Preface
(Or the Why for This Book)

One might think that a career as a professor of molecular oncology and as a biotech entrepreneur, with experience ranging from elucidating the molecular basis of diseases to developing medication for children with brain cancer, is completely fulfilling.

For me, it was not. Dealing with the end of a patient's life will always remain confronting. That experience shaped me, however, and initiated lateral thinking, 15 years ago, whether it could be different. Whether we could think of game-changing tools to predict disease, or even prevent it.

Especially when I learned that in some parts of China, more than 2000 years ago, doctors got paid as long as people in the village remained healthy. Once you got ill, you no longer had to pay. That is, "the system" paid for you to stay healthy. Would it be possible to go back to that situation, but in a contemporary way?

From reactive sickcare to proactive health care?! **Creating and monetizing health** instead of the current standard with my doctor, hospital, pharma companies, medical device makers, etc. making money off me being sick?

I tried to answer that question with Sick No More, a book published in 2014, which explored how we could go back to this ideal world. Chapter 1 summarizes the key take-away messages. Some called it visionary, but I never liked that. I felt it was kind of common sense and feasible to start applying tomorrow. That tomorrow is today, as, indeed, the publication of that book was apparently just a start. The start of a keynote tour across the globe, from Antwerp to Tokyo and Silicon Valley, 36 months and counting, to explain and document my vision outlined therein. Each time, people got inspired by the possibilities of what they learned could come next. To my pleasant surprise, over and over again, my audience endorsed my vision – including the parties who currently thrive from sickcare and make money from illness and disease.

The reason? Perhaps an inspiring, convincing talk in which they heard many things for the first time (their unknown unknowns[1]). But also the unspoken fear that my model of extreme health care could turn out to be as disruptive as had been the transition from analog to digital photography. That transition was initially embraced by Kodak, the former market leader in photography. But after one year, being the first with a digital camera, they didn't want to support it any longer because the

uptick was too slow. Everybody knows what happened a few years later. Kodak went obsolete and filed for bankruptcy. Not a single health care player (actually, no one) wants to experience the Kodak moment. This topic is covered in chapter 2

Imagine, for a second, that the market leaders in development of medication, or medical devices, or hospital care, or health insurance all of a sudden become obsolete.

On the other hand, these parties also struggled to embrace – let alone act upon – this possibility, this drastic emerging change. More on that in chapter 2. I remember, early 2017, a meeting with one of the leading health care players worldwide. The most severe digital tool they had introduced at that point in time was a website. Scary. Especially since I will argue that the digital revolution was just for starters. The biological revolution is about to ignite.

In light of this, I felt I could do more. Offer more than what they expected to receive from a keynote or an ideation workshop, even if it was minimally inspiring, mind-stretching, and thought-provoking. **Offering a gift you were not aware even existed. That was my first encounter with the concept of delight.**

I took the opportunity, along with a number of great people (yes, I'm talking about you, An Tanghe, Bart Collet, Frank Boermeester, Leo Exter, Gregoire Thomas, Peter Roelants, Piet Moerman), to experiment with novel initiatives, creativity workshops, and ground-breaking, award-winning hackathons[2]. We went on a mission to learn how others liked our learnings.

You're holding the (first) result in your hands: a written guide to creating delight in health care and beyond (with a special focus on education). But this is not just a static book. It's a dynamic one for you to explore, using Augmented Reality. In this way the book deals with constant change... and remains up to date!

Chapter 3 will explain what delight actually means and reflect on some of its perils. Chapter 4 will address whom to target and to co-create with. Chapters 5 and 6 provide the framework, the actionable examples, and the strategy you should use to create health (or any other future) by delight.

The second result was Healthskouts[3], a new service we launched in 2017, with the help of a team of bright young giants (Jeroen x3, Pieter, Tom, Katrien, ...). Healthskouts is a personalized, expert-curated newsletter with surprising insights for your health care job to be done, beyond the milkshake example.[4] Healthskouts introduces a novel way to connect relevant dots along silo-ed data, technology and design ideas, and business models from unrelated verticals.

