Advanced Concept Design
2011 - 2016

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introduction

Innovation by integration

Innovation by integration; this is what the Advanced Concept Design (ACD) master course is all about. It starts with a predefined complex problem that challenges designers to think conceptually. This in turn leads to design research and development resulting in innovative product or product-service system concepts. In the past five years, around 600 students have worked with 26 different partner organisations on 42 projects, which can be clustered in the following six themes:

→ Sustainability
→ Lifestyle
→ Inclusive Design
→ Healthcare
→ Retail
→ Aviation

This book presents one student's work for each of the 42 projects; see the index of ACD 2011-2016 projects on page 110. In total, this represents around 25,000 hours of student's work! And, that doesn't even include the many hours spent by the dedicated ACD team and the partner organisations.

The aim of this book is twofold. On the one hand, it commemorates the richness and diversity of the innovative designs produced by the ACD students in the past five years. On the other hand, it is a showcase for the TU Delft Faculty of Industrial Design Engineering (IDE) to inspire new partnerships with companies and institutions, both in and outside the Netherlands.

The IPD master

The ACD course is part of the Integrated Product Design (IPD) Master program, launched in 2003 at the Faculty of Industrial Design Engineering (IDE) of Delft University of Technology. The IPD program focuses on teaching new generations of designers how to design user-centred innovative products and product-service combinations. The innovative designs that students create are based on a balance between the interests of users, business and societal challenges. This master covers the entire design process: it starts with a design brief and ends with a complete product that is fit for mass or small series production.

In the IPD master, the students learn about conceptualization and embodiment design, they apply systematic state-of-the-art theories and methodologies, and integrate user, technology, and business aspects. The program's identity is determined by the coherent integration of all these aspects to arrive at a successful new product proposal; this is what makes the IPD Master's program so challenging, exciting and unique.

The ACD course

In the first year, IPD Master students take the ACD course. They tackle real project assignments provided by the partner organisations.

The focus of ACD is on the conceptualization phase of the product design process. The course begins with a design challenge, co-created by the ACD core team and the partner organisation. It finishes with a product concept which addresses not only the product's main function, but is a unique blend of qualities regarding the usability, comfort and safety of the product; the meaning of the product in society; and technical aspects, such as working principles and materialisation.

In order to achieve this, the course is built around a Concept Design Project (CDP) in combination with different areas of design expertise, and has a strong focus on research. This ensures that the students' innovation is based on up-to-date (self-generated) scientific knowledge. The course set up is targeted to minimise the distance between the acquisition and application of knowledge, thus enabling students to build a set of required competencies.

ACD students experience input from these different areas of expertise:
→ Design, Culture & Society (DCS)
→ Applied Ergonomics Exploration (AEE)
→ Technologies for Concept Design (TCD)
→ Product Communication and Presentation (PCP)

In each area, ACD students acquire specialized theoretical knowledge by attending lectures and applying the newly learnt theory in assignments and workshops. They receive feedback on their competency development in expert meetings and from tests in each area. Moreover, the students are expected to apply these skills and knowledge in their project.

Concept Design Project (CDP)

In the first ten weeks, students work together in a design team of 4-6 students. Based on a real life problem, they start by analysing the design assignment, and exploring the partner organisation. This is followed by performing design-related research in the areas of expertise, with the goal of creating a personal design vision.
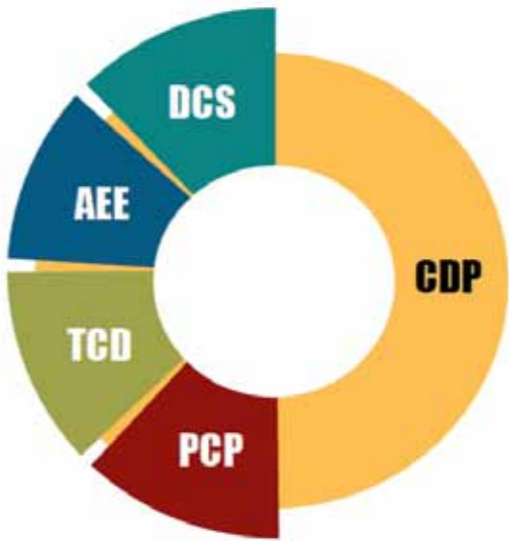
To be successful, the students have to weigh and prioritize the information collected in their research. This phase of 'structuring' results in the students gaining new insights into cultural and societal significances, user needs, and potential emerging technologies. Their final result, the personal design vision, includes the answers on what to design, for whom, and for which future scenario.

In the second period of ten weeks, they individually dedicate themselves to translating this personal design vision into a feasible concept by integrating all relevant aspects. The conceptualization process encourages them to create innovative user scenarios with a strong product identity that are feasible in terms of applied emerging technologies, and estimated economic benefit. During the process, they apply and implement domain-related simulation techniques in order to evaluate and elaborate on preliminary and final design concepts.

Design, Culture & Society (DCS)

DCS learning goals focus on three topics: eye-opener, understanding, and doing. Students learn the required theory and methods to understand the role products (can) play in shaping society and vice versa. DCS has a broad scope, which includes cultural studies (material culture, design history and cultural anthropology) as well as the philosophy of technology (explaining and predicting the impact of products on behaviour and society). Students learn to align products to cultural and social practices and processes. Furthermore, they become aware of the importance of product design concepts and the impact of their visual appearance.

Applied Ergonomics Exploration (AEE)

User-centred design is the central theme of this domain. Students get to know and learn to apply methods and techniques to capture user insights and preferences in terms of comfort, usability and safety. This process is supported by a series of lectures given by experts from academia and industry who, in this way, pass on their theoretical and practice-based knowledge and experience to the students.

In the first period, students work in a team and set up, perform and report explorative ergonomic research through e.g. user observations, questionnaires and/ or interviews. Ergonomic research comprises cognitive, sensorial, organisational, physical and behavioural

aspects. The resulting user, usage and contextual data, the students' analyses, and their conclusions are supportive and inspirational for the CDP design challenge they are working on.

In the second period, students work individually and learn how a continuous focus on the user contributes to and inspires their concept development process. Throughout this period, students are encouraged to evaluate 'conceptual stimuli' like sketches, scenarios, on-screen models, virtual models, and/or physical prototypes, with the intended users. Additionally, user representation tools are used to elaborate design proposals such as cognitive models, anthropometric databases and/or digital human modelling systems.

Technologies for Concept Design (TCD)

Future product-service concepts often deal with emerging technologies; they create products that consider the users' needs, including situational awareness, context sensitivity, and adaptive operation.

In TCD, the students learn and apply methodological approaches to explore and analyse emerging technologies in the fields of cyber physical systems, the internet of things, mechatronics, and emerging materials. They gain insights in the main components (e.g. sensors, actuators, networking and communication technologies, smart materials) of these technologies, and learn how to successfully integrate a technology into their concept.

## Product Communication & Presentation (PCP)

Drawing, visualisation, and presentation are integrated activities throughout the design process: a process that is divided into many steps and stages. Students learn theory and skills from experts and apply these by working on practical exercises.

Drawing serves numerous goals, of which most important are 'exploration' and 'communication'. It is the designer's language to visualise, depict what does not exist yet, and reflect on first drafts. Besides, intermediary design results and proposals need to be evaluated visually. PCP helps students to develop their spatial awareness and to learn about the specific subjects (e.g. materials, spaces, storyboards) they attend to during class sessions. Drawing and visualisation should, for that reason, be regarded as cross-disciplinary, not as a discipline as such: It's both an analysis and a synthesis tool at the same time.

In addition to developing skills and knowledge for visualising things and situations, the PCP ensures that students 'ambitions and expertise are visualised in the form of a professional portfolio. The portfolio exercises and feedback help them understand and apply principles of visual communication: how to bring a message (vision, processes) across, composition, (colour) balance, hierarchy, etc. The portfolio also helps students to present themselves, their expertise, and their preferences.

Qualifications IPD graduate

The IPD program is designed to equip graduates with the knowledge and skills required in professional design practice. As final qualifications for the Integrated Product Design master, the IPD graduate:
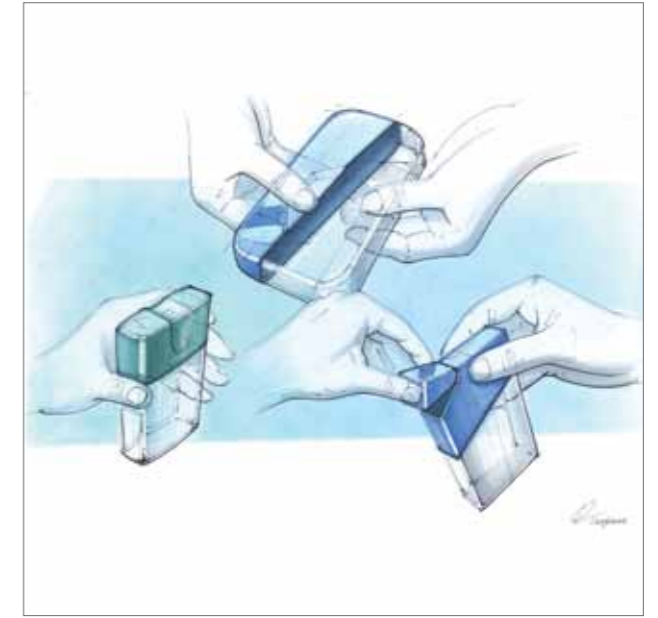
1. is capable of developing innovative products and product-service combinations to satisfy the needs of the stakeholders based on balancing the interests of the users, industry and society, with due regard to international ethical issues;

2. has a thorough knowledge and understanding of, and is proficient in, the execution of the total product design process with a focus on conceptualization and embodiment design;

3. is able to perform and manage the design process independently or as a member or the leader of a team, often in an international setting;

4. has a thorough knowledge of the aesthetical, ergonomic, technical and environmental issues involved and is acquainted with the organisational and economic aspects of products;
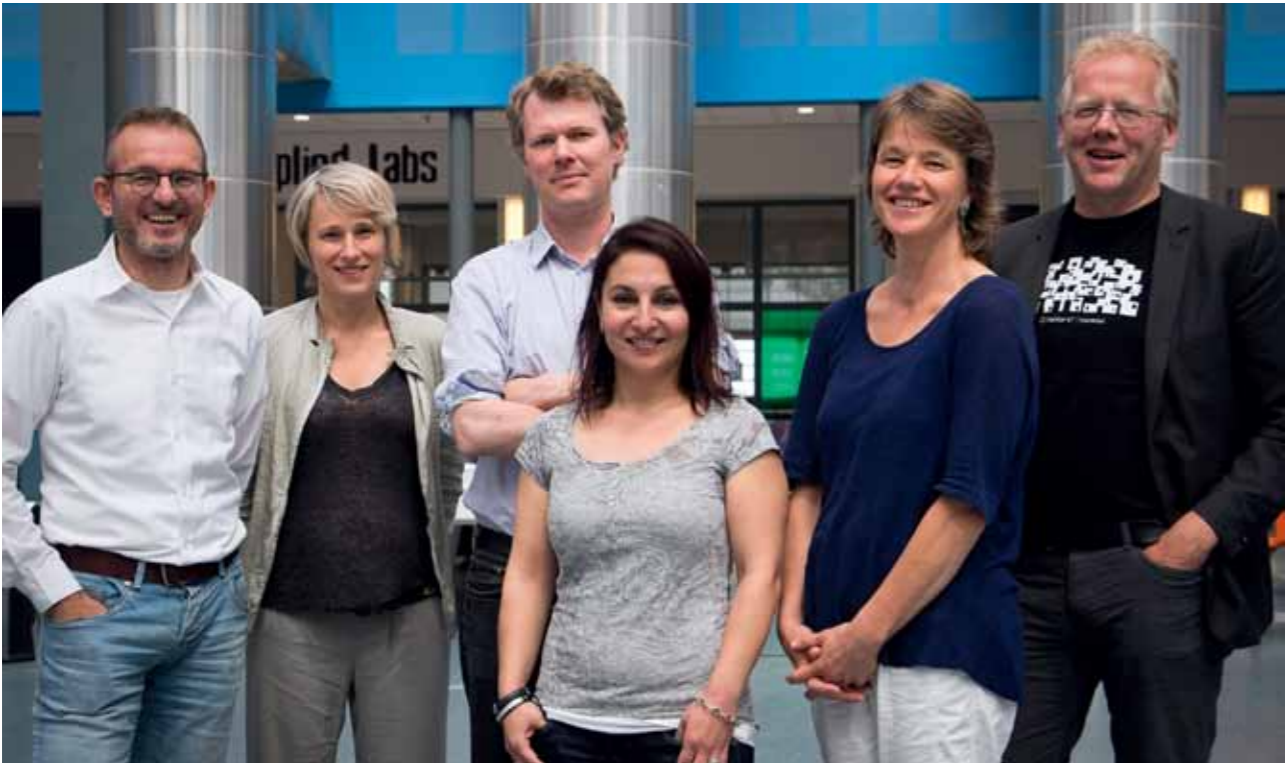
5. has the skills to use integrative approaches to take these (aesthetical, ergonomic, engineering-related and environmental) issues into the product development;
6. is capable of generating new knowledge, based on research performed with scientific rigour.

The ACD team

The ACD team is an extraordinary talented blend of designerly skills, with an added-value mix of scientific expertise and experience. Each year approximately 35 TUD professors, lecturers and student assistants are involved in the ACD course; see page 112 for an overview of all ACD team members between 2011-2016.

The ACD core team consists of:
- Prof.ir. Daan van Eijk (responsible professor)
- Dr.ir. Armagan Albayrak (course coordinator)
- Dr.ir. Annemiek van Boeijen (co-coordinator Design Culture & Society)
- Ir. Marijke Dekker (co-coordinator Applied Ergonomics & Design)
- Ir. Jan Willem Hoftijzer (co-coordinator Product Communication & Presentation)
- Dr.ir. Arjen Jansen (co-coordinator Technology for Concept Design)
- Ir. Marijke Idema (Project Acquisition)

INTERACTIVE
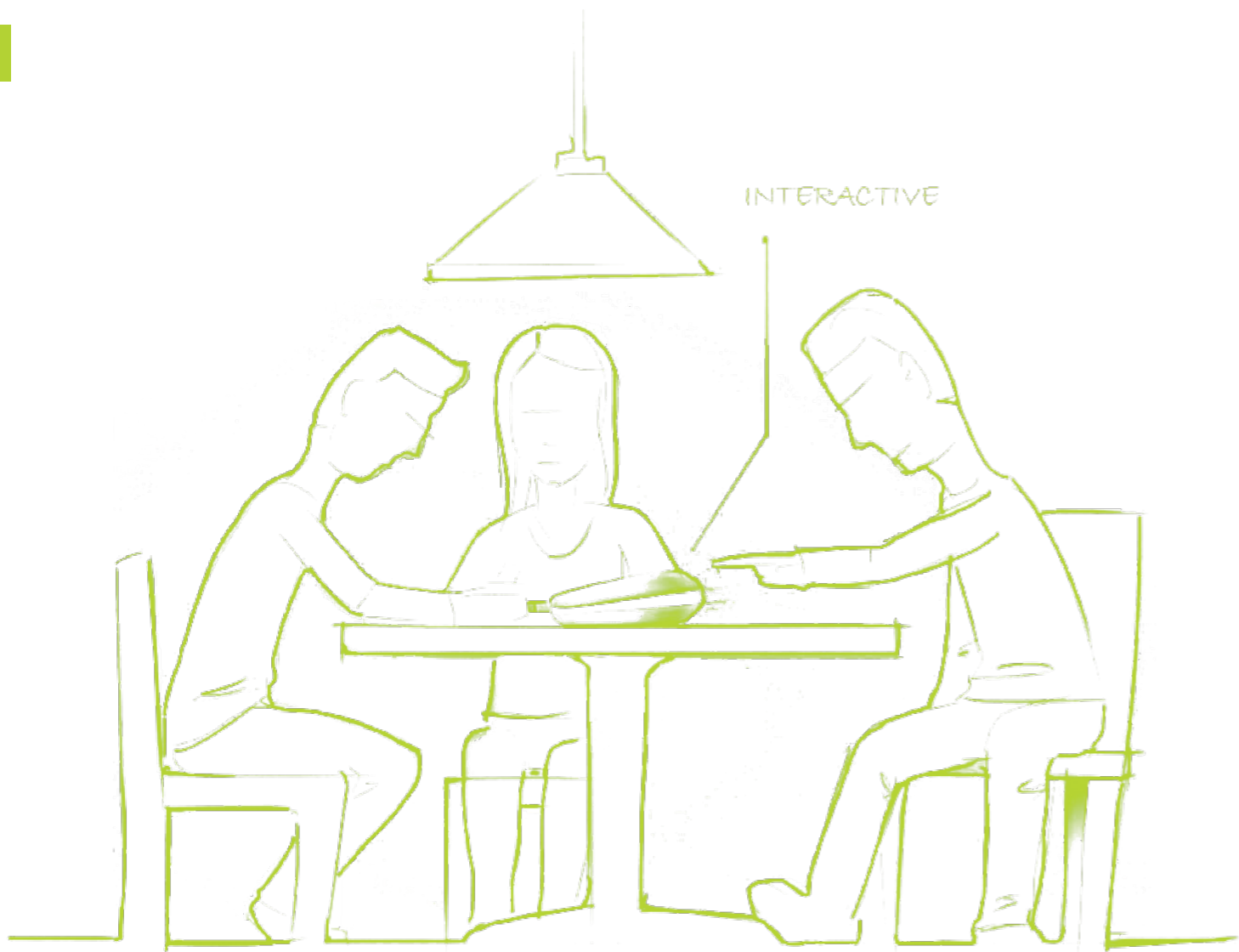
sustainability

Wild City Tiles

The Faculty of Architecture is looking for new modes of city design and related products that bring animals and their natural habitats into our daily lives. The new city vision aims to raise the value of biodiversity to levels never seen before, leading to environmental, spatial and economic benefits for all stakeholders.

Student design vision
Design a product that triggers the potential of natural biodiversity, creating opportunities where a diversity of animal and plant species can flourish: the Wild City Tiles.

