MARKET
RESEARCH

CHOOSING
DRONES

DRONE
RESEARCH

ACCESSORY
OPTIONS

ACCESSORY
DEVELOPMENT

CHAPTER 3

MARKET RESEARCH

INTRODUCTION

This chapter contains the exploration of market demands and opportunities. Different emerging markets are swiftly researched and ideas are documented. Within the markets, existing and non-existing products are investigated. The least promising markets are discarded at an early stage, for allowing more depth in the promising ones. There were only 3 days available to me for performing this market-research, because a meeting had to be arranged before the CEO left the office for a week. Due to this short amount of time, the research in this chapter is not a very in-depth analysis.
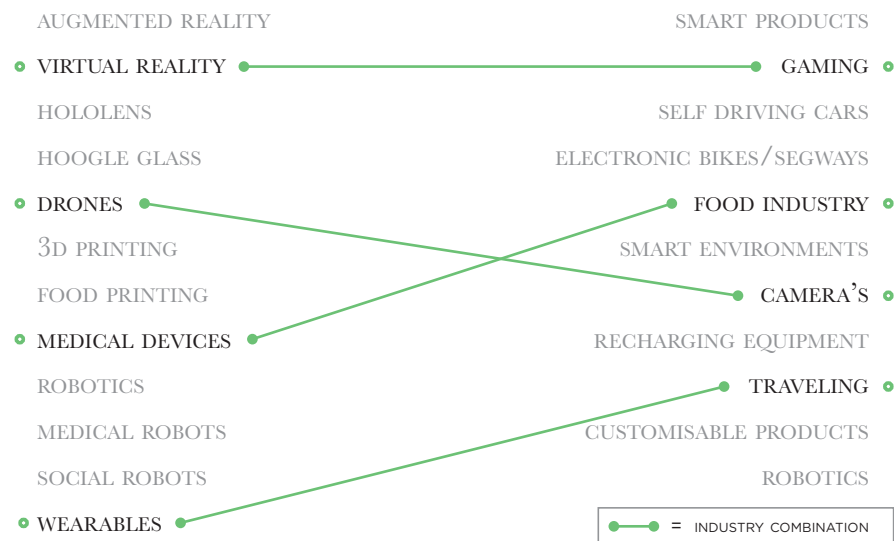
In this chapter you will find:

Market opportunity research

A conclusion

Outcome chapter 3

MARKET OPPORTUNITIES

Two methods are used for researching emerging markets. The first method concerns desk research, by using online tech shops and news blogs as a source of information. Next to that, fellow students interested and engaged in the technological industry have been questioned through communicational media and face-to-face conversations. From this research a list with upcoming industries and products is created as listed below.

AUGMENTED REALITY   SMART PRODUCTS

VIRTUAL REALITY   GAMING

HOLOLENS   SELF DRIVING CARS

HOOGLE GLASS   ELECTRONIC BIKES/SEGWAYS

DRONES   FOOD INDUSTRY

3D PRINTING   SMART ENVIRONMENTS

FOOD PRINTING   CAMERA'S

MEDICAL DEVICES   RECHARGING EQUIPMENT

ROBOTICS   TRAVELING

MEDICAL ROBOTS   CUSTOMISABLE PRODUCTS

SOCIAL ROBOTS   ROBOTICS

WEARABLES   •—• = INDUSTRY COMBINATION

EIGHT FAVORITES

After discussion and online research, the words in bold were chosen as being the most promising industries. The markets of Virtual Reality, Wearables and Drones are appealing because they are emerging and show promising developments. Medical devices for consumers are interesting because they are becoming affordable and available for the broad public and can be improved in terms of design. The food industry is always developing, with its newest hype: superfoods. Apart from this hype more technical gadgets are helping people to eat and stay healthy. The gaming industry has been upcoming for a while, but nonetheless interesting in its possibilities for accessories. The same argument applies to the travel industry. For this industry Red Pimiento could well use its expertise in bags. The same applies to the Music system industry and the Camera industry.

Because eight industries is too much to research in three days, and some of these industries contain overlap, I made market combinations, shown with the green lines in the figure on the left. The section below contains an elaboration of these markets. The research performed on each market combination is fairly general, because it had to be performed in a relatively short amount of time.

GAMING AND VIRTUAL REALITY

The gaming industry in itself has been around for a while, expanding with new and better games, consoles and accessories. Recently, Virtual Reality (VR) was added to the picture. The VR industry itself is a promising industry with many future applications, but most of these futures are still far away or will have arguable success[1]. Augmented Reality seems to be rising too, but is at this moment only incorporated in cellphones (like the new Pokémon Go game) and does not yet have its own device. At this moment, virtual reality is starting to show its success in combination with games[2]. One of the first virtual reality device is the Oculus Rift headset (right page).
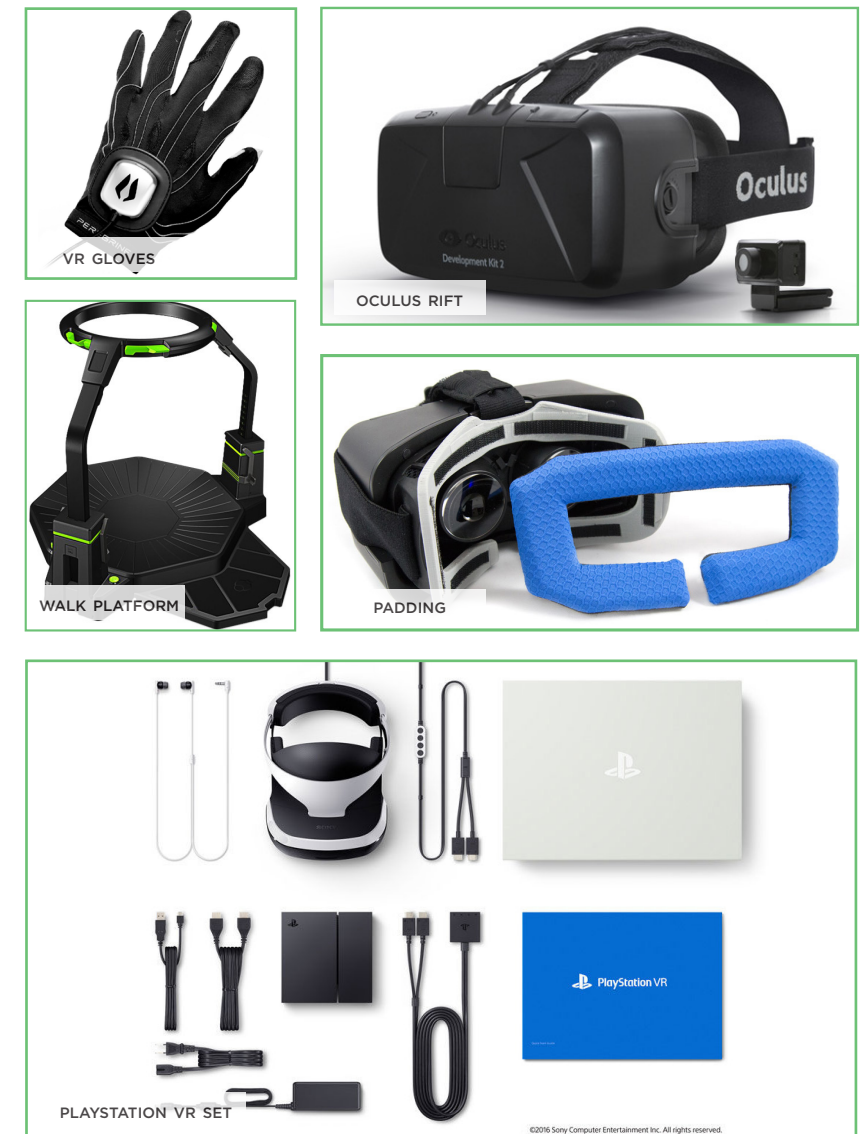
PRO'S

- Virtual Reality may have many future opportunities
- Many markets are, and can be linked to VR
- Gaming: good opportunity for accessories

CON'S

- Gaming: Already a lot of competition
- In Gaming market Red Pimiento already has clients to make accessories for
- Virtual Reality does not involve many different accessories

1 Dredge, S. (2016, January 07). Three real questions on the future of virtual reality. Retrieved April 19, 2016, from https://www.theguardian.com/technology/2016/jan/07/virtual-reality-future-oculus-rift-vr

2 What to expect in the future - Virtual Reality. (2016, January 9). Retrieved April 19, 2016, from http://www.vrs.org.uk/virtual-reality-games/future-expectations.html

VR GLOVES

OCULUS RIFT

WALK PLATFORM

PADDING

PLAYSTATION VR SET

DRONES AND CAMERA'S

The drone industry is a promising industry. The infographic[3] in appendix C gives an overview of most benefits, from which the important parts are listed below:

In 2013, the consumer drone market was a 13.3 billion dollar market. In 2020 it is expected to grow into a staggering 140 billion dollar market industry. The drone market is expending into the internet of things and wearables, which are big industries too. The Federal Aviation Agency expects 100.000 drone related jobs in US by 2015.

The combination of drones and camera's is a very popular combination, among both large organisations and hobbyists. Mainly these hobbyists are an interesting target market, because it is a large and expending market of products averaging a price range of €50,- to €3000,- [4].

PRO'S

- Few competition
- Linked market opportunities
- Fast expanding at this moment
- Probable need for accessories

CON'S

- No experience with drones

---

3 J. (2014, March 25). The Big Business of Consumer Drones [Infographic]. Retrieved April 19, 2016, from http://www.jabil.com/blog/the-big-business-of-consumer-drones-infographic.html

4 http://www.mediamarkt.nl/mcs/productlist/_Drones,10259,576064.html?langId=-11 Retrieved April 17, 2016

MANFROTTO DRONE BACKPACK

DRONES AT A TECH FAIR

EASY TO CRASH

NECKSTRAP ACCESSORY

MOST COMMON ITEMS

FOOD AND MEDICINE

The food and medicine industry is in constant development. According to Accenture Business Research, consumer healthcare is a $502 billion market that will grow by almost 50 percent to $737 billion over the next five years. This growth will be driven primarily by preventive health and wellness such as vitamins, nutrition and weight-management. Market leaders are rapidly adapting to customer needs that include consumer health products and digitalisation of information[5]. The food industry requires many different tools and accessories, mostly because it consists of lots of different products. For the medicine industry, more and more medical devices are developed for personal use on the consumer market. However, often these products do not look appealing.

PRO'S

- Area of importance
- Target group focus possibility
- Always expanding

CON'S

- Many design regulations and rules
- Little experience in this area

---

5 Accenture. (2013). Consumer Health and Wellness Industry Trends retrieved April 18, 2016, from https://www.accenture.com/ us-en /insight -consumer healthcare-market-high-perfor-mance -busi-ness-research-2013

EVAK FOOD PRESERVATION

VAPUR WATER FILTER

INSTYLE BOTTLE WITH PILL COMPARTMENT

DIABETES KIT

OXIGEN CARRIER

HEARING AID SET

WEARABLES AND TRAVELLING

Wearable technology mainly concerns devices and smart clothing such as: glasses, armwear, skin patches, e-textiles. The wearable electronics industry is a new upcoming industry and is estimated to grow $20 billion in 2015 to $70 billion in 2025[6]. Smartwatches take up a large part of this industry. Consumers are willing to spend reasonable prices for wearables, if compared to mobile phones[7]. Most wearables are designed for health- and other information 'on the road'. According to The Economist, for most wearables expenses do not live up to its value yet. Future developments may tackle this problem.

