



January 2020

# AI adoption challenges for healthcare in the Netherlands

From potential to performance





# AI in healthcare is just getting started

Healthcare investments in artificial intelligence (AI) are at their all-time high. AI funding<sup>1</sup> in healthcare hit a historical high in Q2 2019, confirming that the healthcare industry is emerging as one of the frontrunners in artificial intelligence research and applications. Yet, AI is only scratching the surface of the challenges that healthcare systems face.

Global healthcare expenditure is currently estimated at USD 7.5 trillion<sup>2</sup> and it is expected to continue growing faster than global GDP. In some countries its growth rate is expected to be double the rate

of GDP growth. The Netherlands is expected to face the same challenges. Healthcare spending in the Netherlands already ranks among the highest among OECD countries with 12.9% of the GDP<sup>3</sup> and is only projected to increase. The challenges are multi-fold – of cost, access as well as timeliness of care. According to research we concluded in 2017, AI use for the prevention, diagnosis and treatment of just three prevalent conditions (childhood obesity, dementia and breast cancer), could yield cost savings of over EUR 170 billion over the next ten years, while improving access and availability of timely care.

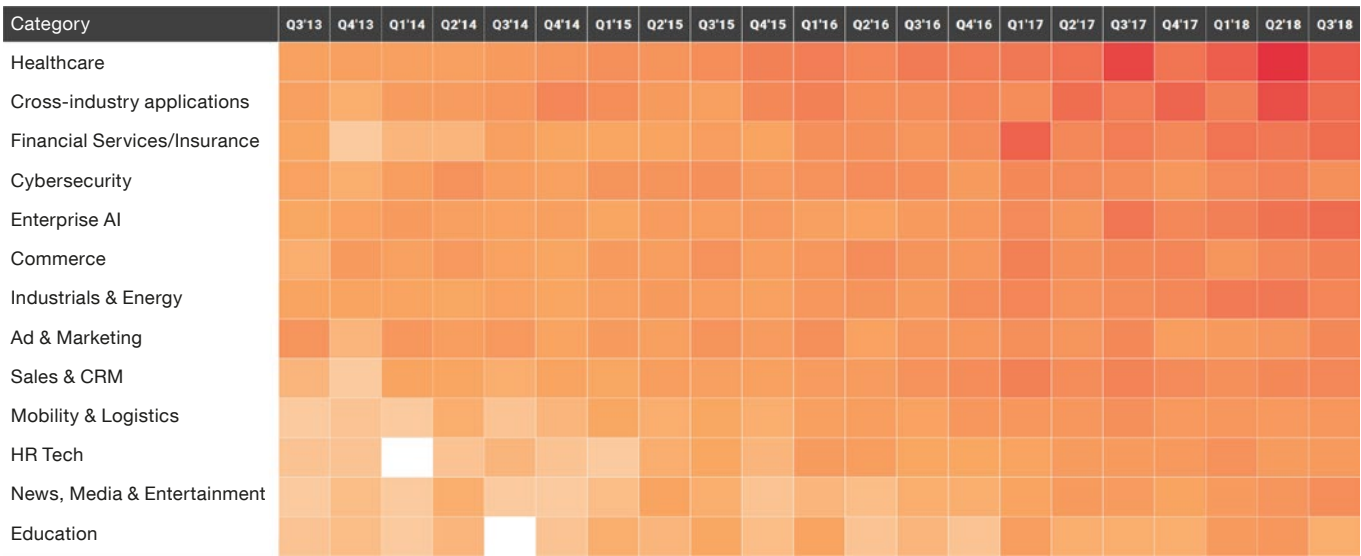
## Table of contents

- 2 AI in healthcare is just getting started
- 4 Adoption challenges remain
- 8 Setting priorities for implementation

