



# De Toekomst van het Lichaam

100 jaar laboratoriumonderwijs  
– Back to the Future

Robin Bergman 30 Sept 2022



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Toekomstbeeld  
der Techniek


# Over STT



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der Techniek

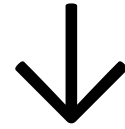
# STT kijkt al 50 jaar vooruit

Stichting Toekomstbeeld der Techniek (STT) werd opgericht in 1968 door het Koninklijk Instituut van Ingenieurs (KIVI) en wordt als onafhankelijke stichting gefinancierd uit bijdragen van deelnemers uit het bedrijfsleven, maatschappelijke organisaties en de overheid.



← S.T.T.- SYMP. BIOTECHNOLOGIE.

Can we do what  
we want?

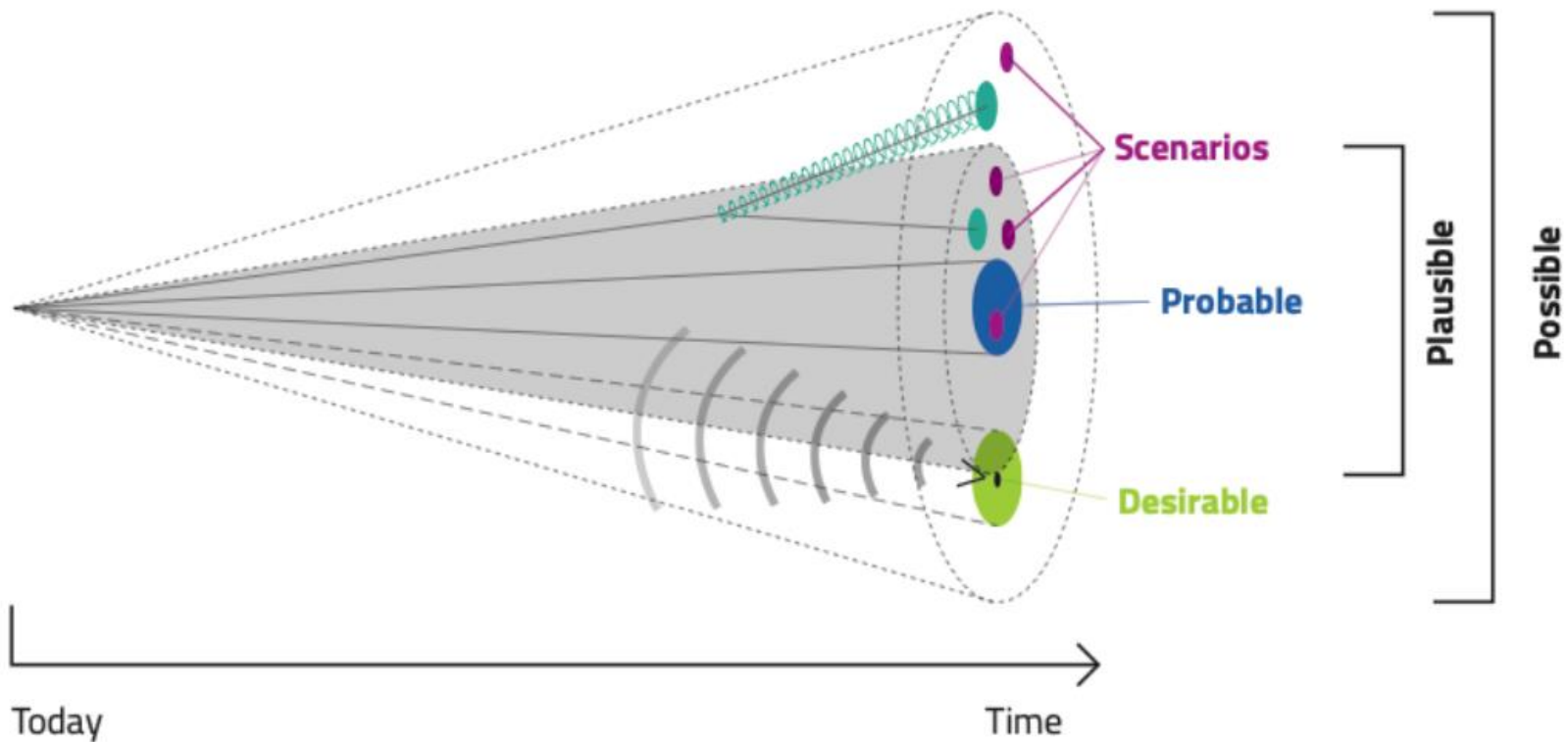


Do we want what  
we can?

**'Om geïnformeerde keuzes te kunnen maken voor de toekomst moeten we weten wat onze opties zijn.'**



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**Rudy van Belkom nieuwe  
directeur Stichting  
Toekomstbeeld der Techniek:  
'Langetermijndenken is  
belangrijker dan ooit'.**





# The Good Ancestor

HOW TO THINK LONG TERM  
IN A SHORT-TERM WORLD

Roman Krznaric



'This is the book our children's  
children will thank us for reading'

THE EDGE, U2

**Klimaatverandering, toenemende ongelijkwaardigheid en oplopende spanningen in de samenleving. Er staat veel op het spel voor onze toekomst. Maar juist in tijden van crisis is langetermijndenken volgens Van Belkom cruciaal**



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©rem van den bosch

PSYCHOLOGY

# Why Futurism Has a Cultural Blindspot

We predicted cell phones, but not women in the workplace.