Project methodology
By mapping all environments in the city of Amsterdam, reviewing the literature, and listing species' characteristics and their relations with
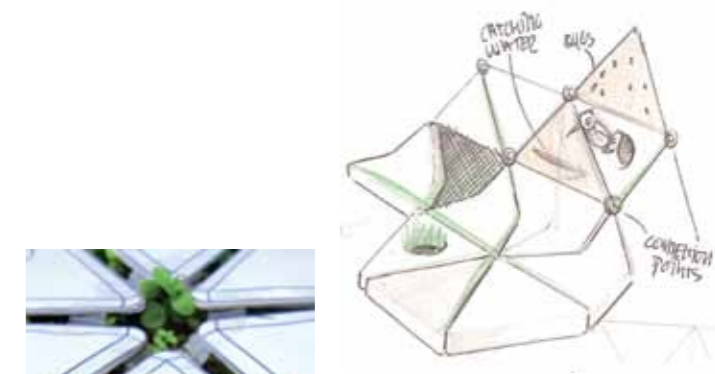
spaces, a better understanding of the context is gained. A literature search was conducted on what the municipality and residents think about natural biodiversity. Interviews with municipal road workers were held to better understand how the Wild City Tiles should be positioned.
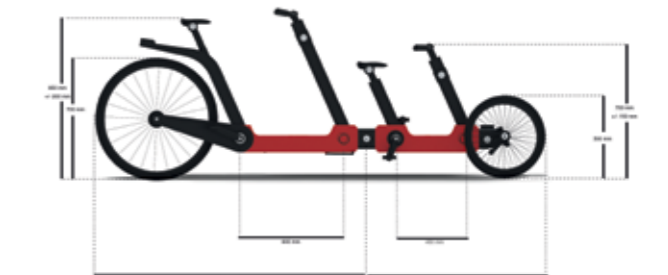
The design
The Wild City Tiles provide a new 'blueprint' for the 'Wild City'. The aim is to shift the current 'balance' of intentional and unintentional, the wanted and unwanted, the controlled and uncontrolled, towards a city with more opportunities for the 'special'.

Wild City Tiles brings the the lives of animals and their 'natural' habitat into our own daily lives. It stimulates the coexistence of street materials with plants, animals and residents. By adding value to unappreciated plants like weeds, the tiles reduce the need for maintenance. The tiles will continue to grow and the 'wildness' will change in form and diversity thanks to its flexibility.

Organisation
Faculty of Architecture
Student
Kay van 't Hof
Coach
Wim Schermer
Year
2011/2012

Footloose

Bugaboo develops mobility related products for use in different areas, and aims to expand their company portfolio to become the iconic innovative mobility brand.

Student design vision
Make the 'functional' transport of a fun activity where children gain awareness of traffic behaviour.

Project methodology
The context was researched to get a better understanding of where, when and how children currently play. Products which are currently used provided valuable insights. Specific attention was given to the differences in gender-typed products designed for children.

Together with Bugaboo, a workshop is organised to gain insights into their desired company direction, and get feedback on the devised concept directions.

The design
The Footloose helps parents bring their children to school or other places. The parent remains in control, however the child assists in this process. This creates a rich interaction and a great way to spend time together.

When using the Footloose, the parent is in fact the 'driving instructor' by which he or she teaches the child how to behave in traffic situations. The child's level of influence can be divided into three steps. First the child is able to pedal along with the parent. In the second phase, the child is able to steer, however the parent will always be able to intervene or adjust. In the final stage, the child is able to fully cycle on his/her own by disconnecting the two parts of the Footloose.

Organisation
Bugaboo
Student
Paul Schouten
Coach
Caroline Kroon
Year
2011/2012

Taks-i

ABB wanted to better understand the new experience that electric vehicles offer, so that they could transform these insights into a fast-charging product that matches the needs of the different type of users.

Student design vision
Putting the customer back in control when ordering a taxi: allowing conscious customers to deliberately select electric over non-electric transportation.

Project methodology
In order to get a better understanding of the technology's functionality and capabilities, research was conducted on the ABB Epyon fast charging technology. The researchers also investigated the current state of the taxi business.

The design
Taks-I links electric mobility to the taxi industry by creating a product service system that puts the customers back in control. A Taksi-I information pillar was designed where customers can order a taxi. Customers can select their destination and instantly get a quote, after which they can select a taxi. A built in filter allows users to choose whether they exclusively select electric taxis. After printing a ticket, the user is then picked up by their taxi.

Organisation
ABB
Student
Wouter Alberda
Coach
Sacha Silvester
Year
2011/2012

tax-i

train station   pick-up spot

sustainability
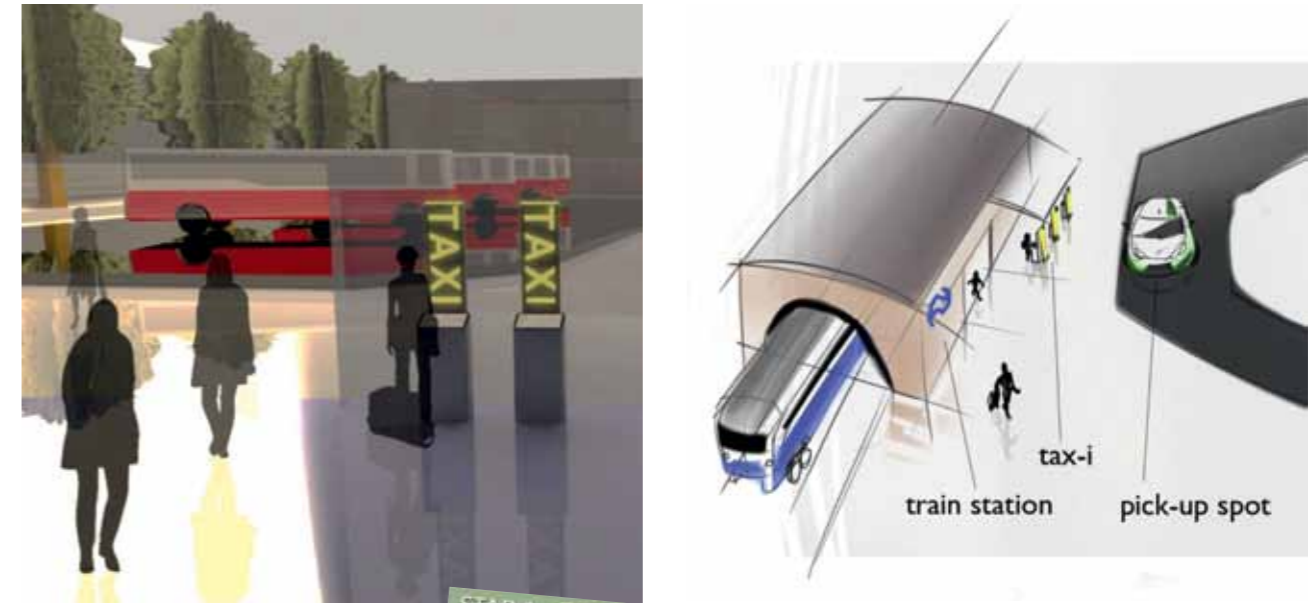
Concept House

The Suslab wants to develop a smart and ubiquitous Vehicle-2-Home (V2H) system in connection with SusLabNWE, dealing with how an electric vehicle is connected to a home or a built environment. The team focussed on the physical interface and interaction between the household and the system.

Student design vision

The Vehicle-2-Home system aims to 'seduce' consumers to overcome additional efforts by clearly showing both environmental and economic benefits in an honest way, while maintaining the relaxation characteristics of the home environment to make it a viable product. By offering a user friendly and educational interface, the product should stimulate use.

Project methodology

Prior to the idea and conceptualization of the to-be-designed Vehicle-2-Home system, the team conducted research at the SusLab Concept House. This is part of the SusLab infrastructure of living labs, constructed to facilitate user-centred design methodology. In order to identify future V2H users' needs, research was conducted on routines in their daily lives, expectations, etc.

The design

The design concept of a V2H system for the SusLab Concept House Prototype consisted of multiple linked elements. An apartment garage contains user dedicated, solar powered, charging spots. An RFID controlled Electric Vehicle (EV) charge manager communicates with EV chargers and apartment grids to insure optimal charging routines. Car keys are fitted with RFID user identification. A smartphone application and a web-based application enable the user to manage the system and gather information.

sustainability

World Wagon

Green8Lution wants to develop a lightweight sustainable mobility concept suited for multi-person or family use in (sub)urban environments.

Student design vision
To create a convenient, sustainable and fun to use transport solution that suits the freedom, style and technology needs of new adult generations.

Project methodology
Research was conducted on several modes of transportation to find out what a vehicle needs to have to be meaningful to young adults' daily lives. To probe the most convenient way of steering on a recumbent bike, the team studied how different body postures affected cyclists' perceptions of comfort.

The design
The 'World Wagon' is a human-powered Quattro cycle vehicle. The vehicle is unique as it is sold as a set of modular parts for self-assembly. This not only reduces manufacturing and transport costs, it creates a deep emotional user attachment, as the young adult has to spend time on its assembly. Furthermore, users will be able to customize the vehicle by either acquiring new parts from the manufacturer and the community, or by creating the required parts to suit their own needs, taking the product beyond its conception limits.

Organisation
Green8Lution
Student
Homero Heredia
Coach
**Sacha Silvester**
Year
2013/2014
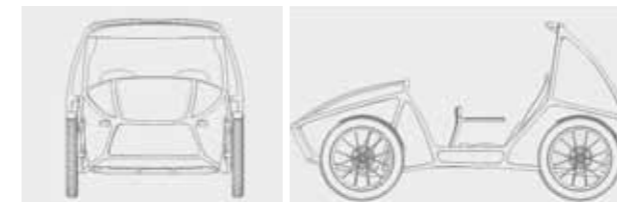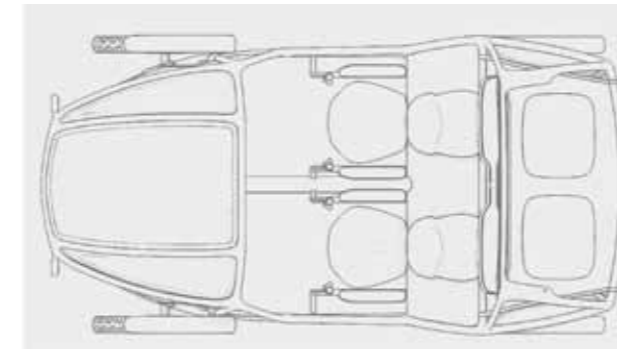
Sealid

Veneca is interested in the issue of recurring waste in the contract catering industry, specifically looking for a sustainable catering solution for soup.

Student design vision

To design a product that makes it possible for caterers to prepare soup and preserve the surplus with as little effort as possible, under the terms of the current legislation. The emphasis was on minimising the use of heat and water.
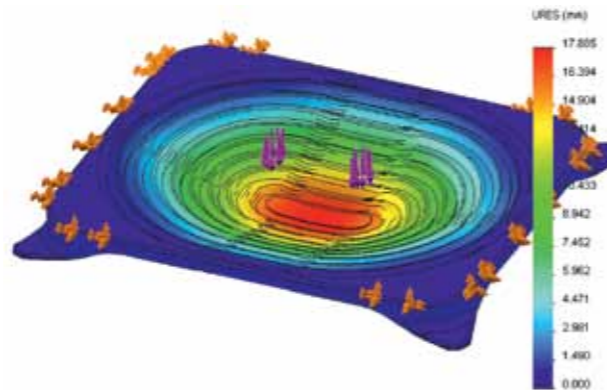

Project methodology

Field studies were conducted to gain a better understanding of the overall context, and observational research revealed consumers' consumption rituals. More in-depth context exploration revealed that waste is not a one-dimensional problem, but that it is influenced by water, food, energy and effort efficiency, among others.

To ensure design safety, the legislation on food preservation was studied, to ensure that the product design is aligned with the requirements.

The design

Sealid is a product that supports the preservation of food. It is a stretchable lid made of silicon, designed to improve food preservation in the catering context. Due to its highly stretchable material and its rippled surface, Sealid easily fits on all shapes of pots, pans, and gastronorm containers, within its own range of sizes.

The silicon lid is airtight, preserving the food longer, and makes stacking possible without the problem of uncovering the food. The Sealid design also includes a valve, making it possible to create a vacuum, which strips bacteria of the oxygen needed for survival, slowing the process of spoiling. A thermo-responsive polymer is located at the centre of the lid, making it easy to measure the temperatures required by catering regulations.
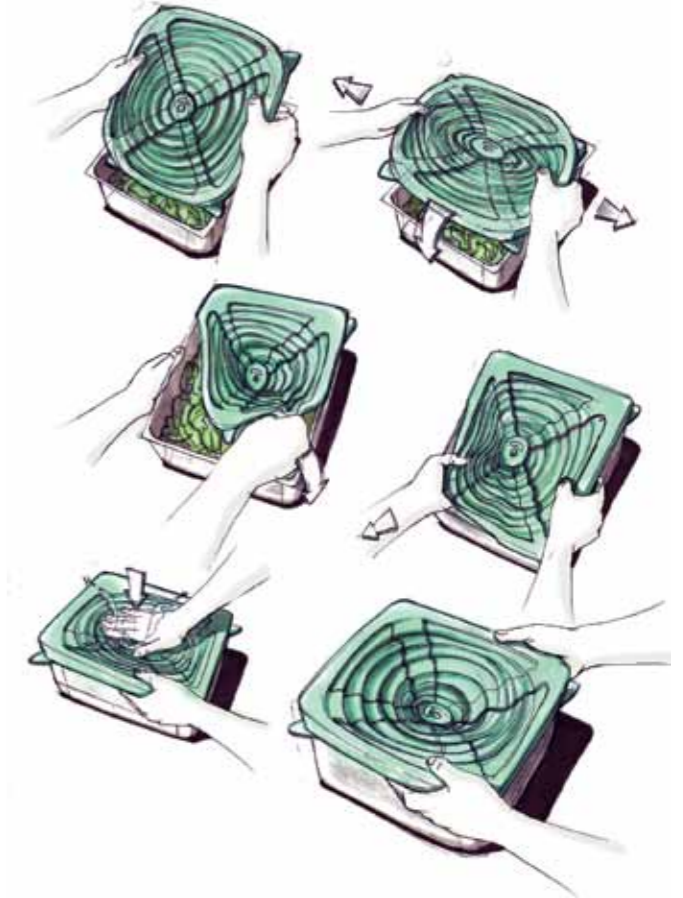
Organisation
Veneca
Student
Dorien van Alphen
Coach
Tjamme Wiegers
Year
2013/2014

PEP

Climate-KIC wants to design a product for the home that supports occupants to become aware of and to reflect on their domestic energy consumption, thereby promoting and influencing sustainable behaviour.

Student design vision

To support people to induce long-term behavioural change regarding their energy consumption during the transition of the energy sector, by giving them a feeling of control and competence through high personalization and commitment.

Project methodology

The team explored people's attitudes to sustainability and how these patterns were affected by household politics. In order to achieve behavioural changes, user research was conducted on the situational variables that influence domestic energy mitigating behaviour.

The design

PEP consists of a base located centrally in the home, which contains the system's control functions. The base functions as a central control, providing the user with direct feedback and an overview of the energy consumption over a specific period. It also functions as an interactive and tangible device which provides information to the family so they can reflect on their energy consumption.

From the centrally located base, there are a number of links with different functions. These links can be placed near or on electrical appliances through the house, measuring people's presence using motion sensors. For example, the link could note that no one is present in the room, and if it sees that the TV is on,
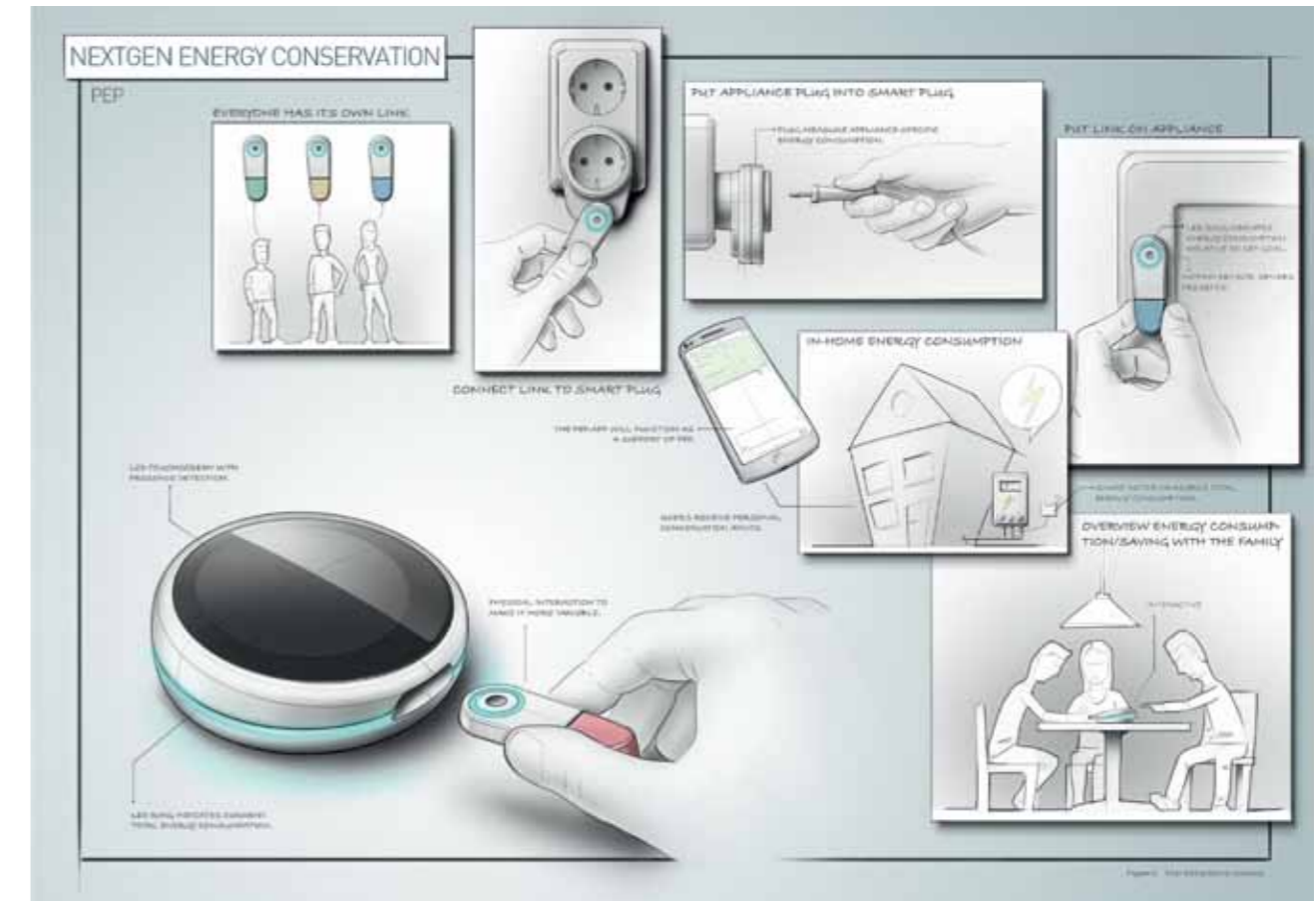
it can provide feedback to the user.