1 For startups working on AI in healthcare, CBInsights, [https://www.cbinsights.com/research/report/healthcare-trends-q2-2019/?utm\\_source=medtechdive&utm\\_medium=press&utm\\_campaign=marketing\\_healthcare\\_q2-2019](https://www.cbinsights.com/research/report/healthcare-trends-q2-2019/?utm_source=medtechdive&utm_medium=press&utm_campaign=marketing_healthcare_q2-2019)  
2 WHO estimates for 2016  
3 CBS, <https://opendata.cbs.nl/statline/#/CBS/en/dataset/81628eng/table?ts=1574169366060>  
4 Truncated, CBInsights, <https://www.cbinsights.com/research/artificial-intelligence-investment-heatmap-expert-intelligence/>

Healthcare is emerging as a prominent area for AI research and applications<sup>4</sup>

### Top industries for AI equity deals



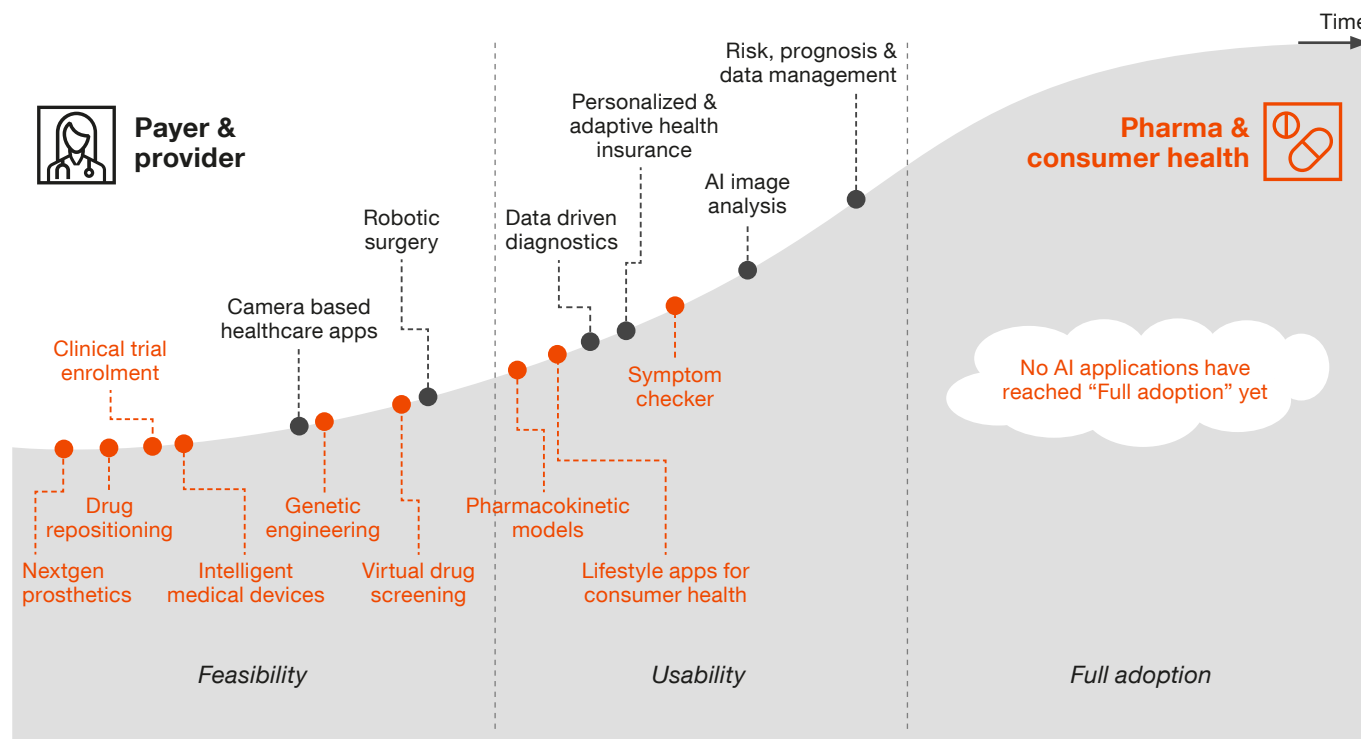
Source: CB Insights

Despite the huge potential, increasing investments and developing use cases, AI applications for healthcare are largely still in their feasibility assessment stages. Medical imaging and diagnostics, which is furthest in adoption among all health applications, received some boost from favorable regulations from authorities. Regulatory authorities signaled fast-track approval for AI-based medical devices, which is expected to open up the pathway to commercial feasibility for over eighty AI imaging and diagnostics companies that have raised equity financing since 2014. Other areas however, are still in their very early stages of establishing feasibility. Clinical trial enrollment has long suffered from bottlenecks in enrolling the right pool of patients. While AI can be immensely useful in matching patient data to trials, the lack of interoperability in health records is still a barrier.

The potential of AI in healthcare is established. At this stage, the most important question remains – what would it take for these applications to reach commercial feasibility? What can be done to take them to full adoption, from their potential to actual performance?

We spoke to hospitals in the Netherlands about the barriers that they see in the adoption of artificial intelligence in healthcare, and their views on addressing them.

AI healthcare applications adoption levels<sup>5</sup>



Source: CB Insights, PwC

<sup>5</sup> <https://www.bioindustry.org/news-listing/unlocking-innovation-cognitive-and-digital-tech-developments-for-improved-drug-development-by-jo-pisani-pwc.html>, [https://www.welcome.ai/news\\_info/strategy/artificial-intelligence-trends-in-2019](https://www.welcome.ai/news_info/strategy/artificial-intelligence-trends-in-2019)



# Adoption challenges remain

Speaking to hospitals and care providers in the Netherlands, it quickly becomes clear that the two biggest challenges to adopting AI are lack of systems and processes that enable adoption and a ‘mindset- and knowledge gap’, that prevents decision makers from making AI and emerging technologies a key priority. One of the key areas to focus on are systems and processes, where the challenges range from homogeneity of data and interoperability of health record systems, to the lack of sufficient incentives to share data and best practices between healthcare providers.

