

SCIFI PROTOTYPES OF THE FUTURE OF BIOMEDICINE

# BIOMEDIFUTURISM II



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# 2083

## BIOMEDIFUTURISM II

**From autonomous robots, via chip implants to deep brain stimulation – the boundaries between human and machine seem to fade. It confronts us with all kinds of challenges and questions, about current as well as future issues.**

In this second volume of *biomedifuturism* biomedical Master students of Radboud umc examine the frontiers of medical biology and explore the ethical, social and cultural issues that arise from the fading boundaries between human (alive and conscious) and machine (non-living and unconscious). Using the method scifi prototyping, they created fictional futures based on scientific fact for the specific purpose of creatively exploring and iterating how technology and social developments can shape and be shaped by the people who use it and explore its implications on the everyday lives of people. They were asked to write a 'day in the life'-story and situate the story in the year 2083. The result is a mosaic of utopian and dystopian stories, of diseases cured forever and technology misused for financial gain. Be inspired by the carefully crafted stories of these students and ask yourself this question: would you want to live in this future?

### COLOFON

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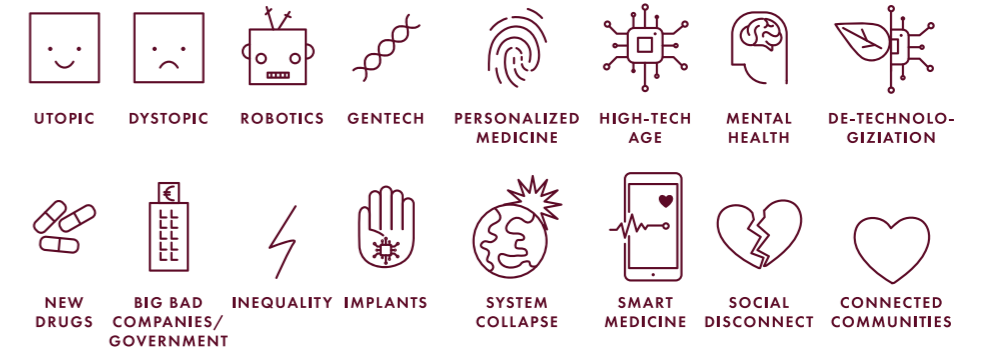
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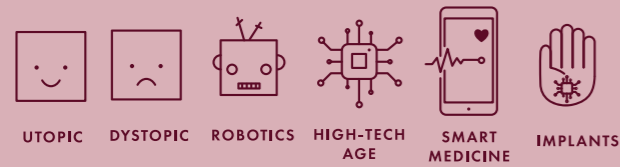
The authors are Master students of biomedical sciences at Radboudumc

Future visualizations have been generated by the students using the AI text-to-image tool Midjourney

**March 2023**

### THEMES





# The Struggles Fade with the Sun

JOLIEN BOGERS + MARLEEN BOONSTRA

It is almost 9 o'clock when I walk into the office, the sun is shining through the high windows and is reflected by all the steel of the buildings surrounding us. This feels like it is going to be a good day. When the sun is out, the robomans are in a better mood. I don't have to struggle so hard to have them do the tasks assigned. Since my circadian implant told me I had 4 hours of REM sleep, I do not have the energy for that today.

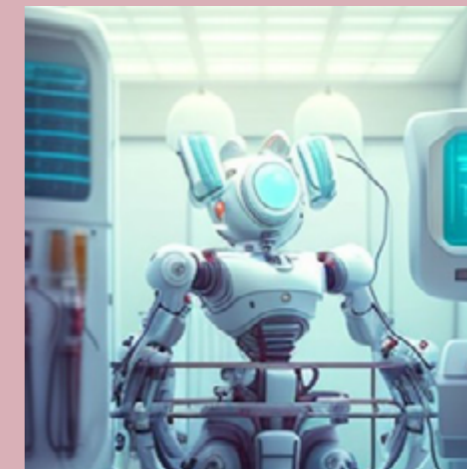
I walk past my boss's office and his virtual assistant greets me. It tells me my boss is not able to hologram me this afternoon, as one of the robomans that escaped last week is found and in bad shape. They were programmed to stay within the facility, but unfortunately this one had an error and got away. Although this type of research is not uncommon, normal people are still scared when they accidentally see one wandering the streets.

I walk towards my desk and ask my virtual assistant what is on my schedule today. It shows me that I have to do the last test on one of the robomans. Before I can do that, I need one of my coworkers

to help me catch the roboman so I can program it to perform this specific experiment. I check on my computer if he is already in the office. He is at his desk and when I walk towards him, I can already see him improve the code for the right settings. After each experiment we have to improve the code, as we find more and more small inconsistencies. We are almost at the right code, finally. After this the real tests can begin for our publication.

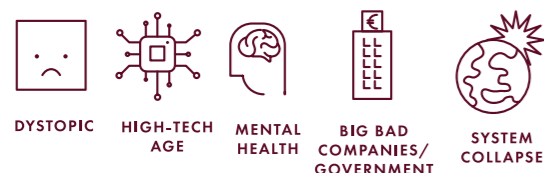
My coworker and I walk towards the hall where all the robomans are held. I scan my iris to gain access to the facility and the doors slide open. We walk towards the end where our test subject is. I feel all of the other robomans watch me while I pass by. I never enjoy coming here. The atmosphere is cold and frigid, and the lights are dimmed. We reach the roboman and try to catch it. This one struggles always much more than the others. That is also why I postpone testing on this one. After 5 minutes of struggling we catch it and take it to the computer room and change its settings to the right experiment.

The experiment focusses on the part responsible for memory. This used to be done with mice, which was easier to perform but results were often useless. Legislation was changed to forbid this around 15 year ago, forcing us to use something else for these experiments. It was easier because robomans do not always feel



like cooperating. They are so advanced that they can think and have mind of their own. Instead of repeating the words back to us or summarizing a long story, they begin chatting to me and become fussy when I do not engage and restrict them. Sometimes they talk to much that their settings cannot keep up and they start rambling. When that happens, I often stare outside to the beautiful landscape imagining that I am outside while I wait for the error to pass.