The newsletter helps to unlock unknown unknowns, delivering delightful, actionable innovation and business development suggestions and insights from the latest research and technology breakthroughs, emerging start-ups, design ideas, and business models from within and outside of health care.

While Healthskouts is currently tailored to support businesses in a B2B fashion, we quickly envisioned this could be directed into a B2C service as well. Indeed, while we now provide the latest ideas to support specific therapeutic teams within pharma companies, for instance, people within these teams started to ask personal health questions or advice, for their child, for their mother, for themselves.

No longer in the format of a newsletter, but rather in a tool to compare your personal health data against a baseline of what we call health. The latter is a moving target, getting more specific with any novel insight we obtain from populations in the real world. That is exactly what Healthskouts aims to integrate and provide as a service in the future. A service which lets you experience the opportunity to remain healthy as long as possible. With the help of your personal digital twin, an avatar representing yourself, a personal assistant who practices first before telling you. I'll discuss this in chapter 5, where I try to revert to the Chinese model mentioned before.

Circle closed.

And then another lightning bolt struck: I met Jasna Rokegem (aka @JasnaRok) in November 2015, at a local festival in Belgium where we both presented part of our future visions. I don't know yet how to describe Jasna. I hope I never will. She was born a fashion-tech queen and hosts a most wonderful imaginative mind. I'm proud we have joined forces to create, amongst other things, an innovation spectacle together, to start showcasing what your digital guardian angel, your digital twin would really look like.

Obviously, I cannot do all of these things alone. Therefore, I am using this book to reach out to everybody who discovers novel tools, products, services, and experiences which help to build that world in which we don't get sick anymore. We are all Healthskouts, all part of a community. I will collect these novelties, credit to you for others to explore as well, and make them available on our website. A way to pay it forward.

Finally, in spreading the word, I wondered and tested whether the ideas and learnings presented in this book could work outside of health care. For insurance companies, banks, law firms, big retailers, logistics companies, … Whether they could work for your organization, but also for you, yourself. And I believe they could.

Therefore, it was an enormous pleasure during the last few months to tinker with Edushock author and learning expert Pieter Sprangers and think about how we can bring our learnings back to our education system in a creative new format. I'm very honored by Pieter's guest editorial as a prelude to more on that topic soon.

After 50 years of practicing, it's time for me to start playing. In doing so, I truly hope I can delight you.

In summary, while built for my work in health care, this book aims to be an inspiring roadmap for anybody. It will not only help to think outside the box, as sometimes you have to think outside of the warehouse which stores the boxes. Sometimes you even have to think outside of the city where the warehouse stores the boxes (and so on). I hope this guide, with a ton of actionable insights and approaches, helps you to do so and to create and experience delight, while defining what is next for your company, your customers, your family and friends, and you.
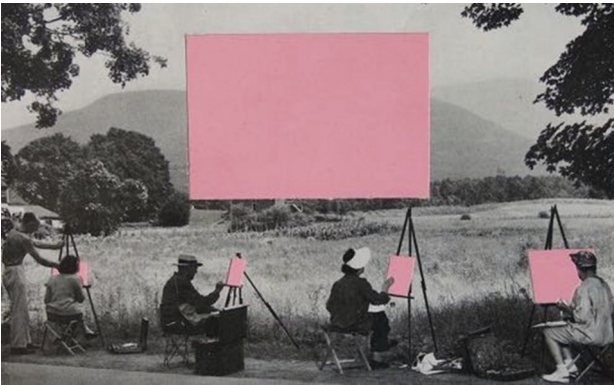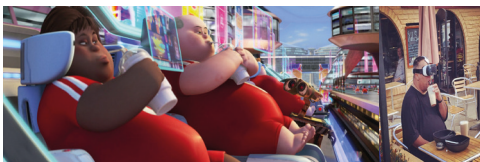

Enjoy the ride.

Chapter 1
Getting Sick No More, a Profound Change Eliminating Friction

If we're honest, all of us know well and good what living a healthy life means, but we haven't made a success of it. Not yet, at least. Look for instance what appeared on the black board when a kindergarten teacher asked a class to create rules for healthy living.[5] No rocket science. And yet.

It's hard to be healthy.