PRO'S

- Possibilities for innovative gadgets
- Target group focus possibility
- Experience in designing for travelling

CON'S

- Travel industry: already competition
- Wearables: no line-up possibilities
- Lack of technological knowledge

6 Harrop, P., Hayward, J., Das, R., & Holland, G. (2015, February). Wearable Technology Report. Retrieved April 19, 2016, from http://www.idtechex.com/research/reports/wearable-technology-2015-2025-technologies-markets-forecasts-000427.asp

7 The wear, why and how. (2015, March 14). Retrieved April 20, 2016, from http://www.economist.com/news/business/21646225-smartwatches-and-other-wearable-devices-become-mainstream-products-will-take-more

SAMSUNG SMARTWATCH

SMART CLOTHING

HEARTBEAT TRACKER

WATERPROOF TRAVEL CASE

SMART SUITCASE LOCK

CONCLUSION

Though this research is not representative for all developments occurring on every market worldwide, it does give insights on market possibilities. After reviewing all options, the most potential market appears to be the drone industry. First of all because it is already a big industry at this moment, instead of in the far future. Secondly, there is not much competition in accessories yet. Thirdly, there áre possibilities for designing accessories and bags.

Virtual Reality is too questionable and too far away, plus: because only few devices exist yet, there is not a big need for accessories at this moment. Same goes for wearables: They do not really require accessories. Food and medicine is interesting, but too far from Red Pimiento's expertise, with all the regulations involving this market. Gaming industry has too many competitors, because it has been upcoming for a while. Of course, focus could be put on a certain target group, such as kids or females, but even then there exists competition.

My supervisor also turned my attention to a different option: not jumping into a particularly emerging market, but to just create designs for products they already work with. For this option I could design covers, bags and cases for products like camera's or speakers. These accessories could be all water- and shock proof, or all explicitly for kids, or maybe all for travel use.

To finalise this research a meeting with Red Pimiento was organised. The outcome of this meeting is documented in the next section.

OUTCOME CHAPTER 3

In this chapter, a quick market research on emerging markets had been performed. After finishing this research, the question of which market Red Pimiento considers most interesting, still remained. Therefore another meeting was arranged with the CEO, my bachelor-assignment mentor, the manager of the designteam and a partner of Red Pimiento. For this meeting I created a powerpoint (appendix D) and explained my findings.

All market categories were discussed and interest in the drone industry was shared. Other categories were discarded, but during the meeting a number of different categories were added. In the following discussion, ideas were mentioned considering Red Pimientos Business to Consumer options.

1: The first idea concerned luggage. This idea was shared by the CEO and was his latest idea. His finding was that luggage trolleys are useful but inconvenient. The wheels are badly designed and the design of the bag itself may be improved. But the development of this, with al the malls having to be made, could take a while.

2: Children accessory line-up for electronic products. The CEO sees potential in creating a line-up for children, for instance: A bag for traveling with your Wii console.

3. Waterproof accessories for consumer electronics. The idea is to create a complete line-up for all kinds of different consumer electronics, which could be a good option. The downside of this is 'consumer electronics' is a very broad concept, but could nonetheless be narrowed and developed.

4 Portable speaker accessories. Red Pimiento has been working on this for a large client. As mentioned before, they could develop the "left over" ideas and create new ones. The downside of this idea is that most designs are already created. Red Pimiento could develop this option, but would not need my help in it.

5 Accessories for drones. Red Pimiento likes the idea of entering the drone market and is interested in its potential. The downside is that the company has no further experience in designing accessories for flying devices. However, this was not seen as a big disadvantage.

The outcome of the meeting was: research the drone industry in more detail, and when the result of this research is still promising, continue to design accessories for the drone market •

CHAPTER 4
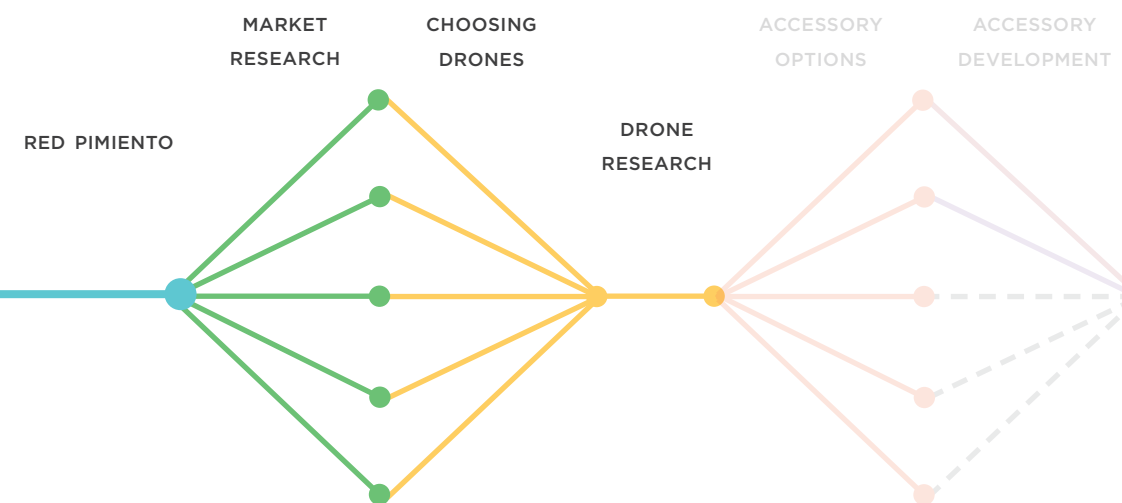
DRONE RESEARCH

INTRODUCTION

This section of the report contains the research on drones, the drone industry, competitors and drone-related accessories. The section is intended to serve as background information to provide insights. These insights are essential for designing drone attributes. During this research I have collected a great deal of information, of which I will spare you most of the details. Some important results are referred to, and included in the appendices. In this chapter of the thesis you will find:

- Drone industry information
- Drone accessory market
- Drone bag market
- A conclusion

THE INDUSTRY OF DRONES

Before being able to decide whether the drone market is truly appropriate for designing accessories for, lets first have a short look at the market value, its players and its need for accessories.
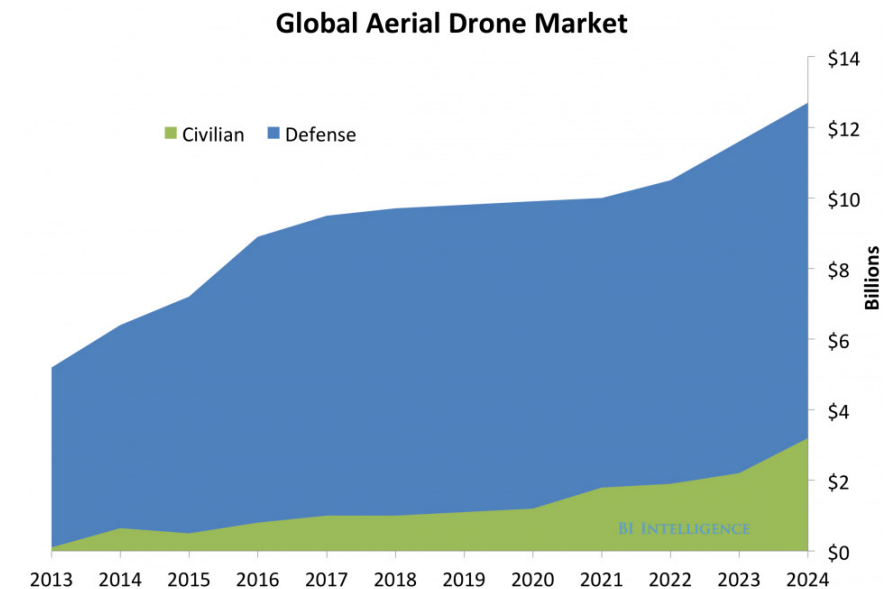
THE DRONE MARKET

A drone is a remote-controlled vehicle that rolls or flies. Another term for the flying variety is unmanned aerial vehicle (UAV)[8]. The size of the drone market has been estimated at many different amplitudes. The Teal group, an aerospace and research firm, estimated that global spending on drones was $6.4 billion in 2014, of which 89% ($5.7 billion) was for military applications[9]. The group further estimates that the global market will increase to $11.5 billion over ten years (see graph 1). The remaining $700 million represents commercial and consumer applications. Most growth in the drone industry is on the commercial/civilian side. The market for commercial/civilian drones will grow at a compound annual growth rate (CAGR) of 19% between 2015 and 2020, compared with 5% growth on the military side.

8 Fung Business Intelligence centre (2015). Global Retail Tech Report Drones. Global Retail Tech Report Drones. Retrieved April 28, 2016, from https://www.fbicgroup.com/sites/default/files/FBIC Global Retail Tech Report Drones Apr. 21_ 2015.pdf.
9 Business Insider (2015, May 27). The Drones Report: Market forecasts, regulatory barriers, top vendors, and leading commercial applications. Retrieved April 26, 2016, from http://uk.businessinsider.com/uav-or-commercial-drone-market-forecast-2015-2?r=US&IR=T

Business Insider[10] is even more positive and released a new drone market forecast. BI Intelligence predicts that the potential for the drone market will top $12 billion by 2021, as recreational drones become more popular and the regulatory environment calms down.


Source: Teal Group, BI Intelligence Estimates, Michael Toscano

GRAPH 1: DEVELOPMENT ESTIMATION OF GLOBAL AERIAL DRONE MARKET

10 Camhi, J. (2016, March 18). Here are the technologies that are making drones safer and accelerating adoption. Retrieved May 13, 2016, from http://uk.businessinsider.com/the-drones-report-market-forecasts-key-players-and-use-cases-and-regulatory-barriers-to-the-proliferation-of-drones-2016-3?r=US&IR=T

BRANDED ACCESSORIES

For this section I looked at all important brands, and the accessories they offer. The full research can be found in appendix E & F . From this research graph 2 below was derived, that illustrates the brands and their accessory offerings.
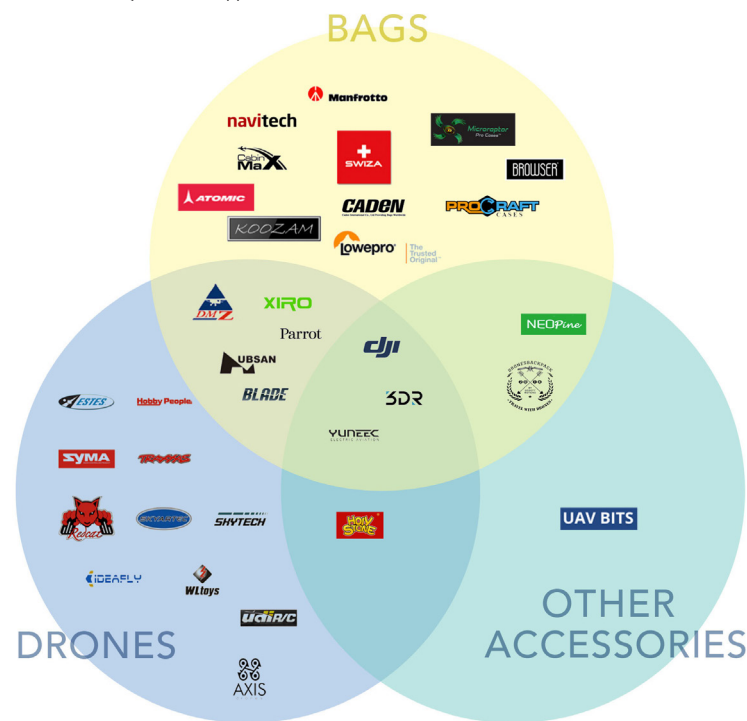
In the graph 'bags' and 'other accessories' are separated, in order to display the possibility of a line-up besides backpacks. From the graph it can be derived that, besides bags (cases included), not many brands offer drone accessories such as mounts, smal cases, sleeves, safety accessories, toys and other accessories one could think of. The brands that do, do not offer a large range (appendix F).