After 6 hours, the experiment is finally done. I had to sit through 3 errors. I reset the roboman and put it back in its place. The day is not over yet, but I am too tired to do anything more. Since my meeting with my boss is cancelled I decide to finish up here and go home. The sun is still shining outside so I decide to walk home instead of drive. I'll have my car drive itself home later tonight. "I need to set a reminder for that" I think to myself, as I did this last week but forgot about it, and it made me be late to my meeting. The sun shines in face and makes my mind calm down. The struggles with the roboman today start to fade out of my mind and I am feeling better again.



# Artificial Intelligence-Diagnoses on Decision Day

CINDY DE WEERT + GEORGIA GRAAT

**Emma wakes up in the same room she has slept in since she was a baby. Although the walls have been painted over with a dark purple, you can still see the outlines of the cloud paintings under the new layer. Exactly 73 days ago she turned 14. She knows today is Decision Day, which each parent dreads every year again.**

Since the government decided the overpopulation became out of control 60 years ago to this day, they established new rules. To achieve the smartest and healthiest population in the world, certain diseases that were determined “untreatable” were considered as bad, and every single person with a diagnosis was banished out of the country. As if that wasn’t enough, the government decided to put in place Decision Day, where each child that turned 14 takes a test determined to filter out the children with such an “untreatable” disease. Instead of waiting for a cure, they used the same advancements in technology and decided to employ them for a different goal.

Countless fled the country the moment the government became so radical. Unfortunately, other governments decided to introduce

this program as well, to decrease overpopulation, but more so to not fall behind as the weaker population. Many don’t see that this caused parents to bring much more children into the world than they had first planned, just to not lose their only child. Every penny the government saved, they put into developing a new AI program. The idea came from an app developed a long, long time ago, where people posted short videos and send them to each other. With the huge amount of information that could be spread through social media, people started sharing experiences and medical evaluations. This eventually led to people self-diagnosing their physical and mental health problems, which over the years took work away from doctors and psychologists. It was decided to combine this with the AI program that researchers had started to develop for the Covid-19 pandemic in 2020. The government saw Decision Day as the only possibility left. Now the new AI program has been in use for a little over 10 years. Emma knows there are still ways to trick the AI system into thinking a certain direction, but there are strict criteria it tests on. It even picked out some of the researchers that developed it...

“Hi love, are you ready for today? It’s already getting late, I made you some breakfast for in bed.”

Her mother walked in with a plate of eggs, toast, and some milk.



Decision Day was a day where every single person in the country was off, as for some families, this was the last time they would see their child or grandchild.

“Hey mom, I am not really hungry if I’m honest. I don’t see how anyone could eat on a day like this.”

“Oh.. you will be alright darling.” Her voice trailed off. Emma knew why. “Just remember what we talked about the past weeks.” A few weeks ago, her mother expressed her concerns to Emma. Not as if she hadn’t known since years. Emma definitely showed some autism- spectrum traits, already since she was a child. She loved the sea and the concept of water, but much more than one would consider normal. She had to check off her nighttime-list of 7 things before she would even touch the bed. She didn’t wear clothes with a tag because they hurt her skin. Her mother had told her it would be okay, that she just needed to act normal, and fill in the AI program as if she was normal.

But what is normal? Thought Emma. How can one be normal if their brain isn’t normal?

A few hours later she was standing in front of a big screen. She had been in a row of 14-year-old children that were anxiously pacing around or crying or simply on their phone for almost 1.5 hours. Now it was her turn. She was pushed in a small cubicle with silver tiles over all the walls. When the door closed, it seemed like it was never there to begin with. She remembers saying goodbye to her parents and little brother, whose tears still made the sleeves of her t-shirt damp. The big screen suddenly lit up. A white bright screen lit the whole room. She couldn’t see outside and see the

other children, nor could they see her. The screen asked her to state her name. The AI program showed her an overview of the math, language, and personality test she had to take. In total only 10 minutes. 10 minutes that determined your whole future.

She remembered what her mother had taught her. Everything that seems out of the ordinary in your head, probably is. Fill it in like something normal. Again that word, Emma hated it.

2+3=...

Easy.

Is a tomato a fruit or vegetable?

Easy, even though some people still think vegetable

Do you ever wear different colored socks?

Was this a trick question? Does this mean autism? Emma got scared.

Exactly 10 minutes later. The screen went black. Emma was confused. Then a loading signal came. It circled, and circled, and circled. Emma went from confused to agitated. This AI program should be 99.8% flawless. Did it take so long with everyone? The screen went black again. And then, even worse than the words “FLAWED” came in big red letters:

“UNDETERMINED”

Emma was frozen to the ground. No one came to get her like they told her they would. The screen went black again. No one saw her result. No one saw her result, she thought. She stood up with trembling confidence. She definitely saw the screen “HEALTHY” today.

# Fit for Life

TIM PUSTJENS + ELIZE SCHREUDERS



UTOPIC



CONNECTED  
COMMUNITIES



HIGH-TECH  
AGE

## 2083

As I take the last sip of my coffee, I look at all the boxes Lars and I packed the last few weeks.

The big move is coming closer and closer. Luckily, we are almost done packing everything. Now, all we have to do is clean up the attic, sort it out, and pack it up. I've been putting this off ever since I knew we were moving. Over the years, the attic has become more and more full. All things from the past are stored there, but also old crafts, photos, and toys of the children are here.

We really need to get started on this. The time has come that Lars and I have to move. We have lived here happily for years, the children grew up here and it really feels like home. However, we are getting too old for this house, and walking on the stairs is getting harder and harder. Fortunately, we were able to buy a nice apartment. I am secretly looking forward to the move.

"Lars, can you please come with me? Let's see if we can get started on packing some boxes in the attic." Lars puts down the hologram tablet he was watching sports on and says "Sure honey, I'll grab some boxes!". When we arrive at the attic, I have no idea where to start. Lars starts opening some random boxes. "Sophie, this box contains some old clothing of yours, maybe you can sort this one out?" As I go through the box I find some old clothing from when I was young. I pick up an old pair of jeans, it startles me a bit. I mean, I know I used to be a lot bigger, but sometimes I forget how big I was. This really makes me think back to the year 2023 when I was officially 'diagnosed' with obesity.