## The data challenge

For any AI-based system to be used for healthcare applications, they need to be trained on clinical data from electronic health records (EHRs), alongside genomic and/or consumer behavioral data, depending on the application. The interoperability of data is therefore the most critical challenge – not only are there are many sources of healthcare data, each originating in a different environment and format – there is also significant heterogeneity within each source. To access large sets of clinical data, the differences in how EHR systems are designed and implemented, will need to be eliminated. Steps have been taken at the EU level, such as the move towards developing a European Electronic Health Record exchange format. Yet, hospitals in the Netherlands have yet to reach agreement on data sharing mechanisms.

The interviewees also noted that the ‘ownership’ of data systems within hospitals remains an unanswered

question. The ownership determines who the decision makers are, and will ultimately influence what the data systems are built for – interoperability and ease of data sharing, use of new AI-based applications or focused on the traditional uses of the EHR systems – maintaining patient health records. It is argued that the owners of these systems should now be well versed with the potential of data, and not just its traditional uses, to lead the way to an AI-based future.

## European Commission recommendation on a European Electronic Health Record exchange format

In February 2019, the EC presented a set of recommendations for the creation of a secure system that will enable citizens to access their electronic health files across Member States. Some member states like Finland and Estonia already started making some progress on making health records accessible and exchangeable, especially focusing on ePrescriptions and patient summaries. Another 20 Member States were expected to be able to exchange this kind of information by the end of 2021. The new recommendation aims to extend this to three new areas of health records, namely laboratory tests, medical discharge reports and images and imaging reports. It urges member states to go through a joint coordination process to elaborate on the recommended baseline of health information domains and specifications for a European electronic health record exchange format.

Source: European Commission,  
[http://europa.eu/rapid/press-release\\_IP-19-842\\_en.htm](http://europa.eu/rapid/press-release_IP-19-842_en.htm)

This could very well mean that the decision makers on EHR systems should see a wider representation of technology and AI professionals, and not just care providers and procurement specialists, which is not the case in many hospitals.