The product will be supported by an app which provides the user with feedback or information on appliance energy consumption.

Sunny Day

Climate-KIC's goal in this project is to improve the wellbeing of people living in houses fitted with the 2ndSkin Façade system, a pre-fabricated, lightweight building envelope that acts as a building's second skin. This skin should improve indoor lighting and reduce energy consumption.

Student design vision

Create a product which improves the wellbeing of residents partaking in the 2ndSkin project by providing natural light at preferred levels to enrich the tenants' domestic environment. This can be achieved by making smart use of sunlight brought into their homes, to stimulate a more sustainable lifestyle.

Organisation
Climate-KIC
Student
Bas Smit
Coach
David Klein
Year
2015/2016

Project methodology

The team investigated the use of artificial and natural light in domestic (sustainable) environments by looking at how people want to use light and consume energy.

Additionally, the cultural context of sustainable practices and lighting was explored. The focus was on how lighting solutions could contribute to sustainable living while providing the comfort and function people require.

The design

Sunny Day reflects light indoors using reflective shelves. It makes smart use of the changing positions of the sun to make optimal use of incoming sunlight. Sunny Day consists of two rows of shelves. A curved profile covered with reflective foil reflects the light inside. The other shelf is used to create privacy when desired. To create a more open view, this row can be temporarily removed.

The shelves are divided into an upper and bottom group. In this way, Sunny Day prevents the glare of reflected light in any sun position, but reflects light far into the living-room.
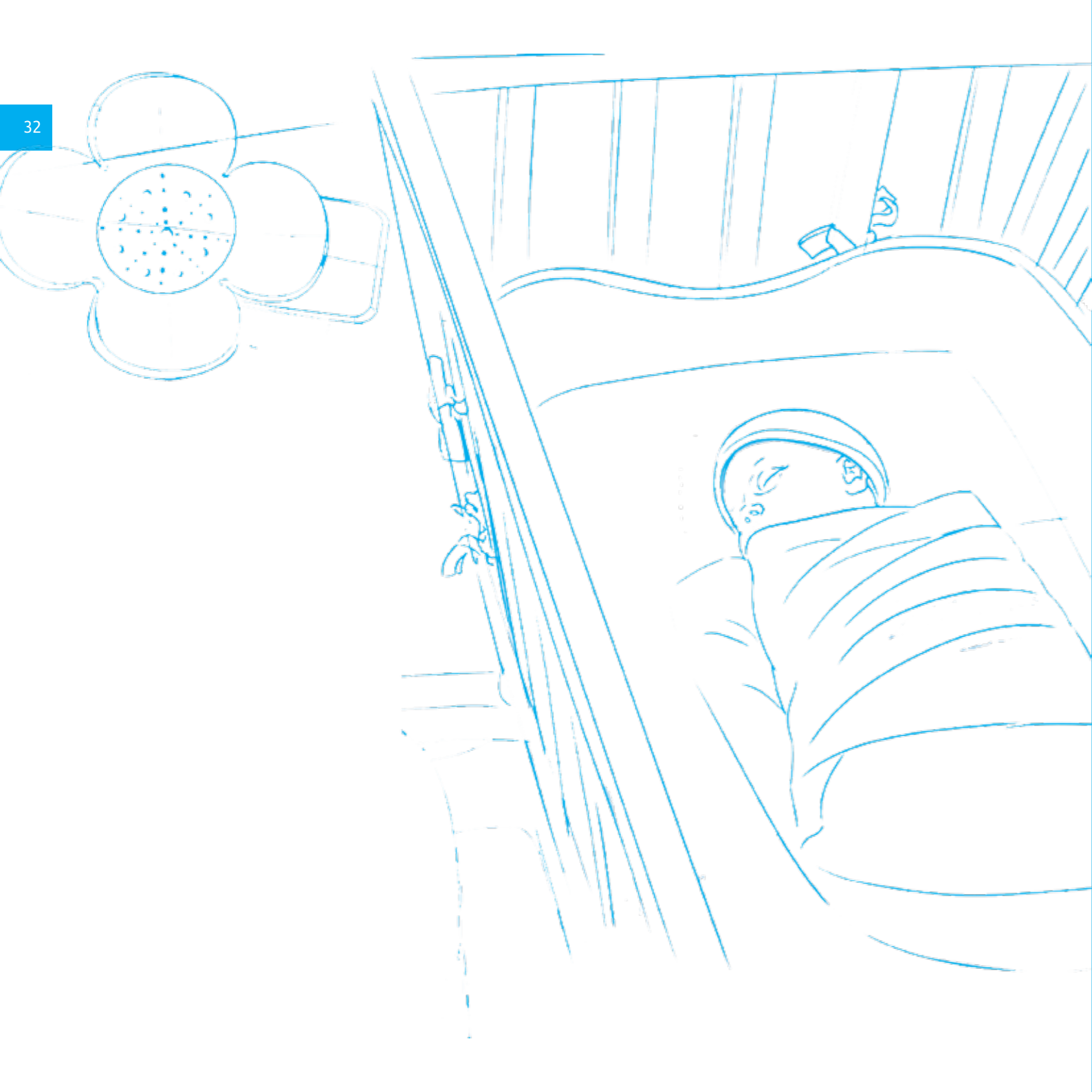
lifestyle

The Stylo

The challenge set by Philips was to create a new product that would help men in their grooming activities, guiding and coaching the user when it comes to styling their facial hair.


Student design vision

Initially, grooming can be quite difficult, and experimentation with facial hair may not immediately give the desired results. A product can give the user insights into what they are getting into, before they even pick up a trimmer.

Project methodology

The target group (young males) was initially interviewed to determine the project's requirements. A study on how cosmetics are marketed was performed in order to learn how to appeal to the target group.

The design

The Stylo marks the contours of your facial hair to give you an impression of the final look before you actually start shaving. To achieve this, the Stylo soaks up water, which when squeezed releases the water, marking facial hair wherever desired. Two colours are available (light or dark) to match your beard. If the resulting look is not what you expected, you can simply rinse and repeat. When you are ready to trim, all you need to do is to stay between the lines.
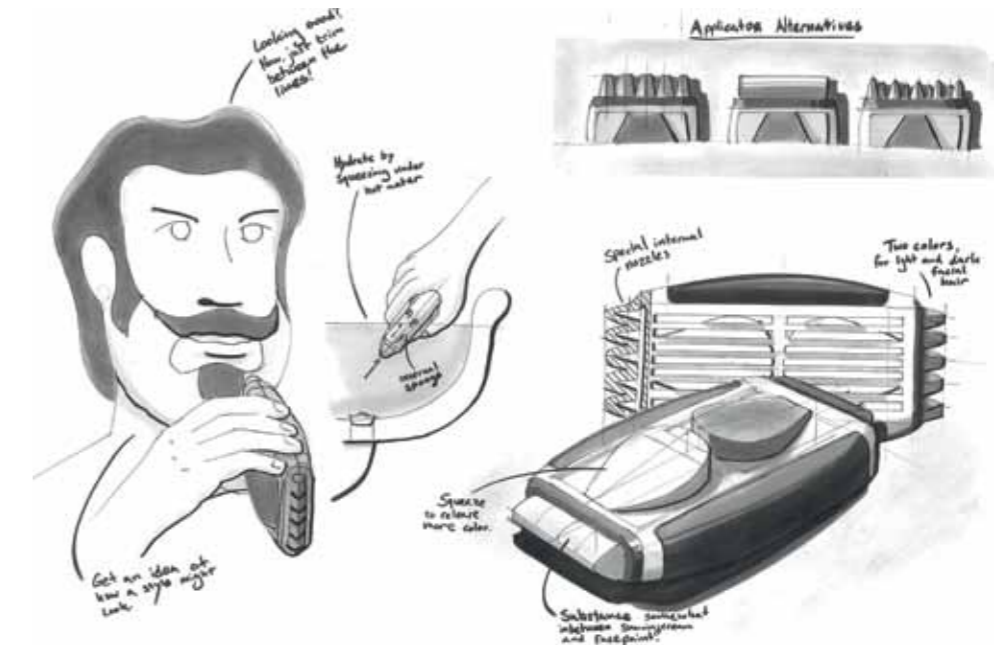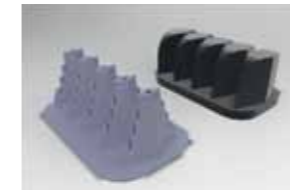
Organisation
**Philips**
Student
Emiel den Exter
Coach
Annemiek van Boeijen
Year
2011/2012

My Coffee Company

The coffee experience in office environments is currently very abstract. Douwe Egberts (D.E.) is looking to explore more opportunities for interaction between the coffee and office workers, in order to stimulate their coffee experience with an impressive perception of the good quality.
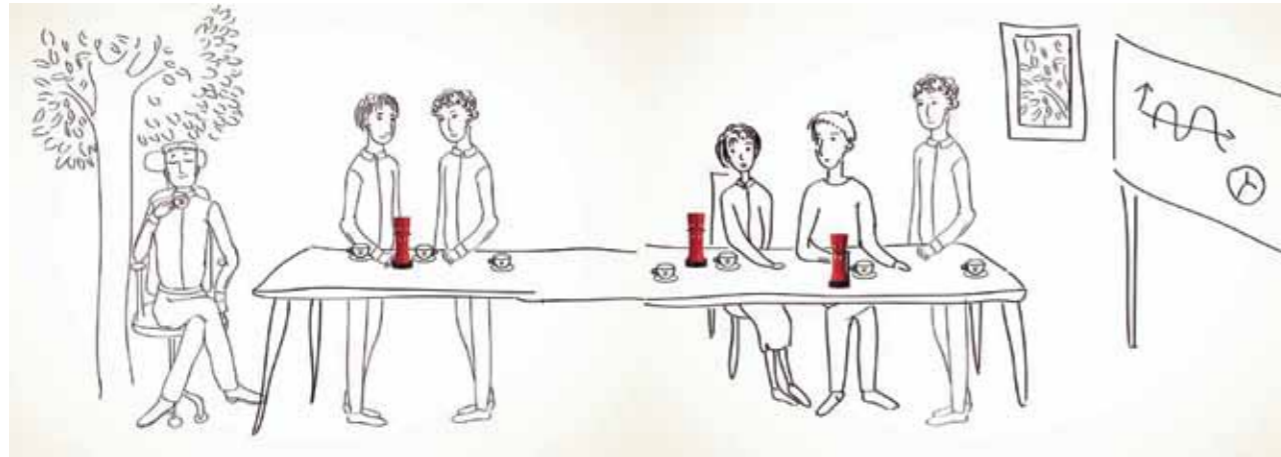
Organisation
Douwe Egberts
Student
Suwen Shen
Coach
Erik Jepma
Year
2012/2013

Student design vision
The new coffee experience should match the office coffee culture and become a proper coffee ritual so that office workers will establish an emotional attachment to D.E. coffee.

Project methodology
User research was conducted among office workers and the results showed that because of work pressure, most

people no longer take a special coffee break; they just grab a cup of coffee and go back to work. They consider coffee as something functional that helps them work efficiently and that divides the day into several time blocks. A contradiction was found in the requirement for work efficiency and the expectation of an inspiring coffee experience at the same time.

The design
The 'My Coffee Company' system is made up of a personal coffee maker and an ingredient refill machine. The design offers office workers a personal and flexible coffee experience, which meets their demands for coffee time in a multi-environment workplace as well as their personal work schedule.
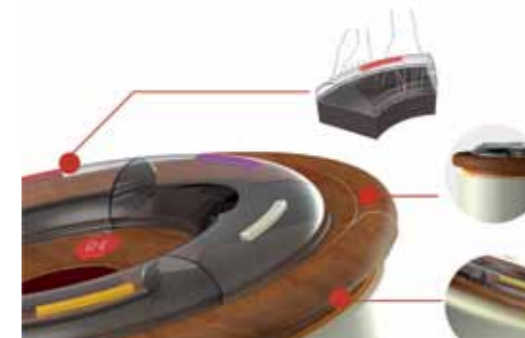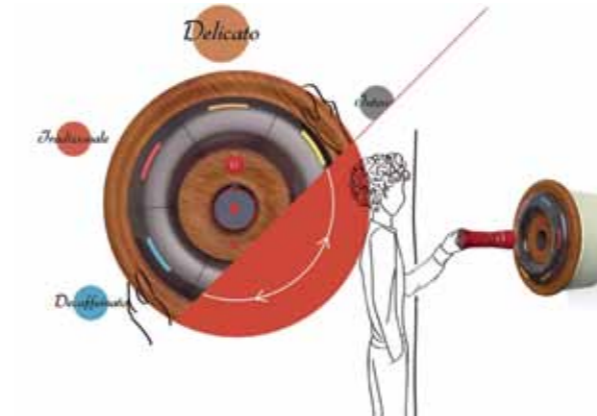
The So-Shawl

Philips AVENT wants to explore possibilities to support mothers during breastfeeding in public, giving them the flexibility and comfort they experience at home.

1. Unfold
2. Get the Baby
3. Position Baby
4. Install
Click!
5. Breastfeed!

Student design vision
The goal of this project was to design a product that enables mothers to breastfeed their baby in on-the-go contexts in an intimate, private and unobtrusive way, while still being able to socially interact.

Project methodology
In order to understand how people feed their babies away from home and the challenges they face, the team conducted scenario observations and held interviews with breastfeeding mothers.

The design
The So-Shawl! is a smart breastfeeding scarf that provides visual privacy to both mother and baby. The

Organisation
Philips AVENT
Student
Maike Borst
Coach
Armagan Albayrak
Year
2012/2013

Dark inside prevents baby from becoming distracted

Scarf is too big, it does not cover all desired areas

Participant breastfeeding her 10-month old daughter with scarf

Participant simulating breastfeeding (with a baby doll)

Remaining fabric blocks others' view from aside

The upper edge of the scarf tends to bend inwards

Scarf is supported by the mother's lap

Full visual privacy during breastfeeding, but still the mother-child contact is there

mother can wear it as a fashion accessory just like any other scarf. However, when privacy is needed during on-the-go breastfeeding, the scarf's pleated fabric can be unfolded, after which it becomes a freestanding cover. Not only does the scarf hide the mother's bare skin from the environment, it also prevents the baby from becoming distracted by visual stimuli. However, the important visual eye contact between mother and child is preserved. After a private and unobtrusive breastfeeding moment, the scarf can quickly be returned to its initial, pleated shape by means of its smart shape memory wire, after which it can be used over and over again.

1. Put in Bag
shape memory wire
structural fabric
2. Wash
+40° C

Smart Workspace

Philips asked us to develop a personal 'shell or zone' for a multi-user office environment, using smart technologies.

Student design vision

The students were asked to design a product for a creative professional working space in a large open-plan office. The product allows its user to adjust the environmental factors to his/her liking in order to reach a higher level of personal comfort and privacy.

Project methodology

Research was conducted into the office environment and employees' personal comfort. Research into office culture investigated the influences of working in flex-offices. Additionally, lighting conditions of office space and their effect on office worker productivity was investigated.

The design

The Philips Smart Workspace design is mainly focused on providing an inspirational solution, aimed at the near future. The design results in a greater sense of privacy by allowing personalization of environmental factors like the acoustics and lighting. The design is integrated in the office plans and allows for users to adapt different concentration and communication modes to any situation.

Organisation
Philips
Student
Ruben Matevosyan
Coach
Johan Kok
Year
2012/2013
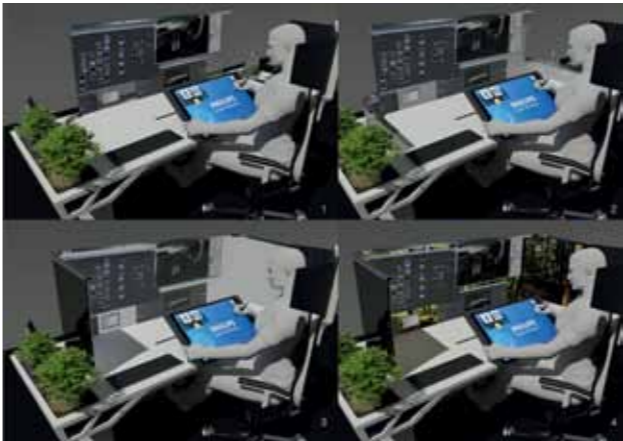
Torus

Philips skincare want to explore possibilitiers to prevent pimples and blackheads, and fights any break-outs for the young target group.

Student design vision
To create a male cleansing device which can be used in shower, is easy to use, does not take extra time, and sporting the brand features of Philips.

Project methodology
Product usage and face-cleaning rituals of (young) males were explored in a user study. Research in fuzzy logics provided a better understanding of ubiquitous appliances and continuously developing smart systems.