## 2023

My doctor looks at me with a serious look on his face, almost as if he's trying to teach one of his children a life lesson. "You've made the right decision addressing this issue" he says. "Obesity can be a very serious issue in a person's life and will eventually lead to other complications. But we offer a treatment programme that might help you". He starts explaining that I will have to meet with several

specialists that will guide me through a programme which focusses on healthy diet, increasing exercise and changing my behaviour. As he continues to explain the details of the treatment I notice that I'm getting nervous, anxious even. My mind starts racing. What if I don't like my psychologist? What if I can't make it through the workout? What if my new diet tastes like shit? What if I fail? Okay, calm down. You can do this, you can get through this! I mean, the doctor says this has worked for many people so it'll all be fine.

The first drip of sweat starts to roll down my nose even though I just started my workout. I feel so low on energy today. Although, now that I think about it, I've been feeling tired for a while now. Between all the these meetings with my physicians, my study, my side-job, exercising, learning new recipes and hanging out with my friends, I barely have any time left for myself. Jeez, how do people do this? Maybe this whole programme just isn't for me. I've been working my ass off and I've only lost a few pounds.

After 15 minutes on the treadmill it almost feels like my lungs are going to collapse. My legs are getting weaker by the second and I'm just so tired. Fuck this! I can't take this anymore. I step off the treadmill and walk towards the changing rooms. As I make my way past the weightlifting section towards the exit, I notice the glaring eyes of everybody looking at me. I can hear them think "she's only been here for 15 minutes and she's already leaving?".

When I come home the sweat is still dripping off my nose. I grab a glass of water, turn on the TV and sit down. Exhausted and tired, I can't get that thought of those guys at the gym out of my mind. A cloud of negativity starts to come over me. I start to think about the past two months. It feels like an eternity since I've started this program but when I look in the mirror, nothing's changed. Why is this so hard? Is it even worth it? Maybe I should just stop.

## 2055

Lars and I decided to celebrate our 15 year anniversary by going to the Argentinian steakhouse we went to on our first date. But when we wanted to make reservations we found out it had been replaced. It was still a steakhouse, only fancier and a lot more expensive. It was one of the few restaurants that grew their own steaks in a lab. "Want to try it out? I know it's expensive but I've heard good things about labsteak.". My husband replies "hmm, maybe. Lets check out the VR tour of the restaurant first?". I hate VR



“Oh crap Lars,  
I think I’m  
actually having  
a stroke.”

tours, especially those of restaurants. They always play this corny music in the background and then suddenly the “chef” appears and tells you it’s the best food you’ll ever taste...yeah sure. It is, however, useful to get a sense of the atmosphere of the restaurant. We put on the headsets and press play. We both gasp excitedly as the VR tour takes us to the main dining area. “OMG Lars, I would have never expected this”. “Me neither, I thought the place would have changed completely but they’ve kept everything the way it was”, he replied. “I’ve made up my mind. We’re going to Harry’s House of Homegrown Steak, honey!”.

We’ve waiting for our entrées for nearly half an hour already. When I have to wait this long I get a little agitated. I notice a muscle cramp in my left arm, although this wasn’t the first one. I’ve randomly been getting muscle cramps for about a few weeks now. “Did you get another headache last night?” Lars asks. “Yeah, and this one was pretty severe. Probably sinus pressure.” I reply. He looks at me with a confused look on his face and says, “What’s wrong? Stop mumbling, your mumbling”. Weird, I think to myself. We’ve been having a normal conversation, what’s he talking about. The expression on his face changes, he looks more concerned now. All of a sudden he blurts out, “are you having a stroke?”. Lars proceeds to ask me a series of questions: whether I could smile, or raise my arms. A little bit of an overreaction in my opinion, but I play along and smile at him and raise my arms. My right arm came up without any trouble, but my left arm stayed limp at my side. So I reach out and grab my left arm at my wrist and pull it up to my chest. As I let go of it, my arm immediately falls back into my lap. “Oh crap Lars, I think I’m actually having a stroke.”

It’s been a few months since my stroke but I still get a little nervous every time I visit the doctor. I sit down and look at the doctor. “How are you feeling?”, he asks. “I’m doing well. It’s been a long road to recovery but I feel better than I did before the stroke”. “That’s good to hear”, he replies with a smile on his face. He swipes his finger on the tablet and my electronic health record appears on the big screen on the wall. “Let’s have a look shall we?”, he says while opening the reports of the rehabilitation team. He browses through several documents. Graphs pop up with describing vital signs during rehabilitation sessions, tables are shown covering the progress I’ve made over the course of the rehabilitation programme and alongside every document the comments of rehabilitation specialists have been added. “The reports from the rehabilitation team look amazing and according to these comments, they too think your recovery has been remarkable. It’s very rare that someone recovers this well, even for someone who underwent AI assisted minimal invasive surgery”. The doctor’s words touch me. I feel blessed that rehabilitation went so well and I feel good, the best I’ve felt in a long time. The graphs and tables showing my progress also fill me with a sense of pride. I smile at the doctor, “Yes, I’m glad I’m back on my feet again”. “So am I Sophie...but as your doctor I am obliged to warn you that this might happen again if you don’t make some serious changes in your life. Obesity is one of the risk factors of stroke. However, it is also something you yourself can actually work on. We actually offer a treatment programme that might be able to help you”. As soon as those words enter my brain, I get a flashback to the last time a doctor said those words. The bittersweet feeling I had turns into a bitter feeling. I start sweat a bit, thinking about the struggles I experienced last time I

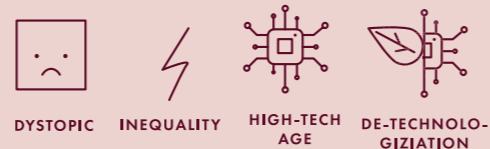
tried to fight my obesity. “I don’t know about that doctor. I’ve tried it before and....it didn’t really work out”. The doctor takes a look in my file. “Ah yes, I see. You participated in a combined lifestyle interventions programme but stopped after two months” he says. “How unfortunate”. He then types ‘eHealth enhanced combined lifestyle interventions’ and a new window pops up, playing a video explaining how the programme has been improved. The man in the video puts on a watch and attaches a few sensors on his joints. I recognize them from my rehabilitation programme. They track my vital signs and movements so the specialists can analyse my exercises and assess what I can improve and how to proceed. I remember how it felt weird at first. You know, kind of like a big brother type situation. But eventually it did help by giving me and my physicians insights into the exercise part of my rehabilitation. In the next part of the video he explains how online communities are integrated in the smartphone app and how they provide a platform for other users to share wquestions. I instantly get reminded of the times I was lost and felt like there was no way anybody could go through with this programme. Maybe it would have helped, having someone to talk to who has experienced the same things as I did. The video proceeds and shows how easy consultations with specialists are by having online meetings. During the meetings with a dietician we can plan all meals for the week and the groceries are added to my personal grocery list and automatically delivered at my door. And it is also possible to discuss and create an exercise plan which I synced with my personal calendar. After watching the video I feel sense of calm wash over me. This suddenly sounds a lot more feasible than the last time I tried to lose weight. I even feel confident I’ll be able to play with my grandchildren in the future. Well, let’s not get overly confident, I think to myself. Let’s just take it step by step.

