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Personalized Health

Preparing for tomorrow's healthcare

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Colophon

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O. (Olivier) Gerrits, director Zorginkoop Zilveren Kruis
Prof. dr. J. (Jan) Kimpen, Chief Medical Officer, Philips
Ir. H.H. (Hyleco) Nauta, director eHealth Innovation, UMC Utrecht
Drs. ir. F.P. (Frank) de Reij, Chief Executive Officer Meander Medisch Centrum
Mr. Y.C.M.T. (Yvonne) van Rooy, Chief Executive Officer NVZ Nederlandse Vereniging van Ziekenhuizen
Drs. R.E.C.S. (Rob) Hoogma, Chief Executive Officer Siza & founder Academy Het Dorp

We would also like to thank the more than 100 respondents who participated in our survey. With their help we were able to create a proper quantitative view of the global developments in the field of the 'self-learning cycle', and of essential aspects such as quality, costs, accessibility, security and privacy that come with a more personalized type of healthcare.

Foreword

It has been two years since we published "Personalized health: Tomorrow's healthcare". In this publication we claimed that patients are increasingly anxious to manage their own health, supported by certain technological developments or "game changers": Quantified Self, Digital Platforms, Artificial Intelligence, and Individual Profiling. In our opinion, these developments should lead to a more personalized type of healthcare.

Meanwhile, our insights have developed. The game changers mentioned before are still essential, but should be considered as part of the "self-learning data cycle" that consists of collecting, transferring, analysing and enriching medical and personal data. This new data is subsequently used for the benefit of the patient, and so the cycle starts again.

Of course, the crucial question is: are our predictions coming true? Are the trends developing in a way that the healthcare landscape will change dramatically within the next ten years? How rapidly are these developments taking place, should we add extra elements to our story? Are the roles of healthcare professionals and patients changing, or will they be in the near future? And how does the healthcare sector experience these changes? Do healthcare professionals recognise trends such as self-management, personalized health, and self-learning data cycle – and how do they respond? Is there a sense of urgency, do service concepts and funding formulas suffice, and is the tipping point for large-scale transitions looming in sight yet?

While we were searching for answers, we set up a survey among more than 100 respondents from hospitals, healthcare institutions, mental healthcare, medical technology companies, sector association and public authorities, health insurance companies, general practitioners and general practice centers.[1] Also, we had in-depth interviews with representatives of various parties within healthcare and we analysed and enriched our own insights.

This has led to views that we would like to share with you by means of this publication. Please note that this is a report on the largest part of the current patient population, i.e. healthcare consumers – citizens that behave like consumers. Naturally there is also a group of patients that does not fit this profile.

We hope to inspire you with this publication and are looking forward to your feedback.

Mathieu van Bergen
Managing Partner Healthcare

Hubert Friederich
Director Life Sciences and Healthcare

Introduction: Personalized Health and the self-learning data cycle

Data is the new gold. This applies to many industries, including healthcare. More and more (accessible) devices appear on the market to help collect and keep up with health data. For instance, citizens – who increasingly want to be in the lead – generate large quantities of data through self-assessments (apps and wearables). Healthcare institutions produce enormous amounts of data as well and are well aware of the fact that this data should be used. Not merely because patients expect their data to be as accessible as – for instance – their telephone usage data, but also because this data can help them improve their efficiency and quality.

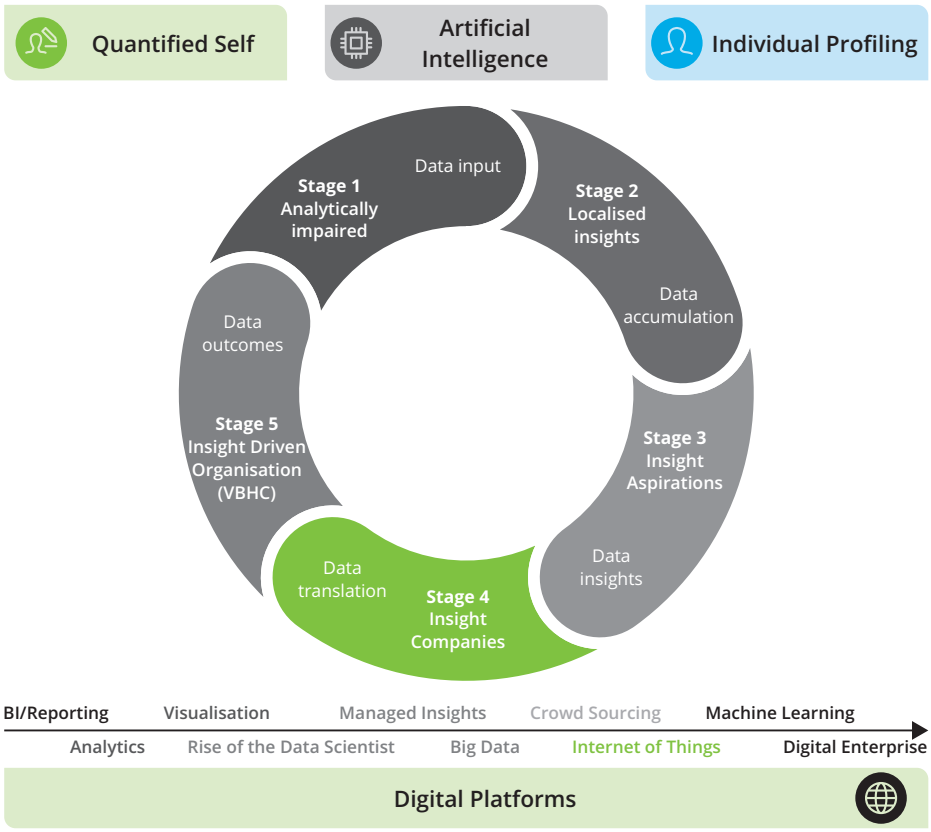

Figure 1. The self-learning data cycle and the four game changers.

From game changers to data cycle

In our publication "Personalized Health: Tomorrow's healthcare" (2015) we described four game changers that we thought would change the healthcare landscape dramatically within ten years' time. Meanwhile, our insights have developed. The game changers are still essential, but we have come to consider them as part of a "self-learning data cycle" that consists of collecting, transferring, analysing and enriching medical and personal data. Collecting data (by means of the game changer Quantified Self) is the first stage of this cycle. The data that has been collected can be stored and transferred through Digital Platforms (game changer number 2) and analysed and enriched with data from the other two game changers, i.e. Artificial Intelligence (AI) and Individual Profiling. See also figure 1. Proper analyses and enrichments lead to new data. The cycle starts again and new innovation opportunities arise – for both healthcare institutions and companies that own large amounts of data, such as telecom companies.

The dot at the horizon: Value Based Healthcare

Moving through the stages of the data cycle will allow healthcare institutions to boost the quality of their services and make healthcare more personalized. For instance, specific genetic data and the characteristics of a patient's condition could be combined with data about treatment and scientific articles from all over the world. Analysis and enrichment of data are also essential for the interpretation of treatment results, and hence an important step towards Value Based Healthcare (see also chapter 5).

Struggling with the data domain

The data domain does not only offer opportunities, but is also the major issue that all parties within healthcare are struggling with. From collecting and storing data to transferring, analysing, enriching and securing data: all these elements require the utmost attention. This is shown by e.g. the investments in the electronic patient record (EPR) that are now taking place, while the next generation EPR is already on its way and chances are that the current systems will soon need an upgrade.

Of course, most healthcare institutions have their own EPR in order, but the transfer of health data could use some improvement in the Netherlands. For instance, there is the challenge of interface security. This is an important issue within data security.

How do we know if data transfer is safe and secure? What can we do? Especially since game changers AI and Individual Profiling highly depend on secure systems – game changers that offer so many innovation opportunities. There are quite a few experiments in the fields of AI and Individual Profiling in the Netherlands, but these technologies are neither mature enough nor generally accepted.

Are the expectations coming true?

Which brings us back to the vision we shared in "Personalized Health: Tomorrow's healthcare". To what extent do we see new developments in the fields of Quantified Self, Digital Platforms, and AI? As we claimed two years ago, Individual Profiling will most likely lag behind, with visible changes from 2025 onwards, mostly because this is still such an expensive technology. But Quantified Self was already developing back in 2015. Has self-assessment become accurate enough for doctors to depend on its results en masse?

We also described that we expected Digital Care Platforms and AI to become the next wave of big transformations. Do we have any evidence of this by now? Have the bottlenecks that we discerned in 2016 – uniform standards, suboptimal collaboration within the chain – been solved yet? What do all these changes imply for the current funding formulas? Are we on the road to Value Based Healthcare? We have answered these questions and many others and asked the opinions of all parties within the healthcare landscape. Please find brief flashbacks on our predictions as well as our enriched vision in the following chapters.

Recommendations Nictiz and NIVEL

In their eHealth Monitor 2016, Nictiz (the Dutch national competence center for eHealth) and NIVEL (Netherlands institute for health services research) have included recommendations in the field of online services. A few examples:

- Healthcare professionals should actively promote e-health solutions for their patients.
- The government should take the lead, and use of standards for electronic transfer of health data should be more binding.
- Government and health insurance companies should focus more on finance issues.

'Offering an e-health service on a website simply isn't enough. We need social innovation', according to Nictiz and NIVEL. (Source: eHealth Monitor 2016, www.nictiz.nl, eHealth, 2016.)

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Chapter 1: Self-management

One of the claims we made in 2015 was that citizens increasingly prefer access to, and management of, their own medical records. Along with the increasing use of wearables – in order to assess one's health, see also chapter 2 – this would lead to more healthcare at a distance, a shift from "sick-care" to "healthcare" and changing dynamics between doctor and patient. What shifts are visible already, does the sector recognise these, and how do the various parties respond?

Access to one's medical record

When it comes to access to one's own medical record, we actually notice an important shift. As of 2018, all citizens have access to their own medical records. This was initiated by NVZ and the Dutch government. Within a year this information should also be digitally accessible.

Yvonne van Rooy, Chief Executive Officer at NVZ, emphasizes the speed with which public opinion on access to one's medical record has shifted. 'Two years ago, it was almost world news when the Nationaal Medisch Centrum (National Health Center) and UMC Utrecht (University Medical Center Utrecht) allowed their patients real-time access to their own data.

Do you recognise (within your own healthcare institution) the shift from sick-care to healthcare and patient self-management? (n=91)

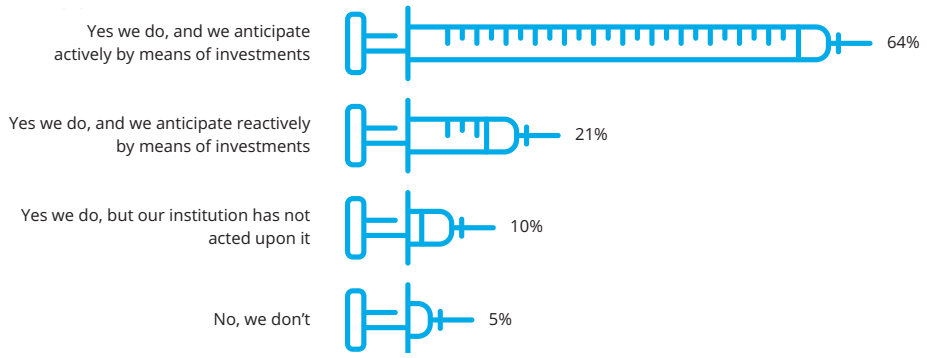


Figure 2. Shift from sick-care to healthcare and self-management.

At the time, there was still much discussion about how much time was required between the production of lab results and the moment these were included in the personal records. That discussion has stopped altogether. The argument that the patient will not understand the data has completely vanished.'

Simultaneously, a survey performed by the Patiëntenfederatie (Patient Federation) shows that 94% of all patients demand a say in their treatments. Doctors are said to often decide what treatment is best without properly informing their patients about alternatives[2].

From "sick-care" to "healthcare"

Another visible shift is that from sick-care to healthcare. Our survey, with 100 respondents from the entire healthcare sector, shows that 64% recognises the shift towards being and staying healthy and actively anticipates by means of investments (see figure 2). They notice distinctive transitions in the healthcare landscape, as well as in healthcare consumer behaviour and prediction pattern. Also, 21% of the respondents recognise this shift and respond reactively, while 10% of them indicate they recognise the shift, but their institution does not act upon it.

Our survey also shows that 75% of respondents think that the healthcare consumer – as we predicted in 2015 – would prefer self-management, and that 80% claims that patients are better informed than before. For instance, patients increasingly choose their healthcare professionals more consciously. However, respondents expect that in the field of data management and data usage, citizens are less eager to play the leading role (see figure 3).

What shifts do you notice in the behaviour and prediction pattern of citizens/patients? (n=91)

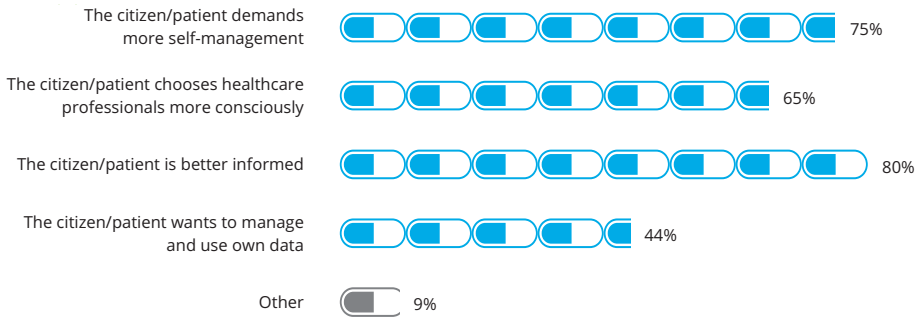


Figure 3. Shifts in citizen behaviour and prediction pattern.