BY TOM VANDERBILT

SEPTEMBER 8, 2015

Illustration By Robin Davey



STEVEN SPIELBERG Presents

# BACK TO THE FUTURE

A ROBERT ZEMECKIS Film

He was never in time  
for his classes...

He wasn't in time  
for his dinner...

Then one day...  
he wasn't in his  
time at all.



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"BACK TO THE FUTURE" Starring MICHAEL J. FOX

CHRISTOPHER LLOYD · LEA THOMPSON · CRISPIN GLOVER

Written by ROBERT ZEMECKIS & BOB GALE Music by ALAN SILVESTRI Produced by BOB GALE and NEIL CANTON

Executive Producers STEVEN SPIELBERG KATHLEEN KENNEDY and FRANK MARSHALL

Directed by ROBERT ZEMECKIS A UNIVERSAL Picture

Soundtrack Available on MCA Records and Cassettes Read the BEVERLY Hills Novelty Book PARENTAL GUIDANCE SUGGESTED

Some Material May Be Suitable for Children

# 10 Technologies Back to the Future Got Right

1. **Brain-controlled/Wireless Games** – when Marty enters the “retro” soda parlor in 2015 and runs into a relic of the 80s, the arcade machine. Two kids are having trouble figuring out how to make the game work. Marty walks up and shows his shootin’ skills, foreshadowing the third installment of the film series. The kids exclaim in surprise that he has to use his hands to make the thing work, “like a baby’s toy.” Today, with voice commands, eye-tracking, and brainwave scanning, there are games that can be played completely without the use of analog, which is, apparently, literally child’s play.
2. **Voice-activated Tech** – in that same soda shop, an animatronic and frankly, deeply unsettling version of Marty’s dad shows up on a computer screen to take his order by Marty’s voice command. Sound familiar? Even if you don’t use them, Siri and Google have become iconic AI personalities at this point.
3. **3D Movies** – met with a holographic shark the size of a small building that tries to eat him, Marty is not prepared for this illusion of light.
4. **Tablet Computers** – Marty gets handed a tablet in the ever-changing yet everlasting plaza of the clocktower.
5. **Videoconferencing** – Marty Sr. has a conference with his coworker, Needles, right before his boss hops in, who was apparently listening to everything that just occurred. I’m glad for the video conferencing becoming a reality, what would we do without Zoom right now? But not so much for the hacking and surveillance tech that can be exploited. These are very much realities of today.
6. **Augmented and Virtual Reality** – Marty Jr. in 2015 views an incoming call at the dinner table with his AR glasses. Doc Brown also has a pair of opaque and silvery AR specs (to go along with his plastic tie, no less).
7. **Drone-filmed News Footage** – the endlessly circuitous conflict between Marty and Biff gets recorded by drone, something very common today.
8. **Super Thin and Sleek Digital Cameras** – Doc Brown carries a device like this around in 2015. It’s much like the superpowered cameras in our phones we carry everywhere we go that fits easily in our pockets.
9. **Wall-mounted Flatscreen TVs** with multiple channels – Marty Jr. has the multi-screen setup akin to what’s going on with the monitors of so many gamers and streamers today.
10. **Mobile Credit Card Readers** – Marty Sr. engages in some less than savory behavior through this easy touch-to-pay method that has become the norm in today’s purchasing process.
11. **Biometrics** – Jennifer gets trapped inside the house of her future self because there is no doorknob; Doc lets her know that she has to scan her finger to open the door in lieu of turning a knob.



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A close-up photograph of a human eye with a light blue iris. A contact lens is visible on the eye, reflecting light. The eye is looking slightly to the right. The surrounding skin and eyelashes are visible.

van voorspellen



naar voorstellen

# De toekomst van het lichaam



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2053



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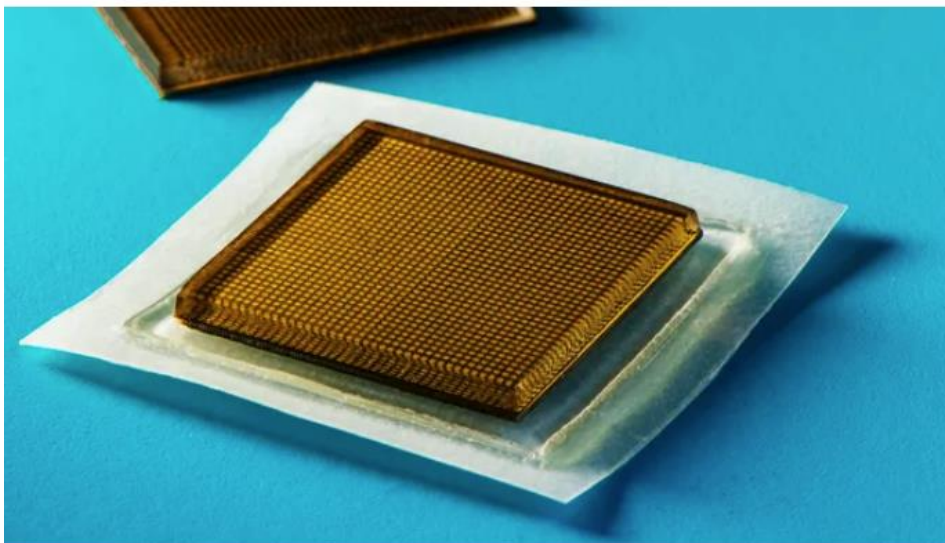
# aanleiding