The design
The Torus consists of two main elements: the torus shape and the charger. The torus shape consists of three layers. The innermost layer is made of silicon in order to provide arm support for the next layers, the middle and outer layer. Both surfaces are used to bubble up the shower gel. While pressed against the skin, the nanotubes of the tape attract to the skin, leaving no residue behind. The gecko tape can be rolled up and down along the skin. The tape's hygienic maintenance is eco-friendly; by washing the nanostructured surface with water and soap, it can be used again.

closed state

open state
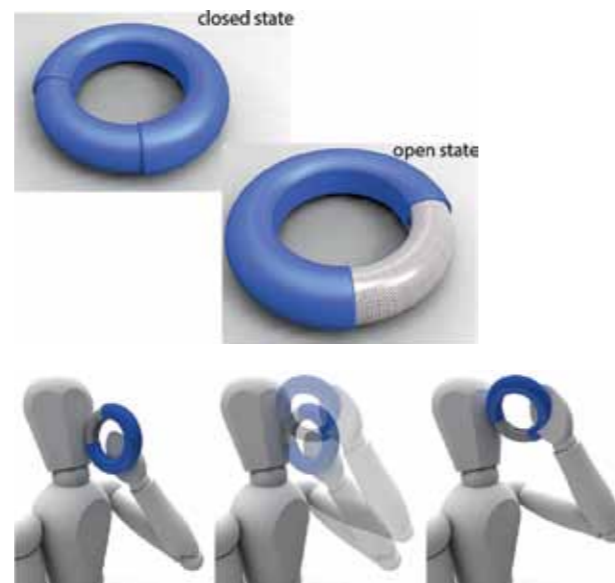
Organisation
Philips Skincare
Student
Sara Horvat
Coach
Caroline Kroon
Year
2012/2013
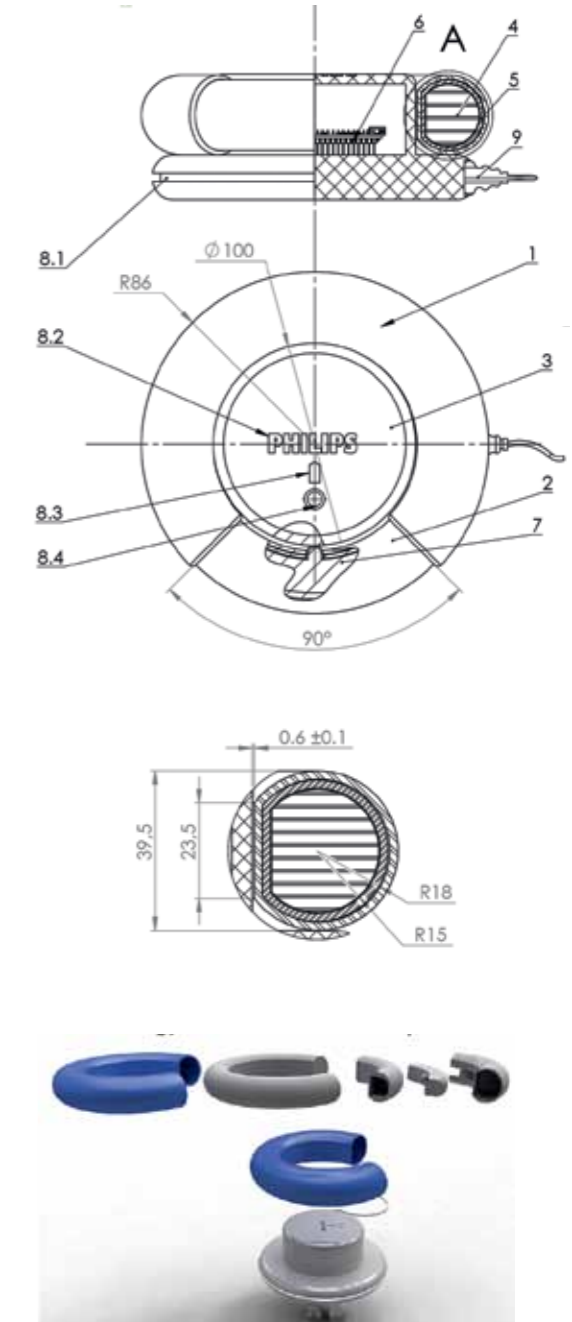
InfraFeel

Philips wants to develop a device for home use that delivers a pleasurable, relaxing experience during use resulting in a healthy and radiant skin.

Student design vision
Give women a healthy, radiant skin in the limited time they have. Give them something to hold on to which is efficient, gratifying, and beneficial. The solution should be logical, natural and basic.

Project methodology
In a user study, the meaning of skincare for the target group and the different rituals they used were investigated. The team explored how skin care routines could be aligned to the users' busy lifestyles, and how they would like to 'perform' these routines as efficiently as possible.

The design
The InfraFeel is an infrared lamp that improves skin condition from within by stimulating blood circulation, providing a 5-minute moment of gratification. The product is an addition to Philips current skin care portfolio and adds a new dimension by giving women a feeling of importance, confidence and health. The InfraFeel provides a relaxing infrared treatment for the face in order to improve skin condition from within. The infrared light warms up the skin deeply to improve the blood circulation, which improves the metabolism in the skin especially at night, resulting in a natural healthy skin. The sensation of the warm infrared light on the skin is calming, gratifying, and stimulates a good night rest.

Organisation
Philips
Student
Mirthe Snoek
Coach
Servaes Spiekerman
Year
2013/2014

lifestyle

Philips Aventure

Philips Avent wants to develop a concept based on the Internet-of-things and data quantification to reduce the uncertainties encountered by future first-time parents. The customized product-service system will form part of the Philips Avent product line.

Student design vision
The vision underlying this product-service concept is founded in the facilitation of parent-child bonding & development routines, in the form of a customised user experience.

Project methodology
Research was conducted into infants' early speech and language development, revealing a correlation between

language development practices such as word frequency and its impact on intelligence and later life success.

Two user focus-groups were conducted in order to design a more ethical, useful and accepted data quantification product. Finally, current and future speech recognition methods were explored in order to develop concepts for the final design.

Organisation
Philips Avent
Student
Emilija Marinkovic
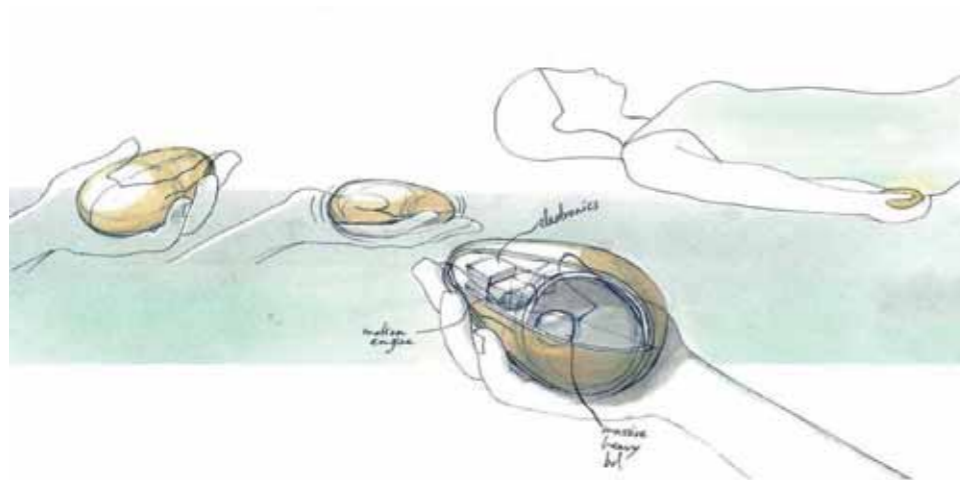Coach
Arjen Jansen
Year
2014/2015
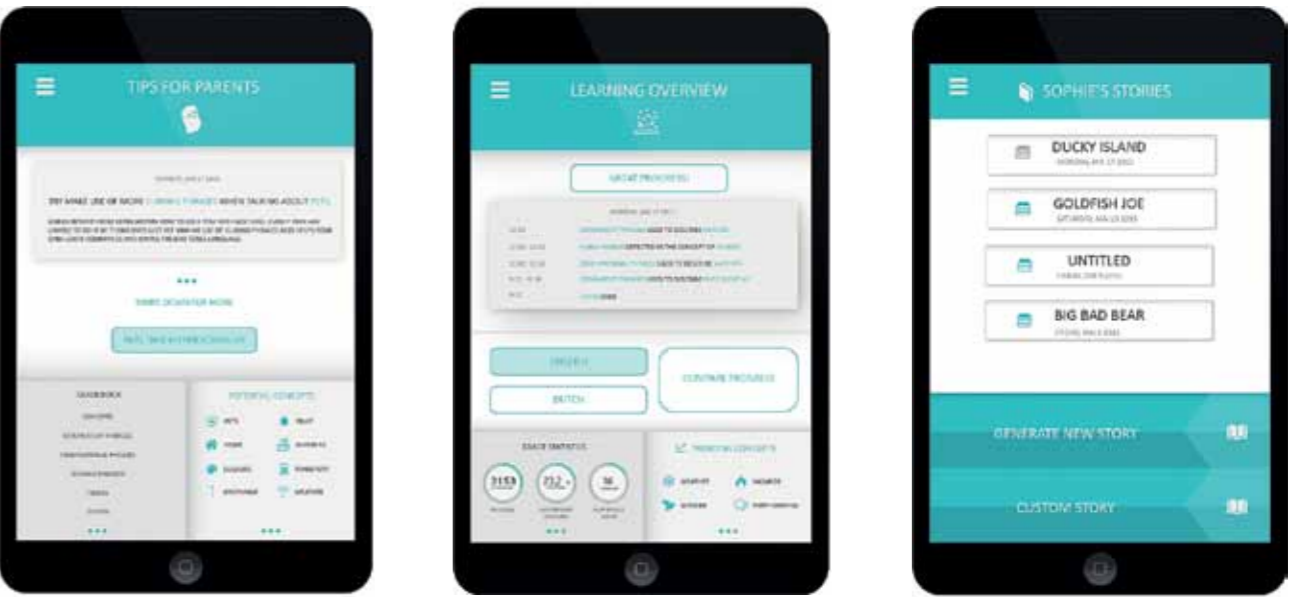
The Design
Based on existing routines of talking to children and repeating concepts at bed time, the Philips Aventure is an interactive storytelling system that helps ensure that a child's language and speech development is on the right track, giving children a head start in life.

Connect the brooch to your smartphone and clip it onto your child. The brooch will monitor language development, giving you insights and providing you with up-to-date tips on your smart watch. Learn whether you can improve how you explain something to your child and get age-appropriate ideas on how to interact with your child.

Sleepy Stones

The research group Light.Touch.Matters (LTM) is interested in developing a new innovative yoga product to support new applications for the LTM material they are developing.

Organisation
light.touch.matters
Student
Michèlle Stoop
Coach
Servaes Spiekerman
Year
2014/2015

Student design vision

Based on sleep research, the assumption was made that the final relaxation exercise at the end of yoga sessions can be seen as a 'power-nap'. This would encourage people to relax in the 'yoga way'.

Project methodology

The practice in yoga in terms of meaning, representations, rituals and different practices were researched. The team focussed on how people practice yoga, both when at home and away form home.

The design

The Sleepy Stones is a small smart product which has been designed as a 'smart relaxation guide'. It monitors the user's heart rate to determine whether the user is relaxing. It attracts attention via motion if the user is not relaxed and focused on the sensation of the product.

The product's small size not only contributes to its portability, but also makes it less obtrusive. The changing gravity point gives a very subtle and small movement. The user has to focus on this motion and his/her body in order to notice the interaction. This leads to a unique intimate interaction that guides the user into relaxation.
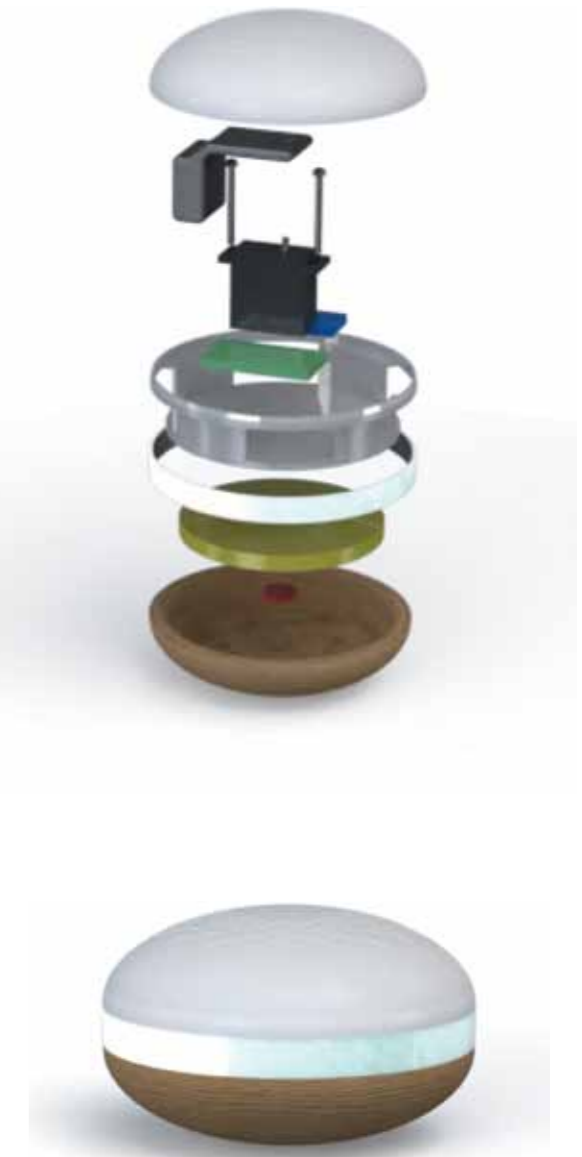
Cambio

Philips has realised that there is need for preventive design to help parents care for their child's health. The focus is on designing a system that should prevent the onset of childhood obesity by stimulating healthy habits in the child.

Project methodology

Self-quantification is becoming increasingly popular: it is a way to reflect and improve personal behaviour. But how does a parent go about 'self-quantifying' his/her child? Research was conducted to gain insight into the relationship between the cultural factors that influence obesity. Topics like obesity, food purchasing, and consumption behaviour were also investigated.
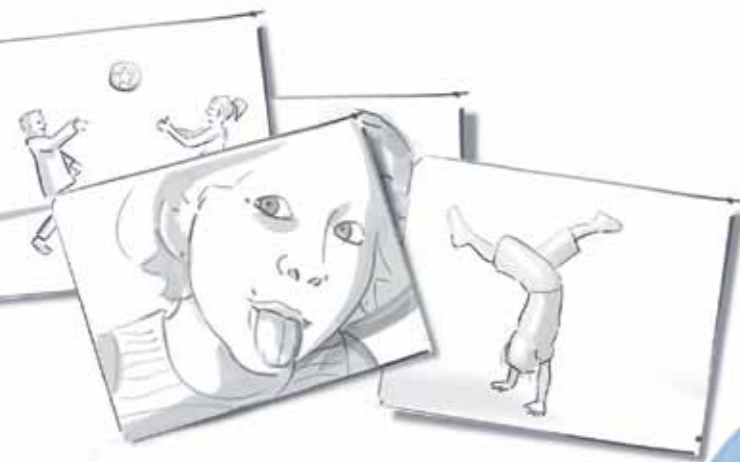
Student design vision

To design a child- oriented device which implies fun, interaction and motivation towards physical activity and imaginative play. It will allow parents to view and interpret measured data in order to help their children to develop healthy habits.
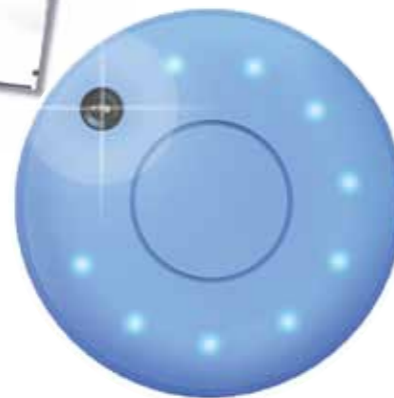
Organisation
Philips
Student
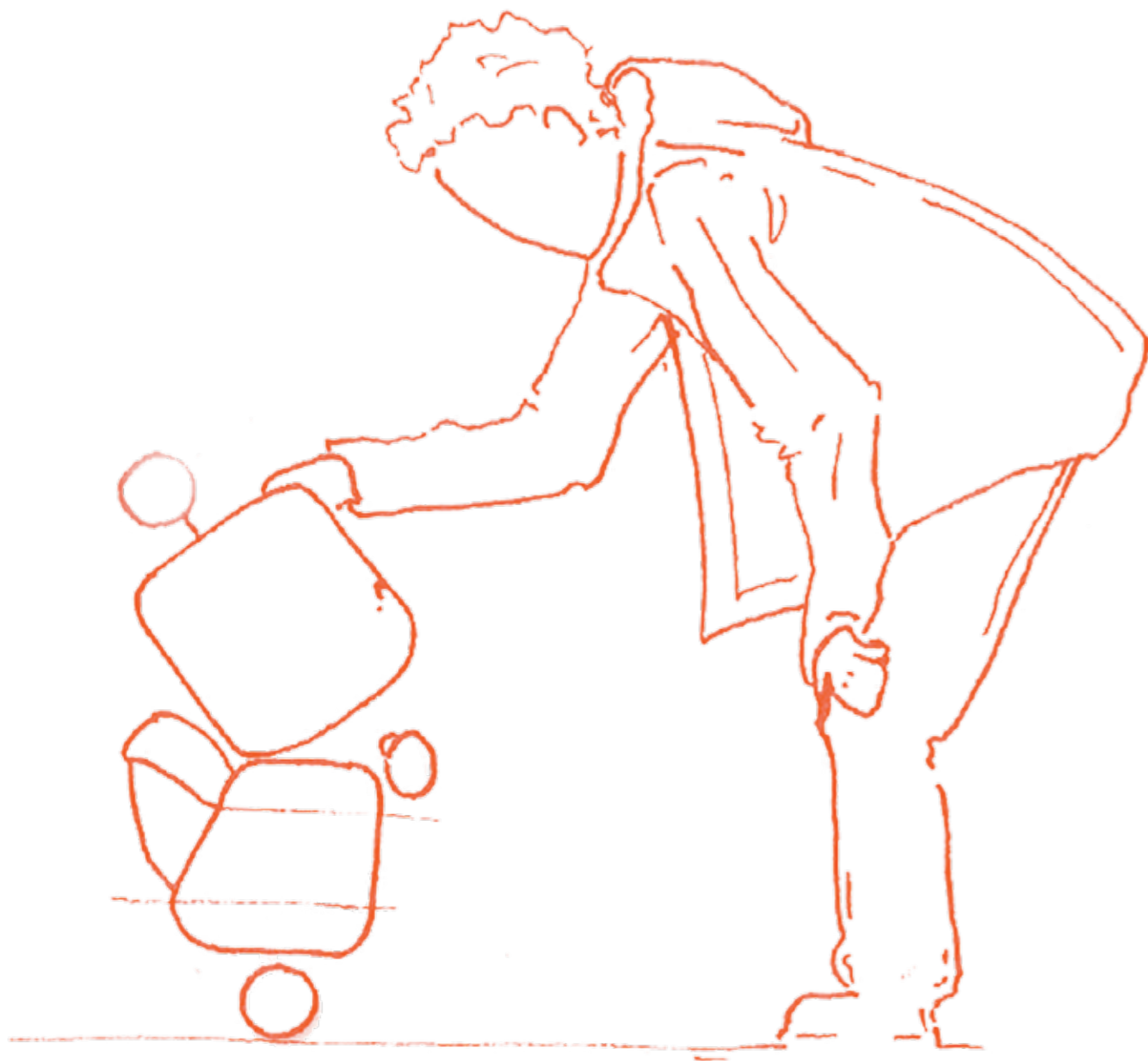**Lara Sophie Strauss**
Coach
Kees Nauta
Year
2015/2016

The design

Cambio consists of a product-service combination that motivates children to move. The Cambio device itself is a smart wearable for children that can be clipped onto clothing. It measures activity levels, distances travelled and time spent being active. It instils healthy habits in the child through fun, interaction, and a reward system. By quantifying biometric data, the device translates activity levels into valuable energy credits - glowing as LED sources on its surface. The more the child moves, the more credits are loaded onto Cambio. These energy credits can then be used to take pictures with the integrated camera. Each credit symbolizes one picture and can be invested consciously by the child. In this playful way, Cambio stimulates the child to collect valuable 'resources' by expending energy. As a result of fun and creative user participation, exercising becomes a pleasurable experience.

inclusive design

The Mepo Concept

TyssenKrupp wants to help the elderly Chinese population with their difficulties with moving up and down stairs. Their focus was on designing a 'user platform', driven along a tubular rail, like current stair lifts, which reduces any associated stigmatism.