Self-management: use cases from UMC Utrecht

Hyleco Nauta, director eHealth Innovation at UMC Utrecht, acknowledges our findings. 'Nowadays we have the technology that allows patients to manage their own health. Digitalisation creates different and better collaboration and communication between healthcare professionals and patients.' According to Nauta, the Internet of Things (IoT) is another important development. IoT allows medical tracking of patients, for instance in order to monitor their blood pressure or well-being – if they have given their consent. This creates a care continuum in which patients and doctors are continuously informed of (changes in) condition, reducing the need for acute care (see also chapter 5). UMC Utrecht has assessed and evaluated this approach already in small-scale pilots for ALS, hypertension, and juvenile rheumatoid arthritis (JRA). The pilot included 70 patients and 3 conditions and will soon be extended to 9 conditions and about 1500 patients. Both doctors and patients encourage the pilot. 'I feel invigorated by what they tell me. It is obvious that this offers added value, it's an unstoppable development. Based on the data, some patients know they can reduce their medication. Others monitor whether their condition alters when they are faced with a change of medicine suppliers. Monitoring offers them piece of mind.'

The need for self-management

Jan Kimpen, Chief Medical Officer at Philips, also recognises that patients increasingly demand self-management. Large-scale transitions in the healthcare landscape are inevitable – not just for healthcare institutions, but also for suppliers like Philips. In order to be able to respond to the changes in the healthcare landscape, his organisation has been going through a large transition itself for some time now. 'Within 60 years world population has grown from 2.5 billion to 8 billion. At the same time, life expectancy has almost doubled worldwide. As a result, the number of chronically ill patients has grown enormously. That in itself makes it impossible to continue our current healthcare system.'

Olivier Gerrits, director Healthcare Procurement at Zilveren Kruis, adds: 'We can't afford to offer these services in the exact same way. There is a strong case for self-management.'

Not everyone?

Not all citizens wish to use wearables and be in control. This is quite common. It usually takes a while before a trend is adopted by the majority. The "hype cycle" as defined by research and advisory company Gartner is based on this thought: a new technology follows the entire cycle from promise to accepted product, with a temporary, but sometimes considerable, relapse somewhere in the middle. A well-known example is the use of mobile phones. In 1999, most Dutch people claimed it was ridiculous to be available 24/7. About 20 years later, this is hard to imagine.[3]

The Gartner hype cycle

According to Gartner, the cycle consists of five stages:

1. Innovation Trigger. The new technology triggers media interest for the first time.
2. Peak of Inflated Expectations. Large expectations arise around the concept, which at that particular time are impossible to fulfil.
3. Trough of Desillusionment. Disappointment about the technology prevails.
4. Slope of Enlightenment. Apparently, the technology does offer a number of opportunities.
5. Plateau of Productivity. The new technology becomes productive and begins to offer return on investment.

'Two years ago, it was almost world news when the Nationaal Medisch Centrum (National Health Center) and UMC Utrecht (University Medical Center Utrecht) allowed their patients real-time access to their own data. At the time, there was still much discussion about how much time was required between the production of lab results and the moment these were included in the personal records. That discussion has stopped altogether. The argument that the patient will not understand the data has completely vanished.'

Yvonne van Rooy, Chief Executive Officer at NVZ

Doctor-patient relationship

One of the complications is the patient's dependency of the doctor. After all, it is easier to switch telecom providers than it is to find a new doctor. Gerrits (Zilveren Kruis) can see that the doctor-patient relationship is changing – for instance because patients are more aware of their own fitness and health condition than before. The speed of change is quite slow, as accuracy is crucial for this new approach to healthcare. But the first signs are there. Gerrits: 'Doctors should start a dialogue.' Much depends on the doctor and patient themselves.

Van Rooy (NVZ): 'In general, young doctors are more enthusiastic about digitalisation than their older colleagues. Also, patients are not a homogeneous group. Some people still expect their doctor to tell them what to do. This group may not be suitable for a digital experiment. The second group consists of patient co-makers (who are often chronically ill), who have some knowledge about their own condition and are open to apps and devices. Finally, there is a group of what we call highly educated patient directors. In little more than a month, they will probably know as much about their specific tumour and cancer cell growth as their doctor. By dividing patients into these groups it is easier to meet their expectations and work more efficiently.'

Also, it is crucial that patients as well as professionals and executives are the point of focus when offering or developing healthcare services[4]. If services such as HartWacht (HeartWatch) are being developed with this in mind, user satisfaction and adoption will significantly increase.

Use case: HartWacht (HeartWatch)
Best practices can help. Such as HartWacht. Zilveren Kruis, FocusCura and CCN were the initiators of this application that allows patients to measure e.g. their blood pressure, weight and heart beat and send the results to their cardiologist. If there is a deviation, the healthcare professional is immediately and automatically informed. If there is a deterioration, a video call can be arranged or the patient can immediately visit one of the local CCN-clinics (Cardiology Centers Netherlands). Thus, hospitalisation is prevented. Continuous monitoring leads to better quality, since interventions can be performed at the right moment.

Collaboration within the chain

Another complication – which we already mentioned in "Personalized Health: Tomorrow's healthcare" – is collaboration within the chain. Frank de Reij, Chief Executive Officer at Meander Medisch Centrum, confirms this. 'We can definitely see that data transfer is improving, but so far a common approach to the patient's issues is lacking. Therefore it is much more difficult for patients to be in control – if they are capable of being in control at all. We must find a way to facilitate collaboration between parties if we want to offer better and more affordable healthcare.'

However, there is also a silver lining. 'The treatment plan is discussed more often, especially in oncology.' Although not all conditions and diseases are equal in this respect. An orthopaedic condition and a tumour require a different approach. 'Patients don't expect discussion about the usefulness of orthopaedic treatment. This might be different in the case of cancer.'

Contact quality

The majority of respondents of our survey considers care at a distance – based on continuous monitoring – to be more effective than one-off personal contact (see figure 4).

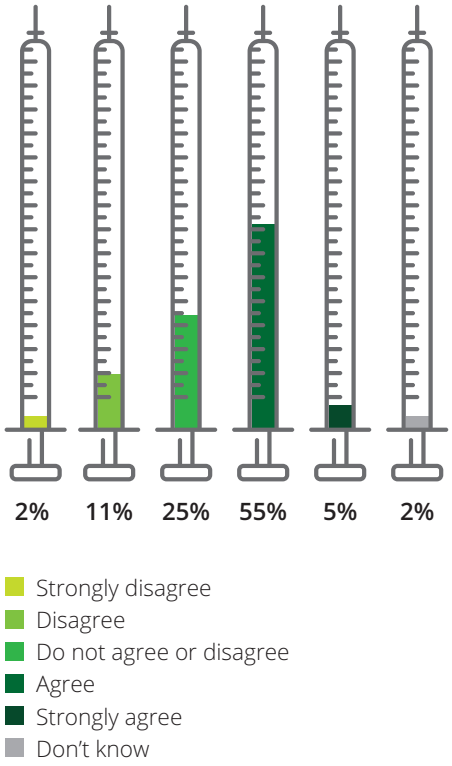


Figure 4. Care at a distance more effective than one-off personal contact.

They are also largely convinced that digital contact is useful and do not consider this as less valuable than face-to-face contact (see figure 5). Moreover, frequent digital contact leads to more continuous insight into the patient's condition. Also, there are opportunities for more efficient check-ins, preparation and information.

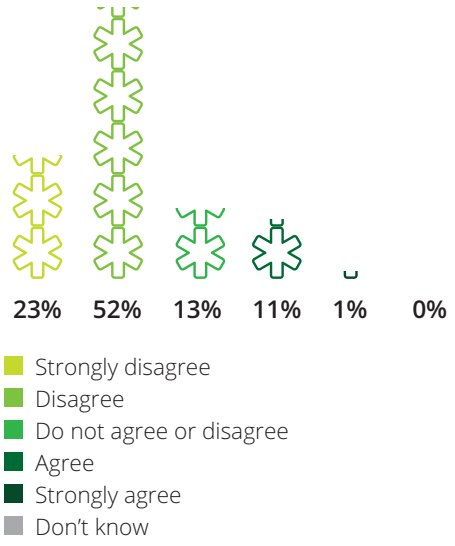


Figure 5. Advancing technology within the primary process deteriorates personal contact with the patient.

E-consults

Most patients need time to get used to some forms of digital contact such as e-consults. Those who do not use these tools – which is the large majority – think that e-consults will diminish personal attention. In 2016, citizens could ask 60% of general practitioners and 34% of medical specialists questions on the internet. Still, only 3% of them actually used this opportunity[5]. A majority of citizens recognises the benefits of e-consults, such as time-saving and time to prepare their questions. Also, most citizens who actually use e-consults are satisfied with user friendliness. Hospitals like Meander Medisch Centrum make sure their patients are well supported when using digital contact. Meander has even appointed someone who helps patients connect at the right moment, since 'consults like these are more complicated than Facetiming with the grandchildren', according to De Reij.

Care at a distance – in care

The above is mainly about the 'cure' aspect of healthcare. In the 'care' sector we also see a growing interest in care at a distance. For a long time, care at a distance seemed more difficult in this particular part of the healthcare sector, as social contact is probably considered even more crucial here than in cure. For people who need long-term care, and especially those who have lost their mobility, social contact is scarce anyway. If direct contact with healthcare professionals is taken away as well, solitude increases rapidly.

However, there are various developments. For instance, a number of wearables are being developed and assessed (see chapter 2). And the European Commission has ordered the development of 'Alfred'. This program allows older people to live longer in their own homes with the possibility to act independently and to actively participate in society.

Alfred consists of four technological pillars. The first one is a mobile app that is fully voice-controlled and responds to commands such as 'Call (name family member or healthcare professional)', 'I am lost, take me home', or 'Call a cab'. The second pillar is personalized social inclusion, which suggests participation in events or maintaining social contacts. The third pillar consists of unobtrusive wearable sensors monitoring the vital signs of older people for family, friends or healthcare professionals. Finally, the fourth pillar invigorates body and mind based on serious gaming, e.g. through a pedometer or mind game.

Next to these applications, certain (one-off) actions in the care sector, such as intake meetings, are increasingly executed through tablets or Skype. Eventually care at a distance will be vital in care, as the group of older people is growing rapidly. See also figure 6 on page 13.

'Nowadays we have the technology that allows patients to manage their own health. Digitalisation creates different and better collaboration and communication between healthcare professionals and patients.'

Hyleco Nauta, director eHealth Innovation at UMC Utrecht

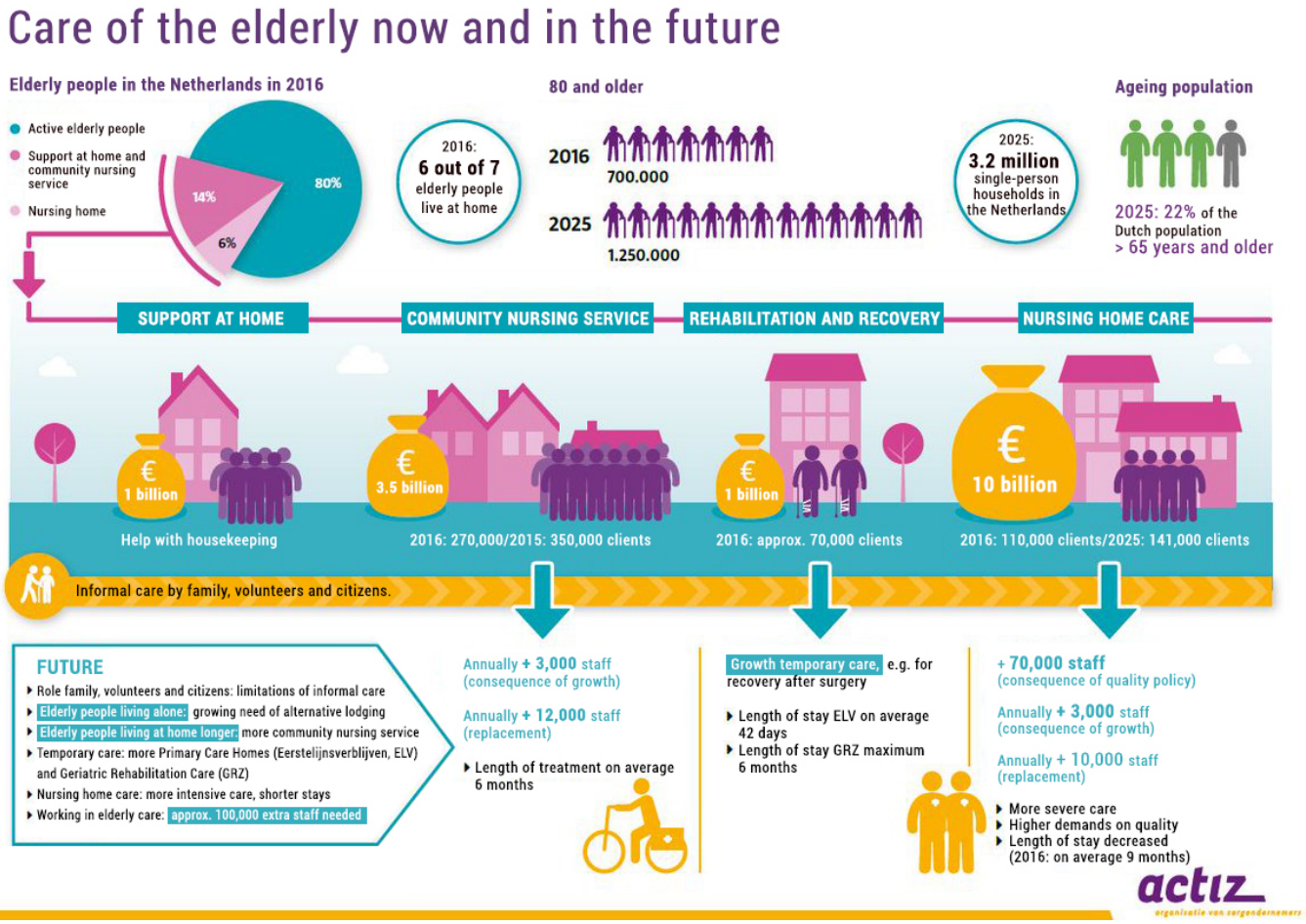


Figure 6. Care of the elderly now and in the future (source: "Feiten en cijfers overzicht", www.actiz.nl).