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Toekomstbeeld  
der Techniek

# This Stamp-Sized Ultrasound Patch Can Image Internal Organs

Getting a scan usually means a visit to a doctor and some giant equipment. What if that gear was wearable?



PHOTOGRAPH: FELICE FRANKEL

BIOTECHNOLOGY

## This startup wants to copy you into an embryo for organ harvesting

With plans to create realistic synthetic embryos, grown in jars, Renewal Bio is on a journey to the horizon of science and ethics.

By Antonio Regalado

August 4, 2022



NEWS | 14 January 2022

## First pig-to-human heart transplant: what can scientists learn?

**Researchers hope that a person who has so far lived for a week with a genetically modified pig heart will provide a trove of data on the possibilities of xenotransplantation.**

[Sara Reardon](#)



Surgeons at the University of Maryland Medical Center transplanted a genetically altered pig heart into David Bennett. Credit: University of Maryland School of Medicine

BIOTECHNOLOGY

## The gene-edited pig heart given to a dying patient was infected with a pig virus

The first transplant of a genetically-modified pig heart into a human may have ended prematurely because of a well-known—and avoidable—risk.

By Antonio Regalado

May 4, 2022



Surgeons at the University of Maryland prepare a pig heart for a transplant into a human.



## *More Trans Teens Are Choosing 'Top Surgery'*

Small studies suggest that breast removal surgery improves transgender teenagers' well-being, but data is sparse. Some state leaders oppose such procedures for minors.



Dr. Sidhbh Gallagher's unusual embrace of social media platforms like TikTok has made her one of the most visible surgeons in her field. Eva Marie Uzcatogui for The New York Times

BIOTECHNOLOGY

## Trans men's eggs have been matured in the lab—and could help them have children

A new technique means eggs can be grown from the ovaries of transgender men, even after years of testosterone therapy. It could offer them new ways to start a family.