Student design vision
The product should provide support and security to the user when using the stairs while enabling effortless user transportation between floors, using an existing rail-based system and featuring luggage transportation possibilities.

Project methodology
An explorational study was conducted on the cultural background of less mobile users. Additionally, the technical properties of existing ThyssenKrupp stair lifts was analysed. In an additional study, the team researched the possibilities and limitations of the elderly when going up and down stairs.

The design
Mepo is a fully automatic, voice interactive machine that aids stair climbing. It also recognises the user's voice so more users can use the product with their preprogramed preference, without even realising it.

Mepo's default state is its compact 'packed' state. In this state, it only uses 32 cm of stair width. When the user

command 'Mepo WALK' or 'Mepo LIFT' is given and recognised, it unpacks itself, the rotatable ring quickly adjusts itself to the user's height and posture, and is ready to help the user ascend or descend the staircase.

Organisation
TyssenKrupp
Student
Viki Pavlic
Coach
Marijke Dekker
Year
2011/2012

The Adjustable

The Japanese social project NexTidEvolution has an inspiring vision: create a society where people naturally connect to each other, regardless of their handicap. This project focusses on the possibilities of this vision within an office environment.

Student design vision
Improving office furniture to enable both normal and hearing-impaired employees to work together in a more efficient and pleasant way.

Project methodology
The relation between the office chair for handicapped people and the office space was approached from a cultural perspective. The study revealed challenges and unnecessary stigmatisation, and explored the meaning of interactions between a chair and specific groups of people. Additionally, researchers explored the personal experiences of deaf people in the office environment.

The design
The AdjusTable is designed to deal with problems of active meeting participation and presentation possibilities by providing multiple settings for meetings for 4-8 people.

For short and highly efficient meetings people can use the table while standing. For longer meetings the participants can simply slide out the chairs to enjoy a more comfortable and relaxed collaboration. The concept is configurable which encourages people to think about the purpose of the meeting, which results in greater employee involvement. The 360-degree setting improves the face-to-face collaboration, which reduces discomfort for employees with a hearing disability. Body language is easier to read and the set up gives an equal feeling.

Organisation
Nextide
Student
Wim Verhoeff
Coach
Servaes Spiekerman
Year
2012/2013

inclusive design
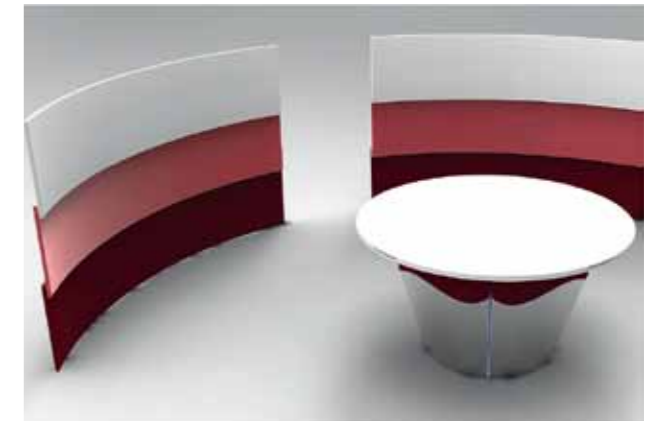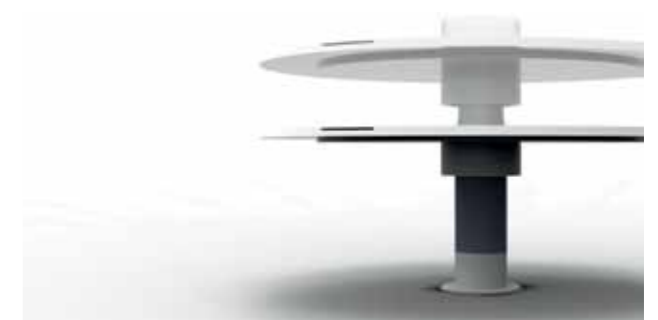
Mo

Selemca, the research insititute, is interested in designing a social robot. For public spaces in the hospital context that adds value to the customer journey.
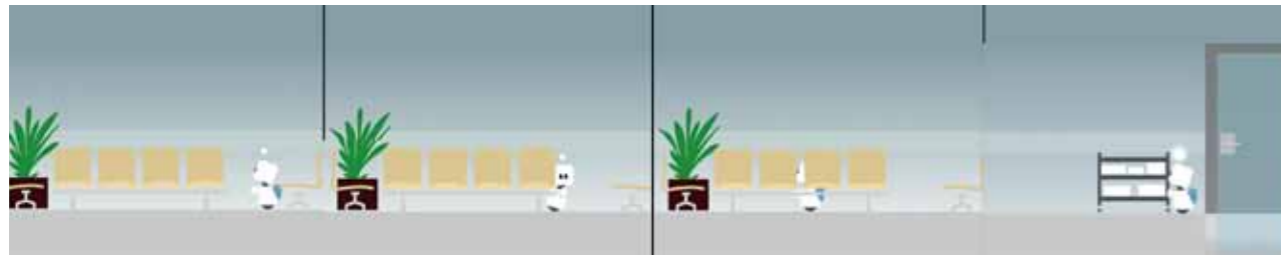
Student design vision
The goal was to characterise the hospital experience in such a way that it will improve hospital visitors' feeling of ease and thereby support the healing process.

Project methodology
The team researched ways to achieve - and reactions to- social aspects of robots across different target groups and cultures. Customer journeys were explored in order to get a better understanding of the user and the context.

The design
'Mo' is a small and approachable, affectionate robot Its appeal are evaluated with hospital visitors. Mo 'knows'

all about the hospital and is able to run errands. It can connect with hospital clients/patients by recognising their desire for interaction and engages them with emotions which distract them from their own anxiety.

Organisation
Selemca
Student
Marijke de Geus
Coach
Wim Schermer
Year
2014/2015
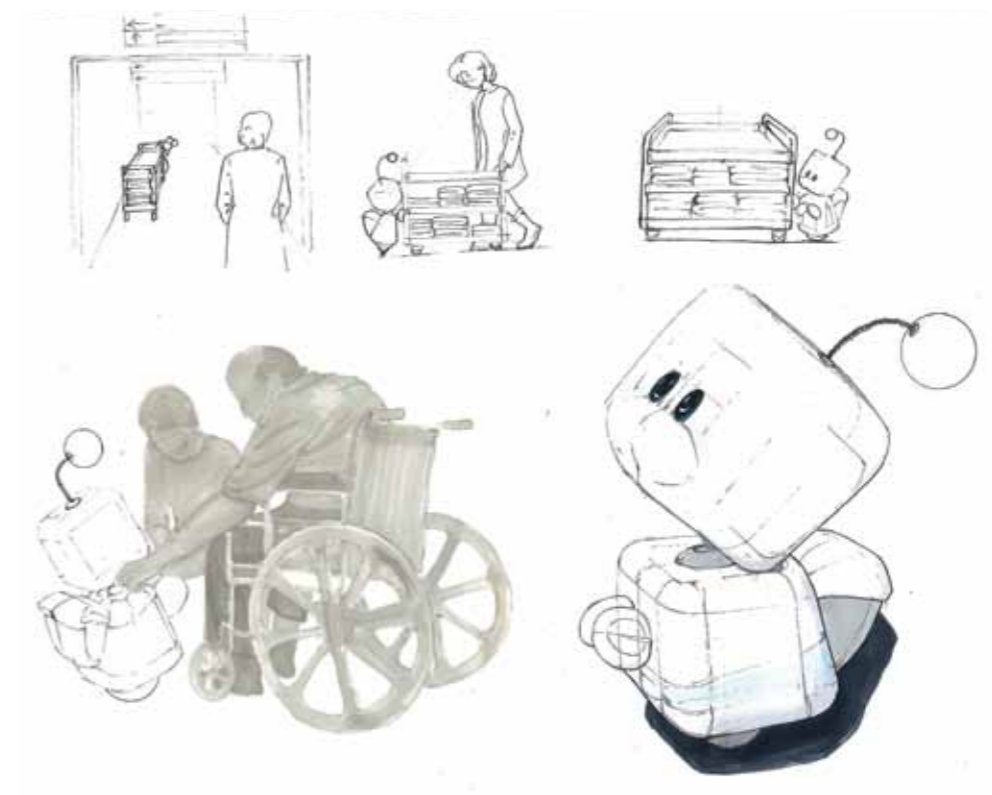
Philips Post

Philips is interested in discovering how patients living with a chronic disease and suffering from mental stress and depression can be supported in their well-being.

Student design vision

It is known that communication between patients and their support network is difficult. The design focus was to make communication between the chronically ill elderly and their support network easier and more accessible.

Project methodology

Research was conducted with the socially isolated to investigate a range of problem areas, especially why the chronically ill elderly have so little contact with their network.
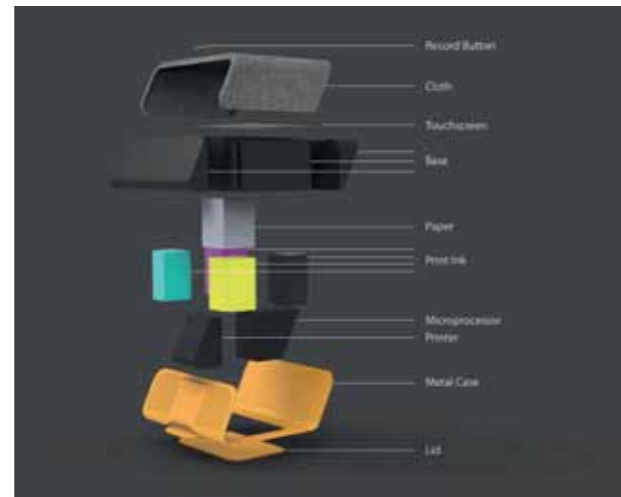
The design

The Philips Post is an in-home device for the chronically ill patient. Friends and family of the patient can download the Philips Post app and send messages to the post device. The device alerts the patient of incoming messages and allows them to listen to it or print it out. To keep the Post as simple as possible, additional functionalities are only adjustable on a phone or tablet.

Organisation
Philips
Student
Joppe van Dijk
Coach
Kees Nauta
Year
2014/2015

Click

The Dutch Police Organisation is interested in designing new police equipment that fulfils current security and safety goals, using state of the art technology, with special attention being paid to portability and immediate operational usage, and that allows individual optimisation.

Student design vision
Dutch law enforcement officers should be able to handle their equipment, especially their duty belt, as easily as breathing. When an officer uses a set of handcuffs, this should look neat and well practiced. The way officers deal with their equipment is an important part of their image; currently, they often appear to be clumsy.

Project methodology
Cultural aspects regarding the identity and representation of the Dutch police force were used as a starting point for the project. Ergonomic aspects of the current police equipment were explored and were mapped against problems encountered during use.

The design
The 'Click' Police belt sports a newly designed snap-fit system that can be detached quickly and comfortably. Each tool can be attached in one way only, avoiding confusion in complex situations. The baton attached to the officer's leg is accessible with a pull button. Push-buttons provide easier access to pepper spray and handcuffs.
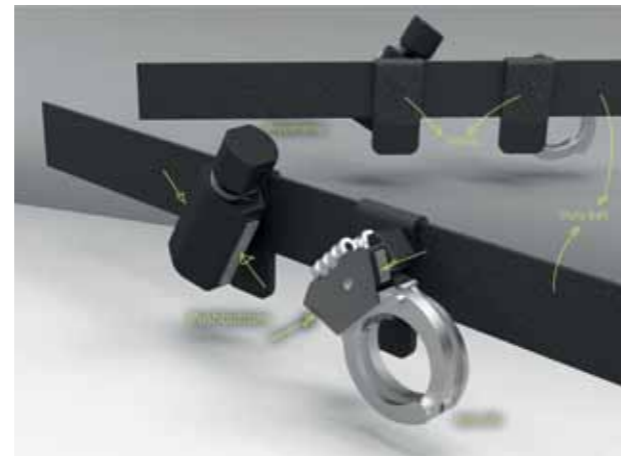
Organisation
The Police
Student
Mesbah Sabur
Coach
Johan Kok
Year
2014/2015
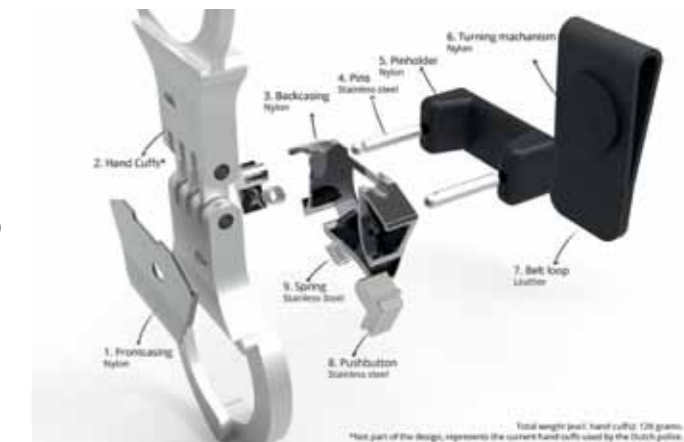
FlexLink

Gresbo/Social Robots is interested in designing a smart and social product that helps employees at 'sheltered' workshops to feel happier in their work, work more independently, and reduce their insecurities. This will reduce the job coaches' workload and help the employees to become more productive.

Student design vision
A social product that prepares and supports employees when transferring to an external company.

Project methodology
In order to identify the meaning of the Gresbo 'Shelter', workshops were organised to explore the problem from different viewpoints. The team also explored the interaction between people with an employment disability and their coach, with the goal of applying learned knowledge in a social support product.

The design
The FlexLink brings companies and employees together via an online platform. Both companies and potential employees create profiles. Through special 30-minute workshops (FlexShops), in an interactive platform every participant is assigned a place at the FlexLink 'table' - a projected screen on a table top with IR touch detection. With guidance from a coach, employees are encouraged to subscribe to skill-oriented workshops and find companies they are interested in. Companies and employees are then matched based on common interests and required skills.

Organisation
Gresbo/Social Robots
Student
**Mattijs Otten**
Coach
Wim Schermer
Year
2015/2016

healthcare

Kwallie

The National Child Cancer Centre (NKOC) is interested in solutions which support the children suffering from cancer.

Kwallie,
the child's cuddly toy

The parent's device

Student design vision
Design a product that creates freedom and independency for the parents and emotional comfort and independency for the child. It should allow parents and their chronically ill child to have emotional closeness and provide a substitute for physical closeness when they are not close by.

Project methodology
Research was conducted to create a deeper understanding of parents' needs when their child is hospitalised. Research helped define independency as well as emotional - and physical closeness in order to see how these aspects could be created and/or simulated by a design.