In Pixar's animated sci-fi story *Wall-E*, the people of the future zoom around in hovering chairs in a climate-controlled dome, with robots refilling their sodas. Their bodies are so flabby they can't even stand. It's the ultimate incarnation of the couch potato. The picture on the right is actually... real life.

It's really hard. **Therefore, we need to focus much more attention on how to make staying healthy more convenient.** In a fantastic series of articles, Steve Downs, Chief Technology & Strategy Officer at the Robert Wood Johnson Foundation, wonders how we can build health into the OS.[6] He argues that, "Over many decades we have engineered movement out of our daily lives. 'Exercise' has become a separate, add-on activity, as opposed to a natural part of going about our days. Processed, high-calorie, low-nutrition food is abundant, cheap, and engineered to appeal perfectly to our cravings. Entertainment, largely screen-based, available 24/7, and engrossing,lures us to our couches and keeps us up at night.

The fact that more than 40 percent of adults are overweight or obese (11% of men and 15% of women) is not due to the individual moral failings of millions of people. It is the result of many different industries, each individually optimizing our engagement for their particular goals, but lacking a coherent value system that prioritizes our overall well-being.

We have an automobile industry that works to get us to spend more time driving, by offering us cars that are ever more comfortable, safe, and desirable. We have real estate and building industries that push us toward more comfortable houses that we don't need to leave, toward neighborhoods where cars are the only viable transportation option. We have the entertainment, consumer electronics, and advertising industries that work symbiotically to command our time and attention by delivering an endless supply of outstanding, compelling entertainment and addictive opportunities for connection, through brilliantly engineered, seductive gadgets. We have the food industry, which has figured out what we crave and how to deliver it with maximum convenience and minimal cost."

Meanwhile, we are at a moment of extraordinary technology invention, potency, and possibility. Smartphones have already become boring, and they are only ten years old. We are at the dawn of AI and the Internet of Things turning into a commodity like electricity or tap water. We are at similar inflection points in areas like 3D printing, materials science, genome editing, synthetic biology, and nanotech.

We don't yet know how these and other technologies will be combined to form the services and habits that will create the new normal for our everyday lives. But for sure, they provide us with unseen possibilities to shape and create an optimal future.

I introduced such a future in my first book, *Sick No More*. It described an evolution from medicine that tries to cure us into one that tries to keep us healthy and even wants to make us "better," to improve us. I described how the use of our personal biological code (our genetic layout or our genome, made permanently available for next to nothing) and other biomarkers, dozens of invisible sensors, smartphone apps, smart social media, games, and the internet promise to keep an eye on us.

Convergence with lightning-fast evolutions in (mobile) information and communications technology (ICT) and social media have already started to ensure that the knowledge and expertise that was once the exclusive domain of trained health care professionals is slowly shifting in the direction of the patient and – ultimately – each of us as healthy citizens.

However, that happens without the need to focus on technology, which is invisibly analyzing data to anticipate events before they become problematic. This way, we can use them to create completely novel, unexpected services and experiences to avoid disease from striking. Most often, that will happen based on fun, engagement, design, and warm human interaction.

This wasn't some completely futuristic peak into the future. It was a vision from the past. As I mentioned earlier, more than 2000 years ago, in some parts of China, doctors used to get paid as long as people in their village remained healthy. Once you got ill, you no longer had to pay.[7]

That is what we should aim for again. Therefore, **this book is no longer about seeing but rather about creating such a novel, healthy future**. We should aim to make this the definition of so-called **outcome-based medicine**, which would be impossible to top. That is in stark contrast to mostly service-based medicine, which has ruled the game until now.
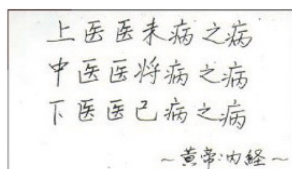
Nowadays, people generally don't go to the doctor until they are sick, and by that time, it is extremely expensive to try and fix the problem. It's expensive not just for you, but also for the health care system. It's also expensive for your employer, and you are probably less productive. For individual investors and for society in general, it makes more sense to keep us healthy. Obviously, a bigger market exists for fixing people who are broken.

