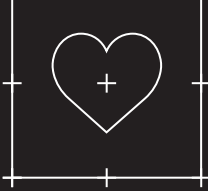# chronic health

embassy of health

chronic health

Designing a Healthy Future

Health is high on everyone's wish list, and we live longer. Technological developments increasingly allow us to manage our own illness and health. But healthcare innovation is not based on technology alone. Empathy, the ability to understand an experience through the eyes of another, is an integral aspect of the design and development of meaningful healthcare solutions.
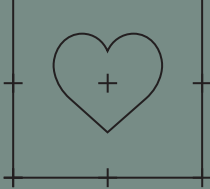
The exhibition 'Chronic Health: Designing a Healthy Future' shows what role design can play in the future of our health. Find a wide range of examples on display: from 'open' design and Do-It-Together applications to high-end medical technologies and creative prototypes. Chronic Health illustrates how design enables us to adapt to illness and limitations, manage them ourselves, take control and try to lead the life we want.

Our western healthcare system is shifting from healthcare agencies, hospitals and labs to self-monitoring and diagnosis at home. Do-It-Yourself trends lead to tension between open source applications in healthcare, patents and existing economic models. How far do we take the development and design of new applications? At the same time, how do we design and implement simple, easy-to-use and educative solutions for areas with limited resources? And what are the opportunities and the effects of applying design thinking and research in developing healthcare innovations and empowering people?

'Chronic Health' does not have all the answers, but it gives an inspiring glimpse of what design could offer healthcare now and in the near future.

Partners of the Embassy of Health:
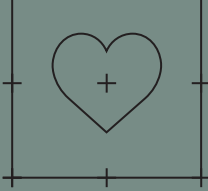VanBerlo, Waag Society, Philips, Máxima Medical Center, U Create

chronic health

The power of 'open'

#WeAreNotWaiting is the slogan of people in the diabetes community who are taking matters into their own hands. It all started in 2013 when a concerned father – and software programmer – was looking for easier ways to monitor and report his child's blood glucose levels. He developed open source software that enabled him to access the blood sugar information in the cloud through his smartphone. The Nightscout community was thus born, a fast-growing grassroots movement that is further developing the open source tool.

Inspiring concepts and examples of 'open' design in healthcare, such as Nightscout, are on the rise. How do these innovations relate to commercial initiatives and patents? Will we be able to operate on ourselves with a DIY surgical robot? Do we even want that?

Open Hardware

Waag Society

The world of healthcare is dominated by patents that protect innovative health solutions. This restricts us from sharing knowledge and prevents innovations from becoming available to a wider audience. In response, 'open' design in healthcare is on the rise. More and more active individuals and open-source communities share and democratize their knowledge. In places like FabLabs, we now have the infrastructure to collaborate on open design on a global scale and the machinery to build nearly anything we want.
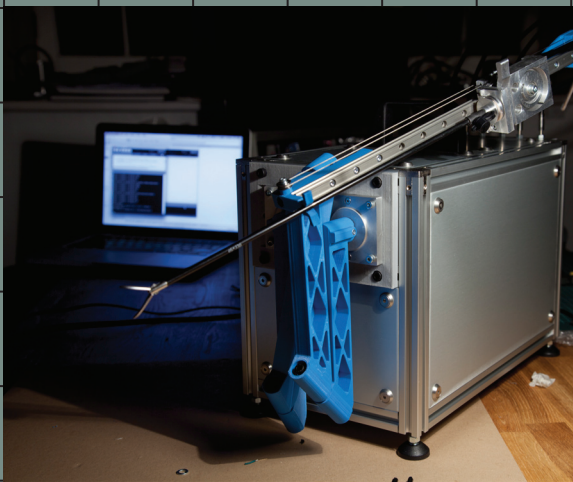

With the Open Hardware developed at Waag Society, you can build your own biology lab. Everyone can learn how to design, grow and extract their own biomaterials using only Open Source hardware that is easy to fabricate. In the BioHack Academy at Waag Society, participants are taught how to build and use the Open Hardware devices that are here on display.