By Jessica Hamzelou

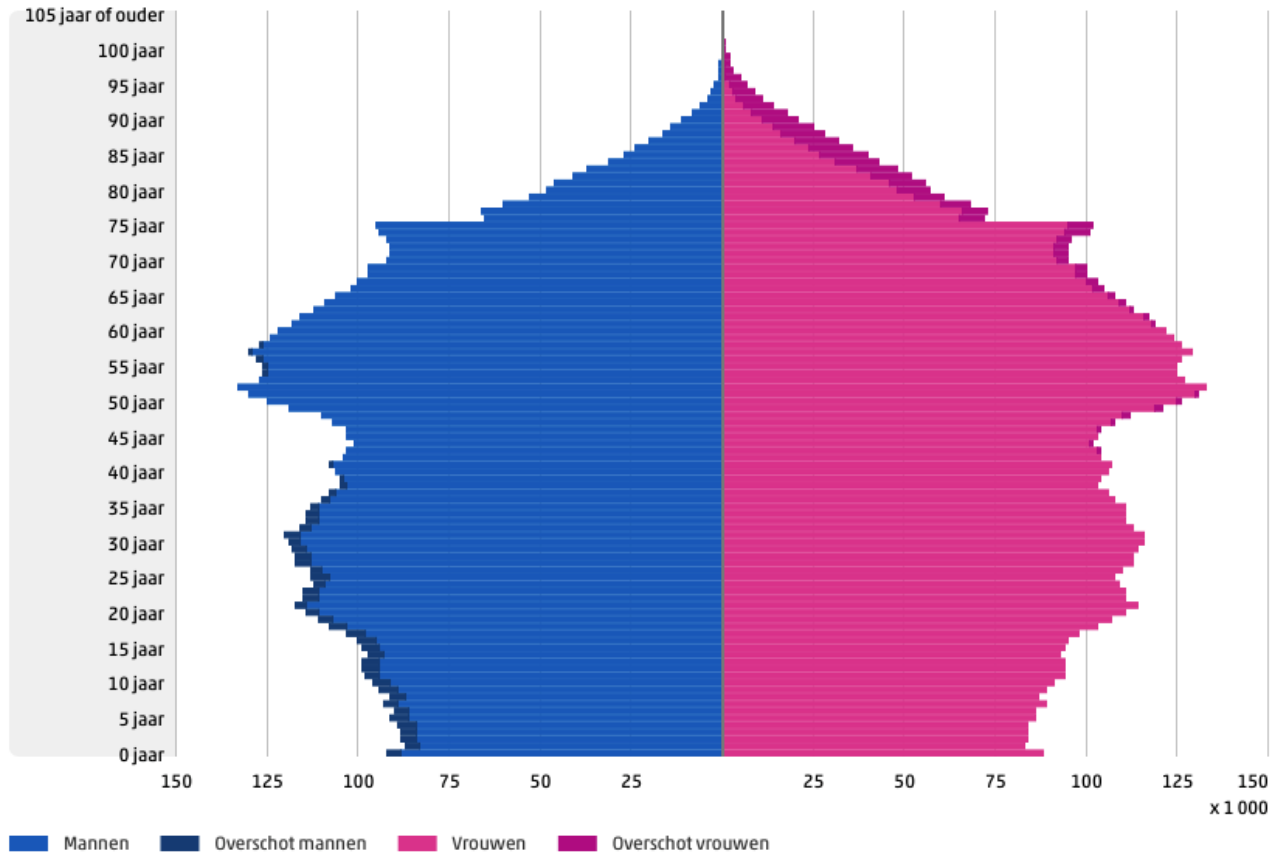
April 26, 2022



# Bevolkingspiramide

## Leeftijdopbouw Nederland 2022 (prognose)

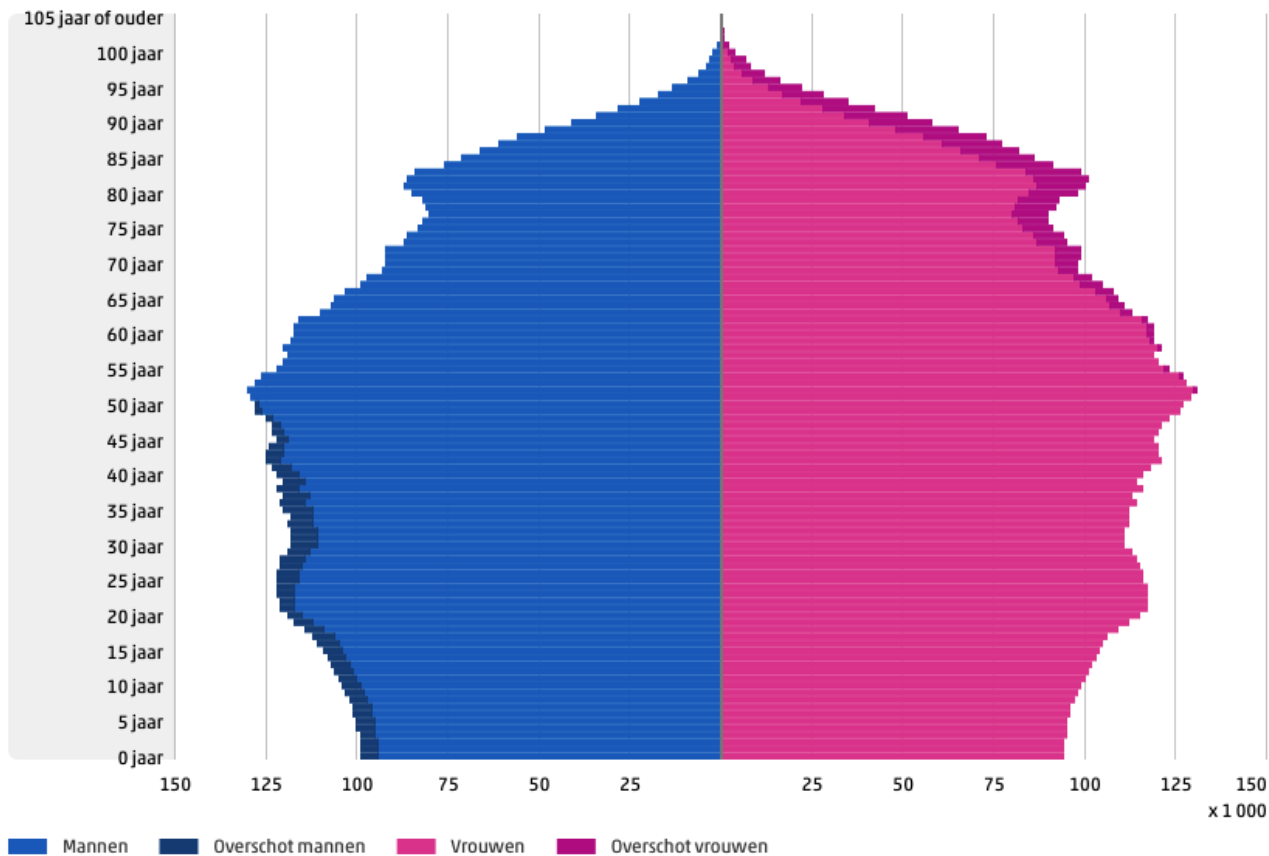
Totaal: 17 594 000 inwoners



# Bevolkingspiramide

## Leeftijdopbouw Nederland 2053 (prognose)

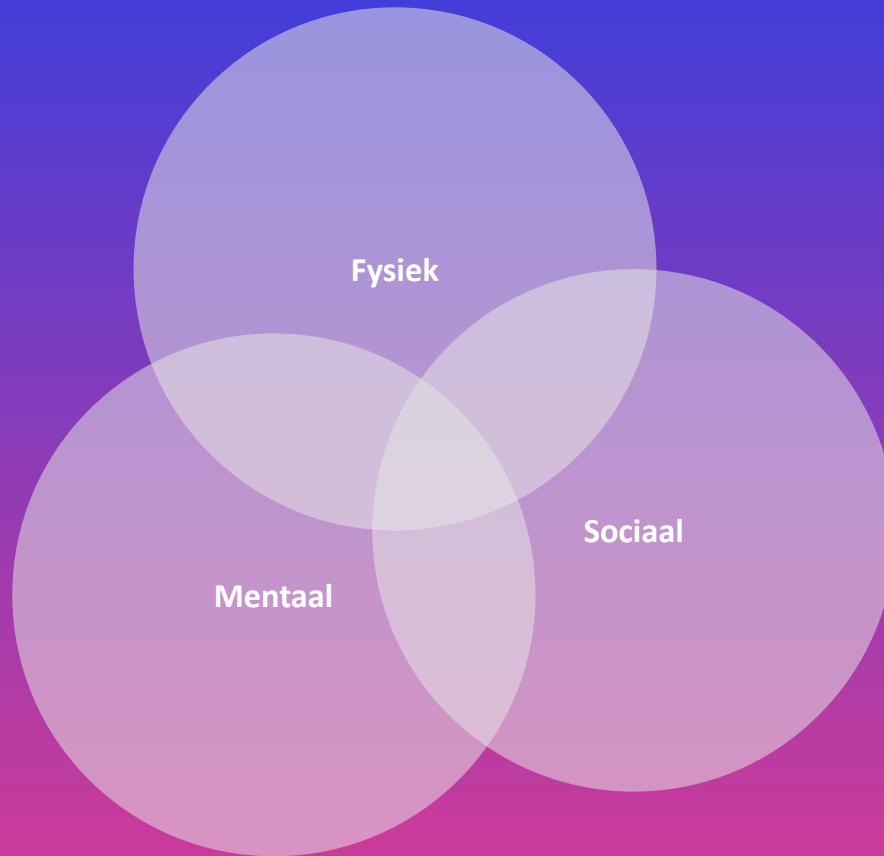