### The mindset- and knowledge gap

Even with most of the technical challenges addressed, understanding and trust in new applications remains remarkably low. Artificial intelligence based tools remain a black box, not just for patients but also for doctors and other care professionals. The proportion of medical professionals who have the skills needed to fully understand the tools remains small, hindering the adoption of AI for healthcare. Add low budgets and fears of job losses to the mix, and you have a strong impediment to AI adoption.

According to the technology and innovation professionals we interviewed, bringing medical professionals to the table to prioritize new technologies' adoption is often difficult, purely by virtue of their priorities being set in providing care on a day to day basis.

### Coordination failures

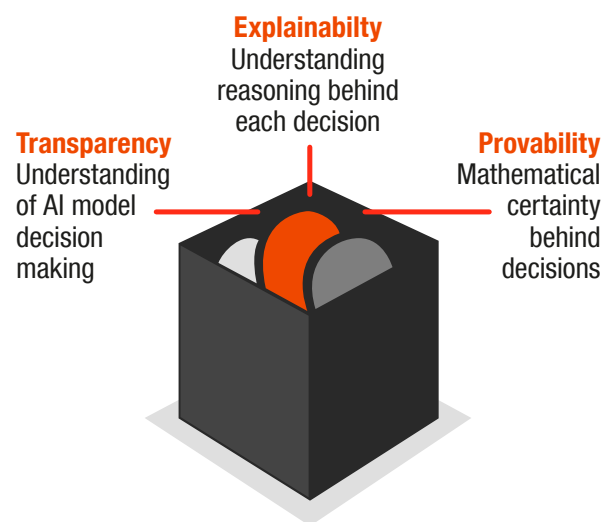
Co-creation might well be the only way to ensure trust and transparency. Market coordination is a prerequisite to ensure investments are directed effectively, yet, at the moment AI research in the EU is rather fragmented, with no definite ecosystem in play.

**“For most healthcare providers, it is still very difficult to get into the AI-driven mindset. Competing with the pressures of everyday care for resource allocation is not easy”**

– Marcel Wilschut, Innovation, Albert Schweitzer Ziekenhuis

The fragmentation was particularly visible in distinct research activities in the various member countries without coordinated national strategy frameworks. The EU took a step in the right direction by adopting its strategy on artificial intelligence in April 2018.