## 2083

Then the doorbell rings, and I’m startled out of my thoughts. I completely forgot that my children and grandchildren were coming for dinner today. Lars and I should have started cooking a long time ago. We walk downstairs together. I open the door and Najia, the youngest daughter of my son, immediately gives me a hug. Najia asks if I want to go to the playground with her. I ask Lars; “Is it okay if I go to the playground with Najia? Then you can order some food because I don’t think we are cooking anymore.” Lars takes out his hologram tablet, and asks, “What’s your appetite

for?” Thinking back to the past I say: “just give me a salad.”

I take Najia’s hand and run with her to the playground. I am so glad that with the help of eHealth, I was able to regain a healthy weight, otherwise, I would never have been such a fit grandmother.



# Live Smart Stay Smart

JUDITH KOENE  
+ NGOC DUNG LE

**“Mommy? Can I have a Mars?”**

**I look at her beautiful face, her porcelain skin. How can I say no to these big round green sparkling eyes?**

**“Of course, my little sweet tooth”.**

**I grab my bag and pull out a Mars miniature. These miniatures are perfect for kids. Better than those big Mars bars they sold decades ago.**

“But remember what mommy said. A handful of berries a day keeps...”

“... degrading neurons away. Yes, yes mommy. I know. But I really want a chocolate bar. We’ve been sitting in the car for hours! Are you now going to tell me where we’re going?”

I turn around to hand her the chocolate first, so I can think for a minute. The car keeps driving to the destination I entered. Traffic accidents are something from a time long gone. All cars now know from each other where they are and where they have to go. If only humanity had known where they were heading 60 years ago.

“You remember when grandma got sick?”

“Yeah, she was in that green house with many old people. She

would forget my name, but her robot Nona was really nice. I loved Nona’s dress!”

“That’s right. Nona was there to help her remember to eat and exercise and play games with her.” ‘But I always won!’

“Yes, you were really good,” I said smiling.

“But we are not going to the green house, are we?”

“No, we’re not. The green house is gone. It was taken down, because people don’t get sick anymore.”

“But daddy got sick! Why didn’t they help him?”

“You know we are ‘Needy’ right? Well, Needy people can’t pay for healthcare, the insurance has become too expensive. There still are hospitals to help people, that’s where the Sustained go.”

“Lucy said the Sustained don’t die, is that true?”

“Well, not completely. The Sustained don’t get sick, but they still get old. They are completely healthy until the day almost everything fails at once. That day is predicted exactly when someone is 130 years old, and the day before that they pass painlessly.”

“But where are we going?”

“We are going to the ‘Rainbow’.”

“You can never reach the Rainbow!”

I smile. “That’s true. We are going to a place called the Rainbow.”

‘What is there?’

“Some people gathered there. They want to create a place to share information on how to stay healthy. They think we should get the



same chance the Sustained get.”

“Do they have a lot of money?”

“No.”

“Then how will they help people who are sick?”

“There are some easy, cheap ways to stay healthy and get almost as old.”

“Then why doesn’t everyone do that?”

“Because you have to do it yourself. Nona would remember grandma when she had to eat and exercise. But doing exercise is tiresome.”

“I always had a lot of fun jumping and running! And I loved dancing, Nona knew exactly which songs I loved!”

“Yeah, we had a lot of fun together. You remember you asked Nona to play a song about ducks and we all waddled around?”

“That was so funny!” We both howl with laughter at the memory.

After I’ve wiped the tears from my eyes, I get back to the Sustained.

“You know how the Sustained live?”

“Yeah, I saw it in the advertisements. They work for one hour a week where they write down ideas to give to the AI Mother. Those who went to college check whether the AI Mother still functions within the laws. The rest of the time they play games, watch films and eat unhealthy snacks. They can go everywhere in VR worlds. They can always ask an AI for a personal story to watch or to play.”

“Yes, those are the families who were once working on or investing in AI and now they have enough money for several lifetimes of luxury. Whenever their habits backfire and they suffer health issues, they pay for a fix to get healed and it works. Like the muscle vibration devices, pills that prevent fat storage after eating fast foods and medicine that improve cardiovascular health. But they don’t want to put the work in themselves.

“If we live healthy on the other hand, most of the time we don’t

need inventions like those. We have so easily forgotten the wisdom Nona repeated. The people at the Rainbow wish to spread this knowledge among the Needy, but also among the Sustained.”

“Why? They don’t need it!”

“No, but if they would live healthier, the healthcare costs could fall, at least a little, and Needy could be treated as well.”

“So, dad could have lived?”

“Yes, and other dads, moms and children won’t die before they are actually old.”

“But will the Sustained listen to them?”

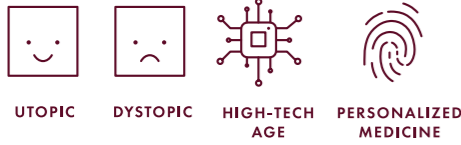
“We can try.”

“But what if they don’t?”

“Then we will have to keep trying. It is our right to be treated equally. So that’s what we will fight for.”

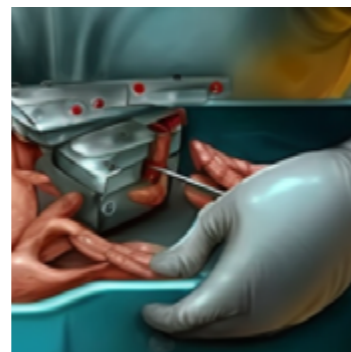
We roll up to the parking lot of the city hall and park the car behind a group of rebels. They hold placards with the text: ‘Defender of Equality’, ‘We are the Future, Give us our Future’, ‘We don’t want to RUN for our life!’, ‘We are not what we EAT!’ and yell “Equal burden, Equal care!” Leia looks at me. Shock crosses Leia’s face and her mouth drops open slightly. She seems overwhelmed with what she’s seeing. Meanwhile, the Mars miniature has become soft and melted in her hand. She takes a look at it for a few seconds, but decides to put it in the cup holder in the door. Her soft voice asks: “May I have a strawberry, mommy?”