Basic condition: digital closeness

From our interviews with representatives within the healthcare sector we have deducted a basic condition for care at a distance: the digital closeness of the doctor. Nauta: 'A patient who lives in Alkmaar and who is treated in Utrecht likes the idea that the medical specialist is monitoring him or her. We are actually able to do so because of our online connection with our patients. The contacts last shorter than before but also take place more frequently. In the past, we only had face-to-face contact during visits to the polyclinic. If, for instance, a patient with juvenile rheumatoid arthritis had any physical complaints in between visits, these would usually be forgotten by the time they went to see their doctor again. Now we are able to see – through apps – when particular complaints occur, offering a more complete view of our patients. In combination with the EPR this allows us to offer more personalized advice and therefore better care. The moment an ALS patient starts to eat less, the speech therapist, occupational therapist or the dietician can develop a solution. We used to follow a protocol with fixed stages, but now we can offer customised care as soon as a condition changes. That is an important development.'

Better perception of the patient

Does more interaction put more pressure on doctors? Not necessarily, according to Nauta. 'Doctors tell us they would like to experience the added value – a better perception of their patients. Also, they'd rather not experience the burdens of change. This is why we have decided to embed the processes into their working environment, enabling them easy access to patient data without having to log in for every separate process.' UMC Utrecht has also chosen to organise the 'inside' of the hospital differently, for instance by having nurses perform more preparations, and by monitoring more often. 'We will be able to react differently: more watchful, maybe more multidisciplinary, in collaboration with e.g. the GP. This creates a model with other processes and types of collaboration.'

Chapter 2: Data collection and data management

Soon, patients will be allowed to withdraw their own healthcare information digitally from healthcare professionals. This is the first stage of the self-learning data cycle: data is being generated through e.g. the EPR, various wearables, sensors and apps, and – eventually – from their own DNA. All this information contributes to the ongoing development to "being healthy and staying healthy". But how rapidly does this first part of the self-learning data cycle actually take place? Are there any challenges? And what has the healthcare sector been saying about this so far?

A short flashback

Our 2015 publication contained a chapter on the game changer Quantified Self in which we claimed that citizens would increasingly be collecting data about their own health – through apps, wearables and access to their EPR. The next step would be that people would wear digital measuring instruments permanently as an integrated part of their body (internables or insidables), although this is actually an ethical issue that deserves more attention. We expected this development to explode in the years following 2016, first with chronically ill patients who would switch to wearables, then with healthy people who would like to remain fit using fitbits, and then the rest of the population would follow. In short: a shift from sick-care to healthcare. We also mentioned a number of challenges, such as reliability of wearables and data privacy and security. However, we expected these issues to be solved in the years following 2016.

Sensors are everywhere

To measure is to know. In all industries the rise of Internet-of-Things applications is visible. From "smart" offices and homes and from self-driving cars to retail applications that help customers search for products (in physical stores) and extra product information[6]. Within healthcare, the use of wearables and apps is also on the rise. For instance, a few years ago eight young professionals travelled through our country in order to show patients and professionals new wearables and collect their reactions. One of these wearables was the smart bandage by Vital Connect which is used to help the mentally handicapped, mental health patients, and the elderly[7]. A Belgian start-up developed a smart bracelet that allows older people to live in their own homes longer and contact healthcare professionals in case of an emergency or a fall.[8]

Investing in technology

Hospitals experiment with wearables for e.g. chronically ill patients. Healthcare insurance companies are interested in wearables as well. In chapter 1 we described the HartWacht, a project initiated by Zilveren Kruis, FocusCura, and CCN. The results of our survey confirm that the healthcare sector is open-minded towards wearables. Figure 7 shows that the majority of the respondents invests heavily in new technological developments (including Quantified Self) in order to meet the future need for healthcare.

Do you recognise these technological developments for healthcare? (n=91)

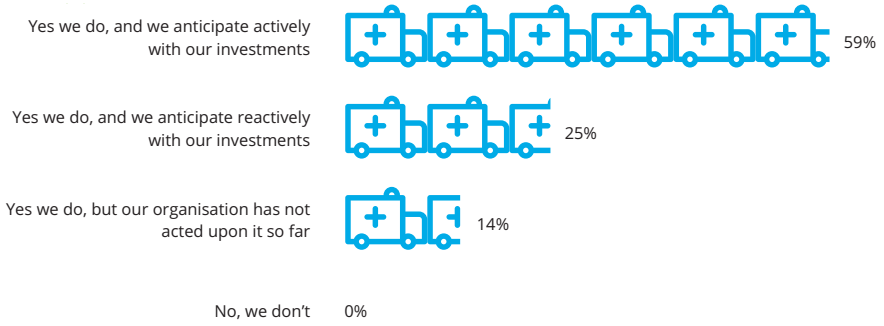


Figure 7. Investing in technological developments.

Self-assessment: unstoppable

One of the hospitals that is experimenting with wearables is UMC Utrecht. For instance, bandages with sensors that measure various vital functions are compared in quality and user friendliness, and are also compared with the results of conventional devices. Nauta: 'This is in fact an IoT device. It is attached to the body for continuous monitoring. The first step is that we use them in clinical practice, the second step is using them at home. This development is unstoppable.' Meander Medisch Centrum also experiments with the reliability of wearables. De Reij: 'We have not yet applied self-assessment on a large scale, but we do use it for e.g. COPD, diabetes and heart failure.' This confirms our earlier predictions – at first, self-assessment is mainly aimed at patients with chronic diseases.

Self-assessments in 2016

The percentage of Dutch people measuring their own fitness and health condition by means of online or mobile applications last year, is 13%. There are obvious differences between age groups. In age groups 15-19 years old and 20-29 years old, the percentage is 21%. For age group 30-39 years old, this is 15%. The higher the age, the lower the number of people measuring their own fitness and health condition.

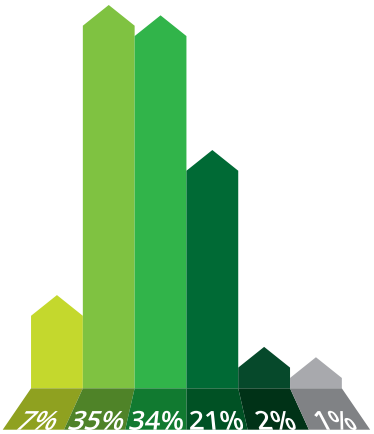
(Source: "13% of Dutch people measure their own condition and health", Gfk, 28 September 2016.)

Reliability and responsibility

The next step is an increasing use of fitbits by healthy people who want to remain fit. This trend is also on the rise, especially among younger people (see also "Self-assessments in 2016").

Gerrits encourages self-assessment. 'It's great when people monitor their own weight and other health data in order to manage their health. We empower them through our Actify platform.' The last stage of Quantified Self application – which we predicted would be reached around 2025 – is that wearables and apps are used for all sorts of conditions. Before then, we need to solve a few issues, such as reliability of and responsibility for the collected data. For instance, is the evaluation of medical data based on self-assessment by the patient acceptable, or is there an unacceptable risk of a wrong indication?

The respondents in our survey are divided over this question (see figure 8). About one third of them has no problems with self-assessment, but another one third highly doubts its reliability, and a small group thinks it is unacceptable.



- Strongly disagree
- Disagree
- Do not agree or disagree
- Agree
- Strongly agree
- Don't know

Figure 8. Evaluation of medical data based on self-assessment remains an unacceptably high risk for a wrong indication.

Encouraging proper use of wearables

One of the basic conditions for reliable data – apart from reliability of the device – is that citizens are able to use the wearables and apps properly. This is first of all the responsibility of medical science and suppliers of wearables, who should collaborate to enable more accurate assessments within the available technological opportunities. The devices should be easy to use for consumers/patients as well as healthcare professionals. Also, it would be convenient if the patient took responsibility for consistent use of the device, says Nauta. 'I think we should develop new social contracts in order to arrange for this. Although legal parameters should not be leading. Doctors must provide their patients with the appropriate devices and consider how we can encourage them to

Experiment: older people and iPads
How do you encourage patients who have no or hardly any experience with computers, to use an iPad, for instance to contact their healthcare professional or family, or to look up nutritional information? One of the partners of UMC Utrecht (FocusCura) has experienced that iPad usage can increase if a bingo app is installed on the iPad. Because patients liked playing bingo on their iPads, they learned how to use their devices and other apps on their iPads. Hyleco Nauta: 'Never underestimate the human urge to play.'

change their lifestyle and feel responsible for a proper use of the wearables.'

UMC Utrecht has been experimenting in this field for a while, along with HKU (Hogeschool voor de Kunsten Utrecht), using experiences within the gaming industry (see "Experiment: older people and iPads"). According to Kimpen (Philips) it would be recommendable if there was a system in the Netherlands that would help patients to transfer their data and feel ownership for their own data. 'Then the patient would decide who can view and enrich the data, from hospitals to GPs and physiotherapists. Unfortunately, no one makes the first move. Philips obviously can't, but we can deliver the tooling, on our own or in collaboration with other parties.'

Privacy

Working with wearables and apps and access to/management of one's own patient record implies dilemmas in the field of privacy.[9] Dilemmas that need to be solved in the next few years in order to accelerate the adoption of Quantified Self. This is confirmed by our survey results. The respondents are strongly divided when it comes to privacy (storing specific personal data). For instance, when it comes to the importance of this data for the most effective treatment methodology. Of all respondents, 45% indicates that an effective treatment based on a patient's profile is of less importance than patient privacy, 32% considers an effective treatment more important and 22% is in doubt (see figure 9). With the interviewees, privacy is top-of-mind as well. Gerrits: 'It is better to be safe than sorry.'[10]

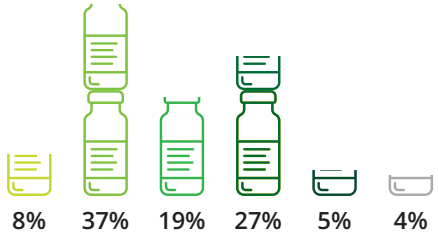


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Figure 9. An effective treatment based on a patient's profile is more important than patient privacy.

Don't board up

Caution is wise, especially in view of the new European privacy law which enters into force in May 2018. But privacy can never be an excuse for lack of innovation and boarding up may not be the proper answer. See also the paragraph on "Clever solutions" in chapter 3. What matters when it comes to privacy is: how do you guarantee privacy at an acceptable level – and what is "acceptable" in which case? Nauta: 'Privacy is highly valued, so we need to be very careful. But that is no reason not to innovate. You will find out what works and what doesn't – with the patient's consent, of course.' Privacy-by-design within innovation is a very powerful solution as well. When applied consistently and correctly, it can guarantee that the right privacy measures are taken – and implemented - in time.

Say what you do and do what you say
From a privacy point of view, it is essential that data streams are easy to monitor and that they offer transparency to the patient who wants to be in control. Compliance with the – often poor – regulation is important, but 'saying what you do and doing as you say', for instance about data collection and data usage by institutions, is crucial. This is also true for algorithm management (see chapter 4). Algorithms, like data, are not controlled or regulated by law and regulations. In order to be considered reliable, it is important that healthcare providers are clear about what they do and what they don't.

(Source: "Preadvies VGR 2017", 17 February 2017, and "Quantified self en zorgplatformen: wat moet en wat kan?", ICT&Health, October 2017).

'Within 60 years world population has grown from 2.5 billion to 8 billion. At the same time, life expectancy has almost doubled worldwide. As a result, the number of chronically ill patients has grown enormously. That in itself makes it impossible to continue our current healthcare system.'

Jan Kimpen, Chief Medical Officer at Philips

Who is responsible for data security?

Another dilemma is also related to privacy: who is responsible for patient data security - the patient or the healthcare institution? Again, the respondents and the interviewees are strongly divided. Of all respondents, 41% claims that patients should not be responsible. Almost 30% thinks they should, and another 30% is not sure. See figure 10.