Three keys to understanding AI decision making



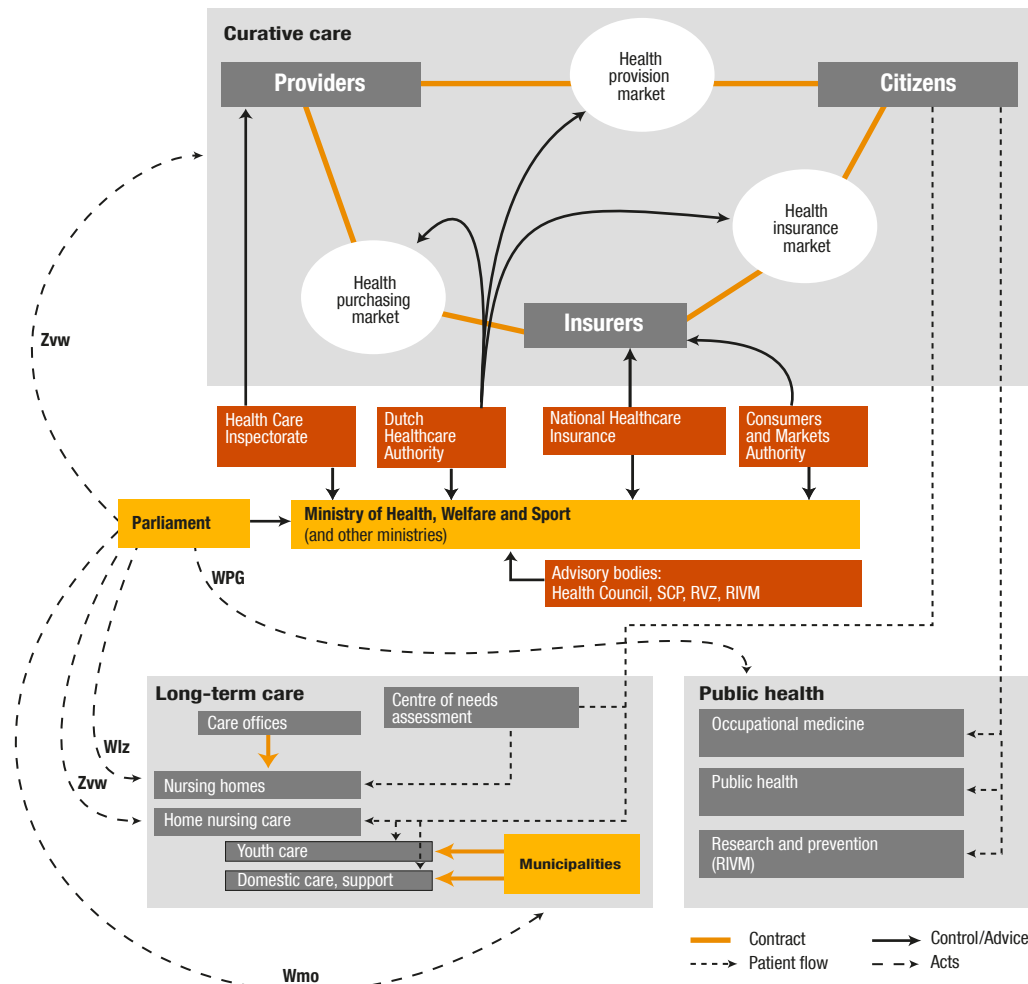
Source: PwC

Through its strategy, the commission intends to support the development of such ecosystems, by focusing on other important aspects like developing the right talent. The strategy intends to support business-education partnerships to attract more AI talent in Europe and support other education initiatives. This is critical to designing complex AI systems for healthcare, yet there is a long way to go before strong ecosystems that foster innovation can be realized.

While co-creation and coordination for AI development is important, hospitals noted that it is equally important to have a coordinated dissemination strategy. Small hospitals that serve smaller catchment areas are usually under immense capacity pressures, that is not conducive to adopting new technology. Pushing the hub and spoke model to disseminate new technology might be a more effective strategy – where larger regional (research) hospitals take the lead on implementing AI tools and eventually assist in their wider dissemination in the region.



The stakeholder landscape for coordination is complex<sup>6</sup>



Source: PwC

<sup>6</sup> Health Systems in Transition, European Observatory on Health Systems and Policies, [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0016/314404/HIT\\_Netherlands.pdf?ua=1](http://www.euro.who.int/__data/assets/pdf_file/0016/314404/HIT_Netherlands.pdf?ua=1)

## Lack of enabling incentive models

In the Netherlands, as in other EU countries, healthcare providers are largely paid on the basis of volume through fee-for-service payment systems (or variants thereof). These payment systems incentivize maximizing patient volumes. Linking this to the aim of AI of creating more value by improving health outcomes, these incentives are not completely aligned. In other words, the extra value that AI generates in healthcare needs to be financially rewarded more directly, by gradually moving towards value-based healthcare.

Another challenge with pushing AI adoption is the simple question of who is going to pay for the AI product. An AI based application can be of great value, but when there is no-one willing to pay for it, it will never be largely adopted. Considering this, there are typically three ways of receiving payment adoption; payment adoption on individual (patient) level, meso (provider) level or macro (national) level.