# Replacing Organs Like It's No Big Deal

ANNE VAN ALPHEN +  
MIRLYNN VENERIUS



It was Tuesday, 16 March 2083, and it was almost lunch time for Frank Williams, a researcher and surgeon in the Health&Innovation hospital. He had a long and busy morning and felt tired. He would've gone for a walk during his lunch break, but the park was not close enough to the hospital, if you could even call it a park. All "nature" was put in designated areas and the rest of the city was just tall buildings and no fun to walk in.

Since a large part of the Netherlands was no longer land but water now, and the second housing crisis in 2042, almost everyone lived in apartments in very tall buildings, giving the cities a very industrial feel. Frank himself also lived in one of these buildings on the 17th floor in an apartment.

While walking to the canteen, he thought back about his life 50 years ago, when he first succeeded in creating an organ from an organoid in the lab that could be used for transplantation. The whole growing organs in the lab had started with organoids, which were small 3D cell cultures that could be used to test medicine on. They developed the technique further and further, until they were able to fully grow an organ in the lab. The procedure was improved over time and nowadays it was routine to grow organs and replace them in humans. When the first transplantation with an organ grown in the lab was successful, it was very exciting, since this meant there was no longer a shortage in donor organs. A big party was organized, and he was set for the rest of his academic career.

That party was a lot more exciting than the one he had to attend today: the 126th birthday of one of the board members of the hospital. He was really not looking forward to it, because the

man was an alcoholic and made his life miserable. Instead of the exciting research he had been doing 50 years ago, his daily activity now consisted of growing organs for patients like this man who simply refused to live more healthily and just came in every couple of months to get an organ replaced again. But he couldn't skip the party, because he needed to stay on good terms with the board. He wanted to keep working on his new intriguing project, and he needed money for that. Almost all organs could be made in the lab by now except for the most complex one: the brain.

One could wonder whether it would be ethical to replace brains, and ask philosophical questions about what made humans human if you could just put a new, lab grown brain in them. Frank wasn't too bothered with these questions. In the past, he had wondered about whether it was a good thing that organs could now be replaced almost indefinitely. This caused people to live longer and longer, and the world was already very overpopulated. But eventually he realized that him thinking about it didn't change anything about his day-to-day life, and he believed that the development would happen at some point anyway, so he might as well spend his time on this one thing he was actually passionate about.

At the end of his workday, he went to the party. As expected, the man whose birthday it was was already piss drunk, and Frank foresaw that he'd have to replace his liver in the upcoming weeks again. He sighed, and hoped that he would soon have time to work on his brain research again, but until then, he'd just keep replacing organs like it was nothing.



ANSEN ZHENG + ELLIS MATHIJSSSEN

# A Desperate Solution to an Obsolete Profession



UTOPIA



DYSTOPIA



GENTECH



CONNECTED COMMUNITIES



DE-TECHNOLOGIZATION



MENTAL HEALTH



NEW DRUGS



IMPLANTS



SYSTEM COLLAPSE

As I wake up, I hear my robot, C2-H6O, shouting from the other room; “Good afternoon Mirai! It’s time to start a new day! Good afternoon Mirai! It’s time to start a new day!”. I’ve got a throbbing headache and his voice feels like I’m being hit by a hammer. “Shut up!”, I shout back. It’s then that I notice the screwdriver in my hand. What happened last night? I look around my room to see crushed empty cans of cheap beer. The sun is shining through the windows and I can hear people enjoying the weather in the Kronenburgerpark across the apartment.

But what happened last night? I let in my best buddy C2-H6O. “Hi Mirai! It’s Tuesday 16th of March 2083 and the time is 14.28. One alarming body item is detected by your subcutaneous chip. Your blood alcohol level is 0.21. You’ve been asleep for 7 hours and 3 minutes. Your heart rate is currently...”.

“Yeah, yeah, I get it. I don’t wanna hear it! Do you know what happened last night? Or all of yesterday? I can’t remember a thing.”

“You did not take me with you, so no. I only know you came home drunk and locked me out of your room.”

I walk into the kitchen and stumble upon more empty beer cans. Work started at 8 o’clock, but it’s probably not like anyone missed me. There were no patients planned and no messages have been projected by the chip in my arm. My profession has been made obsolete by all technological advances, especially the advances of the last two years. Twelve years ago, when I was 18, I started to study medicine. Technology had had its advancements the last decades and patients often already suspected which disease they had before they went to the doctor. But with all new treatments and all pandemics, the role of the general practitioner (GP) was more important than ever. The last two years, however, the personal robots have been updated to be able to diagnose their people. With the help of all the data gathered by the subcutaneous chips, of course. The demand for several medical specialists has

increased, like internists and geneticists. But my job as a GP has become obsolete. What a waste of my training.

I make some breakfast, or rather lunch. But I’m not hungry. A few ginger shots will help me through the day. I find some Ritalin and ClearHead in the medicine cabinet. ClearHead has been developed to relieve symptoms of headache, fatigue, irritability and sensory sensitivity. It has been tested in organs-on-chips and human trials have just started. I got them from the black market. I don’t care that they haven’t been approved yet, I need some relief. Since the ban on animal research in 2067, not a lot of drugs have been brought on the market. The predictive capability of organoid chips is still not optimal so people are reluctant to be part of clinical trials, which often result in several deaths nowadays. This has had a great impact on the growth medicine could have had. I call for my pet rats, “Labra! Tory!”. They can have the rest of my meal. I can’t imagine them being locked in cages and being tested on. Aside from C2-H6O, they are my best friends.

My apartment is a mess. I go around to pick up the empty beer cans and wine bottles. There are three plant pots sitting on the couch. “What the hell happened last night?” “I can order some plants to go with the pots”, replies C2-H6O. “It might brighten up the room a little.” “Sure”, I say as I acknowledge the monotonic style of my apartment. Turo, my 5-year-old son, is coming over after school. He has been living with his father since the divorce. I miss him but at least he won’t notice my problems this way. I’ve still got an hour to clean up this mess.