The small variety in accessories surprised me. About 20 larger drone brands are on the market (with many promising startups on the rise). Only few of these brands offer a backpack or case for their own drone, and even fewer offer anything else (apart from technical equipment). I had expected to see more useful and fun accessories.

Conclusion

There is a clear gap in the accessory market, but whether there is a true need for accessories such as listed above, can only be determined by questioning a large group of drone owners. Due to my lack of connections and time, such a questionnaire will be too hard to accomplish. But, in the available time, I did talk to a number of drone owners, and visited forums. From this research I did perceive an interest in accessories as named before. Some users improvise accessories like landing platforms and toys, some even build their own. Taking this analysis and appendices E & F into consideration, there appears to be a good market opportunity for Red Pimiento in producing drone accessories. Provided that these accessories fit their core business. One of the accessories that Red Pimiento's should definitely offer is a backpack for drones. At Red Pimiento's request I have taken a more detailed look at the backpack for drones market.
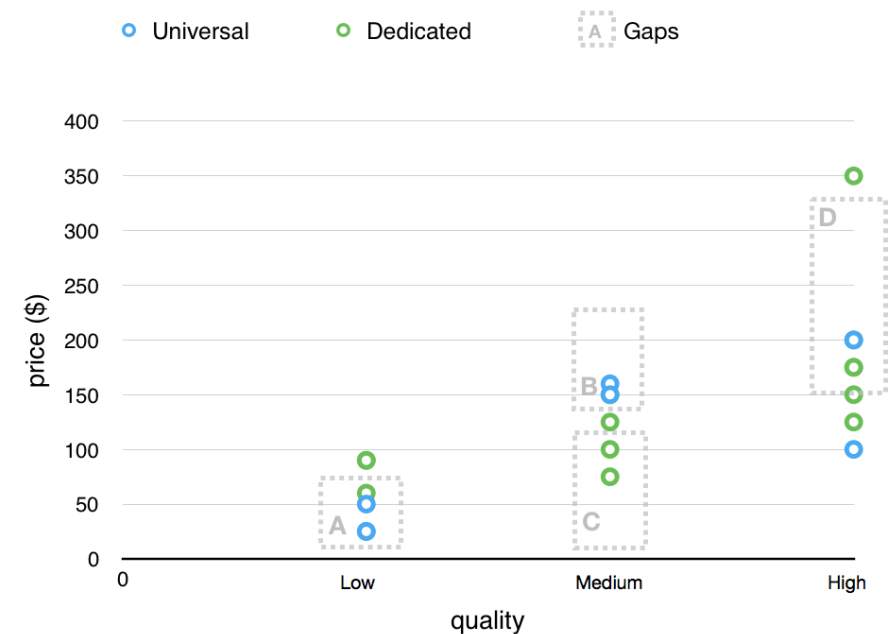
DRONE BAGS

Producing bags, cases and backpacks would fit Red Pimiento's core business very well. But what sort of bags are available, and what are their price ranges? And if Red Pimiento should bring drone backpacks on the market, what should the quality/price ratio be?

BACKPACK FOR DRONES MARKET OPPORTUNITIES

Though graph 2 seems to suggest that there are already a lot of brands in this market, this does not mean the drone-backpack market is saturated. It should be noted that there are only about 20 different brands making drone bags & cases worldwide. Compared to the number of camera bags on the market, this is not a lot. Many of the backpack brands are low-end and sold through Amazon or Ebay only. Many drone backpacks or cases look exactly alike, but have different logo's on them, so it is hard to tell which brands actually design and manufacture the bags themselves. A full listing of backpack brands, prices and quality reviews can be found in appendices G, H & I. This information is bundled in graph 3 on the right hand page.

GAPS IN THE BACKPACK MARKET

Each dot in the graph shows represents a branded backpack. Prices are compared to quality. Each backpack is divided in either universal (for any drone) or designated (one drone only). Quality rating is derived from user reviews and overall impression. It is not based on actual product tests, but is meant as a general indication.

GRAPH 3: GAPS IN THE UNIVERSAL AND DEDICATED DRONE BACKPACK MARKET

From the graph, four interesting gaps can be derived. It shows that [A] there are not many low quality, low priced *dedicated* backpacks for drones; [B] there are not many medium/high priced, medium quality *dedicated* backpacks; [C] not many low/medium priced, medium quality *universal* backpacks; and [D] not many high priced, high quality *universal* backpacks. In fact, there are not many high quality universal backpacks in general. Most dedicated *cases* however, fit in the high priced, high quality [D] region.

Conclusion

Red Pimiento makes high quality bags, so high-quality backpacks would be a good category. The market consists of only few high-quality universal drone backpacks, which makes high quality universal backpacks a good option. A second good option would be to produce medium/high priced, medium quality dedicated backpacks.
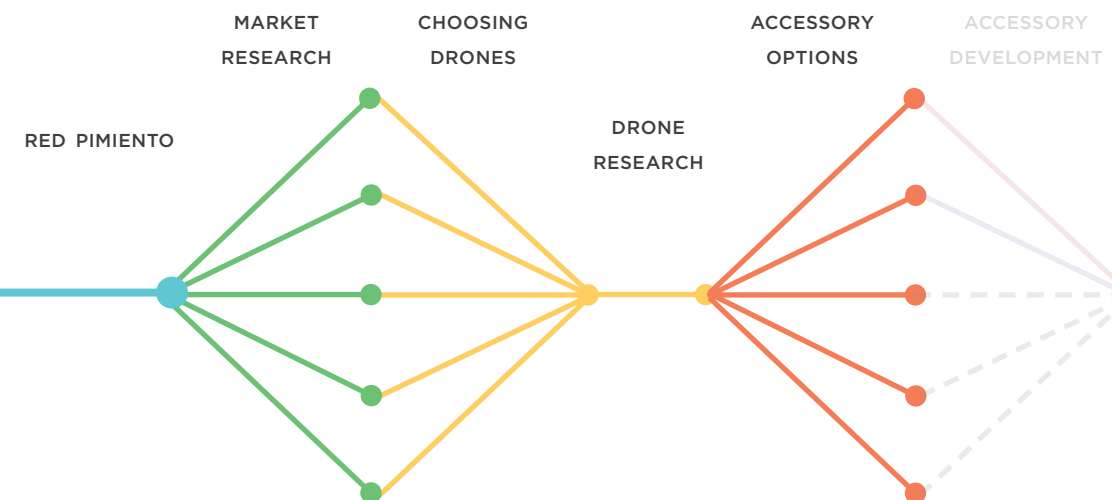
CONCLUSION

During the previous chapters' meeting outcome, Red Pimiento concluded that if my research would show that the drone accessory market is indeed a market with potential, they would be open to step into it. Having already concluded that the drone market is a large and vastly growing market, much can be said in favour or its accessories.

First of all, most brands do not offer any accessory beyond a drone backpack or case. Three companies offer other accessories, but more companies seem to be working on it. Some brands that do not produce drones, do offer backpacks and cases. But even with these extra backpack brands, the amount of offered backpacks, does not weight up to the expected growth on the consumer-drone market. There are few high-end drone-backpack brands, and even fewer universal drone backpack brands. Red Pimiento could enter the drone backpack market by making high-quality, medium/high-priced universal backpacks or medium quality, medium/high priced dedicated backpacks. For the latter option, 2 or 3 backpacks could be designed specifically for popular drone brands such as DJI, 3DR and Parrot.

Most backpacks look the same; they are black, hard- or softcase with a foam cut-out shape (see appendix G) Some are modular, though these usually get negative feedback on lack of sturdiness. There may be good options for Red Pimiento to design a drone backpack that is different from the standard. This could be a high quality modular backpack that is sturdy enough, or maybe one with a different or extra functions.

Also, for accessories that do not involve backpacks, there seems to be a good opportunity for offering non-existing products. Having talked with Red Pimiento about the drone market possibilities, they became convinced and wanted me to come up with a full range of drone accessories. What these accessories could entail will be explored by means of a brainstorm session with employees of Red Pimiento and an interview with- and demonstration by an expert on drones. This exploratory research is found in the next part of this thesis.

RED PIMIENTO

MARKET RESEARCH

CHOOSING DRONES

DRONE RESEARCH

ACCESSORY OPTIONS

ACCESSORY DEVELOPMENT

CHAPTER 5

ACCESSORY OPTIONS

INTRODUCTION

After having looked into the drone market, Red Pimiento and I concluded that it indeed is an interesting emerging market with potential for new accessories. But what accessories are we exactly talking about? In this chapter I will explore just this: I will look for possible ideas for drone accessories, through brainstorm sessions, idea-generations, fieldtrips and lots of youtube video's. These next pages you will find:

- A brainstorm session with Red Pimiento
- A visit to DroneLand and Mediamarkt
- Scenario's
- User details
- Conclusion

BRAINSTORM WITH RED PIMIENTO

Working at an office full of creative designers, I would be crazy not to make use of such qualified resources. So, together with 5 designers of Red Pimiento, a brainstorm session on possible drone accessories was carried out.

BRAINWRITING AND COLLATERAL IDEAS

For preparation, I read a few chapters in 'Creative Facilitation' by Marc Tassoul[11]. I arranged one large paper sheet to put on the wall for writing all the ideas on, and some A4 papers for personal ideas. The session took place in two steps. First a 'brainwriting' technique, developed by Horst Geschka was used. The basic setup was as follows; the five designers were set around a table, each has a form with 3 columns with problem statements I had written at the top. During the first round each person had to write down two or three ideas per column. After 5 minutes, the A4 papers were passed on to the next person after which each designer wrote down another idea below the previous ones. This way, old ideas of others designers could inspire new ideas. The forms circulated until it was too hard to come up with any new idea. The problem statements written on top of the forms were: Drone accessories for fun, Drone accessories for filming/photography and Practical accessories.