Let's start with the simple proposition that health is an asset. It might be our most important asset. And like any asset, if we cultivate it, we increase the value it returns. We're not talking about fixes when health is broken; those are important, but they happen too late.

Obviously, we have lost the Chinese model big time. Or better, "the system" has derailed big time. For every 100 euros (dollars/yen) we spend on health care these days, not a single euro (dollar/yen) is dedicated to prevention, while an average of 90 euros is spent on the last two years of our lives.

That's ridiculous, when you think about it. But what if we were to switch the ratios? And how do we get there? That's what this book is about.

"I think a lot about
the future since it's there I will
spend most of my life."

— Woody Allen

Incidentally, a recent, systematic review to examine the return on investment (ROI) of public health interventions delivered in high-income countries with universal healthcare (the UK, Western Europe, the USA, Canada, Japan, Australia and New Zealand), demonstrated a median return on investment of public health interventions of 14:1. Thus, for every €1, £1, or $1 invested in public health, €14, £14, or $14 will subsequently be returned to the wider health and social care economy. In national campaign this number sometimes even doubled. Some prevention interventions reported substantial effects within 6-12 months[8]. "Every ounce of prevention is worth a pound of cure", Benjamin Franklin knew already.

What can we, you, any corporate create in the 15 years preceding my diagnosis of type 2 diabetes? Cause once it's diagnosed, it's often too late to revert it. Even with the prospect of 3D-printed organ transplants, stem cell therapies, and newer augmentation tricks, the significant risk of losing your kidneys and your eyesight is not a pleasant idea. Actually, that is what diabetics fear most and why end of life is so expensive.

Exercise delays type 2 diabetes development (a result of being obese) and can even revert it.

One of the hallmark studies to show the power of exercise was published in 2014 in the leading medical journal *The Lancet*. Six thousand patients with type 2 diabetes, all treated with the same drug, got sent home with an accurate step counter. Half of the patients walked an extra 2000 steps a day. They turned out to be free from disease worsening (so-called comorbidities of the heart) in 20% of the cases.[9] This was the first real proof that exercise is one of the best drugs we can prescribe. Two years later, it was shown that, with 150 minutes of exercise per week, you are 35% less likely to die prematurely.[10] This is starting to be motivating.

More recently, we have started to understand how exercise helps to combat cancer and to stimulate the brain. To investigate the underlying molecular mechanisms, researchers of the University of Copenhagen in Denmark compared tumor growth in sedentary mice and in those that had access to an exercise wheel for over four weeks. Animals that ran had about 60% fewer tumors, which were also smaller in size. Exercise was associated with an increase in the number of a particular type of immune cell, the natural killer cell, found in the tumors. An exercise-induced surge in the hormone adrenaline mobilized these cells.[11]
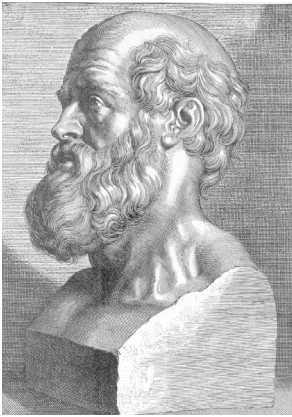
But before going there, let's first answer why we have lost the Chinese model. I wouldn't be able to explain it better than how Molière, the 17th-century French playwright and actor who is considered to be one of the greatest masters of comedy in Western literature, once stated it: "Doctors pour drugs of which they know little, to cure diseases of which they know less, into patients of whom they know nothing."

Nevertheless, knowing your patient is what Hippocrates, the founding father of medicine, considered key: "It is more important to know what sort of person has a disease than to know what sort of disease a person has." In other sectors, that's been called "knowing your customer."

Let's put that in a proper perspective. When I send a package from place A to B using FedEx or UPS services, I can trace that package any single moment via a digital platform, website, or mobile app. I consider that "normal." In contrast, chronic patients[12] (whether it be a heart or diabetic patient, a cancer or Alzheimer's patient) are on their own on average 8755 hours a year, NOT connected to the health care system. In other words, a FedEx or UPS package is better off than me as a patient. That is not right.