The incidence of alcohol use disorder was increasing till a few decades ago. But due to better prevention and treatments, it has almost disappeared from the world. There is one major downside to this; the taboo around addiction has grown. You must have failed very bad at life if you still get addicted in this picture perfect world we live in. Right? I am not addicted, though. I can still turn this thing around. It’s only been the 28th time that nights like this have happened in the last three months. My granddad was addicted to alcohol. I still remember the destructive effect it had on our family. After years of addiction, they found out that he had a mutation in the DRD2 gene, which encodes for the dopamine receptor D2



protein. The gene had been discovered when animal research was still a thing. Poor Labra and Tory. Mutations can lead to an increased susceptibility to addiction. I know I got the mutation as well. It has been known since I was born and my DNA was read. Still, that doesn't mean that I will get addicted!

My granddad has never recovered. He was in denial from his addiction for a long time, and once he was forced into treatment, he was too far gone. The treatments were not good enough at that time and the current treatments don't suffice in severe cases either. The good news is that the long term side effects of alcohol use can be treated quite well nowadays. He is on his fourth 3D printed liver! But is that a life you would want to lead? My life is not gonna be like that! I promise myself that I will never touch alcohol again.

Turo enters the apartment, guided by his own personal robot 5-HT, just as I'm done cleaning. I put on my weather adaptable coat and we go for a walk along the Waal. Yesterday's snow has melted and it's a nice 18 degree weather outside. I build some sand castles with Turo. It's a good afternoon.

The evening has arrived. Turo has gone back to his father and as I'm watching some show about the last living elephants, I feel this hopelessness coming over me.

"What is on the agenda for tomorrow C2-H6O?"

"You got a yoga lesson between 9 and 10 o'clock."

"And for the rest of the day?"

"Nothing, Mirai. There are no patients scheduled."

I feel the anxiety of another empty day coming over me. "Damn it. Can you get me a gin and tonic?" "Are you sure? Your blood alcohol level has been too high for over a month now." "Yes, I'm sure. Get me a ClearHead as well."

I decide to stay up tonight. That way, I won't be able to oversleep again for my yoga lesson. It should be doable with some wine, beer and caffeinated ginger shots. At 4 o'clock, I put on my coat. Two of my fingernails fall off. Strange. I take C2-H6O with me. I know I am already too drunk to find my way back, but he will take me home. He always does. We take a midnight stroll along the sky-high cramped apartment buildings and come across some other people doing the same. C2-H6O and I talk about the lives

they might be leading. Life has become so efficient, and everyone seems to be able to handle it. Everyone seems happy. But are they? People have gotten more emotionless throughout the years. How can they not with all the natural disasters, pandemics and endless crises? The thing is that you never know how anyone is feeling anymore. The new subcutaneous chips come with a feature that lets you create an emotional mask. Despite there being multiple options, most people choose to look happy. I stumble across the streets with my last bottle of wine in my hand. I ramble on about how the world has taken a turn for the worst. C2-H6O grows more and more concerned about me and tries to highlight all positive changes in the world. But his words don't seem to find their way into my drunken brain. Meanwhile, the day is starting in the city. The trams are going more frequently and people are cycling by. "I'll take you home now, Mirai.", says C2-H6O. "You should get some rest and we will talk about your health status this afternoon when you're a bit more sober again. Something has to change. I can't stand seeing you like this anymore".

Several hours later, we're sitting in my home GP office. I think this talk is unnecessary but C2-H6O starts off anyway. "You're never sober anymore Mirai. It's been a month since your blood alcohol level was normal. Your blood pressure is slowly increasing and your liver functions are off. The only ones you still talk to are me, Labra, Tory and Turo."

"It's fine, I'm feeling fine.", I say. "Mirai, you're taking drugs that aren't even approved. Your nails are falling off and your eye color is changing. It can't be good."

"C2-H6O, I..., I...".

I don't know what to say. C2-H6O continues. "As your personal GP, there are two easy treatment options I can propose, and one harder option. We can go to the genetics department of the Radboudumc and try gene therapy. They might be able to repair the mutation of your DRD2 gene. Or you can talk to me. I can be your therapist."

I ponder for some time. I don't like either options. I don't want treatment anyway, I'm not even addicted! Right?

"What is the last option?"

"The last option is group therapy. With other humans." O hell no, I

think by myself. "I'll take the first two. No harm in trying."

Deep down I know that I can't keep going on like this.

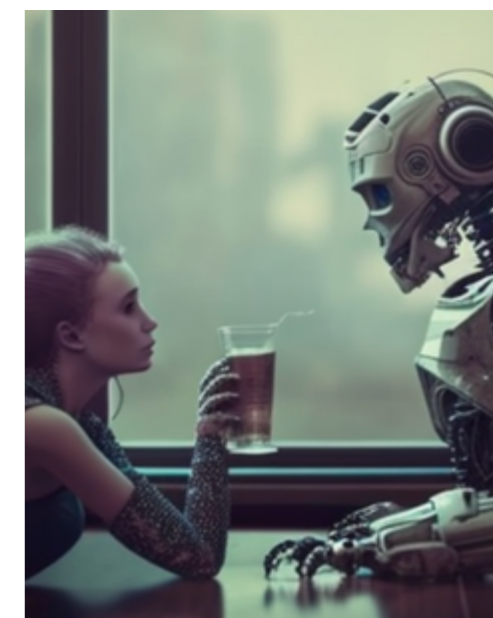
It's been two months. My DRD2 gene has been edited and I've been having deeper conversations with C2-H6O than usual. Last month, I was able to stay sober for two entire days! But I haven't gotten further than that. I've been missing my play dates with Turo and I'm ignoring all hologram calls of my ex that keep coming in via my subcutaneous chip. Yesterday, an elderly woman made an appointment with me as she can't get her head around a robot being her GP. A patient! Finally! She found me passed out on the floor of my kitchen, surrounded by empty bottles and cans. C2-H6O ended up helping her as a GP anyway. The ClearHeads and Ritalin aren't working anymore. I've only got one toenail left and my eyes have turned purple. I'm sitting in the corner of my bedroom with a blank stare into the distance. C2-H6O rolls in. He presses a cold wet washcloth against my neck, an old remedy.