Totaal: 19 728 000 inwoners



# Wat is het lichaam?

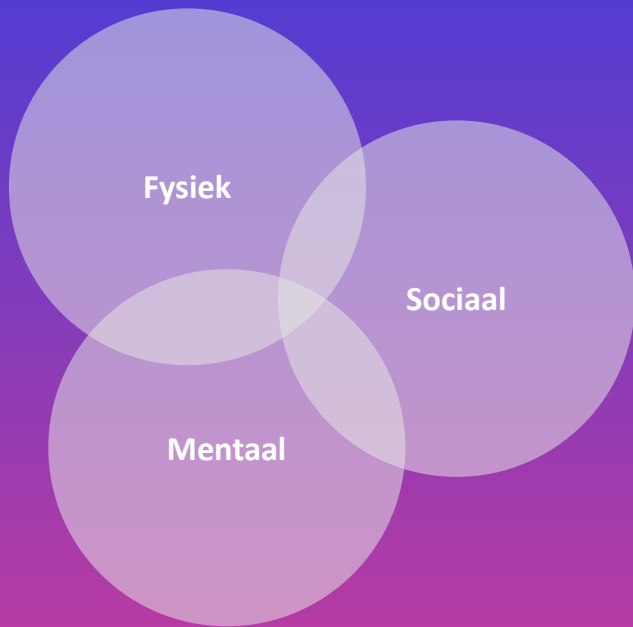


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"Health is a state of complete physical, mental and social well-being" (WHO, Constitution)