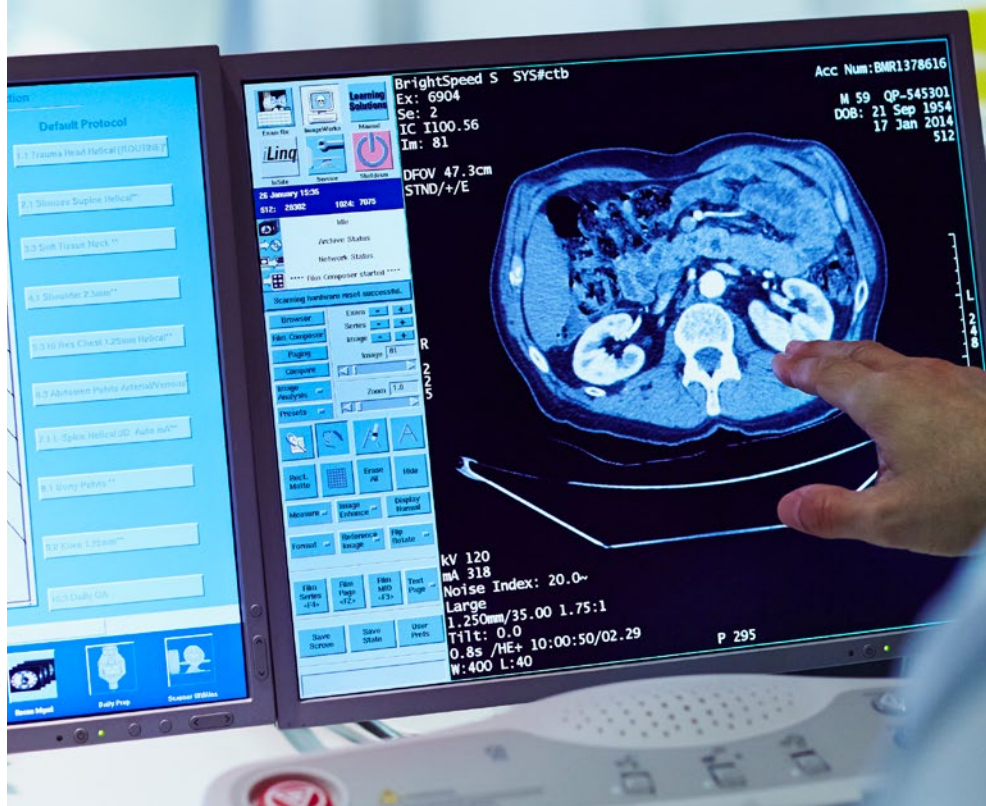
**“Adopting a model that works for small and large hospitals is important if we have to ensure widespread AI use”**

– John van Giessen, Informatisering & Automatisering, Ziekenhuis Gelderse Vallei

Each of these levels includes different market adoption paths and evidence needs. The adoption on meso and macro level are the most relevant for AI adoption, as the cost of AI tools are unlikely to be passed on to patients at early stages of commercial adoption.

When targeting at AI adoption on provider level, there does not need to be created a new reimbursement mechanism. AI products on provider level focus on contributing to the cost-efficiency of providers, in terms of improving workflow or reducing costs per service/treatment for example. Many AI applications that we expect to see in the near future will be embedded in existing systems, removing the need for entirely new payment models. When the goal is to achieve macro level adoption, it is likely that a new reimbursement mechanism will need to be created, while increasing overall focus on value based healthcare. When aiming to achieve macro level adoption, the AI product needs to pass the formal Health Technology Assessment (HTA) process of national HTA institutions, which requires clinical effectiveness and cost-effectiveness.

“An AI based application can be of great value, but when there is no-one willing to pay for it, it will never be largely adopted.”





# Setting priorities for implementation



AI-based applications for healthcare are expected to continue developing quickly over the next few years. In view of the technical developments, it will be important to set priorities to allow for simultaneous adoption across healthcare services. In the Netherlands, as in Europe in general, adoption strategies should pay clear attention to local challenges.