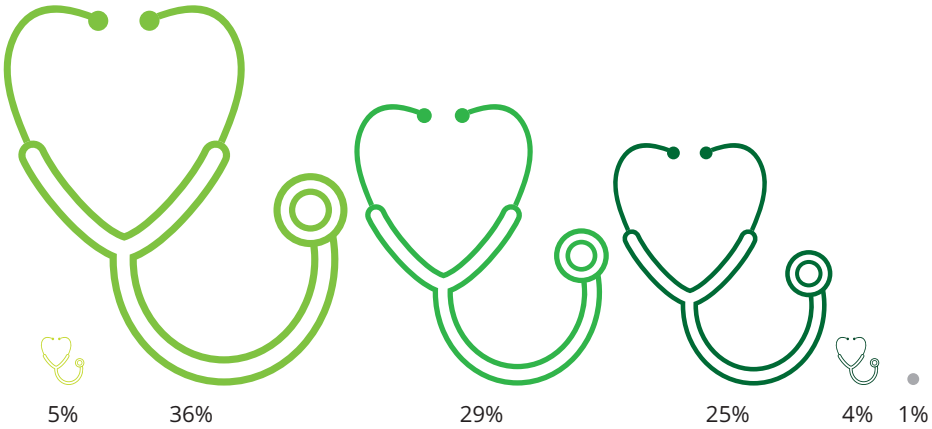

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Figure 10. The patient is responsible for their own data in case of care at a distance.

In our opinion, if citizens use apps themselves, health providers cannot be responsible, except when the health provider offers the app as a service. But that responsibility should be explained thoroughly. Most interviewees agree and expect citizens to be able to handle that responsibility. Kimpen: 'After all, people are much more careful with sharing their bank account information than with party pics on social media.' Also, the public is regularly informed about internet security by several parties. Awareness is crucial, especially since there is still so much ignorance in the field of information security. 'Don't open phishing mails, do not use unidentified USB sticks. As suppliers, we supply warnings about inaccurate use of our products as well.' De Reij is the only interviewee who is not convinced. According to him, security is challenging enough for organisations – so it will be even more difficult for citizens. 'How well secured is your computer?'

Chapter 3: Data transfer

Following the self-learning data cycle, the second stage is data transfer, for which digital platforms appear to be an appropriate solution. These platforms (like Uber and Airbnb) have disrupted many industries in the last few years. Health platforms are on the rise as well, or so we wrote two years ago, largely driven by the patient's need for self-management. So what has happened since? Has the trend developed? Are there any barriers, and if so: which ones? And how does the health sector feel about digital platforms?

A short flashback

In our 2015 publication we discussed the rise of digital platforms in various industries. We also predicted that these platforms would transform the healthcare sector. Why? Because (healthcare) consumers have acknowledged the benefits of platforms in other industries and would like to experience these benefits in the healthcare sector as well. We explained that this type of innovation often develops exponentially: at first there is limited growth, leading to underestimation by the establishment. However, as soon as the tipping point has been reached, developments take place at a much higher pace, the establishment misses out and the industry transforms dramatically. Within the healthcare chain this implies fragmentation and unbundling. Large hospitals will provide acute and highly sophisticated care. Around these hospitals, a circle of a vast number of specialised clinics will arise. The next step will be healthcare internationalisation, with healthcare providers competing on a global level.

Where are we now?

One thing is sure: we have not yet reached the last stage of exponential growth. Still, a majority of respondents think that within three years, digital platforms will be the critical connector of demand and supply within healthcare (see figure 11). They expect that secure data storage and processing of data streams will become a core process for healthcare providers (figure 12).

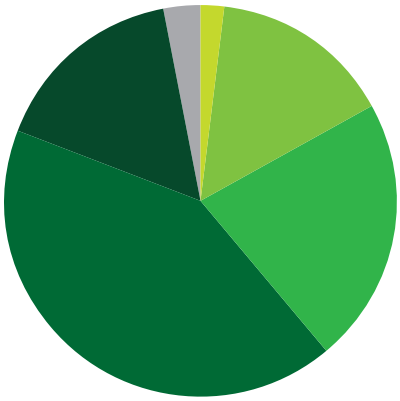

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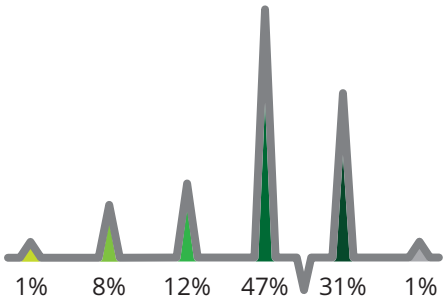
Figure 11. Digital platforms will be the critical connector of demand and supply within healthcare.



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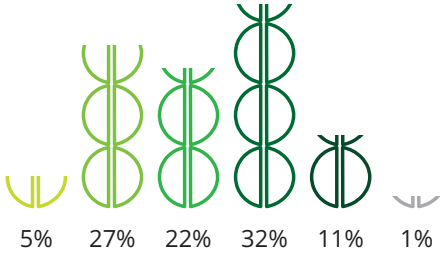
- Strongly agree
- Don't know

Figure 12. Secured data storage and processing of data streams will become a core process for healthcare providers.

There are doubts as well. The choice between waiting until communication platforms are fully secure or offering improved cure and care already through open media (between healthcare provider and patient) is tough. About 43% of the respondents would prefer open media, 32% would rather wait for full security and the other 23% cannot choose between both options (figure 13).



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- Do not agree or disagree
- Agree
- Strongly agree
- Don't know

Figure 13. We should offer improved care now and not wait for a fully secured communication platform in the future.

Use cases in an international perspective

Why the doubts? Healthcare institutions are afraid of patient data being out in the open. Which is completely understandable, but is it fair? To a certain extent, yes. However, we are convinced that secured data transfer is in fact possible. We see examples of this in the banking world, but also in healthcare – in other countries where a national system has already been successfully implemented. In 2012, Denmark started to enrol a national EPR. This system allows all patients to have their own records that they can view and which they are able to share with healthcare providers they themselves approve of. Estonia has a similar system, and Ireland is working on one.[11] Moreover, on a European level there are investments in platforms (and agreement systems) for healthcare institutions and other parties to collect, edit and transfer data.

Restrictive head start

Apart from that, is 100% security really necessary? From hacks of various renowned organisations we know that full security is an illusion and much too expensive. It is far better to apply suitable data security and expand it with types of monitoring that inform the organisation immediately when something happens, so the organisation can take immediate action and make improvements. In many African countries, digital developments are taking place at a much higher pace than in our country. And not just in the banking world – where mobile payment is the norm – but also in healthcare. Doctors are so scarce that security and privacy are considered less important than the actual care itself. In our part of the world, we have to deal with a restrictive head start. De Reij: 'We will never be able to fully prevent all risks. We know there are data leaks, we know that data theft, data hijacking and data manipulation can take place. We should absolutely take this seriously, but it should not hold us back.' It is better to learn from incidents and improve measures from there.

Innovation in healthcare

In April 2017, an interdepartmental policy research (IBO) was published about the most effective government policy for the advancement of effective innovation in healthcare and its implementation. The report focuses on both process innovation and system innovation. In the IBO, special attention is paid to removing barriers for innovation. The role of the government is described in three variants: facilitating, encouraging, and intervening.

(Source: 'Vernieuwing in de zorg, zorg voor implementatie', Interdepartementaal beleidsonderzoek, 24 April 2017.)

Barriers

In our opinion, the biggest barrier for data transfer in Dutch healthcare is the question who should invest in it. The government has created funds to further shape e-health and connectivity, but not much has happened since. No one seems to be taking the lead. Another issue is competition within healthcare. This has created more cost awareness, but it is also a barrier for sharing the 'new gold': data. Why invest in interconnectivity with another institution when you are each other's competitors in some ways? This in combination with the fact that there are no budgets available within these institutions for large-scale collective investments, means it is hard to have a financially sound organisation. It requires a more active role by the government, who can use various means to promote collaboration among healthcare providers. However, there are signs that the government is

taking a more active role, for instance the interdepartmental policy research that was published early this year (see also 'Innovation in healthcare' on page 20).

Happy patients, happy professionals

Still, data transfer offers crucial benefits, such as happy patients and happy healthcare professionals. An increasing number of patients request access to their own medical data. Also, they object to unnecessary loss of time due to travel and waiting rooms for a ten minute talk with their doctor. Hospitals can stand out with improved digital services for their patients. See also chapter 2. Health professionals themselves are transforming as well – the group of doctors who want nothing to do with digitalisation is rapidly declining. Contemporary healthcare professionals look upon technology as a means to improve their services. They have grown accustomed to digitalisation in their hospitals, so the next step – data transfer – is relatively small.

Improved diagnostics and cost reduction

Kimpen acknowledges this. According to him, digital platforms offer many benefits: cost reduction, fewer talent issues, an answer to the increasing demand for imaging, and more accuracy. 'It is well known that one in five first-time diagnoses by pathologists are incorrect. Digitalisation can help them to pick up the right signals and increase the percentage of correct first-time diagnoses to 90%. This is very beneficial for their patients and themselves, and it also reduces costs immensely. This makes for an interesting business case.' He is convinced that trust is more important than a 100% 'waterproof' system and that barriers will be crossed sooner or later, because of the increasing pressure on the current healthcare system. 'One thing is certain: we won't go back to how we were. We simply can't.'

MedMij

MedMij is a system that will allow access to one's own medical data (data from fitbits as well as medical records) in a common personal healthcare environment. That environment is accessible through an app on e.g. a smartphone or personal computer. All parties within the healthcare chain collaborate within MedMij, including patients' associations, to build an agreement system. This could involve agreements on transfer formats, to clarify whether data refer to blood level or a brain scan, but it could also involve agreements about responsibility in the field of privacy and security. It is expected that MedMij will be ready for (general) use early in 2018. Parties are also working on unity of language. Data analytics can sometimes be less reliable due to a diversity of languages. Unity of language will solve that problem.

Lifting barriers

The barrier we experience now can be lifted through politics. Not by increasing laws and regulations, since we have enough of those already. What would help, are additional, specific measures. These could be embedded in a system such as MedMij (see 'MedMij' on this page). Also, more and more "smart" solutions are created to secure data streams. It would be a pity if the fear of incidents keeps us from a proper patient data transfer, since sharing these data would definitely make our healthcare smarter, more efficient and more effective. Which in turn is crucial to guarantee its continuity – in terms of costs, quality and accessibility – even when the demand for healthcare keeps increasing.

'Smart' solutions
Privacy and security issues require 'smart' solutions: instead of a focus on incident prevention (which often holds back innovation) it is preferable to be alert, to monitor what happens in and around a network, and to adequately react to any changes. In short: a shift from prevention to detection, and from rigid to agile. Also, it is important to realise that privacy and security are strategic issues that should be the focus of the organisation from the very start, and not merely when an incident occurs.

Interim solution

At UMC Utrecht, a common standard is highly encouraged, but also considered to be a complicating factor – since there is no such standard yet. For now, the hospital has chosen to optimise its own platform until there is a common standard. Other complicating factors are the complexity of the healthcare data model and the atomic organisation of the Dutch healthcare system. Nauta: 'In Utrecht alone there are 800 GPs, most of them with their own IT system. This also applies to Dutch hospitals and other parties. A standard will largely solve this problem. There will be parties who have a budget to create a solution. Other parties who do not, will follow.'

Digital highway

Both the respondents of our survey and the interviewees are convinced that digital data transfer – the 'digital highway' – through a uniform platform will become a reality. According to Gerrits, there will not be a single Dutch system, but there will most likely be a single standard to enable all parties to communicate with each other. 'The conditions for such a standard are already there. Eventually, we should be able to connect them. Since we are all convinced by now that this is an essential basic condition, I believe we are already on our way.' Nauta adds: 'It is still unclear what such a digital highway would be like, since market parties play such an explicit role in our system. I know at least six transfer platforms with about 100,000 users. This is why MedMij is so important. But I expect there will be a hybrid shape of some sort that will allow all platforms to communicate with each other. Apart from that, it is an administrative issue and it requires some guts.'

What is blockchain?
Blockchain is a digital ledger for transactions that is being kept by a network of organisations. These organisations all have identical copies of the ledger. All participants in a blockchain can view the transactions and add new ones with 'blocks' that are combined to a 'chain'. Once data has been stored in a blockchain, it cannot be erased or edited anymore. Every transaction is 'sealed' by cryptography. This is what makes blockchain technology highly secure and reliable.

Reliable data storage and data transfer: blockchain

Data transfer involves challenges in the field of cybersecurity and privacy. Data transfer should be reliable – information must be available to the right person and generated decently. This is where blockchain could come in, which is a protocol for reliable data transfer. However, it should first be clear what parties take responsibility to organise the use of blockchain and where the facilities for such a network should be set up. Nauta, Gerrits and Van Reij are optimistic about blockchain. Nauta: 'It is so universal. Blockchain is used to store transactions securely and it is decentralised, which makes it suitable for the healthcare sector. It is too early to invest heavily in this technology already, but we will certainly keep an eye on the developments. After all, the EPR is about to change from "momentary lapses" to an entire "movie". Blockchain makes changes more visible. We live in an era in which everything is online and real-time. If you can measure and store changes securely, you are able to improve your advice.'

'We can't afford to offer healthcare in the exact same way. There is a strong case for self-management.'

Olivier Gerrits, director Healthcare Procurement at Zilveren Kruis

Chapter 4: Analysing and enriching data

If we take the data cycle one step further, we get to the stage of analysing and enriching data. If we look beyond the data transfer between patient and healthcare provider on a case basis, towards the collection of all patient data, we can use those for research into various conditions. This creates an even deeper insight into the results of medication and treatments, allowing us to help patients even more. Can Artificial Intelligence (AI) play an important role already? And what about algorithms and cognitive computers – can they support diagnostics yet?