As we would plan for a future of mainstream outcome-based personalized medicine (as you will see, we will aim even higher), we need to consider that many, if not most, of the personalization needs to occur outside of the clinical environment. Indeed, health monitoring at a hospital or office cannot monitor a patient during their normal course of life or as often as desired. This can be a serious limitation because a snapshot, rather than a trend, captured at a hospital or doctor's office may not accurately reflect the patient's health or may not be performed at all due to the infrequency of a patient's visits.

Data suggests that 60% of health outcome influencers are linked to behavioral and environmental determinants, compared to 10% for medical care, and less than five percent of a patient's time is spent interacting with the formal health care system.[13] So, as we struggle to drive real value for patients with our data, we need to be creating solutions that will:

➜ form a connection between all of the clinical and commercial entities, to enable outcome-based reimbursement models and support for more personalized therapies and prevention tools;

➜ augment the teams in those same organizations with both historical and real-time data, deriving insights automatically (using AI);

"Doctors pour drugs
of which they know little,
to cure diseases
of which they know less,
into patients
of whom they know nothing."

— Molière

→ be responsive to each patient on their own terms, to include not only the clinical elements of health care, but the financial, and behavioral aspects within the same context;

→ redefine the conventional idea of a health care customer journey, knowing that most of that journey is invisible to the system today.

Luckily, there is a solution lurking on the horizon: our ability to introduce a new breed of guardian angels. That concept has a famous example from history, from the coalmine era. Miners used to take a canary with them when they went down into the mines. Even the tiniest amount of methane was enough to silence the canary and signal to the miners that it was time to evacuate.

The current equivalent is the large number of sensors in our smartphone or in devices connecting to our smartphone. Now, you are aware of what they do (wristbands counting my steps), but in the not too distant future, they'll be at work in the background and invisible, e.g. in a sticking plaster on our skin, in our garments, or in a tiny gauge inside our body. Or hidden in our car, our house, ... These sensors (in wearables around the body, in dermals sticking to the body, in insideables inside the body, earables, ...) collect so-called **"real-world data." It is like user-generated content, collected in "natural habitats," not in the controlled environment of a hospital or during a clinical trial. It's the kind of data we need to anticipate, predict, and ultimately prevent disease.**

Network specialist Cisco Systems predicts that by 2020, 50 billion computers, appliances, and sensors (including thermostats, mirrors, bathroom scales, ...) will be wirelessly connected to each other in the Internet of Things or IoT,generating 600 zettabytes of information. That's 100x our current storage capacity of 6 zettabytes.

People are also talking about a variation of the IoT, namely the Internet of Everything (IoE) or the Internet of Bodies, where things are connected to people and every other possible process and form of information. The wearable gadgets and smartphone apps will serve as the perfect bridge to the Internet of Things. The fact that a fitness armband is connected to the internet will be the most normal thing in the world for your heart rate to be synchronized with the cloud, in the same way as your smartphone now synchronizes your email, calendar, and contacts, where an app will analyze your data in real time.

To paraphrase Lord Kelvin, **"The numbers tell the tale." They generate the knowledge we'll use as a starting point to create delight.** One of the best-known pioneers of the IoT is Nest (acquired by Google), the thermostat that adapts to whoever's at home, programs itself, and offers suggestions on how to save energy. Nest Labs' second product was a smoke detector called Protect. This is precisely the kind of product that illuminates the direction in which health care needs to evolve: towards prediction and prevention. Like the canary in the coalmine, a smoke detector is designed to sound the alarm when it detects smoke. But what happens when there's no one at home, or bacon starts to burn in a pan a couple of meters from the detector? How do you check the batteries? Nest Protect is also designed to detect carbon monoxide, communicate via your smartphone, and react to a hand gesture when it has reported something.