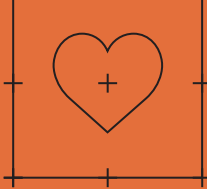# OpenSurgery a do-it-yourself surgery robot

Frank Kolkman

By proposing a robot for do-it-yourself surgery, designer Frank Kolkman wants to spark discussion around alternative care models. Inspiration for OpenSurgery came from YouTube videos in which uninsured Americans can be seen performing medical and dental hacks on themselves.

Combining open-source software, 3D printing and laser cutting with surgical tools bought online, Kolkman developed a low-cost robot-assisted surgery system. Theoretically, this easy-to-replicate system could be used for domestic keyhole surgeries.

During the process, Kolkman ran head-on into an enormous intellectual copyright wall, exposing how big corporations are preventing potentially life-saving technologies from reaching the public. The project can therefore also be seen as a criticism of corporate knowledge monopolies.

www.frankkolkman.nl

chronic health

Take control

We are increasingly able to manage our own illness and health, thanks largely to technological developments. But what if a care application does not meet the needs of users? Do we wait, or try to find other remedies? The rise of maker spaces and digital fabrication labs enables individuals to create their own personalized solutions. Even low-tech DIY solutions made at home can become strong self-empowering tools.

Simultaneously, we can wonder if we are losing the control of our healthcare data or where technological developments are taking us. Gene editing technology is slowly becoming more accessible. But how do we feel about creating 'designer babies'? Who owns your healthcare data and are your values, privacy, freedom and rights protected? Can we set our own conditions and take control?

Hugsy

Sylvie Claes

Kangaroo care – also known as skin-to-skin cuddling – is of vital importance for a baby's healthy development. However, babies who are born prematurely often need to spend weeks or months in an incubator, away from their parents. Hugsy is a smart blanket that introduces kangaroo care into the incubator. During a cuddling session the Hugsy absorbs a parent's smell and records their unique heartbeat. When a baby needs to get back in the incubator, Hugsy then soothingly surrounds babies with their parent's smell and heartbeat, and gives them a feeling of support. This gives babies the comfort they need for deeper sleep, better brain development and improved immunity. Hugsy's evidence-based design has won several design awards and is already in use in Dutch hospitals during clinical trials and in homes.

Project partners: Máxima Medical Center and TU/e, connected by U CREATE

Data, Ownership and Privacy

Waag Society

We are constantly contributing to the amount of data that tells something about our preferences and behaviour. This data is of value to many parties. But who owns our (healthcare) data and is our privacy well protected? The centralization of power and data with a small group of parties puts our freedom, privacy, rights and values under pressure. Your DNA and data belongs to you! So why do other parties make profit from it?
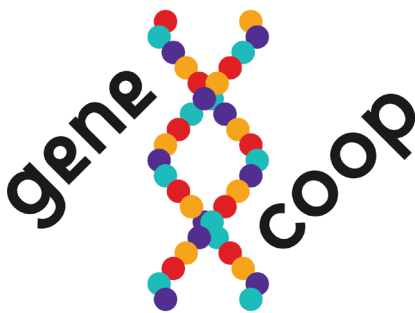
Waag Society is actively searching for solutions for these errors in our systems and believes that 'privacy by design' should be leading in the development of new products and services.

Gene.coop

Gene.coop is a cooperative in which your DNA is stored and only made available to third parties under conditions determined by you. Recent decades brought human genetics from laboratory studies to mainstream commercial products. Today's genetic research is a multi-billion industry that makes use of genetic material acquired from individuals through commercial services. These companies sell the genetic data in digitized form to research institutions for profit. Waag Society decided to challenge this exploitation with a socially responsible business model of self-ownership where citizens remain owners of their genetic material and sequenced data: Gene.coop. This cooperative stores DNA and only makes it available to third parties under conditions determined by owners themselves. In this way, citizens remain in full control of their genetic data and become stockholders of their genomic utilization.

www.gene.coop

The Healthy Human Project

Tamara Hoogeweegen

If we could modify babies before birth to make them the healthiest and most resilient humans possible, should we? Prenatal genetic manipulation to prevent diseases is closer than we think. Thanks to the recent development of CRISPR, engineering DNA has become cheaper, faster and more precise than ever before. This technology is currently used in research laboratories. Even though most scientists do not want to create designer babies, it is just a matter of somebody doing it first. Think about it: would you choose blue eyes and fair skin if you knew that they indicate a higher risk of cancer? How far are you willing to go? Please let us know and cast your vote!