"I give in. I can't do this anymore."

"Do you still remember what the final treatment option was?"

"Yes, yes I do. I'll go."

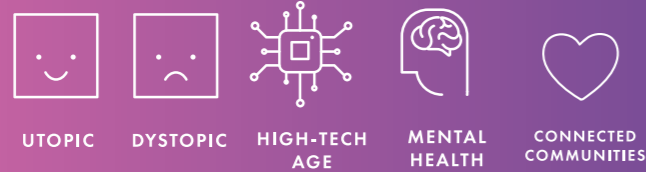
It's again been two months. But this time, the months went by differently. The first few weeks of group therapy were very hard. It was strange to meet other people who are struggling with the same problems. I haven't been so open to other people in years. But my life has started to change for the better. I've been sober for over a week! And I haven't been needing ClearHeads or Ritalin either. Turo has been visiting again and we've been going out again. Whether it's snowing or whether the sun is burning hot. I'm still best friends with C2-H6O but I've gained human friends as well. I'm looking for a new job, a new training, to become a researcher in the field of drug development. I realize now that, while technology can be useful, it can't replace the human connection and support that people need to deal with their problems. As I'm looking out the window at the Kronenburgerpark, I can see that the world really is changing for the better. Despite the long recovery ahead, I know I'll get better with the support of the people around me.





# VR: An Aide for Reality

ANNE VAN UDEN +  
BENJAMIN STEICHLER



The lights glaring through your windows flicker on your face as the wind blows on your curtains. You turn over, hoping to avoid the light shining on your face but end up aggravating that back pain that's been troubling you for nearly a year now. The birds sing loudly, celebrating the warmer Spring days, but to your annoyance, it stops you from falling back asleep. You let out a sigh and roll out of bed begrudgingly. Whilst sitting on the edge, you rub your back to try alleviate the pain but to no success. To your surprise, your phone vibrates. You've stopped receiving notifications over the years ever since the pain held you back from going out, and your friends have become less inclined to invite you out.

Just another spam message from a newsletter you signed up for years ago reminding you that it's your birthday. Had it not been for your hunger, you would have tried going back to bed to sleep away the reminder that no one remembered. You might have forgotten too if it hadn't been for that message. Your legs start to ache as you walk over to your window to draw open the curtains, welcoming the outside world that you've neglected for months.

Holographic pictures of your friends and family mesmerised your glance, reminding you of how much you used to love going to parties, holidaying, and even playing soccer in the bitter cold just so you could spend some more time with your team-mates. The sound of metal clattering interrupted your thoughts as a delivery robot stumbled onto your porch. The year is 2083; you'd think they'd have made more graceful robots by now.

You're met with the aching in your legs again as you make your way to the door. It's no surprise that the automated delivery bot made so much noise on its way to your door; the wheels were tattered and the sensors were held together by what seemed to be an entire roll of tape. But despite its worn-out aesthetic, it's successfully delivered the virtual reality headset and console you ordered for your birthday. After dropping the package off in your living room, the reminder of why you don't leave the house kicked in. Your lower back pulsed and your shoulders were throbbing just from that short trip. Before setting up the device, you trudge to the kitchen to finally address your hunger.

The kitchen is fitted with beautiful utensils and crockery; a chef's dream. The dichotomy of the kitchen was painfully apparent though. Kitchen appliances that aided the best cooks collected dust alongside abandoned knives and tableware. Closer to the sink, we saw the more updated version of yourself. Dirty dishes that haven't been washed for days took up most of the counter. An overflowing bin collected take-away boxes that were too much of a chore to actually take outside. You need simplicity. Intricacy and effort brings pain. Opening the fridge activated its built in

artificial intelligence system. "Good morning!", the fridge yells before announcing the weather forecast and current news affairs. It's quickly shut up after you mute it. A bowl of cereal it is, just like every morning. Another bowl to add to the already large pile of ignored used dishes. Maybe you'll order in tonight again just to avoid the stack from getting too overwhelming...

Back in the living room, you lie on the couch. The pain from bringing in the package was still persisting. The temptation to ignore the newly bought device was looming as that never-ending aching stopped you from even considering setting up the machine. But you persevere; it costed half of your rent after all. Bending down caused a large amount of discomfort in your knees and back, so you sit on the ground instead as you unpack everything and plug in the wires. Finally, everything is set up, you boot up the device, and put on the glasses which enable the virtual reality experience. The 3D environment built up around you, and it almost seems better than reality. Looking down, you see your hands and arms, and using the joysticks you're able to move around so freely, almost as if you were moving around in real life. Excitement exudes as you boot up a virtual reality chat room where you're joined by other users who have also bought the console. You think to yourself, finally, I can move and play around without the agonising trauma the follows every time you move – but just as you think that, you're debilitated by that everlasting pain. The terror of movement has provoked agony again, forcing you to rip the glasses off of you

and sit on the couch.

You look around the room and revisit all the hobbies and activities you used to enjoy, deterred by your life post-surgery. Medals and trophies collected cobwebs, and once again the love of playing soccer was overshadowed by your knees and legs feeling exhausted after even walking to the kitchen. Once again, your half-finished painting stared you in the face after you've disregarded it in fear of standing too long; another reminder of life after your surgery. Your bike, a companion that has accompanied you in many occasions, from biking to and from friends' houses, to biking trips to neighbouring cities, or biking to the gym or basketball court, was now a symbol of inevitable pain. Once again, the idea of leaving the house to bike or walk welcomed that prickly devil that loomed over you as you made any sort of movement. Instead, you curl up on the couch, as you always do when the aching gets too much. Not only do you shy away from your friends who invite you out for drinks or your family who calls you over for dinner, but you shy away from life that inevitably slips by, ignoring you as you ignore it.