---

11 Tassoul, M. (2009). Creative facilitation (3rd ed.). Delft: VSSD. p.7 -17

After this first step, all ideas were written down on the large sheet. While doing so, new ideas arose and old ideas were improved. After all ideas were written down, we ranked them on three levels: ideas that suit Red Pimiento's core business, ideas that are close to it and ideas that are not. Appendix J shows the full brainstorm session. The core ideas are displayed below. Exploratory sketches in these areas can be found in appendix W "Ideation sketches".

GAMES FOR DRONES
unprofessional racing
kids accessories

KITS
content ideas
kit ideas

WAYS FOR CARRYING
hooks
velcro
magnets

CUSTOMIZING
for woman
for children
other

MOUNTS
phone mount
landing pad

BACKPACK
different kinds
different uses
target group

FIELD RESEARCH

Brainstorming at the office proved to be a great way for coming up with novel ideas on drone accessories, but how realistic are these ideas in real life? What do drone users have to say on drones and how are these drones presented and sold in stores? To investigate these questions, I paid a visit to Media Markt; the most common point of sale for standard consumer flying drones, and I also visited DroneLand, a company selling drones and providing flying lessons. Full reports of the visits to DroneLand and Media Markt can be found in appendix K.

MEDIA MARKT

The goal of the visit to Media Markt was to gain more insight on drones in general. I had been researching them for a few weeks now, but had never seen drones in real life. For Media Markt I noted the existing drones and the one backpack they sold and asked about their most sold drones, which were -as I had expected- the universal nr.1: DJI Phantom, the Parrot Bebop, the 3DR Solo, the Xiro Explorer and the Walkera Runner.

DRONELAND

The primary insights from DroneLand were confirmations of ideas and thoughts. The first one is that there are indeed not many accessories for drones. I talked to some people and found out they were very interested in drone backpacks. I also found out that the newer consumer drones are more easy to fly with and do not require much technical experience. Drones are indeed mostly used for filming or racing.

I was surprised to hear that drone racing is already bigger than I thought. Many people enjoy drone racing as a hobby and do not attend public races. So the actual number of drone racers is much higher than it seems.

The backpacks and cases from DroneLand are sold quite well, even though they were priced around 300 euros. It seems that the engaged drone owner is willing to pay a premium price for his/her drone accessory.

Droneland had made their own landing pad. Customers I spoke, thought a landing pad would be great for taking off but it had to be smaller than the one DroneLand offered (±3m2). I also gained more insight in the usage of drones, which are translated in user scenarios (see appendix L).

DRONES AT MEDIAMARKT

DRONES AT DRONELAND

HOW TO USE A DRONE

Drones are getting an increasing amount of attention in the last few years. They appear in the news quite regularly, sometimes in a positive way, sometimes in as a negative way. As explained in this report before, up until a few years ago, they were only used by the army and large organisations. Nowadays, anybody can buy and fly one. But what are they used for? Who are the users and how are they used?

FILMING AND RACING

The two most relevant uses for this research are filming and racing with drones, other drone uses can be found in appendix M. Filming with a drone does not have to be hard. Most (newer) consumer drones are relatively easy to fly, as I have been told at a demonstration during the field-trip to DroneLand.

DRONE SPECIFICATIONS

Lots of hard- and software and equipment are drone related, a listing can be found in appendix N. Information on rules and regulations regarding drones can be found in appendix O.

USERS AND SCENARIOS

Drones are used by all sorts of people. Appendix L elaborates on this

BRINGING ALL EQUIPMENT

UNPACKING IN GRASS

3D GOGGLES FOR FUN

SOMETHING MIGHT BREAK

MATCHING PROTECTION CASES

WHY NOT MAKE YOURSELF COMFORTABLE, IT MAY TAKE A WHI

ATTACHING PROPELLERS

AND YOU ARE READY TO FLY

IMAGE 2: A SCENARIO ON SETTING UP AND PREPARING FOR A DRONE FLIGHT IN THE FIELD

subject and contains three written usage scenarios, based on interviews, online blogs, vlogs and video's. The scenario above is a short version of a sketch based on a youtube video vlog. The full version can be found in appendix P. The scenario shows that much equipment can be involved, it shows how a good backpack can be convenient, and that flying a drone takes some preparation.

CONCLUSION

In this chapter, field research has been done, scenario's have been written and user characteristics have been detailed.

Field- and desk research have shown to be an affirmation of thoughts and conclusions so far and have given insights in usage and significance. Scenarios have partly been based on this field research and have given some ideas that will be translated into sketches.

User research exposed some uncommon user groups on which Red Pimiento could focus, such as researchers or women, and different age groups. I personally would not recommend laying the entire focus on one sub-target group, for two reasons:

Firstly, the drone market is still in its infancy. The main target group is big, but not thát big yet, let alone the sub-target groups.

Secondly, when choosing a younger age-group, the price range of these drones drops drastically. While this does not have to be a direct problem, the willingness to buy extra equipment in low price ranges drops as well. On top of that, the target group is still very small at this moment. In the future however, it may expand to a profitable size.

Without laying the entire focus on drone one sub-targetgroup, Red Pimiento could, however, provide one or two accessories accommodating specific target groups. These could be a backpack for women or children or child-friendly toy-drone accessories.

PRESENTATION RED PIMIENTO

For coming up with accessories I have performed in-depth drone research. In two weeks time, I performed desk- and field research, mapped all related brands, and visualised the drone market opportunities. Accessory options were divided in the categories of Mounts, Kits, Customising, Games for Drones, Carrying for Drones and Target group focus. For narrowing down these options and choosing one final direction for me to proceed into, another meeting with the CEO and my supervisor was arranged. For this meeting I made a comparison table, shown in appendix Q . The complete presentation can be found in appendix R.

MY ADVICE TO RED PIMIENTO

In the presentation I suggested Red Pimiento should enter the market with "Drone carrying" accessories (such as a backpack) and maybe Games for Drones. As the Games for Drones option is suitable for the smaller drones, which adults often don't use, it could be made for kids. I suggested too also produce a drone carrying accessory for kids, to make the line-up more coherent.

RED PIMIENTO'S OPINION

If Red Pimiento has been a little hesitant about the whole 'designing for drones' idea, their doubts now seemed to have completely vaporized. At this point the company is convinced about the drone market. They are quite content with the market research and like the ideas derived from it. From the presentation, the CEO came to the following conclusion:

Red Pimiento will launch a whole line-up of drone accessories as soon as possible, preferably by September. I will design a whole product line, consisting of:

A game for drones

An adult backpack

A kid's backpack

A landing pad

A toolbox

A product for women

According to the CEO, creating a whole line-up is the only way for Red Pimiento to enter the market successfully. At this point, I had six weeks left for finishing my bachelors assignment, so we discussed the fact that it would mean I would not have much time to elaborate much on the content. According to them, this was OK. If I could not finish all concepts, other employees would step in. And as we would find out soon enough, this turned out to be the case. The first two options would take most of my time. Fortunately, we decided to start with the important ones: Games for Drones, and the adult backpack. Ideas on the kid's backpack and landing pad can be found in appendix S & T.

The next chapters contain the design phases of the two most important drone accessories, starting with Games for Drones •

CHAPTER 6

GAME OF DRONES

INTRODUCTION

This chapter is about the theme 'Game of Drones'. In this chapter, accessories for two kinds of drone games will be conceptualised: one for picking up and transporting objects and one for providing a racing game. The full design process can be found in appendix X. For these accessories sizes are derived from research from appendix Y. In the end, racing for drones provides the most opportunity and is chosen as final concept.

In this chapter 6 of the report you will find:

- Program Requirements
- Transportation Game
- Drone Racing Game
- A Conclusion

PROGRAM REQUIREMENTS

These program requirements apply to both concepts, and are meant to provide basic design guidelines and feedback. Most requirements speak for themselves. For usage the demand is that it should be able to use indoor, and preferably outdoor too. This wish has had influence on the design of the second concept.

SAFETY	DEMAND	WISH
	Should be safe for user and bystanders	
	Should not cause damage to drone	
	Should withstand a crash of a flying drone	

USAGE	DEMAND	WISH
	Should be able to be set up indoor	Should be able to set up indoor ánd outdoor
	Set up time of 5 minutes or less*	Set up time of 1 minute or less*
	Should be able to use indoor	Should be able to use indoor ánd outdoor
	Should be able to be used by children aged 8+, supervised by an adult**	Should be able to use by children aged 8+ **
	Should be able to store away	Should be able to store away in 3 minutes or less
	Should be usable for drones with a wingspan of 60 - 250 mm***	Should be usable for drones with a wingspan of 30 - 500 mm***

OTHER	DEMAND	WISH
	Should provide a 'fun' element	
	Should weight less than 5 kilo's****	Should weight less than three kilo
	Should be re-usable	
		Should be water-resistant

*	Indication derived from field- and desk research. Most drones require no more than five minute(s) setup time. Game setup time should not exceed this.
**	Very small drones are advertised as appropriate for children aged 8+
***	Based on research on drone sizes in appendix Y
****	The weight an eight years old should be able to carry

TRANSPORT GAME

First concept: The transport game. The idea of this game is that picking things up with your drone can be great fun. There are many ways for achieving this such as hooks, clips, velcro and magnets. The complete designprocess can be found in the previously mentioned appendix X.

THE GAME

The game is to pick up small animals, like an UFO would do in movies, and drop them as quickly as possible at the right location. When playing with multiple players, the person who collected the most farm animals before they are all gone wins. The farm animals can even be spread out through the whole room by someone else, for making the challenge bigger.

When comparing pros and cons of tools for picking up objects, velcro (klitteband) is the best choice. Velcro is lightweight, easy in it use and easily attachable to the minidrone. For picking up the farm-animal, you have to land on its head. for releasing the load, you simply have to land on a velcro pad that provides a larger contact area. Due to the larger contact area, the load will stick to the pad when flying away.

I have asked around to people owning minidrones, if they would buy a game like this and most would buy it, or give it as a present.

Pick it up with velcro

And stick it to the velcro mat

IMAGE 3: GAME OF DRONES CONCEPT 1: THE TRANSPORT GAME

DRONE RACING

This second concept is an unprofessional racing set for toy drones. The concept is based on the previous finding that racing is getting quite popular. With this game package, kids (and grown-ups) can set up their own small racing track. Indoor or outdoor. The full design process can be found in the previously mentioned appendix X.

REQUIREMENTS

Racing through hoops and loops with your own small drone is fun and very realisable for Red Pimiento. According to the program requirements, these hoops should at least be big enough for drones and quadcopter of 30 - 250mm wingspan to fly through. Such hoops should be attachable preferably indoor ánd outdoor and should be able to stored away easily.