A short flashback

In 2015, we discussed the capabilities of cognitive computers, including supercomputer IBM Watson. Such computers are much more intelligent than traditional computers – they can calculate the results of unstructured data at an amazing pace and are able to think like humans. Based on Precision Medicine, we can generate such specific data for each patient and each case about condition, results and personal treatment program that we are actually moving towards personalized healthcare. We predicted that in the years following 2015, cognitive computers would be able to replace human labour that seemed irreplaceable at the time. Even in healthcare – both in primary processes and supporting processes (see figure 14). Within three years, mobile applications would be marketed that would enable citizens to diagnose for themselves. From 2020 onwards, these computers would be commonplace in healthcare, partly because of large-scale investments from high-tech companies, partly because this trend would be encouraged by patients (demanding even better care). Eventually, the role of the doctor would transform into that of an advisor.

Where are we now?

Were those predictions accurate? That is a tough question. It has only been two years and developments within exponential technologies are quite unpredictable. One moment it seems there is hardly any growth at all and the next moment the developments are rapidly evolving. It might very well be that next year we will come to the conclusion that the tipping point will occur later in time. On a global level, opinions differ strongly. Some parties are excited about cognitive computers that are already able to generate more accurate diagnoses than doctors in case of some oncological conditions. Other parties, such as the Mayo Clinic, claim that the well-known AI-icon in this field, IBM Watson, has the IQ of a two-year-old. At the same time, we see that the adoption of cognitive computers in other sectors, such as the banking world, increases rapidly. And parts of the AI technology, e.g. smart algorithms, are already being used more often within healthcare. For instance, at UMC Utrecht. Nauta: 'We use wonderful algorithms for more insight into the risk profiles for both doctor and cardio patient. The patient can actually gain insight into the result of interventions for longevity.'

Data model T-cell leukaemia
From 9 till 11 June 2017, Deloitte was one of the contestants in the Beyond Banking Hackathon organised by ABN AMRO. Our Make an Impact team won the Social Impact Award with their data model that can improve the treatment of children with T-cell leukaemia and even save lives.

More personalized through analytics

According to Nauta, analytics is a major boost for personalized healthcare. 'We could use Watson-like systems, but we actually choose various kinds of applications. In some fields, like cardio, healthcare has been so protocolled that we only work with algorithms. In other domains, such as neonatology, there are no large-scale try-outs. It is interesting to develop algorithms for those fields.' Therefore, we still expect a breakthrough in specific, limited areas in the short run.

The use of analytics is not only increasing in cure, but also in care. For instance, by implementing pilots (or 'experimental gardens') "Focused prevention", which deal with solitude (see also chapter 5). Nature and extent of solitude are mapped, enabling predictions about solitude in the future. The data also offers insight into events and characteristics that cause or intensify solitude, offering insight into which populations are vulnerable.

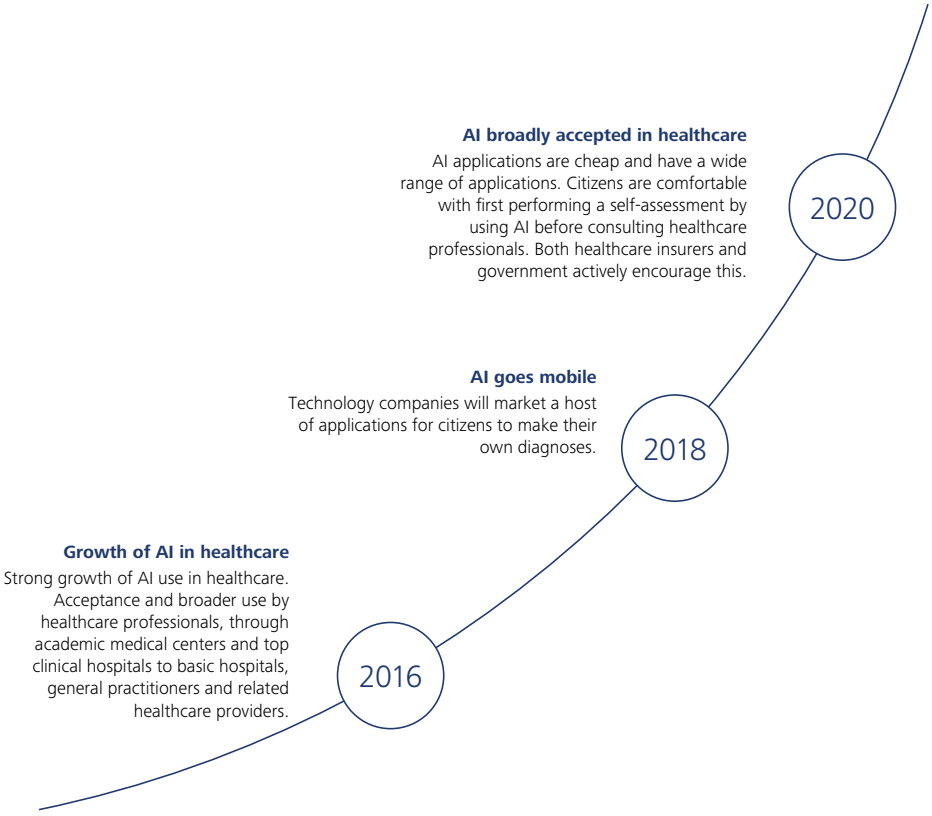


Figure 14. Predicted exponential growth of AI in healthcare. (Source: "Personalized Health: Tomorrow's healthcare", Deloitte, 2015.)

Improved diagnostics?

Are patients already experiencing the benefits of AI? Do their doctors use AI-systems that help them make the right decisions? No, not yet. IBM Watson offers interesting information for the treatment of a number of American oncology patients, but not for i.e. people who suffer from pneumonia. Maybe the predictions in figure 14 were a bit premature after all. However, Philips is already embedding algorithms into medical equipment to help doctors with diagnostics. For instance with personalized guidelines. Also, in the United States pattern recognition for large amounts of data sets is being developed. These patterns cannot easily be identified by humans – or do not attract their attention often enough. Based on these patterns, doctors can improve diagnostics.

Bottlenecks

Are there any bottlenecks for the large-scale application of AI in healthcare in the short run? Yes, there are. First of all, technology is not yet mature enough to diagnose all conditions. Secondly, applications (such as IBM Watson and similar computers) still need to be made accessible and optimised for specific contexts. IBM Watson was localised for the Dutch language only last year. It will take a while before it is applicable for the Dutch context and market.

Another issue is combining data sources within an institution and between institutions. For e.g. diabetes, patients need to be divided into groups. There is a group of older people who appreciate quarterly contact with their doctor, a group of young people who want to know what to do and how to do it so they won't need any help anymore, and there are groups that are used to consume large amounts of sugar based on their cultural background. In short: groups with the same condition who need different treatment plans that require data from both hospital and GP. As long as data transfer and data comparison is not optimised, the results in this AI-field will lag behind.

Unstoppable

Can AI developments be stopped? No – according to us and many within the healthcare sector. De Reij: 'Technology needs to reach a higher level of maturity and there is still some resistance, especially with the older generations that are often afraid of computers that are better at diagnostics than the doctors themselves. But I don't think AI can be stopped. Doctors will not disappear, but eventually fulfil more of an advisory role.' De Reij thinks it is 'better to experiment with and grow AI outside of the traditional hospitals. Within existing legacy environments it is often too complicated to experiment.' He is impatient for a real breakthrough and AI implementation. 'In my opinion, this will highly improve healthcare. Wouldn't it be wonderful to discuss the results of the data with patients and explain the consequences of a particular type of tumour, such as life expectancy, life quality and recovery of body functions?'

Chatbot for north-central London
NHS 111 (the non-emergency medical phone line) will trial Babylon's AI-powered chatbot 'triage' service as an alternative to the NHS's 111 telephone app in north-central London. Previously, the team served roughly 1.2 million people, each of whom cost the NHS £15 every time they call 111. None of the staff are trained medical professionals. What they do when you call, is refer to a booklet of symptoms, and tell you what to do next. The AI-powered chatbot will improve service to patients both in speed and quality and reduce costs by 100%.

(Source: "Primary care today and tomorrow report: Adapting to survive", Deloitte UK, 2017.)

Huge impact

Gerrits adds: 'Self-learning systems are going to have a huge impact on the healthcare sector. For one, because every day brings so much new knowledge, for instance in the field of global professional literature. It is impossible for individual doctors to keep up with and use it for better treatment.' Zilveren Kruis has not yet embedded AI into its processes, but does work with models for e.g. claims that are similar. 'Eventually we will use systems that act between computer and patient directly.'

Van Rooy is positive as well. 'There are companies that collect data for certain conditions on a global scale. Some Dutch hospitals collect data from 100 to 500 patients, but they do so from tens of thousands. That is an enormous contribution to personalized medicine.' She is impressed by self-thinking systems and robotisation, which allow healthcare professionals to spend more time on the human dimension within healthcare. 'Some robots, like Da Vinci, are already more skilled than doctors and are able to improve the quality of life. For instance, they can save a crucial nerve during prostate surgery.'

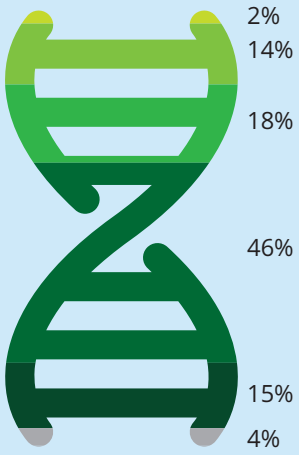
Nauta concludes: 'Sometimes patients are referred by other hospitals when it is already too late. It would be amazing if we could improve in this area by developing and sharing smart algorithms, and use algorithms that are being developed by other parties within the chain. This would enable us to refer patients in time. That would require a different type of dedication – hospitals collaborating in projects.'

'We can definitely see that data transfer is improving, but so far a common approach to the patient's issues is lacking. Therefore it is much more difficult for patients to be in control – if they are capable of being in control at all. We must find a way to facilitate collaboration between parties if we want to offer better and more affordable healthcare.'

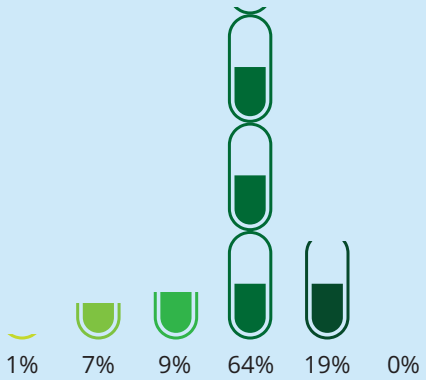
Frank de Reij, Chief Executive Officer at Meander Medisch Centrum

Research and enriching data

The data that is generated from all patients can be used for research into various conditions. This is also part of the self-learning data cycle. With Big Data, unknown and hidden information can be discovered – information that was not even considered before, but that could be useful for society, practice or healthcare. The use of Big Data is at odds with the current scientific approach based on hypotheses, but is gaining in popularity (see also "Ethiek in het onderzoek van de toekomst", ICT&Health no. 3, June 2017). A majority of respondents of our survey (61%) agrees that the core function of Research in Healthcare should have free access to health data, since this will facilitate research in healthcare. Also, a large majority (83%) actually feels that technology and data management should be an essential part of healthcare education (figure 15).



The core function of Research in Healthcare will benefit most from free access to healthcare data



Technology and data management are an essential part of healthcare education

- Strongly disagree
- Disagree
- Do not agree or disagree
- Agree
- Strongly agree
- Don't know

Figure 15

Chapter 5: Service concepts, funding formulas and financing

What are the consequences of the self-learning data cycle for service concepts, funding formulas and financing within healthcare? What (financial) opportunities do prevention and care at a distance offer? What funding formulas and financial instruments drive innovation? And is Value Based Healthcare finally coming within reach?

Prevention

The word 'prevention' has gained momentum within healthcare. It was one of the main topics during our interviews. Naturally, prevention and care at a distance are related, although prevention comes in more shapes. For instance, current and future costs can be reduced if medication and surgery are – when applicable – replaced by a healthier lifestyle. Van Rooy is impressed by the Sint Maartenskliniek. 'Initially, they were heavily criticised by the media. What if a patient walks in with lower back pains and the doctor says: "You are overweight. You should lose at least twenty pounds. That will probably reduce your back pains severely." Many patients will get angry, since they expect to have surgery. However, they get a free membership for the gym and that is it. When they return after six months, they may not have lost twenty pounds, but they are a lot fitter and don't need surgery anymore. "Please continue your membership." This approach was initially considered by many as severe selection, but it actually helps to prevent increased lower back damage as a result of surgery."

Prevention and care at a distance
FocusCura focuses on innovation in healthcare. Through telemonitoring (by tablet) patients with kidney disease are offered home dialysis. COPD patients and patients with heart failure can do home measurements. These measurements are monitored by the local nurse. If thresholds are exceeded, the pneumonologist is contacted. This allows the local nurse to be more efficient and spend more time on monitoring in order to prevent deterioration of health for all patients. This approach also offers the additional benefit of more collaboration within the health chain (GPs, medical centers and hospitals).

(Source: "Gerichte preventie: meer leefplezier, minder kosten", GovLab Deloitte, 2017.)