The design
Kwallie is a combination of a toy and a handheld product. The two devices allow the parent and child to share emotions and feel physically connected at a distance. By using smart technologies, skin warmth can be transported from the parent to the child for comfort. A code language helps the child share emotions. The child becomes more independent and the parent has more time for him/herself. This allows the parent to feel more in control when away as the child still receives emotional support, benefitting their future adult lives.
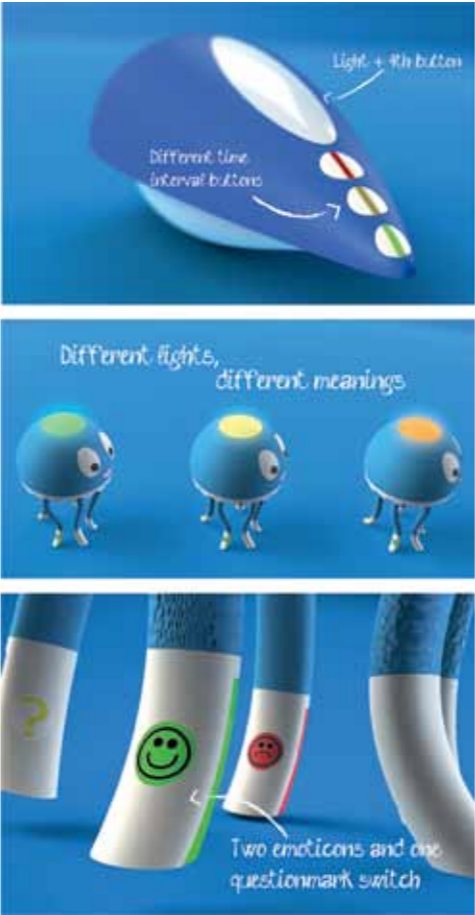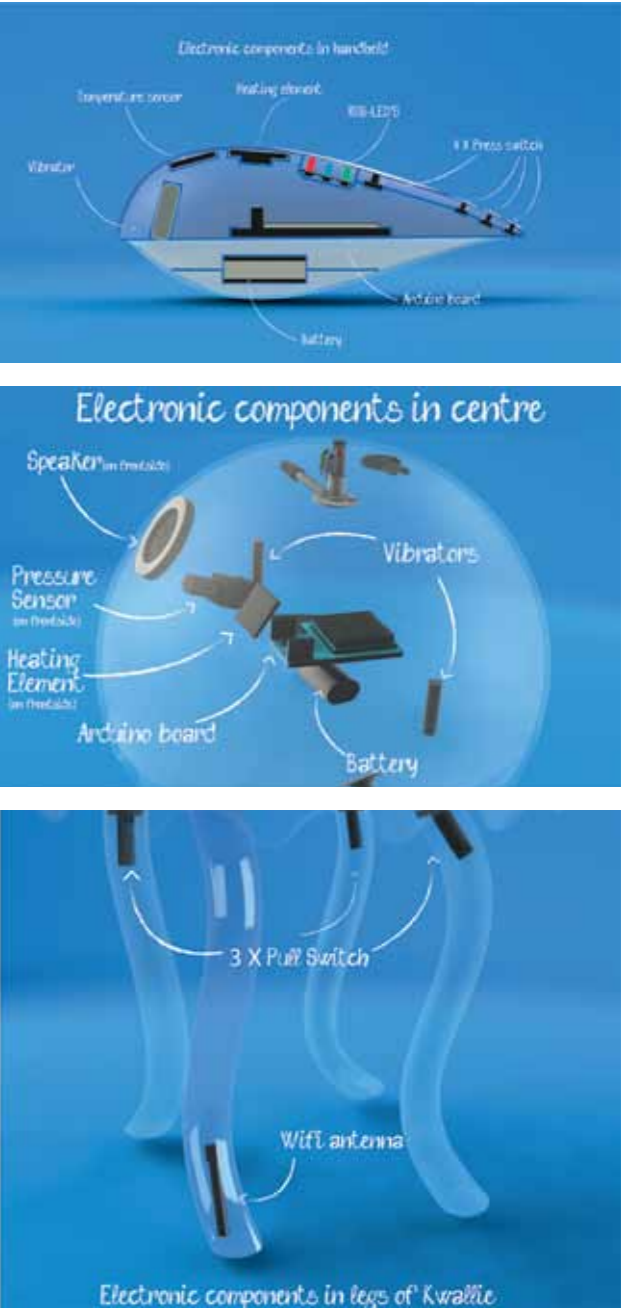
Vigo

Philips is interested in developing a product that uses technology called 'Transcutaneous Electrical Nerve Stimulation' in order to help people manage and handle chronic pain. The goal is to develop a device, product or service that adds to the existing TENS product in order to motivate the elderly with Osteoarthritis (OA) to move more frequently.

Student design vision
Create a product that uses user-data to give profile-based recommendations to deal with chronic pain, while naturally blending into the user's daily activities.

Project methodology
Societal views on OA patients with pain were examined in a study in order to find a method that encourages OA patients to move in a functional, controlled manner, and that minimises deterioration of their conditions. Research was done to discover activities that strengthen or worsen the effects of OA.

The design
Vigo emphasizes the partnership aspect and the changes to this relationship when one of the partners is diagnosed with OA. Vigo actively engages the problems in communication of the personal condition to the partner by the partner with OA wearing a bracelet that indicates the amount of energy he/she has. In this way, the other partner can see how the OA partner is feeling, and can act on this information in a compassionate and intimate way.

The bracelets introduce a game-like experience that encourages both parties to do more together and 'charge' their batteries together.

Organisation
Philips
Student
Jaco Janssen
Coach
Tjamme Wiegers
Year
2012/2013
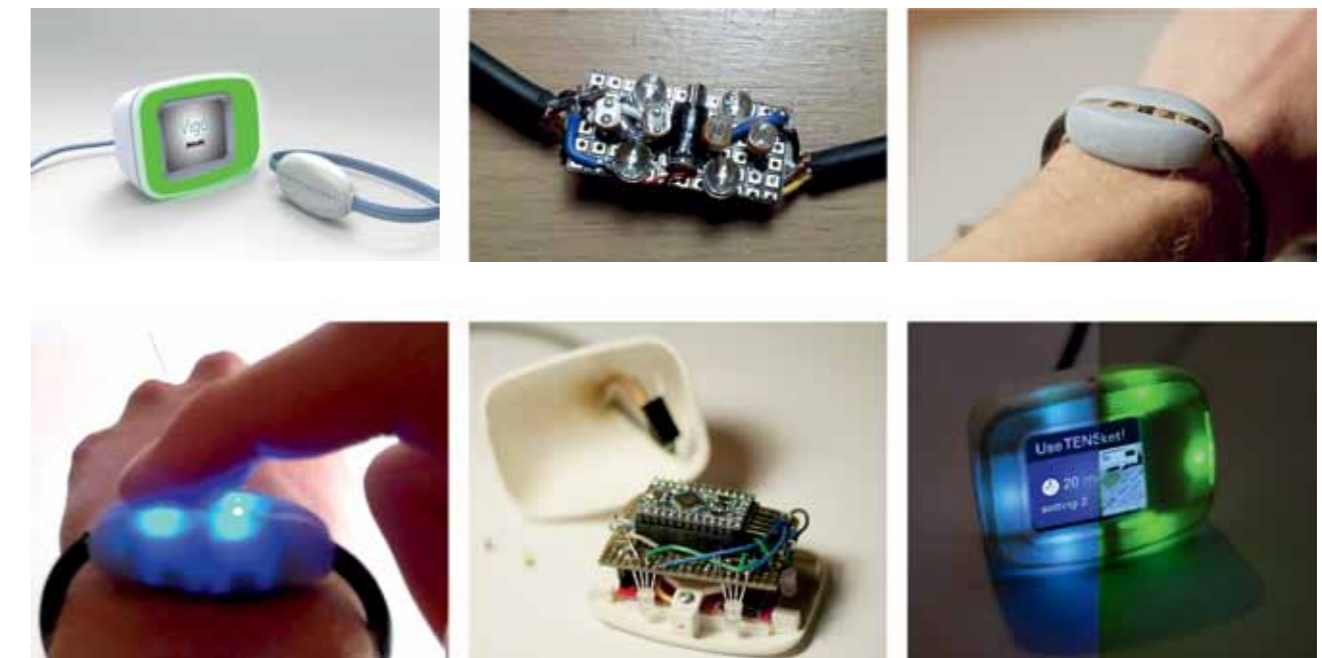
Pearl

Philips wants to improve medication adherence of elderly people by inducing and establishing a very basic, subconscious connection between positive feelings and medication-taking behaviour.

Student design vision

To design an aid that integrates therapy adherence into the elderly's existing lives and routines. This aid helps the elderly to live healthy lives, in which they gain control over their therapy and maintain their existing quality of life. This aid should help the elderly to lose the limitations that are attached to the medication intake, so they can achieve the goals they have in life and build a positive association towards the therapy.

Project methodology

The broader subject of taking medication was researched in a literature study, by conducting interviews, and observational research. The practical issues of taking medication, like having problems with reading the prescription label, and poor storage were observed and discussed with the users.

The design

The Pearl holds your treasure, the medication designed to improve your life quality. The five compartments store medication for a single day. A

Organisation
Philips
Student
Marit Mohlmann
Coach
Marijke Idema
Year
2012/2013

touch screen in the top shell makes you aware of positive thoughts and how you can take action. After taking medication, you reflect on your mood. This input gives you the opportunity to reflect on what influences contribute to a positive mood.

The Guiding Glasses

Selemca is interested in solutions to support people with dementia to live longer at home with a better quality of life, and to reduce the strain on the informal caregiver and family. The concept involves developing and implementing 'care droid' technology by 2025 following a period of extensive research and development.

Student design vision
The design should help Alzheimer patients to avoid dangerous or social embarrassing situations through the provision of structured daily tasks, increasing their independence and giving informal caregivers more time for themselves.

Project methodology
Research focused on the problems patients face when performing morning rituals, and how they could be guided without the help of an informal caregiver, thereby reducing the caregivers' burden. Also a study was conducted to investigate whether Alzheimer's patients could accept aid from a droid, and if so, which interactions would be possible.

The design
The 'guiding glasses' interacts with three different stakeholders; the patient, the informal caregiver and the professional caregiver. For the dementia patient, the glasses give instructions on what to do, while checking whether the tasks are actually completed.

Organisation
Selemca
Student
Roeland Reitsema
Coach
Marijke Idema
Year
2013/2014

The informal caregiver has control over the set tasks, while the professional caregiver can react if dangerous situations occur. The glasses give the patient verbal and visual feedback as several sensors detect the patient's actions; other stakeholders also receive this information.

The service includes several parts: scanning the patients' glasses, 3D printing of the attached products, the installation of the system and sensors in the home, the provision of system updates, and ensuring the availability of a professional caregiver in case of dangerous situations.

Wolk

Biomet wants to improve people's perception of their rehabilitation process after having a Total Hip Replacement (THR).

Organisation
Biomet
Student
Michiel Kersteman
Coach
Armagan Albayrak
Year
2013/2014

Student design vision

The stigma that people recovering from operations have about rehabilitation can be changed, and thus change people's experience before even starting the rehabilitation process. The philosophy is to have a programme that people are committed to and stay committed to, with Biomet as caretaker of the overall patient journey.

Project methodology

Different studies were conducted in order to gain a better understanding of the patient journey and to define opportunities for Biomet. The reserach team explored the use of information channels by patients in the process of having a THR. The patient satisfaction on the process of rehabilitation after total hip arthroplasty was also investigated.

The design

BACK to BETTER (B2B) is the name of a new rehabilitation programme. Unlike normal rehabilitation, it does not focus on getting back to normal, but on self-improvement. To achieve

this, BACK to BETTER offers a new visual style of representation of rehabilitation, a recovery process based on milestones and a tailor-made shoe. By presenting the recovery process in a different way, the patient's expectations are changed. Virtual influence has been shown to greatly affect people's experience of products and phenomena: if you change expectations, you change the experience.

WOLK is a physical result of the BACK to BETTER program. WOLK is a set of interactive shoes that show the patient where they are in the B2B programme, and it reminds patients to move after a certain period of inactivity by providing vibrational feedback. This prevents the threshold to move again from becoming too high. The vibration intervals are dependant on the gait stability of a patient.

Pain Coping Strategy Therapy

Biomet wants to support osteoarthritis (OA) patients in the early stages of their disease.


Student design vision

To create a system/product that helps OA patients maintain control over their pain in the course of the day, reducing the uncertainties with respect to their living environment.

Project methodology

The research team explored the life style of, and the attitude that Baby-boomers, the generation next in line for hip or knee replacement, have towards medical care. They also explored how the attitude and self-efficacy of OA patients affect the way they approach new tasks. Finally, a literature study on different pain-coping strategies and how they can be used to train OA patient to cope with their daily pain was conducted.

The design

A pain-coping therapy for OA patients for Biomet was developed. In sessions guided by professionals, OA patients learn how to cope with pain in a number of ways. By focussing on exercises, communication with fellow patients and experts, pain can be kept under control and reduce the patients' uncertainties about partaking in daily activities. This pain-coping training programme is paired with an application which enhances therapy results.
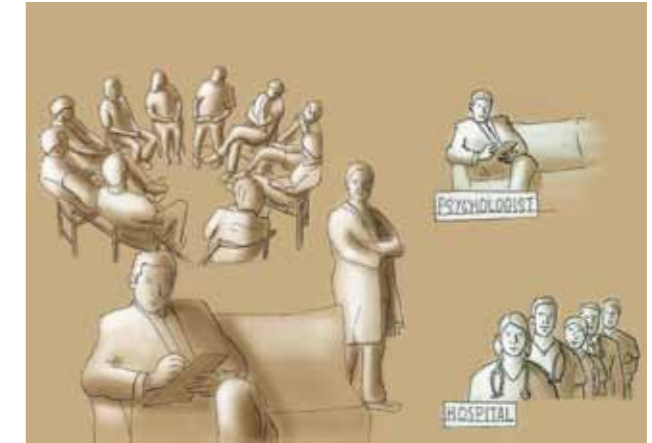
Organisation
Biomet
Student
Noud van Esseveld
Coach
Armagan Albayrak
Year
2014/2015

Beaky

The Princess Maxima Centre wants to help parents take on their new role and learn the necessary skills that match their abilities when dealing with their child's illness. How can they become the eyes and ears of the therapists and be sensitive to relevant signals, while at the same time avoid anxiety and an overprotective attitude towards their ill child?

Student design vision

The most challenging route for parents and children in paediatric oncology is injectable drug administration. In the future, paediatric oncology will move towards a situation where parental involvement can facilitate and improve their child's cooperation and attitudes when undergoing injectable drug delivery.

Project methodology

In a study, the researchers explored how cancer has been perceived throughout history, and the effect of changes in perception on parental involvement when a child has cancer. In addition, insights were gained on the influence of parental involvement on children's behaviour.

The Design

Many paediatric oncology patients receive chemotherapy every three weeks. The chemotherapy programme is only carried out at the Princess Maxima Centre in Utrecht, and is time consuming and uncomfortable for the child.

Beaky allows the procedure of blood sampling and testing to be carried out at the place where the child feels most comfortable and secure: home. It is simple, secure and child-friendly. Beaky, your health companion, will ease your 'walk' through the procedure.

Organisation
Princess Maxima Centre for Paediatric Oncology
Student
Bart van Driessche
Coach
Eric van Kujik
Year
2015/2016

healthcare
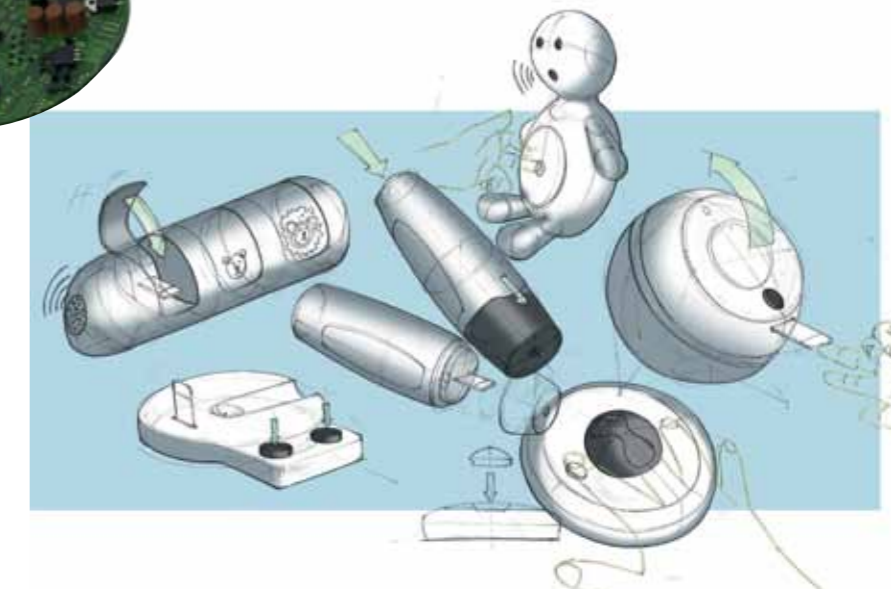
Body Vision

Erasmus MC wants to offer anatomy students pre-job surgical training for more realistic learning and higher quality education. Currently, the time students spend inside the dissection room is limited which means that students have to learn the necessary content outside of the dissection room.

Student design vision
Enable the students to have parts of the dissection-experience outside of the dissection room. This requires realistic image footage from cadavers, and the possibility to observe the tool in a three-dimensional way.

Project methodology
By looking into the advantages and disadvantages of dissection and research conducted amongst medical students, the effectiveness of teaching by dissection with other teaching methods was compared. Results show that in addition to educational effectiveness, cadaveric dissection is surrounded with a certain degree of prestige.

The design
The BodyVision device can be best described as a window into the user's body. It is a multiple-device-product consisting of a screen, smart garments and external sensors. Attached to data-points on the smart garment, the screen reveals what is hidden underneath
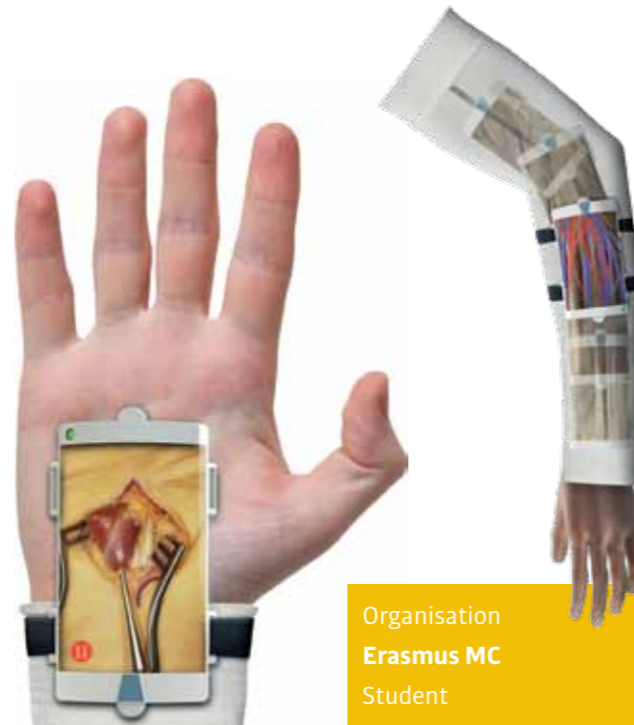
Organisation
Erasmus MC
Student
Erik Liermann
Coach
Caroline Kroon
Year
2015/2016

the learners' skin. Interactivity and games make the BodyVision an educational tool which helps students to learn about the appearance, structure and function of the human body in an exciting way. The device acts as a supporting tool beside the anatomy atlas, without the ambition of making it obsolete. It helps students to understand what they have learned in a three dimensional context, and helps them to manage the transition between the book and the 'real world' outside of the dissection room. This facilitates a more effective use of their time when inside the dissection room.
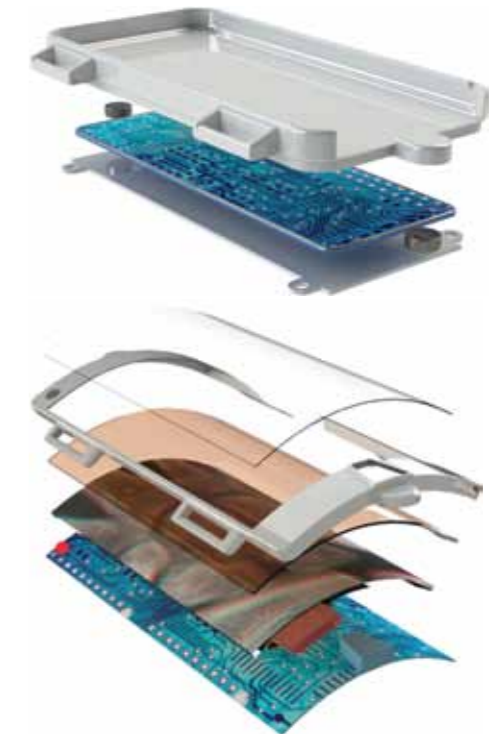
Blossom

UMC Utrecht asked for design concepts that improve patients' wellbeing regarding privacy and connectedness in a shared hospital room

Student design vision

To design distractions that provide patients with a higher perceived personal space, by lowering their awareness of the other patient in the room. The design focused on extremely ill patients, as they do not have energy to seek other distractions, and rest is extremely important to them.