## Het lichaam

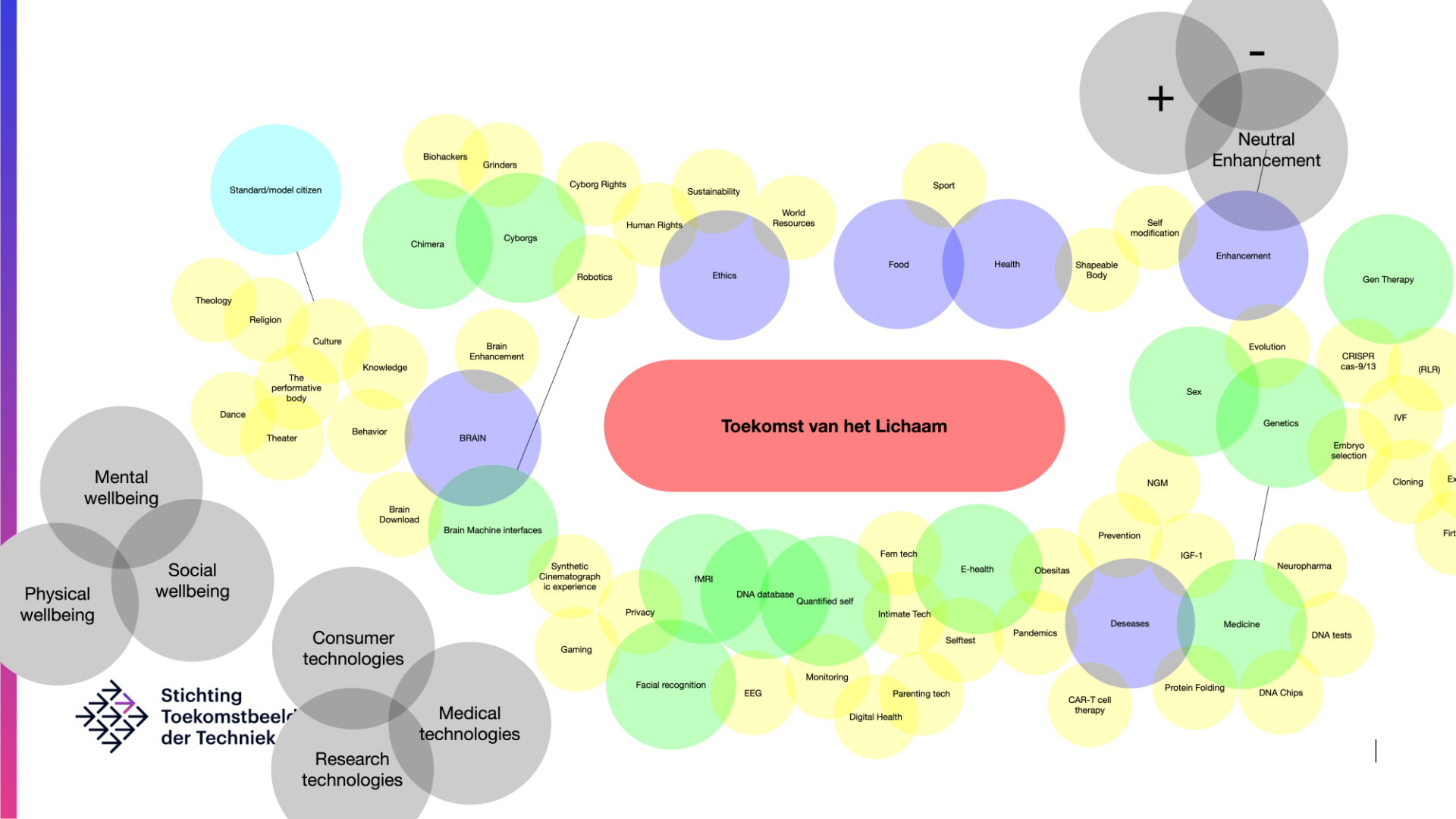
- De rol van technologie binnen deze thema's
- Maatschappelijke ontwikkelingen:
  - Enhancement
  - Identiteit
  - Langer zullen we leven



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Toekomstbeeld  
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mental and social well-being" (WHO,  
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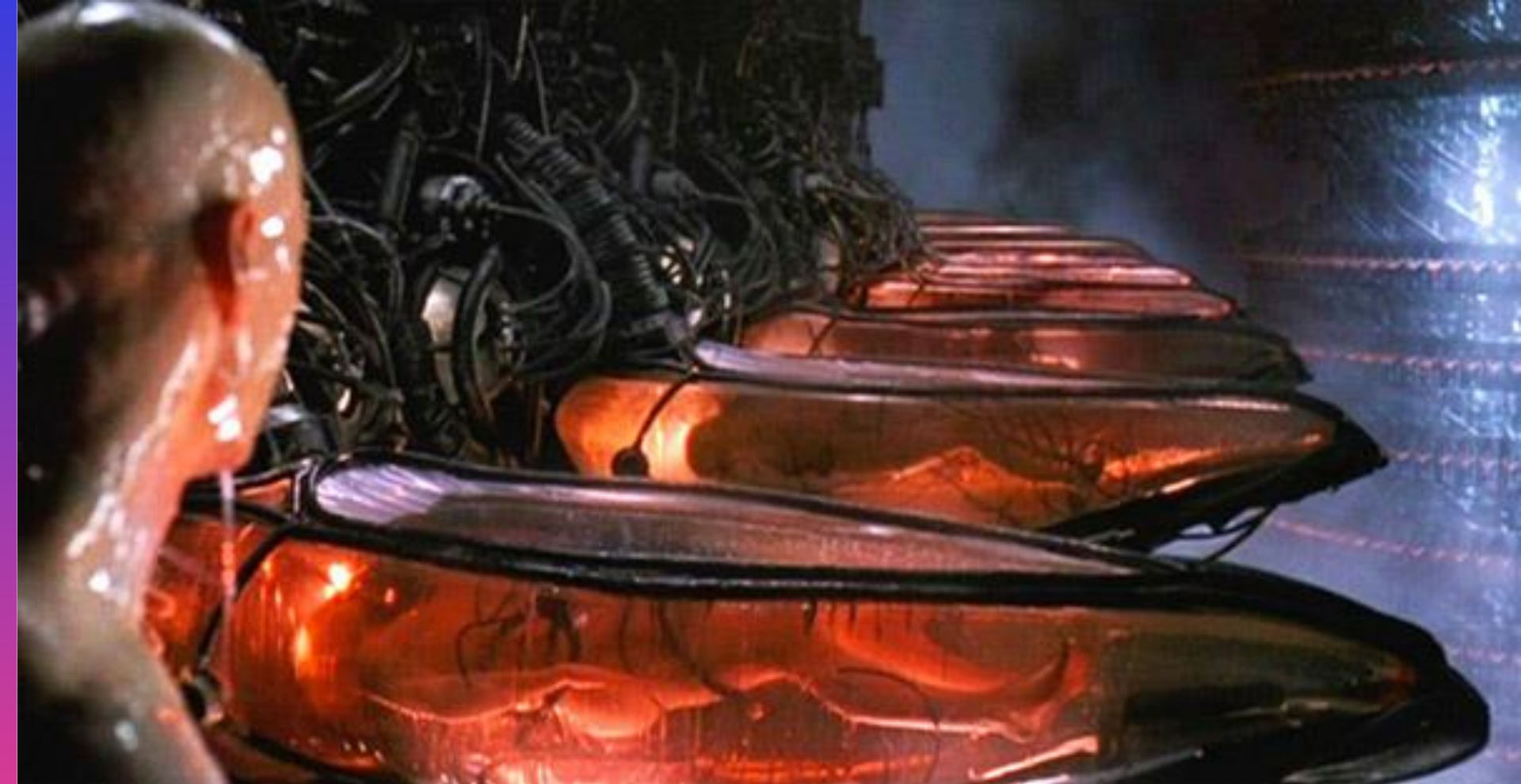
# Toekomst van het Lichaam