50% decrease hospitalisation

Kimpen mentions a successful telehealth program that was started with Banner Health, one of the largest non-profit hospitals in the United States[12]. Among its patients was a relatively small group of chronically ill people who required a lot of care. "They would visit the emergency room every week. We provided them with scales, blood pressure monitors, and tablets which they could use to ask questions but also for video consults with their doctor. We also involved their own GP – which was a basic condition for them to enter the program. At the background, healthcare professionals in the hospital could monitor how patients were doing by means of specially developed dashboards. This allowed them to prevent deterioration in an early stage. After two years, the number of hospitalisations had decreased by 50%, readmissions by 75%, visits to the emergency room by 40%, and costs by 34%.'

Reducing solitude and costs

In cure and in care, prevention is used more often. For instance through our pilots (or so-called "experimental gardens") "Focused prevention", that have been implemented within four towns already.[13] One of them is the municipality of Maassluis, where a preventive approach is being used to reduce depression and solitude – and by this, future healthcare costs. In Maassluis, the number of inhabitants suffering from these conditions was relatively high. By paying attention to these issues with various parties (including inhabitants and key figures within communities), the cost of healthcare will be reduced eventually. This approach is fully data-driven, from policy to focused interventions. See also chapter 4.

Health continuum

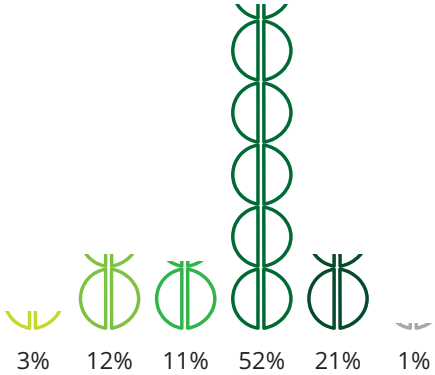
Care at a distance and self-management have other benefits to offer – citizens don't go from healthy to being sick and back again, but are in a 'health continuum' where health is always top-of-mind. Kimpen: 'Being ill interrupts your life and your job and creates anxiety at the workplace. It is much more comfortable if you can just continue with your life, even though you are not feeling well. We don't want people to be part of a healthcare system, but allow them to move within a health continuum where they can manage their own health without becoming a patient. Instead of rushing to the hospital they are continuously aware of their health condition.'

Extra costs?

Care at a distance, prevention and self-management by the patient obviously reduce costs, for instance those of emergency admissions to hospitals. However, some people claim that this approach can also increase costs in some cases – wearables are expensive and self-management could cause a massive influx of health consumers with less serious conditions who want to be treated immediately. This is a plausible scenario, but we don't expect the costs to outweigh the benefits. The interviewees agree. Nauta: 'Based on case studies we are convinced that care at a distance is profitable, not only because of decreased hospitalisation, but also because of personalized medicine which will reduce medication drastically.'

Funding formulas

New service concepts and business models like prevention and care at a distance imply new funding formulas. The use of e.g. e-health applications is restrained by the current funding formula. This view is confirmed by our survey results (figure 16).



- Strongly disagree
- Disagree
- Do not agree or disagree
- Agree
- Strongly agree
- Don't know

Figure 16. Breakthrough of e-health applications restrained by current healthcare funding formula.

Most respondents (75%) feel the need for a new revenue model and new types of financing (figure 17). They indicate that the current types of collaboration within the chain are obstructions, are aimed mainly at production, do not offer sufficient incentives for investment in innovation, and – last but not least – do not meet the needs of the patient (figure 18).

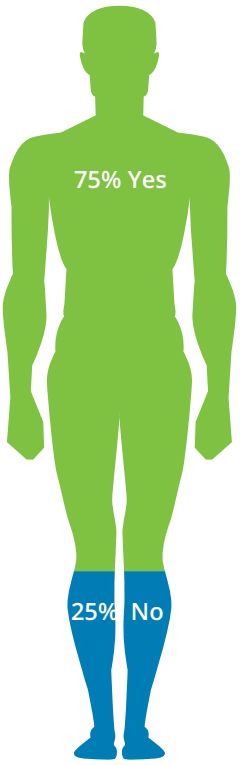


Figure 17. New revenue models and financing within healthcare: wanted or not? (n=91)

Why do you feel the need within your organisation for new revenue models and financing? (n=68)

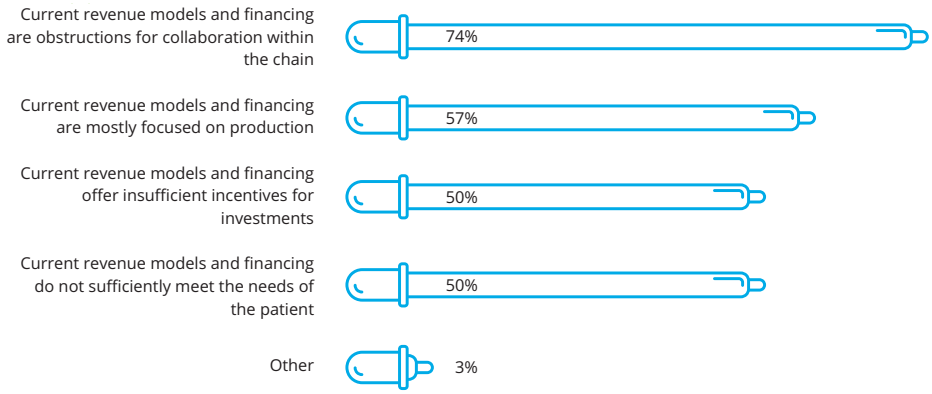


Figure 18. Arguments for new revenue models and financing.

Different funding formulas needed

The results of the survey are confirmed by the interviewees. In general, executives of healthcare institutions are not anxious to be in the front row, since the funding formula is still based on the number of treatments. De Reij: 'Such a system is not very beneficial for innovation – it mainly encourages more treatments. That is something we should discuss. Bundled payment within the entire chain, for instance for the treatment of breast cancer, could be a solution well worth considering.'

Gerrits is also positive about bundled payment for care at a distance. However, he expounds: 'There is no ultimate funding formula. Every system has its own pros and cons. For population funding, it can be tempting to work with waiting lists. Payment based on results might lead to severe selection.' His advice: 'Think about what you would like to achieve within the next few years and what you need. Optimise quality. Lump sums might work, sometimes competition is better, and for chronic conditions bundled payment-like solutions will do.'

Transition arrangements

In order to give healthcare providers the time to switch to another funding formula than the current one, Zilveren Kruis offers transition arrangements. 'In the past, insurance companies have not always facilitated sufficiently. It is not fair to tell healthcare providers to stop offering certain services or offer them in a different way – to save costs – and then add that the cancelled services will not be reimbursed anymore. Healthcare providers have fixed costs. We offer them transition arrangements instead.'

What also works out well, is that insurance companies increasingly join forces to support innovation. 'If a particular innovation obviously only offers value to our clients, we operate on our own. But if this innovation could improve Dutch healthcare, insurance companies should invest as a group. Fortunately, the number of use cases is growing – such as the wearable artificial kidney.'

Real estate: reduction of square metres?

The number of square metres is a crucial debit entry. However, more and more people claim that hospitals will be much smaller in about ten years. Last year, Gupta predicted that as soon as in 2025, hospitals will need 40% less capacity – based on current technology only, not taking into account new technologies. NVZ reaches a similar conclusion in their vision document "Care for 2020"[14]. The interviewees also expect fewer square metres will be needed in the coming years. According to De Reij, policlinics and day treatment offer the best reduction opportunities. 'A lot of routine work can be performed in other spaces or through video-consults.' Although this does not imply that hospitals will be much more affordable. 'Hospitals will always be expensive, since highly complex interventions will still be performed there.'

Different care and work processes

We expect that digitalisation will allow for a different organisation of care and work processes. The number of physical contact moments between patient and healthcare professional will decrease, and so will the need for actual presence at a hospital location. This is particularly true for supporting functions. Hospitals will become 'hot-floors' with facilities that are expensive or immobile and where medical specialists meet for complex interventions.

Number of beds and fluctuating demand for care

The growing number of chronically ill people (especially older people) will put more pressure on hospitals. At the same time, patient permeability will decrease because of lesser capacity in long-term care. This could lead to disruption of permeability in the chain. Hospitals and institutions for the care for the elderly (especially nursing homes) should consider how they can adapt the number of beds to the (fluctuating) demand for care. What helps is a detailed strategic real estate policy that is adapted to the local situation and potential (chain) partners.

New revenue models

Especially sophisticated healthcare institutions are interested in experimenting with replacing staff by technology – because it is cost-saving and because they expect that patients want to be more in control of their healthcare process. New revenue models appear that require healthcare providers to change their view on operational management. The government could enhance these developments and remove legal obstacles.

Financing healthcare

Financing healthcare is not restricted to banks anymore. New types of financing, such as crowdfunding for real estate investment, leasing, managed services, and bonds for private persons or foreign institutional investors attract attention, although bank lending is still leading. In long-term care we see a different situation. Increasing restrictions by banks on real estate investments, especially equity, cause healthcare institutions to look for alternatives more often. Since investors are interested in investments in real estate for healthcare, we expect an exponential rise of investors who are looking for these investment opportunities in the near future.

We are now awaiting the Senate's response to the bill Expanding investment opportunities medical specialist care. This bill will – under strict conditions - allow shareholdership and dividend in hospitals.

Value Based Healthcare

About twenty years ago, Value Based Healthcare was first introduced by Porter. In 2017, this concept is hotter than ever. We are convinced that once the self-learning data cycle has been completed, Value Based Healthcare can become reality. Based on an increasing number of data, treatments will be optimised and results will become more transparent. Especially when all parties that are needed for a particular treatment, can clarify to each other what 'value' they would like to create and what indicators are vital for a patient's health. Even though the data cycle has not been completed yet, the first changes are visible. Gerrits (Zilveren Kruis): 'In the past, discussions about costs and quality would always be about perceived differences in quality levels. Providers would try to convince insurance companies that their services were better than those of others. Now the discussion is much more about how we can create more value for the same price, or offer the same quality for less.'

Case: Siza's service concept and funding formula

Healthcare provider Siza has about 150 locations all over the Dutch provinces Gelderland and Midden-Brabant. Siza offers support and care to people with a physical, mental, or multiple disability and to people with non-congenital brain injury or autism-related impairment. This varies from support at home to 24-hour care in a special community and from treatment to outplacement. Siza aims to challenge people to push their own boundaries.

Rob Hoogma, Siza's Chief Executive Officer and founder of Academy Het Dorp: 'In our society, you can usually make your own choices, except when it comes to healthcare. This is true for all of us, but – oddly enough – especially for people with a disability, a chronic disease or some type of dementia. They unwillingly become dependent of others, from civil servants or behavioural scientists to nurses or family members. What we take from them as a society, is in fact quality of life: determining how to live your life. Why should we restrain them from making their own choices just because they have a disability?'

Loving care and technology

In order to give their clients more freedom of choice, Siza chose a different path about ten years ago. Siza's approach consists not only of loving care, but also of the use of technology and the development of a different kind of professional services, with the client as a partner. This has created innovative quality care and disruptive innovations in healthcare and housing. For instance, 'paswoningen' (tailor-made homes) were developed for people with a mental disability. These homes contain smart apps and applications, including a rotating kitchen, a movable wall, and eye-control/gaze interaction, as well as apps that help them through the day. This allows them to live their lives more independently. They don't have to wait for healthcare providers or family to help them, and make appointments whenever suits them best. This initiative was the basis for Academy Het Dorp in which businesses, healthcare professionals and clients collaborate to create successful innovations.

Hoogma: 'We test new ideas to find out what is feasible and what really helps people. For instance, if older people don't want to eat, they are often fed against their will. However, there is another approach as well – by bringing back aromas that remind them of their childhood. This will encourage them to eat and become more energetic.'

Data collection is essential

Data collection is an essential prerequisite for the development of these innovations. 'In the field of Quantified Self there are already solutions that no longer require the use of wearables, such as sensors in the ceiling that measure blood pressure. This creates a learning environment and eventually a prescriptive environment for our clients that encourages them for instance to open their curtains and become more mobile after a stroke.'

The technological solutions that are invented, are subsequently explored and tested. For instance, Academy Het Dorp has mapped at what moments during the day people depend on others, and asked businesses and clients what (new) solutions would help. At the moment, 20 projects have been selected, of which 10 are already viable options.

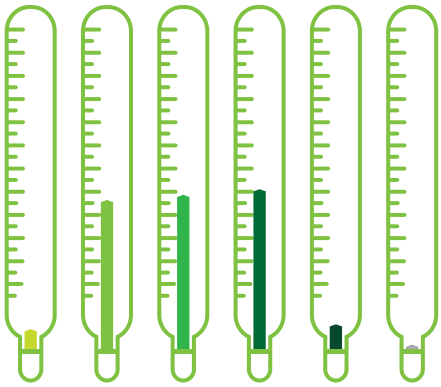
Funding

Siza often experiences the drawbacks of the current funding formulas. 'There is an impetus in our legislation that does not really help. Our approach to healthcare, which saves time, can save up to 20 or 30% of the costs and seriously increase client satisfaction. However, reimbursement by municipalities is based on the number of hours that healthcare professionals work, so we miss out on part of the funding. Moreover, prevention of intramural hospitalisation does not really appeal to them, since this requires more funding by municipalities. We need a different revenue model in order to improve our accountability. Fortunately, the ministry of Health, Welfare & Sport – both minister and civil servants – is beginning to see the opportunities that our approach has to offer.'