Project methodology

The aspects of privacy when in a shared hospital room were studied. The aim was to better understand which sensory aspects influence the perceived privacy of patients in a shared hospital room, and the extent to which these aspects influence their perceived privacy, and how all of these aspects relate to each other.

Further insights from the user perspective were gained by conducting interviews with ex-patients and through the use of context mapping.

The design

Blossom is a directional speaker integrated in a modern IV pole. With only a small hand gesture, the directional speaker can be turned on. The music played can offer a distraction when the patient really needs it, for example when the other patient has a conversation that they do not want to hear. The music is only audible for one patient, so it does not disturb the other patient, allowing patients to focus on themselves.
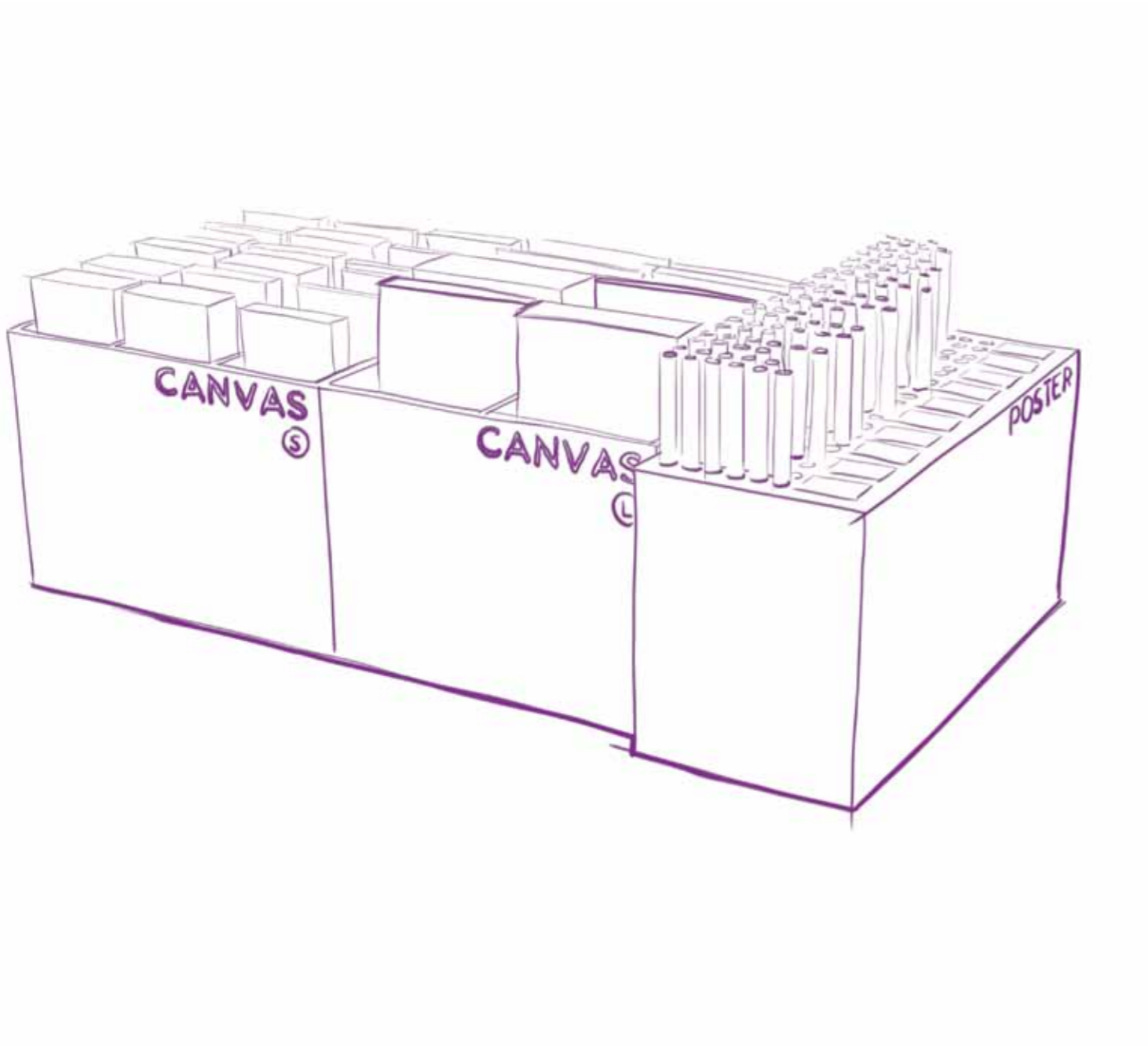
Organisation
UMC Utrecht
Student
Iris Groot Koerkamp
Coach
Johan Kok
Year
2015/2016

retail

NCR SwiftScan

NCR Corporation wants to design a new customer-focused self-service checkout system.

Student design vision

To create a new self-checkout system that improves the customer experience by reducing flow interruptions when shopping. Resulting in less in-store waiting time and prevents shrinkage for retailers.

Project methodology

A study was conducted on shopping culture and the cultural influences of shopping bag use, looking for potential sources of innovation, and comparing plastic single use bags with sustainable alternatives. Additionally, the researchers investigated shopkeepers' and customers' attitudes towards self-service checkout systems, to identify potential challenges.

The design

The NCR SwiftScan concept is a scanner with a tiltable head that allows users to scan their own groceries. The scanner can be either handheld or placed on a shopping cart or basket. After scanning all products, the user proceeds to the SwiftScan station where the products are packed. The items can be weighed and observed by cameras for security, minimising theft and shrinkage.

Organisation
NCR Corporation
Student
Jorn Duwel
Coach
Johan Kok
Year
2011/2012
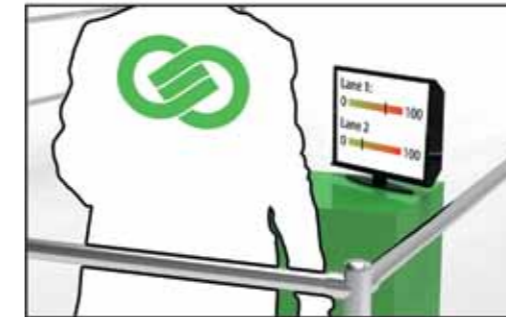
Discover nature hut

HEMA is looking for concepts that will enhance the male shopping experience in their stores. They particularly want to stimulate the interaction between men and their children by inspiring them with product combinations.

Student design vision
Encouraging men to do something together with their children could be a way to get them to try something new.

Project methodology
Research was conducted to identify important aspects of male shopping behaviour. The Hema store layout was mapped, and cognitive aspects of male store navigation were explored.

The design
The 'discover nature hut' is a combination of a product and smartphone application targeted at fathers shopping with their children. The application encourages children to go out and catalogue aspects of nature they encounter. An in-app quiz then stimulates the children to think about their findings and learn new things. Once outside, the hut can be set up and provides shelter from weather conditions. An in-app integrated camera allows them to save memorable findings. These findings are shared with other users in the HEMA store to encourage and inspire further exploration, stimulating in-store behaviour for the father.
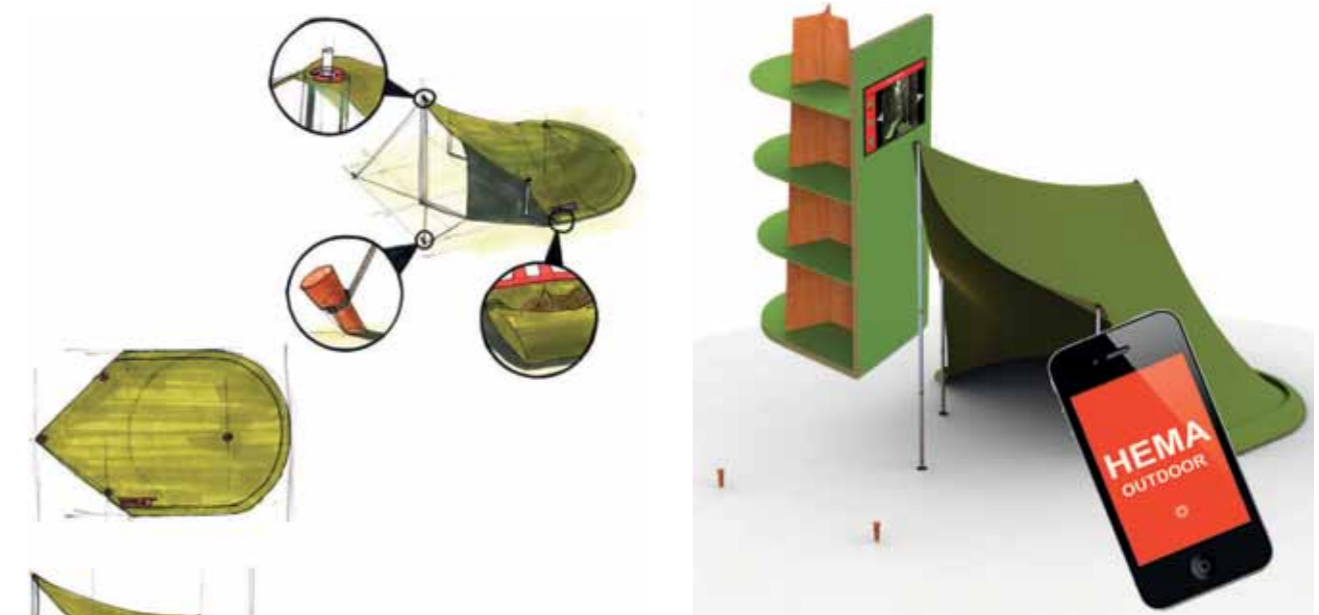
Organisation
Hema
Student
Wisse van Woerkom
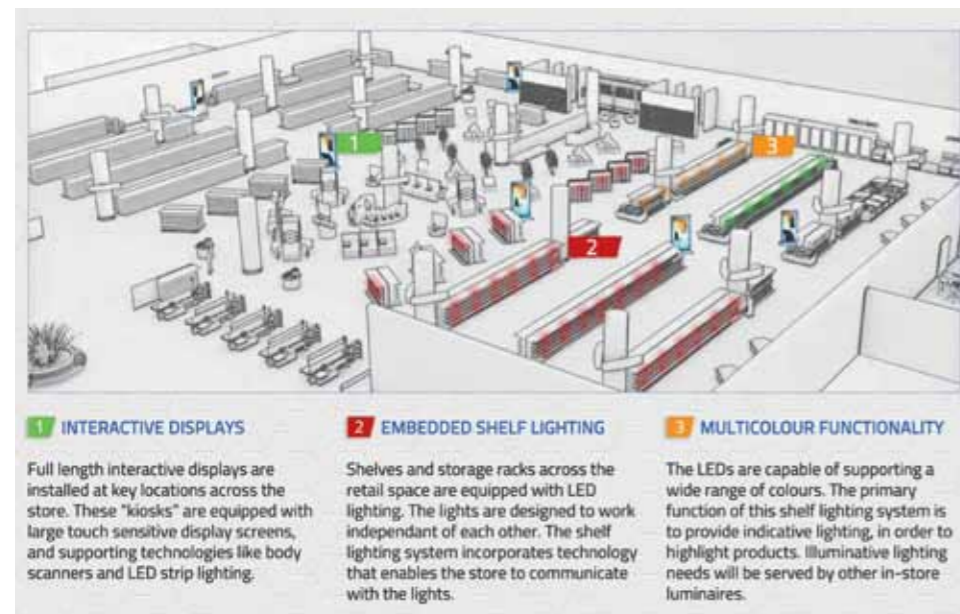Coach
Erik Jepma
Year
2011/2012

LightUp!

Philips is interested in the topic of how retail stores should redefine themselves in the future. Can lighting play a role in this quest, and can gamification principles be applied?

Student design vision
To enable brands to establish deep personal connections with customers by enabling in-store experiences that are meaningful and go beyond the four walls of the retail store. A lasting impact could be achieved either through intimate social engagement, highly personalised experiences, or both.

Project methodology
A study was performed to gain insights into the role of gamification in retail stores. Different strategies to motivate customers to seek new experiences in stores and keep them coming back for more were explored. Finally, the sensory perception of lighting to gain a better understanding of the way light

1 INTERACTIVE DISPLAYS
Full length interactive displays are installed at key locations across the store. These "kiosks" are equipped with large touch sensitive display screens, and supporting technologies like body scanners and LED strip lighting.

2 EMBEDDED SHELF LIGHTING
Shelves and storage racks across the retail space are equipped with LED lighting. The lights are designed to work independant of each other. The shelf lighting system incorporates technology that enables the store to communicate with the lights.

3 MULTICOLOUR FUNCTIONALITY
The LEDs are capable of supporting a wide range of colours. The primary function of this shelf lighting system is to provide indicative lighting, in order to highlight products. Illuminative lighting needs will be served by other in-store luminaires.

influences moods, behaviour and brand perception was analysed.

The design
Full-length interactive displays are installed at key locations across the store. These 'kiosks' are equipped with large touch sensitive display screens, and supporting technologies like body scanners and LED strip lighting. Shelves and storage racks across the retail space are equipped with LEDs in a wide range of colours. The shelves provide indicative lighting in order to highlight products. With these functionalities the system can advertise, advise, inform and share.

Reproduction Service System

Since the opening of the new entry hall in July 2015, the Van Gogh Museum has needed a new system to store and sell its reproductions. The entrance is located at the museum square and takes visitors down to the entry hall by escalator. The new shop no longer has enough space for the reproductions it currently sells.

Student design vision

The reproduction section needs to be smaller, but still generate as much or more sales. The aim is to guide users and help staff by creating a new representation of the reproductions. The interaction focuses on providing an easy and understandable experience stimulating personal choice of purchases.

Project methodology

The experience of both visitors and museum shop staff in the current Van Gogh Museum shop was explored. In addition, people's reasons for buying a reproduction in a museum shop and the success factors needed for selling reproductions were analysed.

The design

The redesigned museum shop consists of four elements. A large touchscreen allows five people to create their own wall with reproductions at once. Visitors can select their own elements and preview the results real-time. Displays placed around the museum advertise the reproductions in the shop, and the ways by which visitors can experience them when inside the museum

Organisation
Van Gogh Museum
Student
Romee Noorman
Coach
Marijke Idema
Year
2014/2015

Before people buy a product, they want to see and feel it, using their senses. In the case of buying a reproduction, most people would want to have an idea on what it looks like in reality. This is why they need the displays which present the actual reproductions.

Modular cabins were designed for visitors who want to buy a reproduction in the shop to take home straight away. The cabins stock and present part of the reproduction product offer.

SMART Bar

Blofield required an inspiring vision for the concept of a Smart Bar. The vision should evolve from research that discovers possible meanings of the bar and the needs of various stakeholders: bar users, festival organisers, lifestyle brands from the FMCG market, and rental companies.

Student design vision
Bringing people together and creating an event-specific atmosphere through the centrepiece bar.

7 elements were created: three bar sizes, two connectable wall segments, and two table sizes, together with a chair developed by Blofield.

Project methodology
In the context of the development of a new inflatable bar, a study was conducted to gain insights into the optimal workspace arrangement of cocktail bars in order to make recommendations for reducing bartenders' physical and mental workload.
In another study the meanings related to different kinds of bars were investigated and compared.