THE GAME

The game will be sold as a full set, for small, medium or large drones. An example of a racing package are illustrated in image ... below. The set consists of hoops, hooks, pins and iron rope, all elements with sizes are shown in image 5.
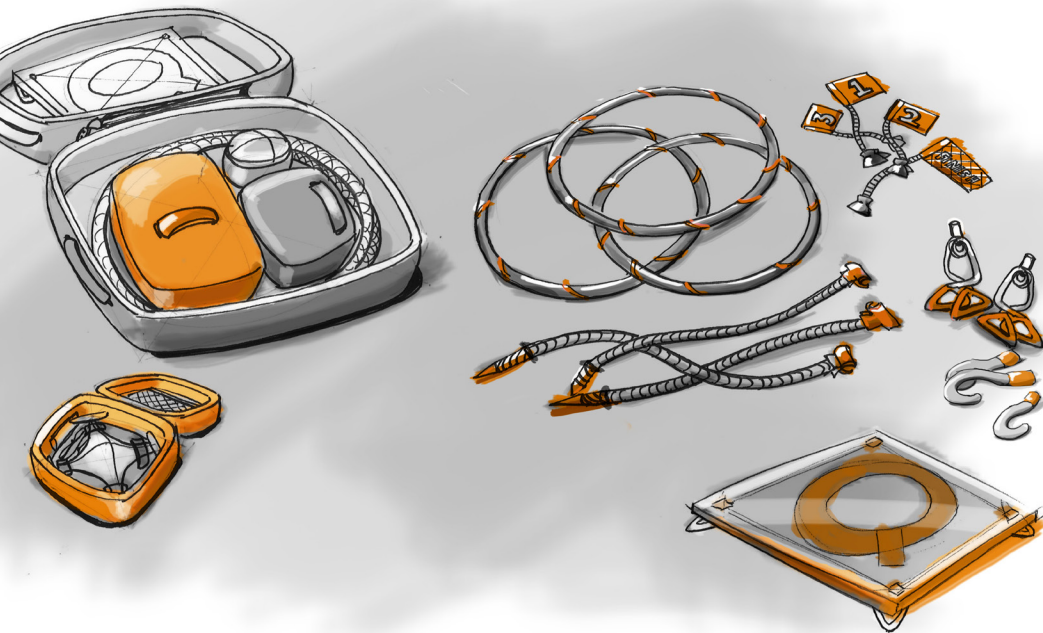

IMAGE 5: RACING GAME AS A PACKAGE

The parts are detachable, this way it all fits in the package, less ropes are necessary and it can be used in any situation: Just attach the right ending to the rope and you are good to go.
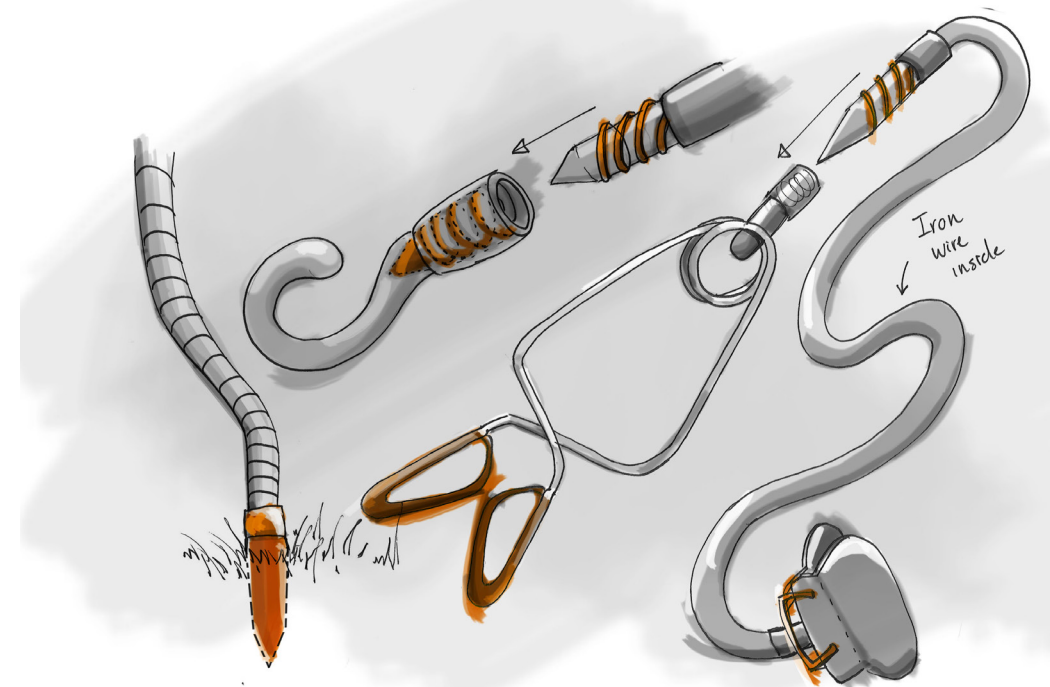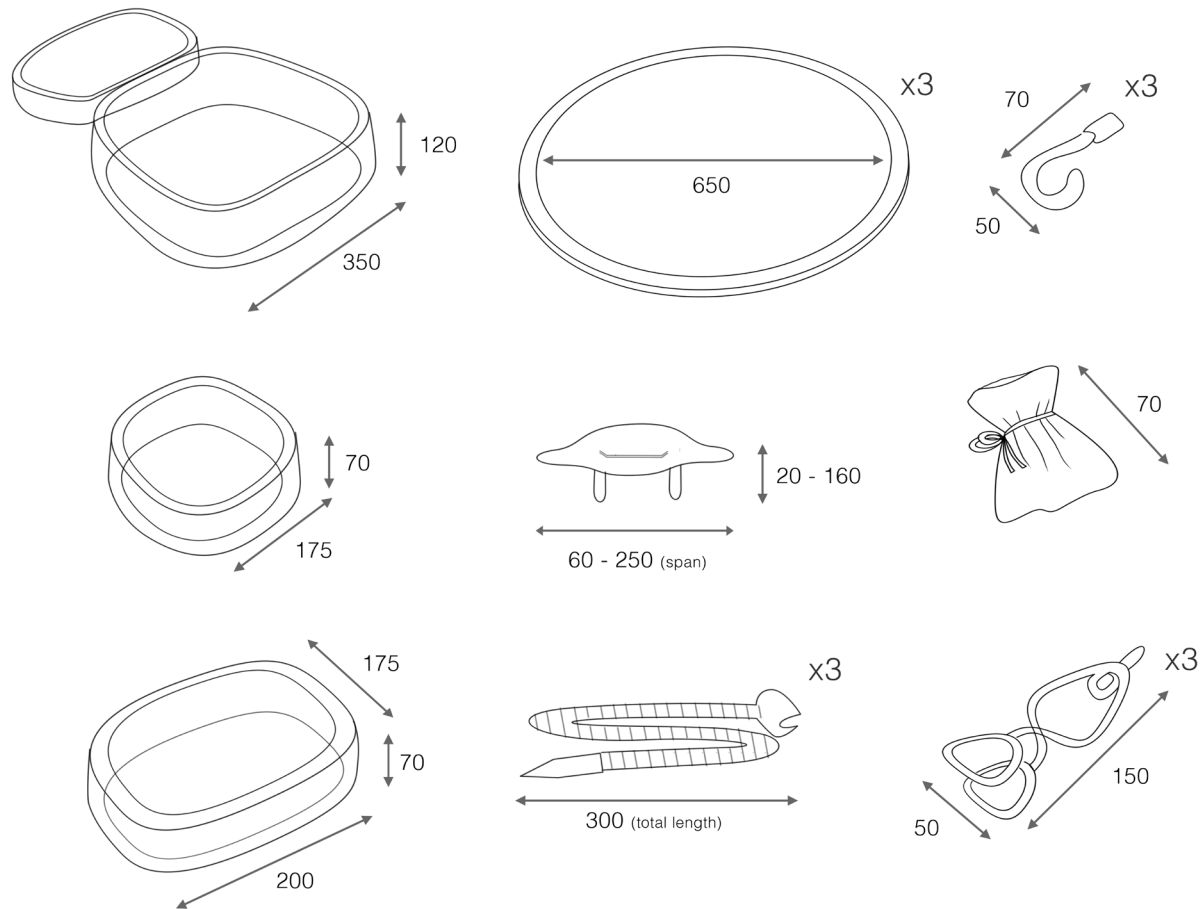

Iron wire inside

IMAGE 6: DETACHABLE ENDINGS

120

350

650

x3

70

50

x3

70

175

20 - 160

60 - 250 (span)

70

175

70

x3

300 (total length)

200

50

150

x3

SIZES

For determining the sizes appropriate for the racing package, I made a research, on drones and drone sizes found in the previously mentioned appendix V. The illustration above displays the determined sizes. The package should include: A large case with the hoops (hoops can be folded to fit the case), Smaller cases to contain 3 hooks, 3 clips, a drone (sized up until 250 mm) and 3 'stiff ropes'. Larger drones will need their own case. The inner-case for a small drone could also be used for saving extra batteries and propellers/propguards of the large drone.

From appendix V can be concluded that most popular hobby drones, appropriate for (unprofessional) racing, are between 60 and 550 mm. Around 250 - 450 mm wingspan are some drones that have first person view. Some professional racing organisations maintain guidelines concerning drone sizes. An often used guideline divides drones in three groups, micro, mini and open. These categories are used for the drone game.

650 mm

325 mm

OPEN

MINI

MICRO

450 mm

250 mm

150 mm
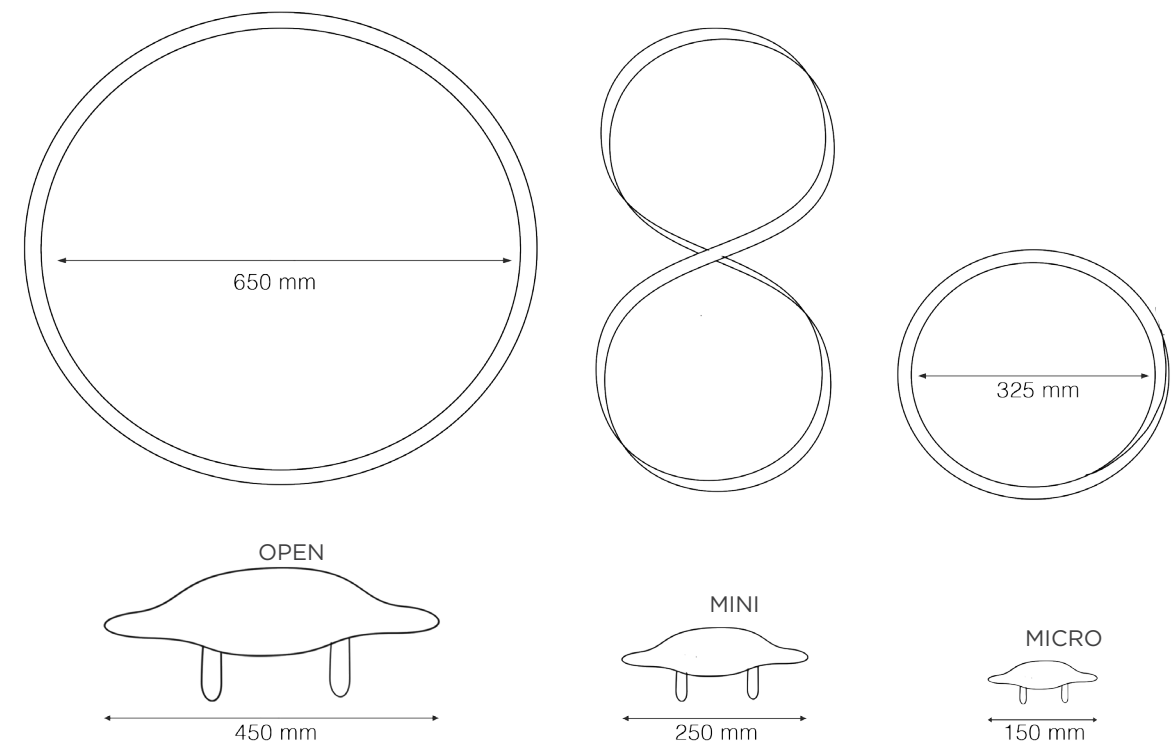
CONCLUSION

In the end, Red Pimiento likes both concepts very much and has chosen concept 2: racing for drones as the final concept, for three reasons:

- It has less of a 'Toy Store' image
- It is fun for all ages
- There is a branding opportunity

Much is yet to be done for realising this concept. Though the main concept is here, more research should go into safety aspects of the accessory, into materials, production and usability. If Red Pimiento will put their drone accessory line-up on the market, they are able to use their own resources for making the concept production ready ●

CHAPTER 7

THE DRONE BACKPACK

INTRODUCTION

This final part of the thesis is about a backpack I designed for drones. It is designed including the production guidelines, which have now been sent to the factory for trial production. The backpack is the biggest project within this thesis and took 3 weeks to complete. The designproces of this item has been quite different from the design processes taught at the study Industrial Design Engineering. That is why -after having shown the result- I will first explain my plan of action, and the reason why I choose to work according to this plan. After that, the design process itself will be fully elaborated upon.

In this section you will find:

- The Result
- The Process
- A Plan of Action
- Design Commentary
- A Conclusion

THE RESULT

Before explaining how the drone backpack is designed, let us first take a look at the result (see image 9 on the right): an universal drone backpack with a separate compartment for containing different drone models. Especially drone models of the popular drone brands will fit in this compartment. The compartment is a hard case insert made from EVA (Ethylene-vinyl acetate), which provides shockproof protection from the outside, and is soft-padded on the inside.

The top compartment provides enough space to fit in -among others- your remote controller, a GoPro or camera, chargers and goggles. The backside provides space for storing a laptop and tablet. The sides contain zippers, sleeves and straps for small equipment and a tripod. On the inside the drone and batteries & propellers can be stored, and last but not least; it contains a raincover for those rainy days.
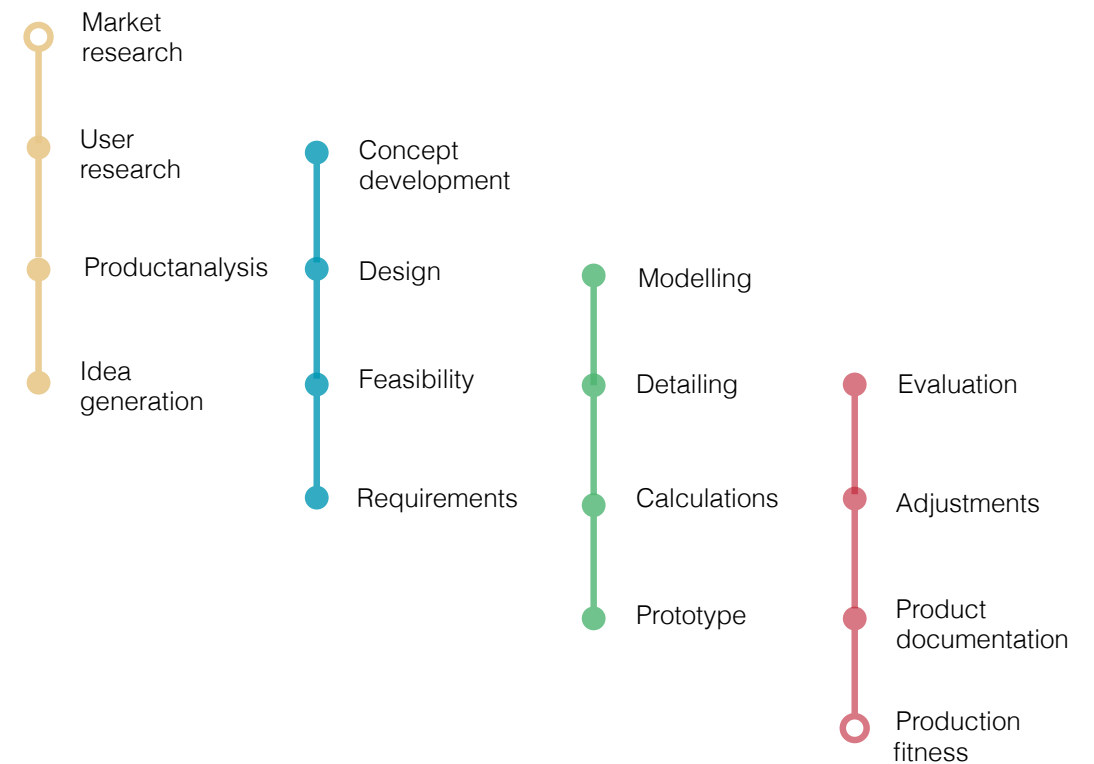

IMAGE **9:** THE DRONE BACKPACK

THE PROCESS

Though I would love to spent a 100 more pages on all the design details -which I honestly could- I understand that for this thesis, it is the most important that I can show my awareness of the bigger picture. And how I have aimed to use as much of my imagination as possible, to make 'a good invention' out of the perfect 'pile of junk' that I had piled op over the past few weeks.

AN UNUSUAL PROCESS

This chapter of the report will not show a 'standard' design process, because the process of designing the drone backpack did not go according to the steps I learned during my bachelors. For this backpack, I followed the 'design steps' Red Pimiento uses, because it would safe me time, and moreover: I wanted to learn how a company executes the actual design of a product. Though I can imagine every company has their own way, it would be the perfect chance to gain new experience and to find what colour the grass is at a design company like this.

As I was saying, the process has not been standard, at least not to my understanding. A standard design process, taught at the University of Twente, often looks like graph 4 [12] on the right. Where every step is walked through mostly chronologically, from top to bottom, but often enough is also carried out simultaneously, from left to right.
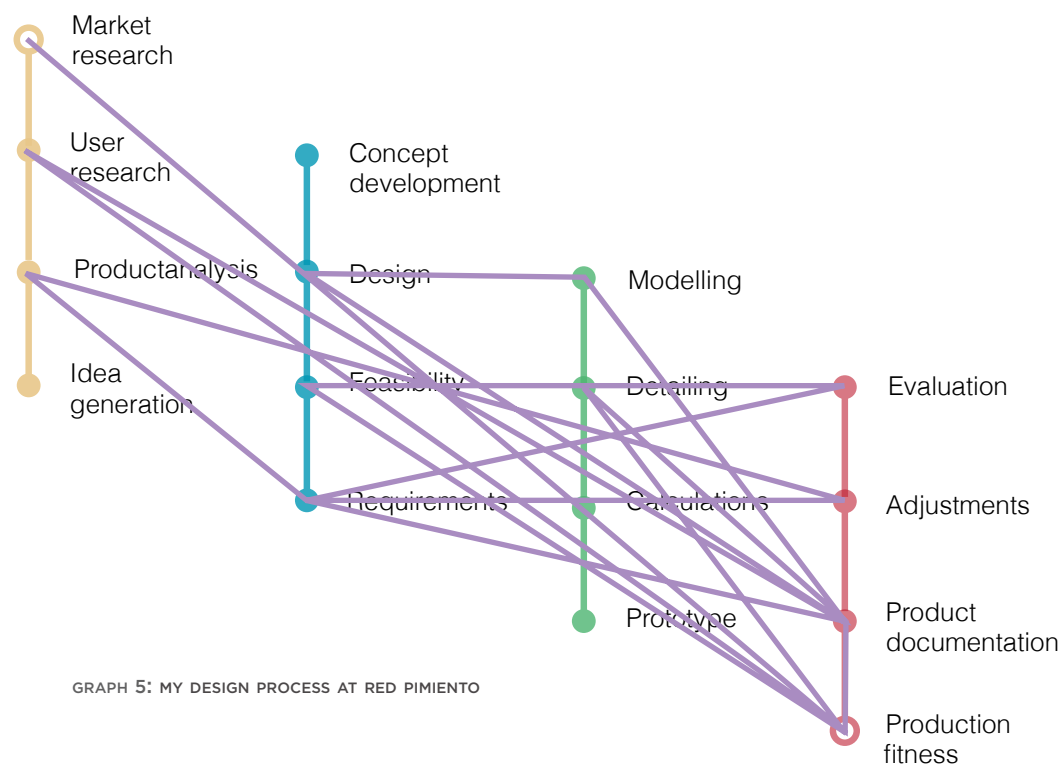
---

12 inspired by a design process graph (figure 1) found in the bachelor assignment course guide by A.P. van den Beukel and E. van Oosterzee (2015). Bachelor Eindopdracht (ed. 15-3). University of Twente. p.5

Market research
User research
Productanalysis
Idea generation

Concept development
Design
Feasibility
Requirements

Modelling
Detailing
Calculations
Prototype

Evaluation
Adjustments
Product documentation
Production fitness

GRAPH 4: A TYPICAL DESIGN PROCESS

Using the same graph, the course of the design process of the drone backpack looked more like the purple line in the graph the left page.

Which mostly shows that a normal step-by-step process did not apply to this sub-project. Most steps in the design process occurred simultaneously, and while a lot of feedback and redesigning took place. The most important reason for these changes was based on the 'Production fitness'. If a shape, strap or stitch was not appropriate for production, it had to removed or redesigned.

Market research

User research

Productanalysis   Concept development   Modelling

Idea generation   Design

Feasibility   Detailing   Evaluation

Requirements   Calculations   Adjustments

Prototype   Product documentation

Production fitness

GRAPH 5: MY DESIGN PROCESS AT RED PIMIENTO

Because the previous graph is starting to look somewhat complicated, the graph below is more appropriate for illustrating the Red Pimiento design process:

GRAPH 6: RED PIMIENTO'S DESIGN PROCESS
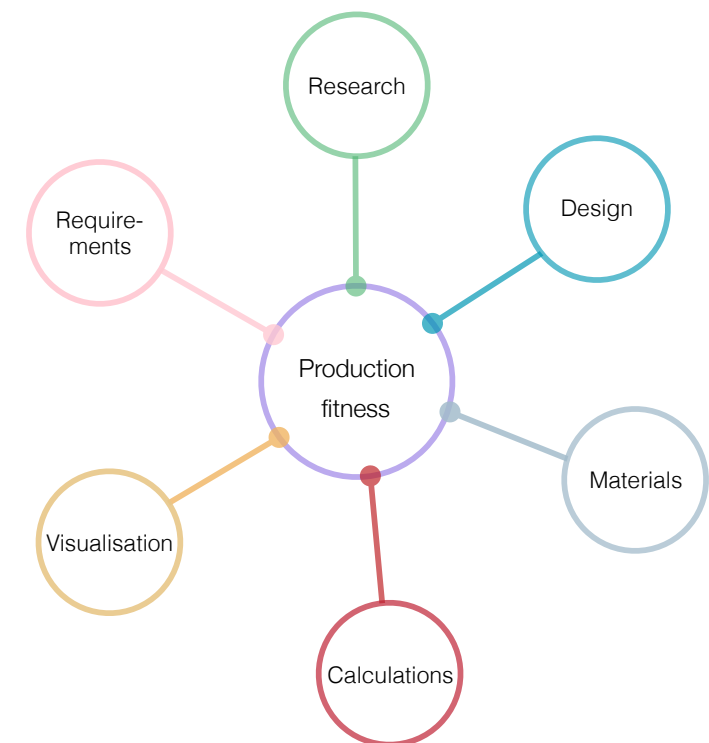
The central point in the design process is its fitness for production, all other aspects evolve around this. That is why -for instance- the aspect of 'Visualisation' has to be edited simultaneously with 'Design' and 'Materials'.