Life Hacks

Waag Society

What if you need help or a care application that does not exist? Caregivers are often very resourceful when it comes to daily interventions that enable people to remain living independently at home. Those who have run into obstacles in care situations themselves will recognize these simple Do-It-Yourself solutions. Some of the objects displayed here are tangible outcomes found when searching for solutions for daily problems of dementia patients in the project FIT by Waag Society. A lot of these best practices get lost because there is no place to share them. Showcasing some of them now puts the knowledge of caregivers in a positive context: instead of the victim of the situation, they are the experts! These types of solutions will be mapped and shared in Waag Society's project Made4You in 2018.
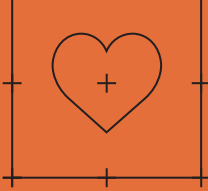
Victoria

Máxima Medical Center, in collaboration with Medsim and Nemo Healthcare

Perinatal care is key at the Máxima Medical Center (MMC) Veldhoven. To improve birth outcome, MMC cooperates with different partners on the development of novel technologies. With Medsim, for example, on childbirth simulation to train medical staff. And with Nemo Healthcare to improve foetal monitoring during pregnancy and labour. The goal: make births safer for mother and child!

Meet Victoria, the world's most lifelike childbirth simulator, with accurate anatomical proportions. Medsim uses Victoria for simulation training. Her smooth, full-body skin resembles real patients, immersing trainees in realistic scenarios. It provides them with the opportunity to experience true labour and delivery in a safe environment, yet allowing mistakes.

Victoria has Nemo's electrode patch on her abdomen, monitoring her contractions in a comfortable, non-invasive and thus safe way. The patch provides reliable information for diagnosis, such as when an intervention is needed or treatment needs to change.
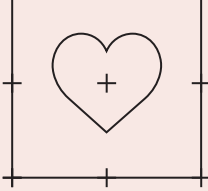
Chocobombes

Naomi Jansen

Chocobombes are chocolates filled with a healthy message specially designed for pregnant women. Chocobombes make expectant mothers aware of the importance of a healthy diet. The fillings – for instance spinach and orange, olive oil and walnut, or fig and green apple – have been carefully composed to contain the necessary nutrients. Divided over three trimesters, the chocolates are accompanied by information on the foods that contain crucial nutrients such as folic acid, calcium, iron and fibres. The playful and tasty Chocobombes that come in three varieties for each trimester help expectant mothers keep a healthy and varied daily diet.

Project partners: Máxima Medical Centre and Pastryclub, connected by U CREATE

chronic health

Do It Together

Various healthcare solutions show the added value of design thinking in healthcare. Empowering users now takes centre stage. Designers, patients, healthcare professionals and others are brought together in a Do-It-Together approach. Combining such a range of expertise generates a result that is more than the sum of its parts. Experimental collaboration between the arts, science, technology and business can achieve innovative healthcare solutions. In addition, the roles between patient and doctor are shifting. How can this new partnership be supported through design?

High Risk Pregnancy Toolkit

Innovating for maternal healthcare in fragile environments

The toolkit aims to support early detection of high-risk pregnancies in fragile communities and to encourage referral to health facilities. The toolkit includes 'High Risk Pregnancy Referral Cards'; which help identify the conditions which lead to complications during delivery and to indicate correct behaviors and practices for a healthier pregnancy. The toolkit also includes a 'Heart for 2' device, a double-headed, battery free, fetoscope (fetal stethoscope) and a manual to support the training of healthcare workers in finding and listening to fetal heart beats. The stereo function also enables the pregnant woman and/or the family to listen to the fetal heart beat during the antenatal care visit. The 'High Risk Pregnancy Referral Cards' will be rolled out in 8 African countries via 100 primary care facilities by the end of 2017, with the ambition of reaching 75.000 pregnant women. The 'Heart for 2' is still under development.