The design
A product family which can be rented and assembled in various ways. To increase the applicability and flexibility of the smart bar for different events,

Organisation
Blofield
Student
Katrin Bottmeyer
Coach
Alex Visser
Year
2015/2016
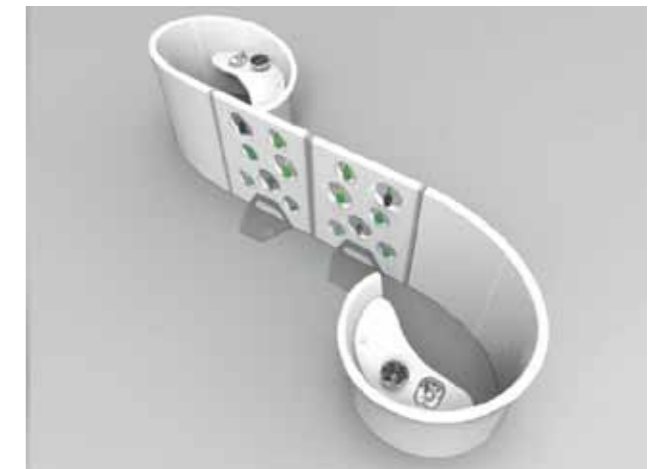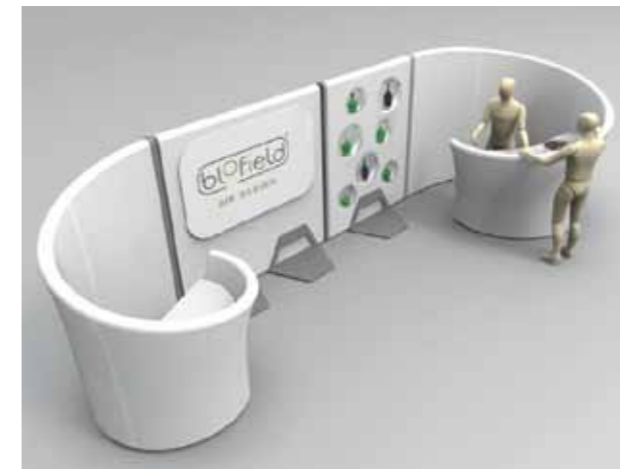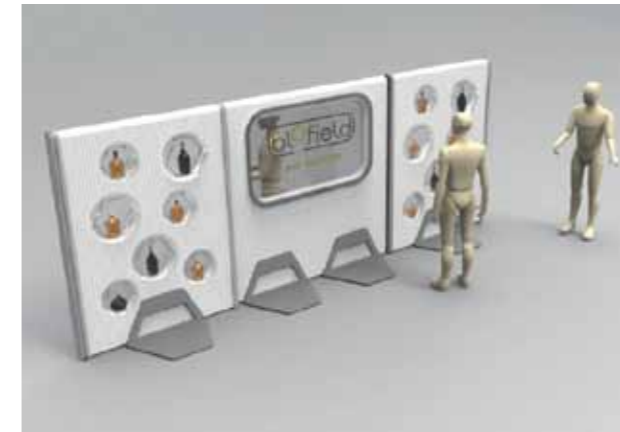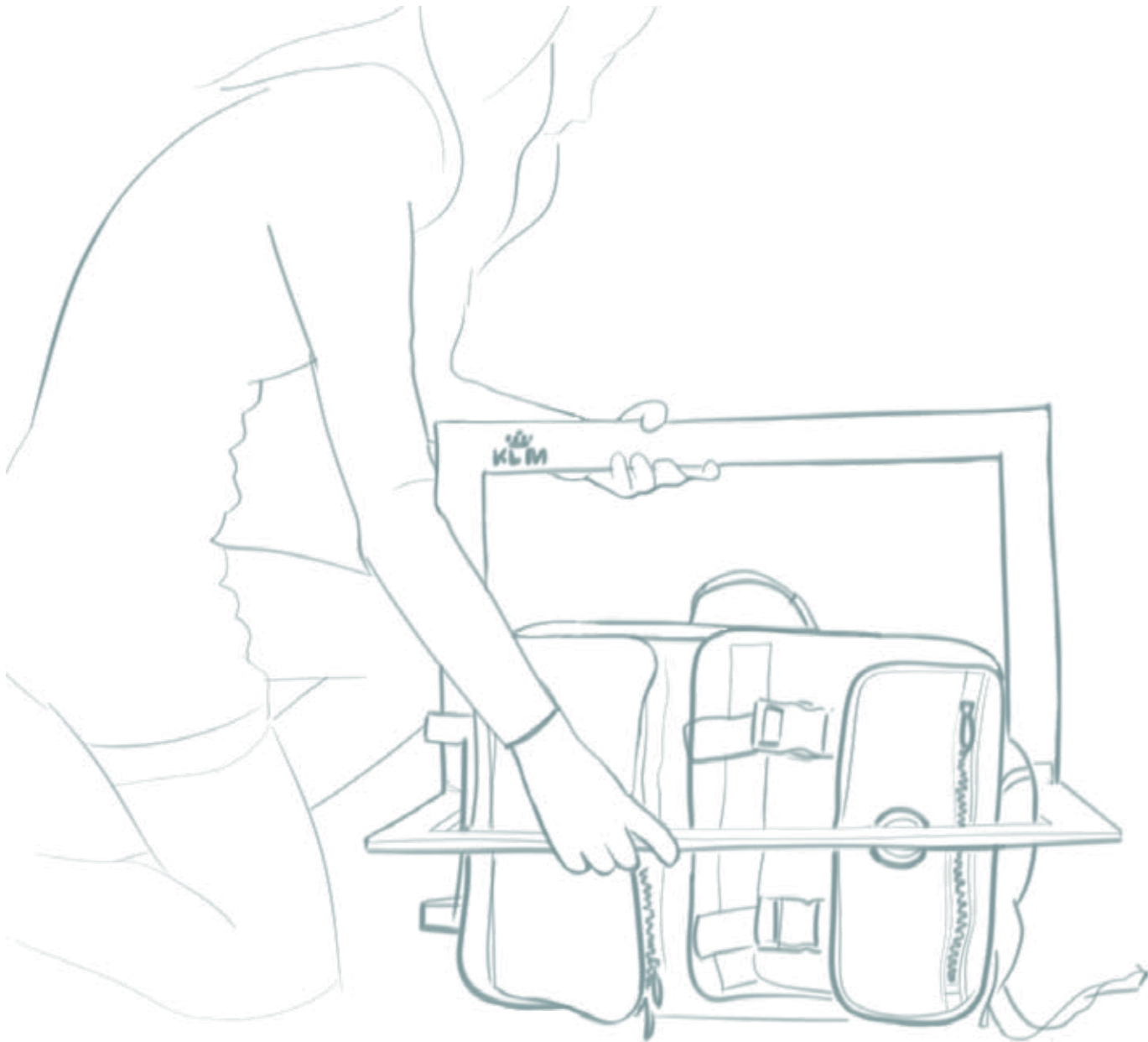
aviation

Portable Size Checker

Schiphol and KLM are interested in solutions that will enhance the hand luggage process at Schiphol Airport.

Student design vision

The goal is to ensure that passengers stick to the rules for hand luggage. By complying with these rules, less hand luggage has to be taken to the belly of the plane, resulting in less luggage to scan in the security filter. Therefore, this process will be faster and reduce waiting time. However, it is important that the customers' satisfaction remains high and that passengers will still want to use the self-service system.

Project methodology

Self-service is an important factor to improve the luggage handling process at Schiphol airport. To investigate peoples' motivations to use self-service at Schiphol Airport, the team interviewed travelers and conducted observational research. Additionally, research on the BAGSTORE system used for transfer flights at Schiphol was performed, in order to come up with improvements for the airport.

Organisation
Schiphol & KLM
Student
Puck Bos
Coach
Wim Schermer
Year
2012/2013

The design

The Portable Size Checker is a simple, short-term solution to check if the size of a hand luggage piece satisfies the airline's requirements.
The Overhead Compartment concept is a long-term solution. It is a realistic compartment that can be used by passengers, before entering the plane, to check luggage size as well as a learning experience about how to place their hand luggage. At Schiphol, passengers can use this before checking-in so that they can still check-in their hand luggage if it turns out to be too big.

The compartment has the exact size of three pieces of maximum-sized hand luggage. It stands on a transparent frame that has the same curve as an airplane, so passengers will recognize it immediately. It is transparent so it looks less big, and the compartment is immediately apparent.

ISE

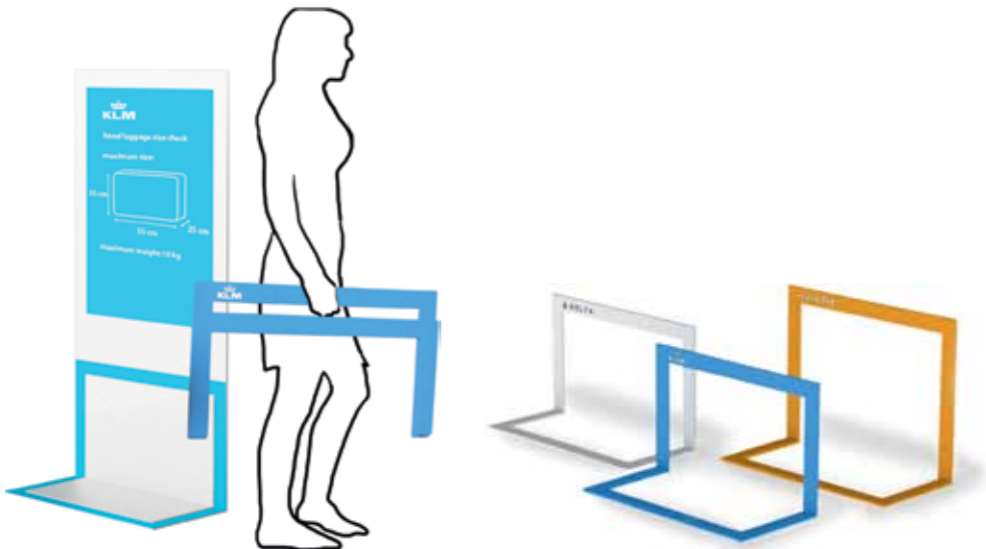Schiphol required a design that would improve conditions for the security guards working at the airport's exit checkpoints. These are the checkpoints where visitors and employees have their identification checked when they enter and leave the premises.
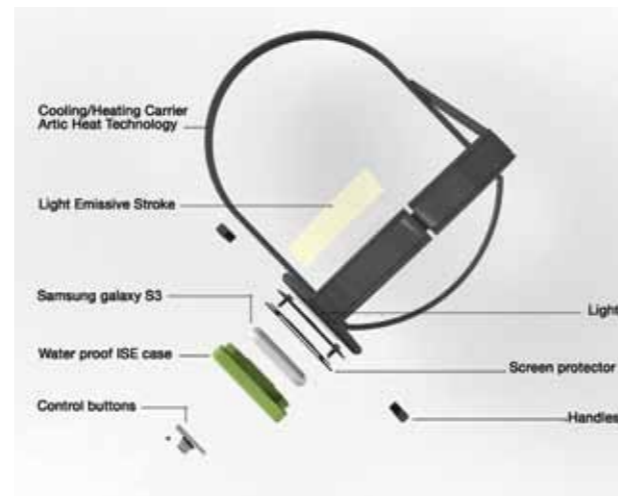
Student design vision
The design focuses on organisational support to improve the guard's working-environment and comfort levels.

Project methodology
Research was conducted to emplore what professionalism means to security guards, and how products can contribute to their sense of being professional. The researchers also analysed the influence of the security guards' working environment on their perceived comfort.

The design
Integrate Security Equipment (ISE) is a portable device for security employees working at the airport employee security checkpoints. The device has the same functionality as the security cabin, but by being portable, it gives the guard more freedom to move around, while still being able to scan employee identity cards and communicate with colleagues.

Cooling/Heating Carrier
Artic Heat Technology

Light Emissive Stroke

Samsung galaxy S3

Water proof ISE case

Control buttons

Light

Screen protector

Handles

Organisation
Schiphol
Student
Paul Schoenmakers
Coach
Wim Schermer
Year
2013/2014

Wave Boarding

Amsterdam Airport Schiphol (AAS) will undergo major renovations that will influence the boarding process for passengers travelling across the airport. The security-checks, which are now located at each individual gate, will move towards a central location leading to a more time, space and labour efficient process. KLM Passenger Services is looking for new opportunities to further improve both the boarding process and the passenger experience.

Student design vision

A new boarding process will be designed that gives a passenger a more pleasant waiting experience and more freedom. This will reduce the negative experience of waiting times with regard to the anxiety of missing a flight, and result in improved confidence in the boarding process. Additionally, the new boarding process should improve the time efficiency from KLM's perspective in order to reduce the turnaround time of the airplane, resulting in more cost efficient flights.

Project methodology

The perception of 'flying' is unique in the experience, excitement and complications it offers. Therefore, it is interesting to research the topics: What do people associate with the concept of 'flying'? What meanings do we attribute to air travel? How can we sum up the 'culture of flying'? Additionally, the influence of passenger time allocation after the security-check in relation to the travel experience was studied.

Organisation
KLM Passenger Services
Student
Bart Bossenbroek
Coach
Johan Kok
Year
2013/2014

The design

Wave boarding lets passengers board an aircraft in waves. The number of waves depend on the type of aircraft. An algorithm derived from SMART-boarding is used to allocate waves to passengers. The wave number a passenger receives depends on the type of aircraft and the number of seats. As the plane type is known well in advance, passengers can receive their wave when booking, and this can be integrated on the boarding pass.

The space between two seats of the same wave gives passengers time and space to store their hand luggage. Each wave is then divided into multiple subwaves using the available aviobridges and the two aisles within the aircraft. This reduces aisle congestion, making the process more efficient. The boarding pass has a clear 'boarding'-area where the wave and seat number (based on the subwave numbers) are communicated.

Schiphol Reach

Amsterdam Airport Schiphol wants to improve passenger way-finding with a design for a new, yet-to-be-built terminal.

Student design vision

Enable people to go on their own journey, whenever they want, while being assured of harmony, forgiveness, the feeling of being a part of a team.

Project methodology

The research team used contextual research techniques to explore relevant topics like the architectural domain, as well as to identify the required forecasting skills for the period 2023 and beyond. In addition, the ways to increase the mass flow of passengers through the terminal and provide an intuitive experience were explored and defined.

The design

The solution resulted in the REACH service, a luggage-check-in on the go, facilitated by an electric vehicle (EV). The key value proposition is that the passengers are filtered on their level of travel experience. Those who are independent can arrange their check-in themselves, remote from the terminal. Those who need assistance can find help inside the terminal. REACH should be able to reduce a percentage of passengers checking-in, thereby relieving pressure on the terminal. This leaves more room for employees to offer focused help.

Organisation
Amsterdam Airport Schiphol
Student
Randy Kadarman
Coach
Marijke Idema
Year
2015/2016
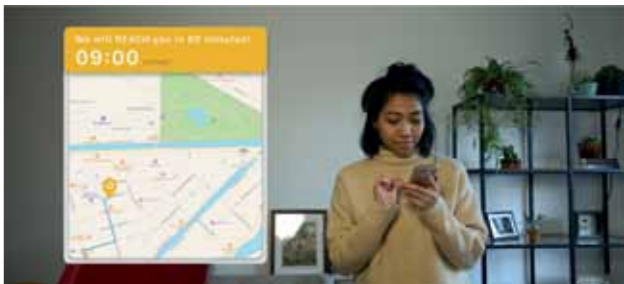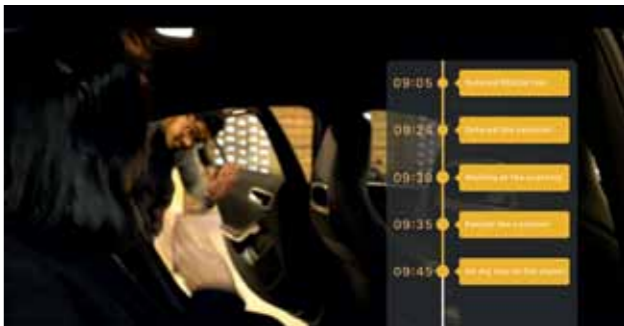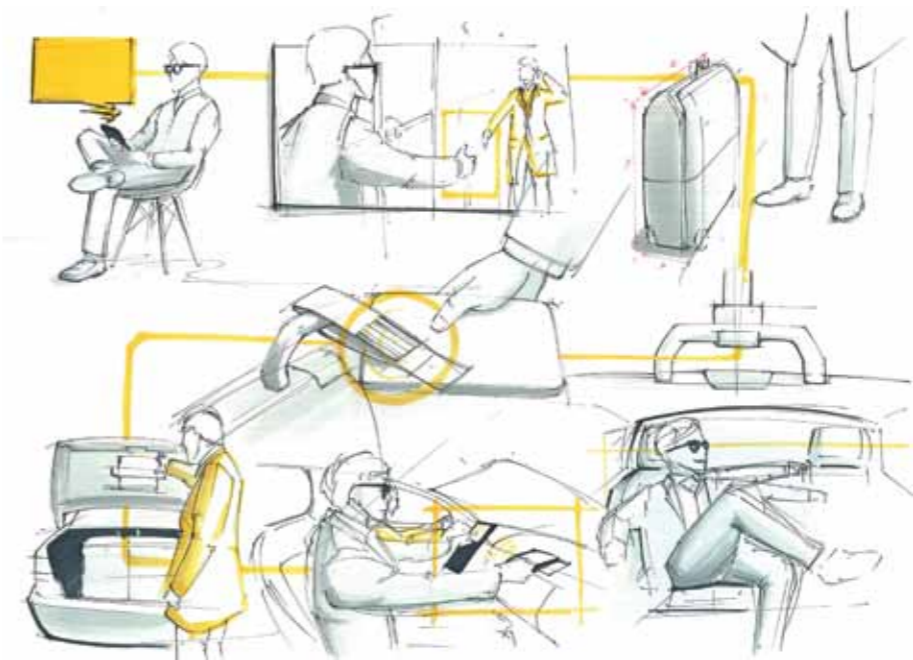
Nexus

The next step KLM and Schiphol want to take is the use of biometric identification by facial recognition to create a seamless flow of the passenger departure process. Improving the passenger flow will lead to a better use of space with a higher capacity and a more positive departure experience. This will prepare the airport for the future demands of air transport and brings Schiphol closer to maintaining the image of being Europe's preferred airport.

Smartphone app (also Apple)

Nexus identifier (at a location nearby)

PC, scanner and enrolment website

possible by reducing processing times, preventing queues, and guiding passengers before, during, and after their use of touch points in a relaxed way.

Project methodology

A study was conducted to explore passengers' views on biometric technology, especially with regard to privacy concerns. Additional research was performed on how the passenger experience can be improved when using self-service biometric systems at Schiphol Airport.

Organisation
KLM
Student
Tim van den Ing
Coach
André Valkenhoff
Year
2015/2016

The design

The Nexus system divides enrolment into steps: passengers start enrolling in their home environment and complete the process at the airport.

Nexus lets passengers decide how and where they want to enrol in a number of ways. At the airport, available data is used to verify the enrolment. The Nexus verifier gate recognizes the passenger based on their photo and reads the RFID passport chip using the MRZ data linked

to the passenger during the first enrolment step. After verification, a bag tag is printed and the passenger can put the luggage on a conveyor belt.

If the passenger immediately recognized, the process of checking in, biometric verification and printing the bag tag will only take 25 seconds. For second time users, who have already been verified, reading the passport again is unnecessary resulting in a processing time of 14 seconds.

Index of ACD 2011-2016

projects, students and partner organisations

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2011-2016

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Advanced Concept Design 2011 - 2016

Innovation by integration; this is what the Advanced Concept Design (ACD) master course is all about. It starts with a predefined complex problem that challenges designers to think conceptually. This in turn leads to design research and development resulting in innovative product or product-service system concepts.

In the past five years, around 600 students have worked with 26 different partner organisations on 42 projects, which can be clustered in 6 themes: Sustainability, Lifestyle, Inclusive Design, Healthcare, Retail and Aviation. This book presents one student's work for each of the projects.

The aim of this book is twofold. On the one hand, it commemorates the richness and diversity of the innovative designs produced by the ACD students in the past five years. On the other hand, it is a showcase for the TU Delft Faculty of Industrial Design Engineering to inspire new partnerships with companies and institutions, both in and outside the Netherlands.

TUDelft