PLAN OF ACTION

In order to make sure the backpack was production fit, I started by choosing an existing backpack, from a small booklet of a Chinese backpack manufacturer. I asked for images of that backpack, to Photoshop into a drone-suitable backpack. The following steps are taken for 'designing' the backpack:

- choice of backpack
- what should fit inside
- large adjustments to backpack
- small adjustments to backpack
- drone-case
- drone-case inside
- material choice
- making Production Guidelines

I will not elaborate on every aspect of the design and choice made on the backpack design, because showing the details of the design itself takes 30+ pages. The full backpack design, including how it is made, can be found in the Production Guidelines, added in appendix Z, image 10 shows an example of such a Guideline page. I will, however, try to explain most of the important design choices made in the process.

RED PiMiENTO

Project name	Backpack for drones	Designer	Mendel
Date Created	15-07-2016	Brand	Red Pimiento
Description	Backpack for drones and drone equipment	Quantity	500, 1K, 2K, 5K, 10K

[A. Backpack]   6.   Details - Backside

Laptop compartment

- Material inside laptop compartment: **[g]**
- Add pocket for tablet inside laptop compartment. Dimensions as in line drawing. Material: bue velvet **[]** with 3 mm padding.

g

Backview
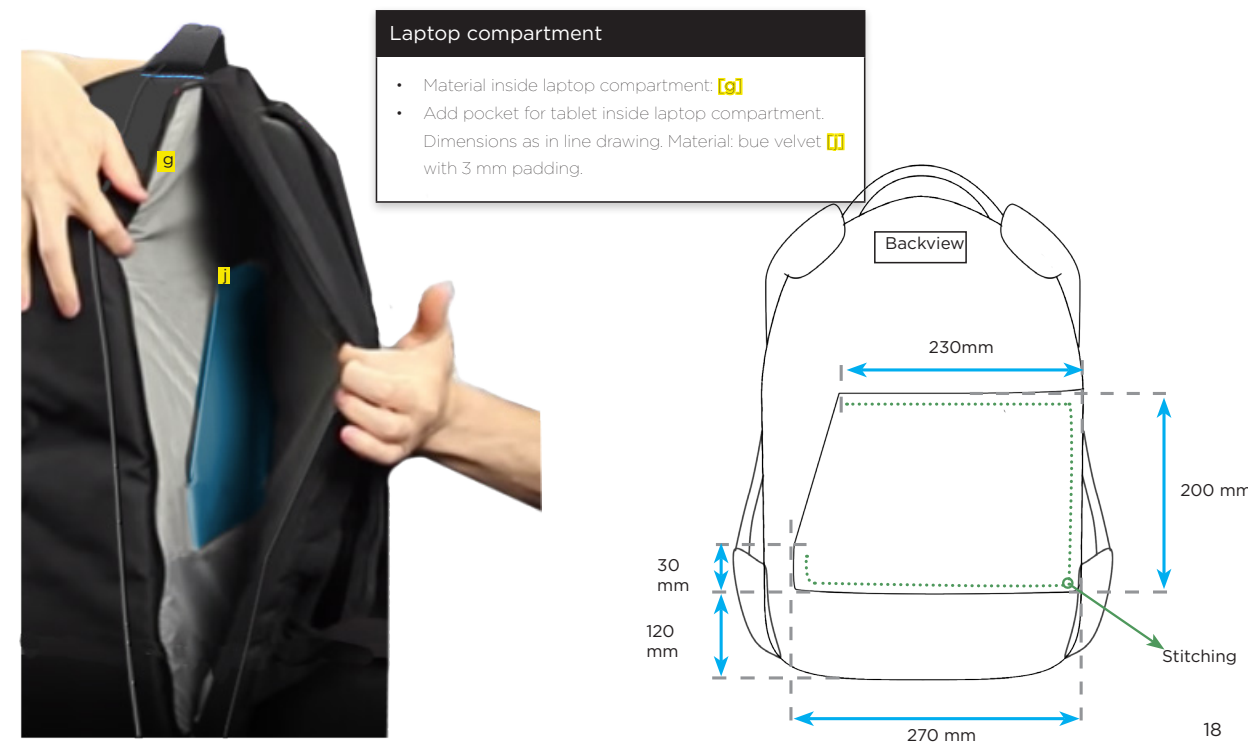
230mm

200 mm

30 mm

120 mm

Stitching

270 mm

18

IMAGE 10: A PAGE OF THE DRONE BACKPACK PRODUCTION GUIDELINES

DESIGN COMMENTARY

In this chapter I will give a brief commentary on some of the relevant design choices to reach a high-end product design, starting at the beginning: choice of backpack.

BASIC LAYOUT

Image 11 shows the backpack that formed the base of the drone backpack. I chose this backpack because it looks strong, protective and high-end. It has a good basic size and already consists of a laptop compartment.

The backpack will not have a foam inlay for the drone, like most drone backpacks, but a separate EVA-hardcase that fits a drone. I chose not to put an inlay in the backpack because lots of people complain in youtube videos, reviews and blogs about the lack of space in their backpack due to the foam. Next to the lack of space, the foam will deteriorate easily and loose its high-end protective look and feel. Bags that do not have an inlay, however, do not seem to be protective enough. People are too scared to pile it with other backpacks or to take it with them on a plane.

That is why this backpack will consists of 2 compartments, a (non-detachable) EVA-case, and the top compartment with detachable dividers, for taking extra stuff on your trip (see image 12 below).

IMAGE 12: TWO COMPARTMENTS INSIDE THE DRONE BACKPACK

SHAPE DEVELOPMENT

First I changed the basic shape to image 13 **B**. The primary idea was that the drone compartment could be opened from below, with the lid flipping upwards. My supervisor and I reasoned soon enough that opening the drone compartment from above, instead of below, is more convenient, for it prevents stuff from falling out when opening. This way, design **C** was created.

The same problem changed the top compartment. Opening from the bottom would not be realistic, because the top edge of the backpack is curved, which is not appropriate for bending. So design **D** became the result.
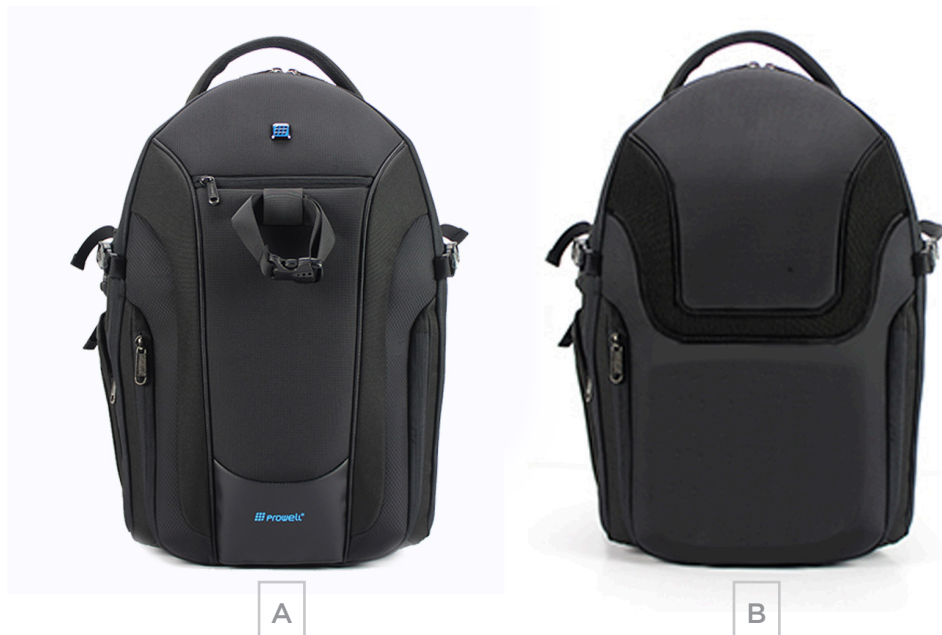
Shape **B** also contained too little space for the EVA-case. From the listing in appendix V and the spreadsheet on the next pages I calculated the exact needed dimensions. All exact sizes are shown in the Production Guidelines (appendix Z). The next page shows a spreadsheet with objects that people often choose to bring when flying a drone. All objects are scaled relative to each-other. I used the sheet to drag and drop the objects and to make sure most logical combinations could fit the backpack.

IMAGE 13: A, B, C & D: DEVELOPMENT OF THE DRONE BACKPACK

IMAGE 14: SPREADSHEET OF ALL RELEVANT OBJECTS WHEN FLYING A DRONE

LEFT AND RIGHTSIDE DETAILS

On the right-side of the backpack (image 15 right), a pocket, a strap and a buckle strap are added, for bringing a bottle or a large or small tripod on your trip. A fabric detail was added for aesthetics, in the same size of the pocket on the left-side. These details were edited and changed in Photoshop to decrease its rawness and to create a more delicate look. The pocket on the left-side (image 15 left) is added for extra convenience. I added these side pockets for optimizing the usability. Some drone-backpack user reviews, for instance, talked about how there was no place for their keys, phone or other small stuff.

IMAGE 15: LEFT: LEFTSIDE OF THE BACKPACK, RIGHT: RIGHTSIDE OF THE BACKPACK

As you may have noticed, the backpack is not very obtrusive in its colour. After some discussion at Red Pimiento, my supervisor and I chose this grey look, for appealing to a larger general audience. Later on, if they would choose to design a backpack for a specific target group, other looks will be used.