A collaborative initiative by ICRC - Philips Design - Philips Foundation

Mobile Obstetric Monitoring

Philips Telehealth Service in Indonesia

The Philips MOM solution helps community caregivers and doctors work together to identify and manage high-risk pregnancies, bringing care to where it's urgently needed. The MOM solution features two mobile phone apps, a web portal, and training for the change management aspect. The Caregiver app provides midwifes an antenatal examination checklist and allows collection of vitals like weight, blood pressure and sync it to the MOM web portal using SMS/internet from patient's home. The Doctor app allows doctors to track this data and review a woman's pregnancy on-the-go. Specialists at regional hospitals can remotely review pregnancy data via the MOM web portal. An algorithm suggests a pregnancy risks score to assist caregivers. MOM has been implemented in 5 healthcare centers across 3 provinces in Indonesia.

A combined effort from Padang City government, Indonesia and Philips

Diabetes Patient Empowerment

Vincent Laagland (VanBerlo)

The difficulty of diabetes treatment lies in its complex and personal character. Because patients cannot surrender the responsibility of diabetes management to their healthcare professional, they are left to manage their diabetes on their own. Although significant efforts have been made in diabetes care, many patients still do not achieve adequate glycaemic control and experience devastating complications that result in decreased quality and length of life.

Novo Reflex is smart product-service system that supports type 1 diabetes patients in their self-management. The proposed product-service system consists of a smart pen case and a supporting application. It aims to simplify treatment, provide structure for self-management and support patients throughout the entire process. Improved effectiveness of self-management potentially increases metabolic control and quality of life, and decreases healthcare-related costs.

Raising Confidence in CPR
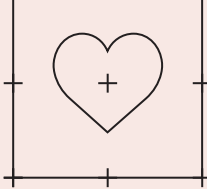
VanBerlo, together with Holst and TU Delft

LifeSaver is a new concept that focuses on smart and intuitive CPR guidance. When someone suffers a cardiac arrest, a bystander's quick and proper intervention has the power to save a life. The growing number of AEDs in public spaces has increased the heart attack survival rate. Still, this rate can be boosted when more people feel confident enough to perform cardiopulmonary resuscitation, CPR, and when chest compression quality can be improved. That's where LifeSaver comes in!

LifeSaver takes the panic out of CPR, and guides the user in a smart and intuitive way. From quick and correct electrode placement to indicating the right location and rhythm for chest compressions.

www.vanberlo.nl

Healthcare Disrupted

VanBerlo, with Is Ook / Twynstra Gudde

People are growing older...and that's wonderful as long as they can live happily and independently at home. But if an elderly person falls, the effects can present a big challenge. In many cases the current healthcare system doesn't bring the desired result. That's why VanBerlo was asked to look at this issue from a different angle and come up with new solutions. Using Design Thinking methodology, it analysed the problem and carried out empathetic research together with healthcare consultancy ZONH and the association of physiotherapists KNGF. Deep-dive interviews were conducted with all stakeholders involved: the elderly themselves, nurses, GPs and housing associations. These interviews helped us to discover the real needs. The most striking insights from the research included the desire for more clear-cut information, autonomy and recognition. With the use of the Reframing ideation methodology, VanBerlo then devised innovative solutions for elderly people recovering from a fall. With good results.

Designs for Flies domestic drug-screening kit

Frank Kolkman

Designs for Flies offers an entirely new approach to pharmaceutical research into rare illnesses. Traditional medicine development for such diseases is generally not cost-effective for pharmaceutical companies. In close collaboration with scientists at the Kyoto Institute of Technology (KIT), designer Frank Kolkman developed a speculative design for pharmaceutical research involving patients themselves.
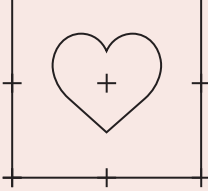
Designs for Flies proposes a personalized drug-screening strategy for patients living with Charcot-Marie-Tooth disease (CMT). Building on KIT research in which a genetic map for CMT was created, the project promotes the use of genetically modified fruit flies to mimic the patients' characteristics. The flies would serve as 'guinea pigs' for drug testing, to be executed by patients at home using a specially designed toolkit. This method could be an inclusive alternative to the prevailing capitalist system of drug development.