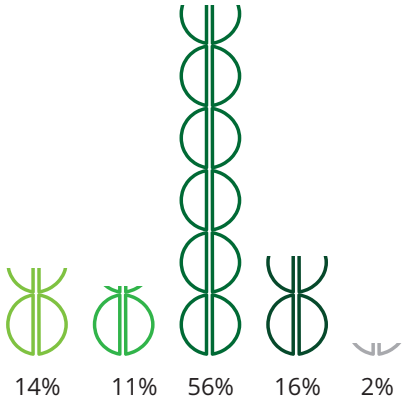
'For real innovation, and a societal breakthrough, government support is crucial. Take, for instance, the electrical car. If legislation had not been adapted, we wouldn't have had electrical cars. The government must take a stand towards private initiatives. Otherwise, the five healthcare insurance companies with the largest funds will determine what is going to happen. Do we really want that?'

Chapter 6: Moving on

In the previous chapters we described how we saw movement in all stages of the self-learning data cycle. The tipping point has not been reached yet, but this could change at any time in the next few years. After all, the complicating factors can all be solved. What could happen and how should the healthcare sector prepare itself?



My organisation is agile enough to adapt to (future) changes in healthcare



In order to respond to changes in healthcare a transformation of the current business model of my organisation is required

- Strongly disagree
- Disagree
- Do not agree or disagree
- Agree
- Strongly agree
- Don't know

Gradual or sudden?

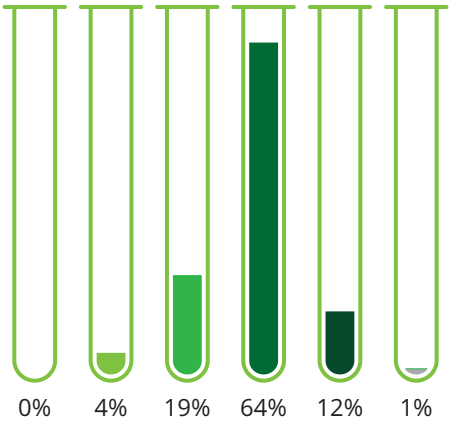
Most parties within the healthcare sector don't expect a tipping point followed by rapid transformation. They believe change will be gradual, for various reasons. For instance, Gerrits discerns three factors: little pull from patients (who are not yet aware of the opportunities), a limited push from the traditional sector, and huge entry barriers for new players, mainly caused by uncertainty about regulation – what profits are allowed and what are not.

Necessity

So far, the necessity for transformation was not particularly obvious – although all parties agree that something must change in order for healthcare to remain affordable, accessible and high-quality. In other industries, such as the telecom industry, customers often hire a new provider if they have complaints about their current one. This is more difficult within healthcare. Also, many patients are not yet aware of the opportunities – see also the limited interest in e-consults mentioned in chapter 1 and the contained rise of Quantified Self (chapter 2). Based on developments in other industries, we know that in order to reach the tipping point, three factors are important: convenience, benefit and trust in new developments. All these factors require patient awareness of what is available in the market. However, patient awareness is increasing, because healthcare providers like UMC Utrecht and Meander Medisch Centrum are experimenting with new applications and insurance companies are looking for inspiring use cases such as HartWacht (HeartWatch, see chapter 1). Convenience, benefit and trust will therefore probably increase rapidly. In order to reach the tipping point, critical mass is a prerequisite. If every healthcare institution would take responsibility to experiment, a larger part of the population will discover the opportunities of a new, digitised type of treatment. This will bring the tipping point closer.

Agility

Healthcare providers will probably respond to changes in the landscape in the coming years. Are all organisations agile enough for the imminent changes? A large majority feels that a transformation of the current business model is necessary in order to respond to these changes (figure 19).



I expect that new players (possibly from outside the sector) will play an important role in healthcare

- Strongly disagree
- Disagree
- Do not agree or disagree
- Agree
- Strongly agree
- Don't know

Figure 19. Agility of own organisation and changes in the healthcare sector.

New players

Figure 19 also shows that most respondents expect that new players (both from inside and outside the healthcare sector) will play a substantial role in future healthcare. The interviewees agree. This confirms our earlier predictions. Who are these new players? Some of them are from the telecom or high-tech industry. They have been considering for some time how to contribute to a smart and secured patient data transfer. These companies have large amounts of data and deal with them in a smart way. Other new players are tech companies like Google and Apple. For instance, Google is developing the AI-application Deepmind. And there is a rapidly growing number of clinics and start-ups that are able to position their services well. Big healthcare providers still deliver services in all fields. Such a portfolio of services is more difficult to sell than an institution that claims that patients can walk in early in the morning and walk out at the end of the day with a replaced hip. Many of those players are focused on prevention, others specialise in a niche market within the current healthcare sector.

New players in numbers

Numbers by zorgkaartnederland.nl support the impression that there are more and more new players within healthcare and that patients – especially from younger generations – often actively search for such companies.

- 4 million page views per month.
- 12,000 new likes per month in 2016. This is an increase of 30% compared to 2015.
- 800,000 unique visitors per month.
- 1,000,000 visitors per month in 2015 and 1,100,000 in 2016 – the number of visitors rises every month.
- 137,000 healthcare organisations and healthcare providers in 2016. This number has increased rapidly over the last few years, indicating there are new players.

British use cases

The Northumbria Specialist Emergency Care Hospital (NSECH), which opened in 2015, provides 24/7 specialist emergency care for seriously ill and injured patients from across Northumberland and North Tyneside. It has 337 inpatient beds covering a population of 500,000. The hospital has received nationwide recognition for restructuring and integrating emergency services with community based care and is viewed as the future model for emergency care in England. Clinical outcomes show a reduction of hospital admissions by almost 30% over the first year of operation. Another successful British use case is Babylon Health, a digital-based health company offering GP services that range from symptom checking, health monitoring to text-based e-consultations and same day face to face video consultations. In 2016, it had 350,000 registered users in the UK.

(Sources: "Vital Signs report" and "Primary care today and tomorrow report: Adapting to survive", Deloitte UK, 2017.)

Positioning

Especially younger generations are sensitive to well-positioned new players (see "New players in numbers"). Instead of visiting the nearest hospital they search the internet for the best option based on comparison, reviews, and other types of

digital pre-analysis. The new players often organise themselves in small groups and choose an almost fully digital business model. The only thing that is still physical, is the rented space where treatments are being performed. We often see that for financing their business they approach venture capitalists. So the fragmentation of the healthcare landscape, as mentioned in chapter 3 and in 2015, has already started. Eventually, we expect the landscape to look like that in figure 19: personalized and digital (see also the paragraph on real estate in chapter 5). This landscape is based largely on care at a distance, prevention, care from the community, AI, DNA profiles and many small niche players – and eventually internationalisation of healthcare. Complex surgery is performed by a few big players.

We are all patients, so it is going to happen

If patients demand a different service concept in the coming years, developments could take off even more rapidly. The use case of the role of the doctor underlines this. As soon as AI has reached a certain level of maturity, doctors will start checking more and more often what IBM Watson (or any other cognitive computer) has to say about the available digital patient data. Do these findings match those of the doctor? After a while there will be another shift, with patients entering their data first in e.g. the Watson Oncology Advisor and then checking the outcome with their doctor. The next step of course being that the doctor is only consulted for a second opinion.

Eventually, the patient has the final say and the healthcare landscape will change dramatically. Nauta concludes: 'It is not at all hard to imagine what the patient wants, since we are all patients, including doctors and the Executive Board of hospitals. This is why this is going to happen.'

The "hospital" of the future is personal and digital

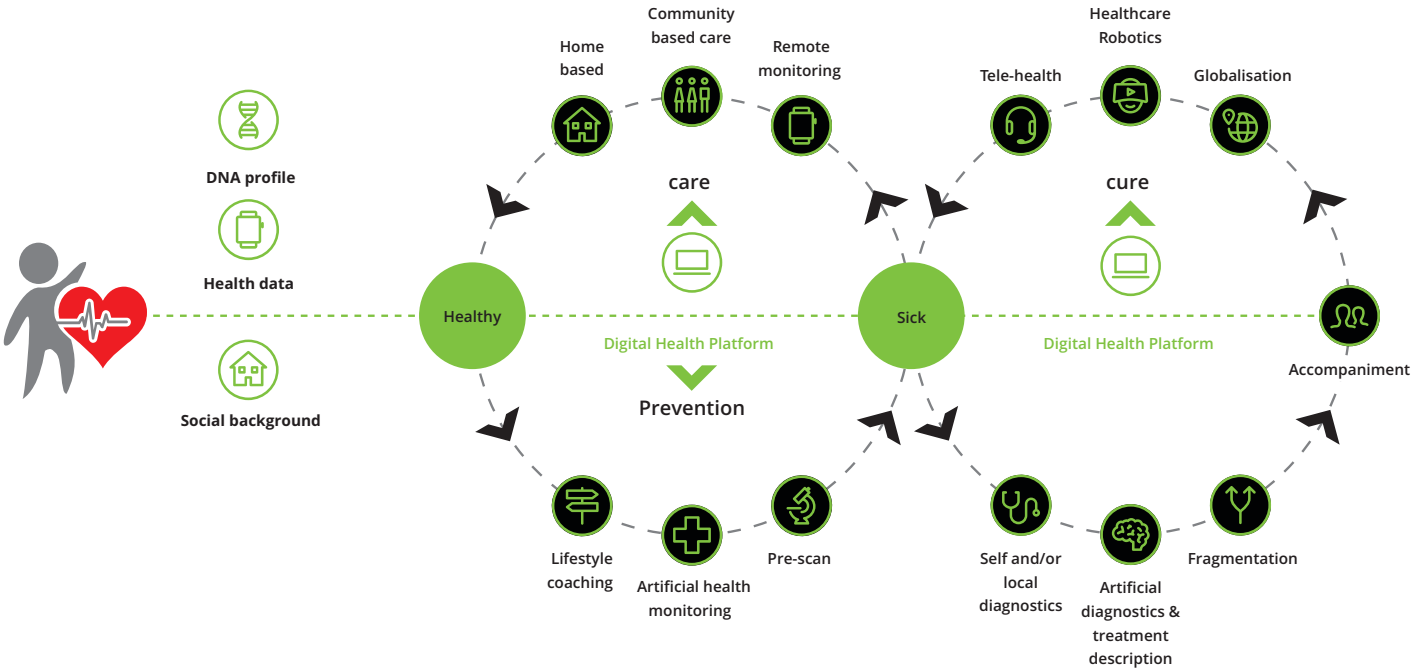


Figure 20. Consequences for hospitals (source: presentation "From hospitals to home-spitals", Deloitte, 8 June 2017).

How can Deloitte help you?

Are you looking for ways to navigate your organisation through the transforming healthcare landscape? We can help you overcome challenges and inform you about new opportunities and options. Below you will find a number of services that have been specifically developed for the higher end of the healthcare market.

Analytics

The most important revolutions we have described in our vision of the future are all data-driven. The applications that are based on data have therefore become the success factors for hospitals. For Deloitte, data analytics has been a strategic pillar for some years. That is why over 100 data scientists work for our firm, and that is just our Dutch firm. They have designed and implemented innovative and effective solutions for various clients. We always advise a parallel top-down (strategic) and bottom-up (pilots) approach.

Insight driven organisation (IDO)

During the transformation to a data-driven organisation we implement an organisation model and strategy that are not solely focused on the data & ICT department of the hospital. After all, we are convinced that a proper use of data is crucial for the entire organisation and for healthcare professionals and doctors in particular. Our organisation model consists of five parts:

- **Strategy:** vision, stakeholders, innovation, business model, and operating model.
- **People:** leadership, organisational design, talent acquisition, change management, decision making process, and knowledge management.
- **Process:** Prioritisation, agile, automation, governance, and 'what's in it for us?'
- **Data:** sources, quality, privacy and ethics, compliance.
- **Technology:** supplier selection, architecture, cloud strategy, reliability.

Naturally we also support institutions through separate parts of their data-driven strategy. To mention two not-so-obvious examples:

- We have a full-service compliance department in the field of data privacy with a team consisting of legal advisers, data specialists and healthcare specialists, since data privacy protection should be considered from more angles than just compliance. This team supports a large number of healthcare institutions in the Netherlands.
- Data analytics trainings. Our specialists use other and often more techniques than those offered in med school.

Pilots

We collaborate with hospitals in various innovative pilots in the field of advanced data analytics techniques, such as

- genetic and clinical data to predict the best treatment for cancer patients
- public data, e.g. to visualise the social consequences for cancer survivors (divorce, loss of income and property)
- non-quantitative data, e.g. to map patient satisfaction based on open questions rather than the usual NPS-scores.

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Scaling of the Edge

Innovation requires a structured approach and way of thinking. Deloitte's "Scaling of the Edge" model can help develop an innovation vision by experimenting with new concepts or ideas outside the current business model. This approach optimises the growth potential of projects that are related to long-term trends. Scaling of the Edge helps you focus on the innovative opportunities at the edges of the current business model. A group of professionals experiments with one or more innovations on a small scale, not interrupted by the rest of the organisation. Some of these promising innovations will become actual propositions, eventually renewing or replacing the current system. This approach enhances the learning capability of the organisation while preventing resistance from within.