But, to prevent the backpack from being too dull, I added a drone fabric detail I put together, at several places in the backpack (see image 16 below). Illustrations used in the fabric are designed by FlatIcon.
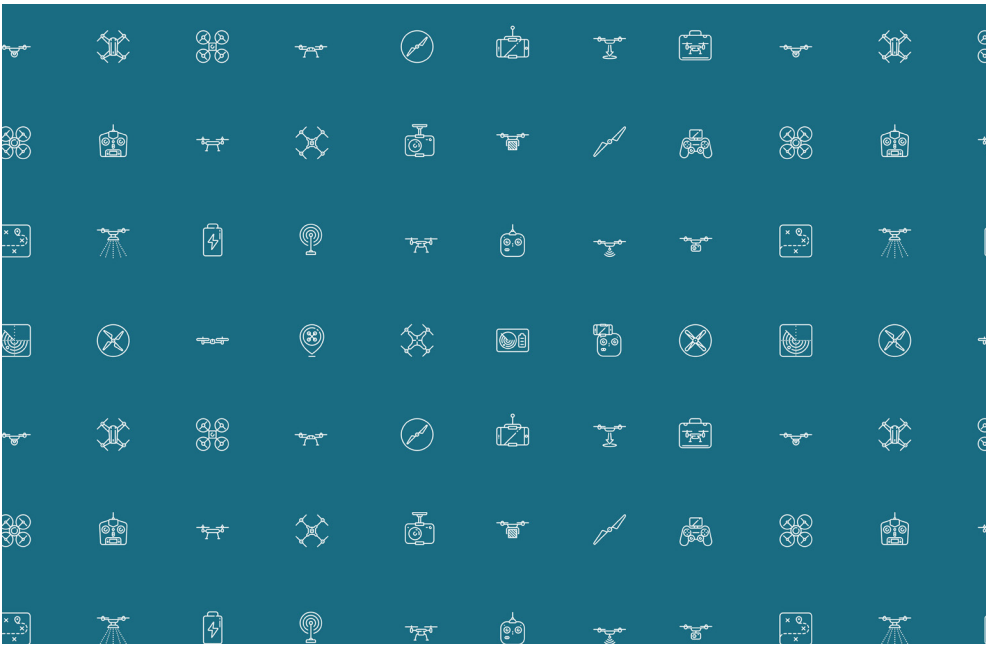

IMAGE 16: DRONEPATTERN ON FABRIC

THE EVA CASE

The Eva-case consists of a lid and a case. The case is sewed into the backpack. The lid is attached to the backpack on bottomside. This way, the lid will only have one zipper. I choose the Eva-case to be non-removable from the backpack for several reasons. First of all; The backpack would look strange when the case is removed. Next to that; the stuff in the top compartment will sag down into this compartment. It will also mean that the compartment has two zippers for opening, and, maybe the most important reason: Designing it any other way will be very hard to explain in the guidelines and for the factory to make in production.
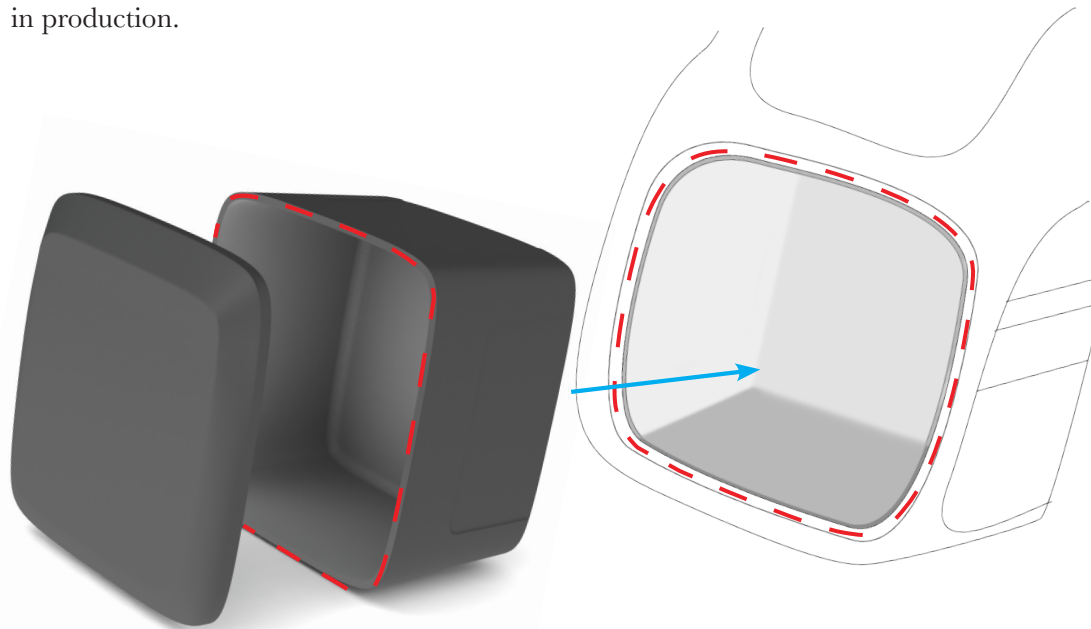

IMAGE 17: EVA-CASE IS SEWED INTO THE BACKPACK

IMAGE 18: EVA-CASE LID IS SEWED AT THE BOTTOM EDGE

IMAGE 19: A: INSIDE OF EVA-CASE, B: VELVET POUCH WITH VELCRO STRAPS

IMAGE 20: VELVET POUCH WITH ZIPPER FOR CONTAINING EQUIPMENT

INSIDE THE EVA-CASE

The inside of the EVA-case is meant to accommodate different drones. Whether it fits snugly or loosely, the straps are designed to hold any sided done tightly. The two dividers and pouches can be adjusted or removed by their velcro paddings.

The dividers and pouches are designed to provide extra storing for equipment, and to protect the drone from these equipment.

I ordered the pouch to have a 100% polyester material on the inside, because polyester is an affordable flame retardant material. One of my research findings mentioned how the batteries can produce a lot of heat when they are stored after flight.

OTHER DETAILS

Many more details have been added such as the images below briefly explain. These details have been designed, edited and re-edited throughout the process. The same applies to the material choice, which has also been based on the looks and feels of existing backpacks in Red Pimiento's office and my supervisors' expertise.

IMAGE 22: THE EVA-CASE LID CONTAINS AN EXTRA DIVIDER WITH ELASTIC GRID, FOR STORING PROPELLERS.

IMAGE 21: TOP COMPARTMENT OF THE DRONE BACKPACK, WITH DIVIDERS FOR A CAMERA OR OTHER EQUIPMENT

IMAGE 23: THE SHOULDERSTRPAPS ARE DETAILED WITH A DIFFERENT FABRIC AND STICHING

CONCLUSION

In this chapter, I have explained the making of the backpack for drones. I showed some elements of the backpack design and walked through the design process. Now it is time to take a step back, and look at the 'bigger picture' of the backpack design process once more.

A VIEW ACROSS THE BOARD

As I stated before, all design steps evolve around the backpack's production fitness, as illustrated again by graph 6 on the right page.

During the process, I performed RESEARCH on drone sizes, drone equipment and existing drone backpacks. By doing this during the design-phase, it slowed down the process and made a number of re-designs necessary. On the other hand, by choosing this focused research approach, no research time was lost on topics that might later prove to be irrelevant. Looking back at it though, performing more preliminary research would have been my personal preference.

In the Red Pimiento approach, DESIGN and (graphic) VISUALISATION are executed simultaneously. Although I had made some idea- and concept sketches, most design ideas were directly 'tested' on the Photoshop backpack image, which was a completely new way of designing for me. I did not mind it however, because it immediately showed the exact effect of the design choices in the final result, and its feasability.

The choice of MATERIALS was quite difficult for me. Red Pimiento keeps tens if not hundreds material swatches in their office, from which I was

GRAPH 6: RED PIMIENTO'S DESIGN PROCESS

allowed to choose almost any. I did get a lot of help on this matter from my supervisor, but in the end, it were decisions I had to make. So I chose what seemed to be the most appropriate materials, considering that if a material would tun out to be unsuitable after all, it could always be modified before ordering large quantities.

CALCULATIONS included drone sizes and drone equipment sizes, related to the drone backpack. These were also executed continuously during the design-process.

And so did the REQUIREMENTS. As you may have noticed, the beginning of this chapter does not include a program of requirements. I could have made one after finishing the design, for the sake of making a standard design report. But I decided I would only be inventing the wheel when the car is already build. I therefore chose not to detail the requirements, mainly because the design process Red Pimiento operates on does not require this step in such an explicit way. The 'requirements' in this chapter were based on the equipment that should fit in the backpack, knowledge I gained throughout the process, and most important of all: existing knowledge and rules of Red Pimiento that provided the basic guidelines and preconditions.

Writing this report and reflecting on the course of events during this process, it becomes clear it would have been more structured if I would have outlined the requirements upfront •

CHAPTER 8

EPILOGUE

THE ASSIGNMENT IN RETROSPECT

Red Pimiento chose to enter a possible Business to Consumer future with an open mindset. Their choice for not steering me in a certain direction has particularly born its fruit. If they would not have done so, they would not have gotten the results as they are now. Results of which both parties look back on with satisfaction.

REVIEW ON THE APPROACH

In my process I have chosen a diverging and converging approach, for achieving the best possible options in this field of play. By diverging, I broadened the field of play into different markets, products and possibilities. Together with Red Pimiento we converged the focus each time towards the most appropriate option. This resulted in B2C options they would not have foreseen themselves, and for which some healthy scepticism existed. The choices made, however, did turn out to be the right choices.

The good choice of entering the drone market, was plainly confirmed when the CEO went to a congress of rising companies, and was confronted with the magnitude and potential of the drone industry. It proved to be an affirmation of the choices made, and the success of my diverging and converging approach for Red Pimiento.

In my elaboration of the drone concepts, I chose to use Red Pimiento's design approach when designing the backpack. To some extend, the game for drones accessory was a warming up, after which most time was spent on the grand final of the drone backpack.

The unconventional choice for using Red Pimiento's design approach in contrast to the standard approach, turned out to be the most effective approach for this bachelor assignment. Apart from saving me a lot of time, it also enabled me to work closely with my supervisor and colleagues, giving them the opportunity to immediately guide and advice me. Without this, I would not have come this far in my design. The main downside for me personally was that the fast pace kept me from proper documentation during this last period of my assignment.

The backpack design however, was finished in time and has been send out for a test production. In the mean time, the other remaining design options have been taken up by other interns, to whom I have had the privilege to provide information and insights after my assignment at Red Pimiento was finished.

ADVICE TO RED PIMIENTO

Red Pimiento is an innovative company that has certainly won its spurs in the design world. The company harbours great potential for further extending their qualities from the B2B market into the B2C market.

ENTERING THE B2C MARKET

For the time to come, Red Pimiento would do well by entering the B2C market with core business products, in order to avoid mischances as much as possible. Depending on the success of these first steps, additional product lines could be developed. Primarily in the drone industry, but in later stages other market combinations mentioned before could be introduced.

For embarking on other market combinations, choosing the diverging and converging approach could provide a good method for Red Pimiento to use. The B2B market, however, will most probably continue to be an important part of Red Pimiento's basic revenue stream.

Finally, to support future developments, Red Pimiento's business model should be taken into consideration. Tackling issues such as; how can structural research be performed, how can two business lines be resourced, and whether Red Pimiento wants to make new steps in the field of technological expertise. These options will have to be analysed with great care by Red Pimiento's management team, evaluating whether trade-offs in IT investments will compensate for their expected future returns ●