Design for Flies was awarded with a 2016 Dutch Design Award in the category 'Service & systems'. Jury remark: "One of the project's strengths is the way it involves patients, restoring their sense of value, and giving them a degree of control over their treatment and progress."
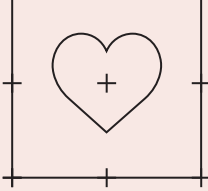
www.frankkolkman.nl

Doll's Houses

Peter Masselink

Architecture is not only about designing functional spaces; it is also about creating room for imagination. But what if your body and mind work differently to most people? Peter Masselink, architect and father of a severely handicapped son Sverre, asked architectural firms throughout the Netherlands to design a doll's house for children with mitochondrial disease. His call resulted in eighteen proposals that deal with disability in a variety of ways. They are art objects to play with, investigate and learn from. They challenge, stimulate and entice kids into a special 'architectural' world, bringing that world to bed if needed. The doll's houses will be auctioned by the end of 2017, with the proceeds going to research aimed at finding a cure.
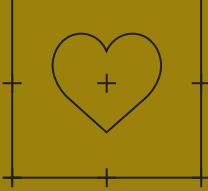
www.dolls-house.nl

Lorenzo's Customized Bicycle

Co-creation by Lorenzo, his parents, TOG therapists and Opendot designers.

Six-year-old Lorenzo is affected by a complex neurological disorder that hinders most simple daily activities such as cycling. But now that he has a custom-made bicycle, he can! This tricycle is the product of co-creation by Lorenzo, his parents, his therapists and the designers of the Milan makerspace Opendot. In the process of digital fabrication, it was customized for Lorenzo's posture, measurements and abilities, including specific functions that are often ignored in mass production. It's an open design that can quickly be adapted for other children with different disabilities. The rise of Fablabs enables individuals to (digitally) fabricate and co-create these types of new products. This helps patients, caretakers and designers to take control and develop new healthcare solutions together.

chronic health

Utopian future

Utopian Future offers a glimpse into what healthcare might look like in 2050. Will we live according to the 'Blue Zones' lessons, striving to live for a hundred years or more? Could Virtual Reality technology answer questions about the 'end of life' and reduce fear of death?

In Utopian Future, co-design, design thinking and design research merge with healthcare innovation. Crossover collaboration results in creative prototypes and innovative products, showcasing pioneering work by future health designers.

Outrospectre

Frank Kolkman

Outrospectre by Frank Kolkman is an experimental proposal for a medical device aimed at reconciling people with death through simulating out-of-body experiences. In healthcare the majority of efforts and research focus on keeping people alive. The fear and experience of death is a mostly neglected topic. Recent (para) psychological research, however, suggests that the sensation of drifting outside of one's own body using virtual reality technology could help reduce death anxiety. Outrospectre explores the possible application of these findings in hospital surroundings where it could help terminal patients accept their own mortality with more comfort. In this project, Kolkman investigates unanswered questions about mortality and 'end of life'.

Outrospectre is generously supported by the AFK (Amsterdam Fund for the Arts) and was developed within the scope of a 3PackageDeal in collaboration with: Waag Society (Creative Care Lab), Makerversity Amsterdam & Museum Vrolik.

www.frankkolkman.nl

Movemat

Xander van den Arend
& Jan van der Zijden

Prolonged illness means spending lots of time immobile. But too much time spent without moving is not conducive to recovery. The Movemat helps sick children to get exercise. This cushion with sensors works as a game controller. It is placed under the shoulders or buttocks and attached to a game computer. Shifting the weight on the mat affects the game: the racing car you are sitting in swerves to the left or right without too much effort. The small movements keep the midriff active and increase core stability. With the help of the Movemat, a child that get too little exercise can become active again without getting out of bed.