Together, technological innovations will occasion a new idea of **future medicine, where technology will allow us to anticipate events and be used to guide, and influence to the better, our actions and behaviors**. This way, they will keep us healthy as long as possible, in part by anonymously combining our personal measurement data with that of many other individual users and exploiting the knowledge we can distil from it. If, of course, we manage to get the weakest link in the chain on our side: ourselves. We will obviously come back to that in the following chapters.
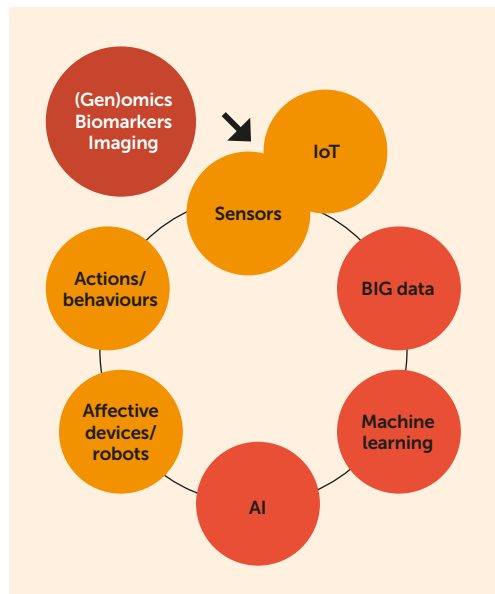
All of the above is summarized in the graph on the previous page. Basically, that graph very much reminds me of Doctor Baymax in Disney's 3D computer-animated superhero movie *Big Hero 6*.[14] The film tells the story of the special bond that develops between plus-sized inflatable robot Doctor Baymax, offering preventive care, and prodigy Hiro Hamada, who team up with a group of friends to form a band of high-tech heroes. They almost become twins...

In summary, these technologies, and the data they collect and mine, offer the promise of helping to improve care in at least five ways:

1. From episodic to continuous, always ON.
2. From a focus on the average patient to a focus on each individual patient, **P**ersonalized or **P**recise.
3. From care based on precedent (previous patients) to care based on continuous, real-time feedback and learning, **P**redictive.
4. From patient-as-recipient of care to patient-as-participant (and owner or driver of care – we'll see how to co-create health), **P**articipatory.
5. From reactive to anticipatory to **P**reventive.

Using a strategy introducing delight (thinking), the following chapters present a hundred examples that serve to illustrate the evolution to a health care system with 4 **P**s[15]: **P**recise (or **P**ersonalized), **P**redictive, **P**articipatory, and most importantly, **P**reventive.

Along the way, we'll meet many ideas and projects at different stages of execution, such as Scranton.

Scranton, a city of 76,000 people in Pennsylvania, is the launch site for an innovative, exciting approach to an entire community's health. Geisinger Health System (a large health care provider) has engaged and convened a network of global, national, and local partners. The goal is to transform health care at its core by focusing on preventive care, behavioral health, and economic growth. Their vision: healthier families, stronger neighborhoods, resilient communities. Fresh Food Farmacy (FFF) was the first major project of Geisinger's new initiative.[16] FFF brings a "food-as-medicine" approach to communities, designed to combat high rates of obesity, pre-diabetes, and diabetes. The pilot stage of the FFF began in July 2016. Early data demonstrates improvements in blood sugar control and weight. In addition, most participants have begun exercising and report that they are more involved in managing their own health and the health of their families. Perhaps the most profound findings are that several participants have been able to reduce or even eliminate their diabetes medications.[17]

Data collected by the plenitude of sensors and information written in our biological code will generate knowledge to accumulate wisdom. **The wisdom to anticipate. That is what will create delight.**

Data ➜ Information ➜ Knowledge ➜ Wisdom ➜ Anticipation ➜ Delight

The delight of not getting sick anymore. That sounds disruptive, but it shouldn't. This book will introduce delight thinking "to rescue" traditional health care players which currently make money from people being sick, from being disrupted.

You will learn how these guardian angels, collecting real-world data up to 24/7, allow us to enhance already current operations (richer clinical trials, tools for outcome-based medicine, ...). In doing so, these parties will start to realize how they too can use these data, combined with novel business models, to avoid sickness in the first place. To remove some serious friction, if you like. And be honest: which tagline would you like to run?

"We develop medication for unmet clinical needs"
OR
"We develop tools to keep you healthy"

Meanwhile, citizens (not patients yet) will get a plethora of options from the creation of health, sometimes even to monetize their health. **This book will provide a framework and a ton of examples to make these points.**

But let's focus on dealing with this upcoming change first.