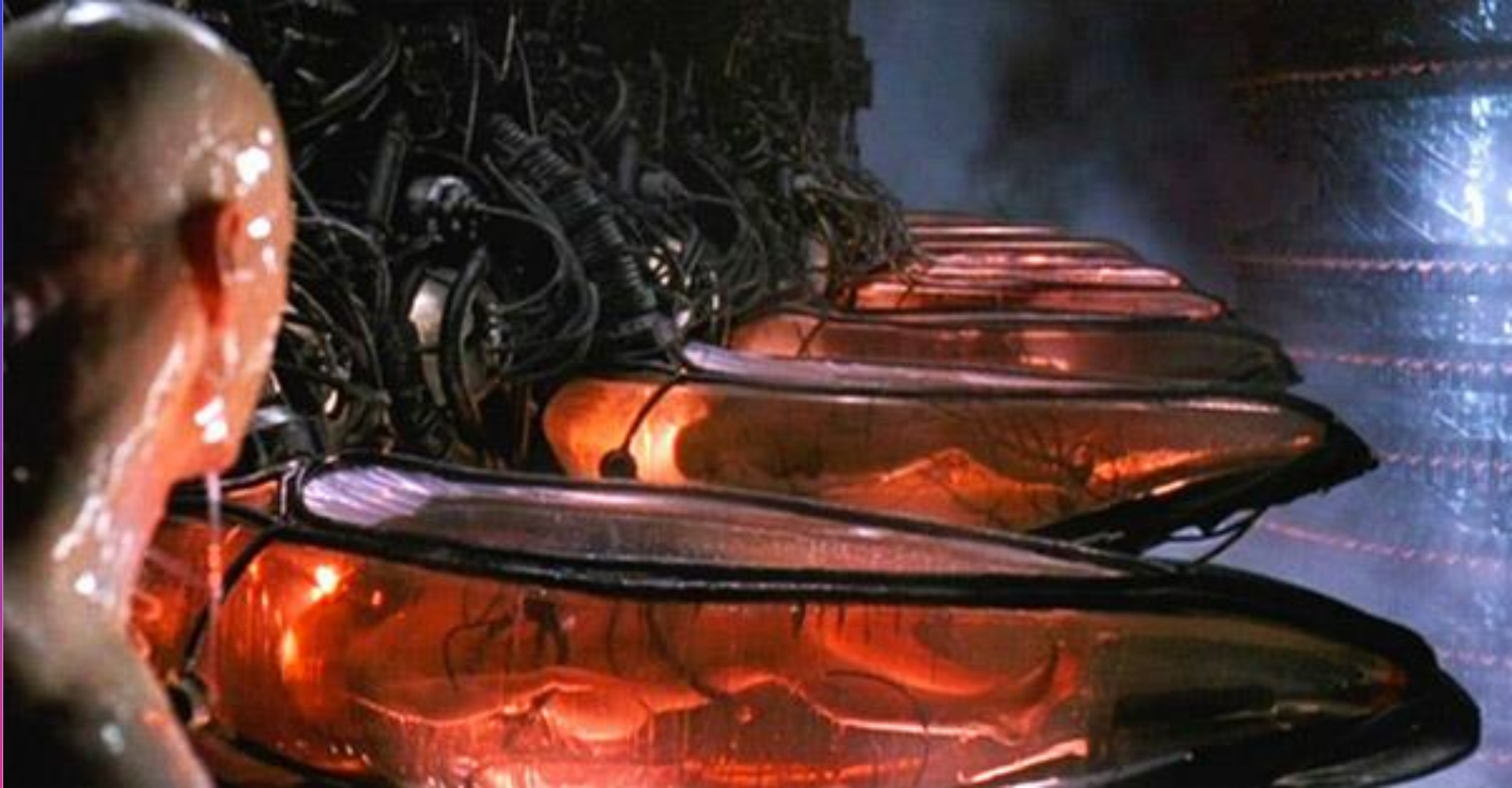


Stichting Toekomstbeeld der Techniek

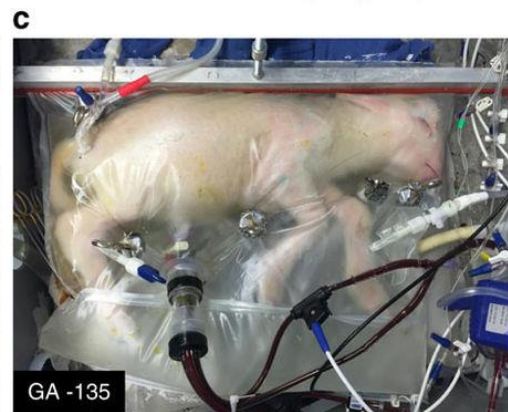
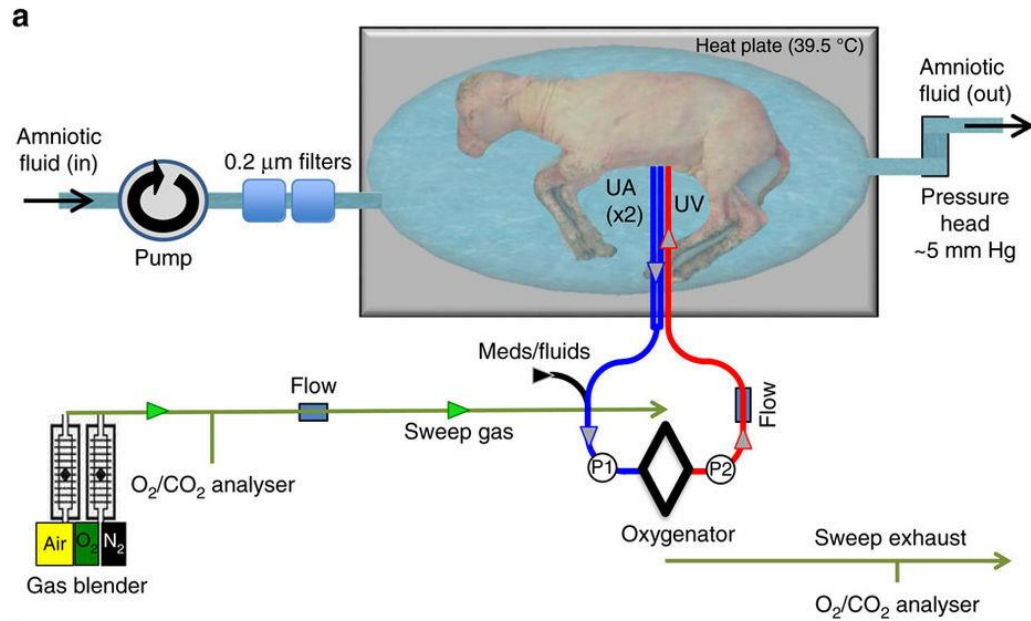
Consumer technologies  
Medical technologies  
Research technologies







The Matrix Lana Wachowski & Lilly Wachowski, 1999



# Wat is de mogelijke invloed op fysiek vlak?



# Wat is de mogelijke invloed op mentaal vlak?



# Wat is de mogelijke invloed op sociaal vlak?





## Impact en vragen

- Fysiek
  - Bevrijding voor de vrouw?
  - Goed voor het kind?
  
- Mentaal
  - Wat betekent dit voor ouderschap?
  
- Sociaal
  - Werk?
  - Zwangerschapsverlof?



Máxima Medical Center, TU/e, Next Nature Network: Artificial Womb. Chronic Health exhibition @ Dutch Design Week, 2018



# Wat is een wenselijke toekomst voor het lichaam?



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# Wat is er al?



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# Mind Meditation

Find calm and stay focused





# Wat willen we?



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HS\_paint\_034/ sorayama.jp/works

# Fysiek?



kale.themwith.kindness

Scotland



POSED

EDITED

RELAXED

UNEDITED

# Mentaal?





# Sociaal?



# Wat is wenselijk?



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iwmbuzz.com

## Ontwerpwedstrijd

- Wat vind men belangrijk op basis van de elementen = ontwerpuitdaging!
- Samenwerking



Thanks! See ya in the future



Robin Bergman

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[Verken mee op stt.nl](http://stt.nl)



Verken de toekomst



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