Project partners: University Medical Centre Groningen and University of Applied Sciences Utrecht, connected by U CREATE

Steps

Xander van den Arend
& Jan van der Zijden

About a third of healthy people over 65 fall at least once a year. Falling at a later age can have serious consequences. Balance and muscle training is vital for fall prevention. Steps is one of the solutions developed in a two-year research project on co-design and provides an enjoyable and social experience when practicing balance and muscle power. The two pads, the Steps, are connected to a television on which balance and muscle exercises appear. Aside from the exercises, personal photographs can be loaded onto Steps from a USB stick. If you execute the exercise correctly, repeating it becomes the navigation through your set of personal pictures. Steps is easy to use with the help of a walker-rollator or seated on a chair.

Project partners: Zorgspectrum and University of Applied Sciences Utrecht, connected by U CREATE.

Apart from the Norm

Cox Janssens

When it comes to having children, people have a choice.
But because the prevailing societal norm is still to aspire
to parenthood, the choice is not as free as it appears.
Social pressure is considerable. After researching the
subject, Cox Janssens decided to balance the debate
and offer a more positive view of life without offspring.
She created a set of conversation cards that can be
used by those still in doubt or those struggling with
involuntary childlessness. The
cards' visual cues help them to
distinguish their own desires from
those projected by other people.

Project partners: Máxima Medical
Center, connected by U CREATE

Blue Zones: Longevity Hotspots
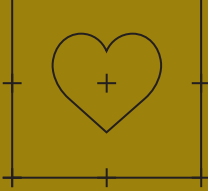
Waag Society

What is the secret to a long and healthy life? Let's start with the people who actually live it: take a look at the so-called 'Blue Zones' where people live measurably longer lives than elsewhere. The concept grew out of demographic work conducted by researchers Poulain and Pes. They acknowledged Sardinia's Nuoro province as the region with the highest concentration of men who live to one hundred years or more. As they zeroed in on the villages with the highest longevity, they drew concentric blue circles on the map. In addition, Dan Buettner identified four other longevity hotspots in Japan, Costa Rica, Greece and California, and found nine commonalities among the people who live there. What can we learn from their habits in our search for chronic health?

Waag Society studied the Blue Zones as part of the European project Express to Connect, which examined how to empower elderly people. The graphic is taken from Waag's publication Connect: Design for an Empathic Society (2013).

www.bluezones.com

BLUE ZONES

LOMA LINDA, CALIFORNIA

SARDINIA, ITALY

ICARIA, GREECE

OKINAWA, JAPAN

NICOYA PENINSULA, COSTA RICA

NINE LESSONS

1. MOVE NATURALLY.
DON'T DO MARATHONS OR PUMP IRON, WORK AROUND THE HOUSE, GARDEN, WALK, CYCLE, WALK WHEN TALKING ON THE PHONE.

2. KNOW YOUR PURPOSE.
HAVE A REASON FOR WAKING UP IN THE MORNING.

3. KICK BACK.
FIND WAYS TO SHED STRESS, WHETHER IT'S PRAYING, NAPPING OR GOING TO HAPPY HOUR.

4. EAT LESS.
STOP EATING WHEN YOU ARE 80% FULL.

5. EAT LESS MEAT.
BEANS ARE A CORNERSTONE OF MOST CENTENARIANS' DIETS.

6. DRINK IN MODERATION.
ONLY THE SEVENTH-DAY ADVENTISTS IN CALIFORNIA DIDN'T HAVE ONE TO TWO GLASSES A DAY.

7. HAVE FAITH.
DENOMINATION DOESN'T SEEM TO MATTER, BUT ATTENDING FAITH-BASED SERVICES (4 TIMES A MONTH) DOES.

8. POWER OF LOVE.
PUT FAMILIES FIRST, INCLUDING COMMITTING TO A PARTNER AND KEEPING AGEING PARENTS AND GRAND-PARENTS NEARBY.