Hours pass by and you wake up to a vibration from your phone. Another notification, probably from that fast food place you always order from gifting you a discount. You turn onto your back now to avoid that tingling sensation on your shoulder; a new feeling you've acquired probably from sleeping so much. Another buzz from the phone. It's too annoying to disregard. You summon the strength to get up and mute your phone, but now get a shooting

sensation in your thighs. To your surprise, it's a text message from that friend that frequently features on your photos. Those weird sensations subsided as you read their texts that wished you a happy birthday, and mentioned that they saw you online on the virtual reality console's "friends list". They invited you to play with them. The trend of months of turning down your friends' plans to hang out because of your ailments could have continued, but at that moment, you felt a burst of excitement, a feeling you know so little of recently. When usually you'd be scared to step out the door, or too worried to walk for a long period of time, you didn't even consider the pain at that moment. You put on your virtual reality gear again, and without hesitation, joined a game with your friend. The sun had set and the night sky illuminated your living room. Playing with your friend had captivated you and you felt no sign of that irking, annoying, insistent pain. "You playing tomorrow?" asked your friend, and without hesitation, you agree to play with them again. Finally, you slip into bed, barely able to contain the eagerness to play with your friend of whom you thought you had lost.

The birdsong and flapping curtains wake you up again. You roll out of bed, and sit on the edge to try alleviate that backpain. Your legs are tired, your knees sore. Your lower back is tense, and your shoulders are throbbing. But despite this all, you smile, eager to start your day.





# What's Work Got to do With It?



DYSTOPIC HIGH-TECH AGE BIG BAD COMPANIES/GOVERNMENT SOCIAL DISCONNECT NEW DRUGS MENTAL HEALTH

LINDA HAZEN + ROSWINTHE WIBIER

I wake up every morning to the sound of my alarm blaring in my ear, signaling the start of another grueling day. My body feels heavy, my mind foggy, and I'm filled with a sense of dread as I contemplate the long hours ahead of me. It's the year 2083, and capitalism has taken over every aspect of our lives. The world is a never-ending cycle of work, consume, repeat. The technological industry has exploded in the last few decades.

We have all become slaves to the system, chained to our desks and our screens, doing whatever it takes to survive in this ruthless world. But the toll it takes on us is enormous. Burnout is rampant, and everyone is feeling the strain. The technological advances have led us to become more isolated from each other than ever. We try to mask our symptoms by hiding our exhaustion and anxiety behind fake smiles and caffeine, but it's becoming more and more difficult. One day, during a particularly exhausting meeting, I can feel the burnout symptoms creeping up on me like some a disease. My body is tense, my palms are sweaty, and my mind racing. I try to focus on the presentation, but the words blur together and I can't seem to concentrate. My colleague Hannah notices my distress and leans over to whisper in my ear. "Are you okay? You look like you're about to pass out!" I try to shake it off, telling her that I'm just a little tired. "Here, take one of these new VitaBoosts capsules. It will get you up and running in no time!" Not another new development, I think to myself. When will it finally stop? "No thank you, Hannah" I reply. But the truth is, I'm on the brink of collapse. I've been working nonstop for weeks behind a screen, barely sleeping or eating, and my body and mind are starting to shut down. Hannah looks at me with concern, "You need to take

at least a break, seriously. You're not doing anyone any favors by working yourself to death." But I know I can't stop. The system won't let me. I need to keep working, keep producing, keep consuming. It's the only way to survive. The technological development is not allowed to stagnate.

As the weeks go by, the burnout only gets worse. I start to experience physical symptoms, like headaches and stomach aches. My relationships suffer, and I find myself snapping at my loved ones over the smallest things. My productivity at work plummets, and I'm constantly on edge, waiting for the next crisis to strike. But it's not just me. The entire city is in a state of constant chaos. People are collapsing in the streets, unable to keep up with the demands of their jobs. The healthcare system is overwhelmed, and mental health services are a luxury that only the rich can afford.

As I walk through the city streets, I'm struck by the sense of despair and hopelessness that hangs in the air. The neon lights and high-tech gadgets that once seemed so exciting now feel hollow and meaningless. We're all trapped in a never-ending cycle of work, consume, repeat, and there seems to be no way out.

One day, I can't take it anymore. I collapse at my desk, my body wracked with pain and exhaustion. My colleagues rush to my side, but I know it's too late. The burnout has consumed me, body and soul. As I lay there, staring up at the fluorescent lights, I realize that this is it. This is the future we've created for ourselves - a world where we're all slaves to capitalism. Where burnout is the norm, and where there seems to be no escape. But as my vision starts to blur and my breathing slows, I feel a glimmer of hope. Maybe, just maybe, there's a way to break free from this endless cycle. Maybe there's a way to live a life that's more than just work and consumption. Maybe in the far future, when my remains will be resurrected, I'll have the chance to truly live life. And as I slip into unconsciousness, I know that I'll keep searching for that way, no matter what it takes.



# Breaking Free: A Day in the Life of Jane

ALMIR BANDA  
+ JENNEKE OUDIJN



UTOPIC



HIGH-TECH  
AGE



PERSONALIZED  
MEDICINE

It was a typical day in the life of Jane, a 42-year-old woman living in the year 2083. She had been struggling with addiction for years, trying various treatments and therapies, but nothing seemed to work. She felt hopeless and trapped in her habits, unable to break free from the cycle of addiction. That was until she heard about a new intervention that was being developed by researchers.

Excited by the possibilities, Jane went to see a specialist who explained to her the potential of this futuristic approach to deep brain stimulation. "By understanding how the different neural systems control habitual versus goal-directed behavior, we can create personalized interventions that are more targeted and effective," the specialist said.

Jane was intrigued by the idea and decided to undergo the procedure. The deep brain stimulation involved implanting tiny electrodes in specific areas of her brain that controlled her addiction. The electrodes sent electrical impulses to these areas, disrupting the neural circuits involved in habit formation.

After the procedure, Jane felt a significant change. She no longer had the intense cravings for her addictive substance. It was like a weight had been lifted off her shoulders. She felt a newfound sense of control over her life and her decisions.

As she went about her day, she noticed how the world around her was changing. The streets were bustling with people, but the cars

were all self-driving, and the air was cleaner than ever before. She smelled the scent of fresh produce at the local farmer's market and noticed the various types of plant-based foods that were available. She also saw people exercising outdoors and using advanced fitness trackers to monitor their progress.

As she reflected on her own life, she realized how much had changed since the intervention. Her relationships had improved, and she had been able to regain the trust of her loved ones. She had also been able to pursue new interests and hobbies, such as gardening and painting, that she had never had the energy for before.

The intervention had not only helped her break free from her addiction but had also opened up a world of possibilities. She was grateful for the latest scientific developments that had made this possible and was excited about what the future held. With her newfound sense of control and optimism, she felt ready to take on whatever challenges lay ahead.