Innovation Journey

In order to implement Scaling of the Edge we start at a more operational level with the "Innovation Journey". This consists of three stages:

- **Strategy development.** During this stage you dive into and collect knowledge about the specific area in which you would like to add value. How can you apply technological innovations within your own sphere of influence? What does the patient journey look like?
- **Design and test.** During this stage the approach is being structured and organised, preferably within your own sphere of influence, with a multidisciplinary team. At first we make a clear outline of the opportunities the concept has to offer. Then the hypotheses are tested. The expected profit is visualised, both qualitatively and quantitatively. Thus the basic conditions arise that are required for the innovation or transformation to be successful. You also learn about obstacles, such as risks in the field of privacy and cybersecurity, shortcomings in ICT prerequisites, lack of financing and a demonstrably healthy revenue model for investors.
- **Applying or implementing the approach.** At this stage, you should "Think big, start small and scale up quickly". Use the lessons that were learned during the pilot.

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GovLab

Whether discovering the next big thing or expanding on what's come before, organisations thrive and grow from innovation. GovLab brings together a wide range of capabilities, tools, and people to help public sector organisations create new sources of growth and prosperity. For many years, Deloitte has pioneered in the discipline of innovation and helped leading organisations navigate through turbulent environments, helping organisations solve complex problems that matter through a rigorous, interdisciplinary approach. Through a combination of design, strategy, social science, and technology, we explore how forces of change potentially impact the organisation and policy domain. We identify where opportunities lie within the seemingly chaotic landscape and set an "innovation ambition" which we also help you implement. We make sure your organisation has access to the proper processes and partnerships to be even more innovative.

- **Provoking & leading thoughtware.** GovLab produces engaging, insightful, robust and impact oriented thought leadership on new ideas and trends that have the potential to transform the way the government realises her public goals.
- **Innovation and data analytics.** (See also Analytics on page 38.)
- **Connecting to an inspiring Ecosystem.** GovLab connects clients to creative environments and ecosystems in the field of exponential technological and social innovations.
- **Impact investing.** GovLab connects governments, social entrepreneurs and social investors to create entirely new public private partnerships to solve wicked societal problems.
- **Digital.** GovLab helps the public sector to transform and adapt to the digital age with offerings on digital strategy, robotics, apps, mobile and platforms.

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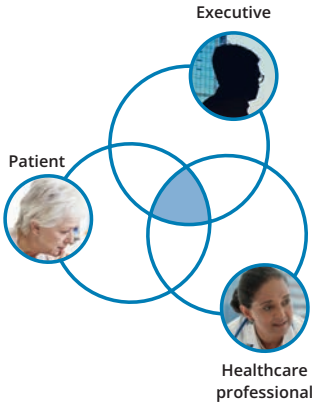
Digital

Deloitte Digital can help you design your digital strategy. Through our design thinking methodology we focus on the executive, healthcare professional and patient/client in our designs of digital health concepts and digital services. The development of personas, patient and employee journeys is essential for a proper understanding of these journeys and for working from a roadmap that is patient-driven and employee-driven. With our understanding of e-health technology we help you choose the right solution for your organisation. Thus we are able to guarantee that services are developed with proven quantitative and qualitative benefits for all players who use this service. Based on Agile/SCRUM methodology these concepts are developed in collaboration with your employees and patients in order to improve your service, quality of healthcare and customer satisfaction. We support you with making a start with a Digital health application within your organisation, as follows:

- **Digital Strategy:** designing your digital (health) strategy in line with your organisational and IT strategy.
- **Digital Health readiness assessment:** a quick scan for your organisation to determine the maturity and readiness for digital health, including recommendations for a successful start.
- **Service design and design thinking:** designing your services driven by customer-facing research and perspective, by design and development of personas, journeys and experience maps. The concepts are then translated into a successful digital service through prototyping with your employees and customers.
- **Digital development:** development of Digital Health concepts through package implementations and customised concepts based on Agile/SCRUM methodology.

Personas as a basis for research

Personas show who your most important target groups are and what they need



Personas are (fictional) profiles (archetypes) of your most important target groups.

Personas represent a certain group with shared characteristics, interests, and/or behaviour.

Research into personas maps emotions, expectations and/or needs. It might lead to new and valuable insights into who your target groups are and what they need.

Personas are used as a basis for a customer journey.

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Digital Health Compliance

The application of e-health by healthcare providers and ICT providers requires smart choices in order to make technological developments in healthcare more affordable and scalable. So how do you know that you have made the right choices and how do you guarantee a secured and responsible handling of patient data? Deloitte can help, based on a new service: Digital Health Compliance (DHC). DHC encourages digitalisation and makes sure that data security, privacy and compliance are in order. The solutions are offered in a customised service to prevent that solving one problem means aggravating another one. The coherence within compliance is crucial. Our approach is based on expertise, but also on the use of digital (compliance) tools. If you follow the right path in your healthcare approach, you are able to realise the required regulatory framework along the lines of your strategic goals, and translate this framework into actual requirements and pragmatic actions within your organisation. This digital healthcare path consists of the following stages:

- **Digital Strategy:** how do new technologies support your organisation's strategic goals? (See also "Digital" on the former page.)
- **Compliance Blueprint:** what rules and regulations apply and what requirements follow from the regulatory framework?
- **Implementation Program:** how do you follow through legal, technical and organisational measures in your organisation?
- **Compliance Health Check:** are you complying with all requirements within the regulatory framework? How do you perform (periodical) assessments to monitor compliance?
- **Compliance Monitoring:** how do you make sure the entire organisation will follow all requirements for a careful treatment of patient data?
- **Compliant Through Digital:** is compliance considered a "burden" within your organisation and do you want to reduce this burden without losing control? The use of digital tools will help you.

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W: www.digitalhealthcompliance.com

Cybersecurity

Digitalisation in healthcare brings a lot of new opportunities as well as risks in the field of data availability, integrity and confidentiality. Patients and healthcare regulators assume that the treatment of medical data is careful. However, cyber incidents happen regularly. For instance in the shape of external hacking attacks, but also in the shape of internal inaccuracy. Therefore, it's important that cybersecurity, like patient security, is addressed as an essential basic condition for good healthcare. Deloitte approaches cybersecurity from the angle that organisations should not only be secure, but also vigilant and resilient. Because of all the innovations within the healthcare landscape, organisations should approach cybersecurity from a strategic angle driven by their primary goals, and realise that 100% security is unlikely. Digital security breaches should be detected as quickly as possible in order to act accordingly. Moreover, organisations should be able to act effectively if something goes wrong and go back as soon as possible to how the situation was before the incident.

- **Cybersecurity strategy.** What strategic choices do you make and how should you implement those? How do you equip your organisation to keep this risk under control? How do you assess the cybersecurity maturity of your organisation? How do you train your employees?
- **Secure:** who has access to what data and from where? Can IT systems be hacked? Is the technical infrastructure (including medical equipment) well-suited for data security?
- **Vigilant and resilient:** how do you know your data was stolen or leaked? How do you monitor all data streams? To what digital threats is your organisation exposed? What do you do if an incident does occur?

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Blockchain

Structuring and organising healthcare is becoming more decentralised. Healthcare consumers have a network of healthcare providers and caretakers around them. The safe and secure transfer of data is essential for the delivery of high-quality, effective care. Many of the e-health applications solve relevant health-related problems, but the increasing use of applications also results in the fragmented storage of medical data in the digital health data landscape.

To (continue to) deliver consumer-centered and high-quality services it is important that data can be safely and securely shared with relevant stakeholders. Blockchain technology is an important building block for the transfer of medical data between different systems within a network of healthcare providers and healthcare consumers. Data with high security and privacy requirements can be transferred quickly and easily using a blockchain. The patient is central in this process and decides to give consent to access his or her data. We can help you with the following blockchain-related services:

- **Prototype.** The implementation of a blockchain application involves multiple stakeholders within the care process. We focus on the successful production of a solution in a network of stakeholders.
- **Pilot.** Small scale blockchain pilot where the application will be implemented in the organisation and practical experience can be gained. Additional technical and organisational requirements are determined.
- **Bootcamp.** Exploring a blockchain use case which is relevant for your healthcare organisation and specific case. The customer journey and technical feasibility will be determined to create support within the organisation for an implementation process.
- **Innovation lab.** Start with the basics of a blockchain application and learn where and how it can be used. Gain more knowledge of the application of blockchain technology and learn how it can be applied within your organisation.

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Real Estate & Partnerships (RE&P)

In order for real estate to be the impetus for successful operations within the local market and with (possible) collaboration partners, we help hospitals and other healthcare institutions to define their strategic real estate policy.

Deloitte Financial Advisory Services (FAS) helps healthcare institutions with their financial policy. We do this hands-on by setting up business cases for (multiannual) investments, but also through the structured acquisition of financing.

Also, we help parties in healthcare (both care and cure) with building site development and real estate development, with an emphasis on organising collaborations with market parties by tendering or buying and selling ownership and real estate (portfolios).

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Change management

Change processes in healthcare consist of being able to inspire healthcare professionals and making sure that changes do not frustrate them, but encourage them. We share a passion for changes in the healthcare domain. Our drive is to offer tailor-made solutions for complex social challenges by thinking outside of the box, and having the courage and skills to follow up these ideas. We are always focused on creating value for clients/patients and healthcare providers. We combine knowledge from various sources, dare to suggest unexpected angles and are willing to experiment. Also, we know from experience what works and what doesn't work and use successful methodologies. For us, change management means being able to think beyond good communication and training (which are essential as well). We combine data, platforms and input by all stakeholders to an effective approach. We often look beyond regulation and expectations and aim at the healthcare domain as a whole.

Years of experience with change management in complex healthcare challenges

Our team members have a combined experience in healthcare of over 50 years, with healthcare institutions, healthcare insurance companies, ministries, municipalities, government institutions, and private organisations, on a national and an international level. We aim to contribute to social ecosystems and to the entire healthcare system. Improvements in healthcare require careful consideration of different stakeholders and translating these into solution-oriented and measurable change management solutions. We distinguish ourselves in this field with the following approach:

- **Accelerated Business Value.** An experience that drives value and accelerates measurable business results through design-thinking and immersion techniques such as change labs.
- **Leader Led.** Leaders are aligned on a clear & compelling vision, enabling them to take collective action towards a common goal, and inspire and enable others to do so as well.
- **High Touch, High Tech.** An experiential change journey that is enabled by high impact engagements, combined with digital technology. The change process will deploy multiple channels such as audio, visual and kinetic means that appeal to multiple senses and emotions.
- **Underpinned by behavioural science.** Targeted behaviour change interventions to 'nudge' and shape successful change adoption.
- **Precise and measurable through analytics.** Drive focused change efforts on the right initiatives and the right stakeholders at the right time by means of impact, readiness or state of change adoption data.
- **Culture and employee engagement.** Research by Deloitte shows that eight out of ten organisations consider lack of employee engagement as their biggest challenge. If you learn to understand your own culture and are able to develop better strategies to involve people, you will retain talent and create growth opportunities.

Innovations as a part of change

Our team pays special attention to social and technological innovations. Along with citizens, private and non-profit organisations we help to solve social issues. We also initiate and accompany innovation platforms, proeftuinen ("experimental gardens"), social labs/design and panels, and we consult experts and networks to develop new solutions. If a healthcare institution requires change, we can perform analyses that provide insight into the organisation's ability to change. This creates solutions and tailor-made interventions. We offer various competences: our team consists of colleagues with strategic, creative, or technical skills, but also professionals who are skilled in group dynamics, stakeholders communications, and who are well-experienced in the field of (complex) types of collaboration.

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Endnotes

1. *Most organisations have over 1,000 employees (62%). Respondents' positions vary from executive (22%), manager (21%), innovation manager (8%) to medical specialist (21%), researcher (1%), or else. Innovation budgets also vary: from 100,000 euro to 25 million euro per year.*
2. *"Arts beslist te vaak op eigen houtje", AD, 26 August 2017.*
3. *Source: YouTube, "Mobile phone in Amsterdam 1999".*
4. *See "How can Deloitte help you?" at the end of this publication.*
5. *"Groot verschil tussen aanbod en gebruik e-consult", Zorgvisie, 1 August 2017. See also "E-consult heeft nog een lange weg te gaan", Skipr, 3 August 2017, and "5 tips om het e-consult effectiever in te zetten", Skipr, 30 August 2017.*
6. *See e.g. "The Deloitte Consumer Review – Digital Predictions 2017", Deloitte UK, March 2017.*
7. *"Wearables in de zorg: het land in met een 'slimme pleister'", www.smarthealth.nl, 14 August 2014.*
8. *"Wearable voor valdetectie", www.robotzorg.nl, 20 November 2015.*
9. *On 25 Mei 2018, the Algemene verordening gegevensbescherming comes into force, in which e.g. is arranged that patients can request access to and elimination of their data.*
10. *An interesting publication about the privacy dilemma is "Je hebt wél iets te verbergen: over het levensbelang van privacy", by research journalists Maurits Martijn and Dimitri Tokmetzis, 13 September 2016.*
11. *"Politiek moet landelijk EPD snel regelen", Zorgvisie, 20 February 2017.*
12. *"What Banner Health and Philips learned from an outpatient telehealth program", medcitynews.com, 30 November 2016.*
13. *"Gerichte preventie: meer leefplezier, minder kosten", GovLab, Deloitte, 2017.*
14. *"Van Bricks naar clicks", www.zorgvoor2020.nl.*

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