9. STAY SOCIAL.
BUILD A SOCIAL NETWORK THAT SUPPORTS HEALTHY BEHAVIOURS.

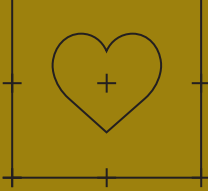SOURCE: CONNECT, DESIGN FOR AN EMPATHIC SOCIETY, BIS PUBL., 2013

IV-Walk

Alissa Rees

Patients in hospital who are attached to an infusion are impeded in their mobility. IV-Walk is a portable alternative to the traditional IV Pole. The soft, flexible and wearable
IV-Walk stimulates patient mobility with the aim of accelerating recovery. Without hampering the treatment of the patient, the jacket hides the medical equipment as much as possible, almost turning it into a personal garment that becomes part of the patient's identity. The IV-Walk enhances the patient's self-esteem and makes the sometimes unpleasant experience in hospitals more bearable.

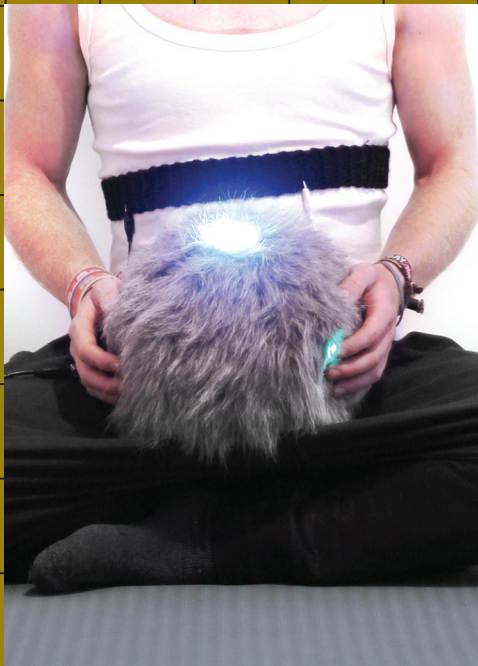Project partner: Design Academy, connected by U CREATE

Numinous

Stefanie Bonte

A burn-out often seriously disrupts the body. Stress can cause heart palpitations, hyperventilation, ringing ears and sore muscles. But how can you measure stress in a useful way? In co-creation with patients and therapists, Stefanie Bonte studied how to give practical feedback about bodily functions. Numinous makes heartbeat, breathing and muscle tension visible, audible or tangible through bio-feedback. For example, the 'fluffy ball' translates your heartbeat into vibrations. With a good breathing exercise, you feel the frequency dropping. In this way, people with burn-out symptoms acquire insight into what is happening inside their body. Numinous helps in controlling stress during the difficult first phase of a burn-out.

Numinous won the jury and public prize at the 2016 HKU Awards. With innovation and advisory office VANBLEND and various therapists, Bonte is currently examining how to market Numinous.

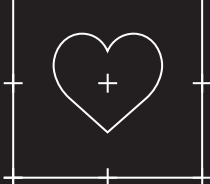Project partner: VANBLEND & de Participatiekliniek, connected by U CREATE

ADS-Mirror

Gerjanne van Gink

People with Alzheimer's disease can have difficulty recognizing objects and recalling how to use them. They can also have problems performing certain daily actions or doing them in the right order. The ADS mirror is a product that offers emphatic forms of support in the day-to-day routines of Alzheimer patients. As soon as the patient picks up a toothbrush in front of the mirror, he or she will see a tutorial on or beside the mirror. In healthcare this is known as 'mirroring', the demonstration of an act. The ADS mirror supports users with toothbrushing, washing, drying or hair combing.

connected by U CREATE

Chronic Health – Designing a Healthy Future

Premiering at the first World Design Event from 21-29 October 2017, Dutch Design Week will see the Innovation Powerhouse transformed into the Health Embassy. Here you'll find the pulse of design for health at the exhibition 'Chronic health - Designing a healthy future'. For young and old. From 'open' design and Do It Together care applications to high-end medical technology and creative prototypes.

Curator: Waag Society
Location: VanBerlo
Production: de Projectstudio
Design: mkgk

world design event

VANBERLO **PHILIPS**

waag society **máxima medisch centrum** **U CREATE WE CONNECT**