## Determine a national coordinated strategy for AI in healthcare

Though there have been various efforts to develop a national strategy for AI development and adoption, there needs to be higher coordination among stakeholders in the country to ensure widespread adoption. Stakeholders include not only healthcare providers and regulators, but also healthcare technology providers, payers, research organizations and patient groups. At a more micro level, a hub and spoke model for healthcare providers would be effective on the national scale – where the hub hospitals can act as the driver for AI-based

applications, responsible for adoption of other hospitals in their ecosystem. Correspondingly, at the macro level, collaboration between European and multi-national policies and programs would also be vital for the creation of a strategy that allows for seamless adoption of AI for healthcare, that are accessible throughout the region.

## Prioritize applications based on need and ease of adoption

When it comes to ease of adoption, not all AI-based applications are created equal. To allow for widespread access and use, it will be important to focus on applications that are low on investments and suited for wider use. For instance, preventive applications such as point of care systems, wearables or minimally invasive implants, sensor systems for more efficient measurement of physiological parameters, such as posture, sitting position, physical activity, oxygen saturation, etc. might be good places to start pushing adoption.



For diagnostic applications, real-time location services that can track patients, staff or medical devices, environmental monitoring, such as checking hand hygiene compliance etc., could be effective places to exhibit feasibility of large scale AI use in healthcare.

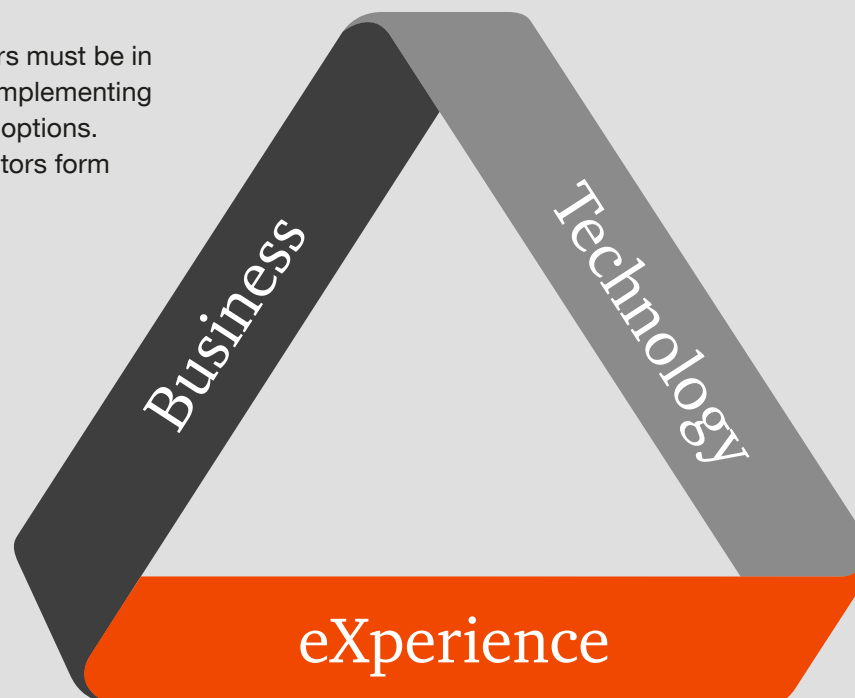
It is important to understand that it is not just the technology and its feasibility that is important. Equally important is to understand the business side of things, so that the added value is realized for the patients and the providers. PwC's BXT model (see box below), puts all these factors – business, experience and technology, into perspective, for optimal results.

#### Address data issues urgently

AI development for healthcare, as well as effective use is highly dependent on availability of data. Focusing on EHRs is a good strategy, as is clearing issues and concerns related to data privacy. Businesses and the industry in general must work towards devising products, systems and processes that work with privacy requirements of patients, providers and regulators in Europe. Innovation should be focused on answering data challenges – including data management and data governance, but also developing devices and systems for protecting individual health information. That includes securing ownership and storage of health data, data sharing with healthcare providers, and rendering real time anonymity for wider data analytics. Investing in devices or systems that improve security, like blockchain to improve health or personal records exchanges would also be increasingly important. ■

#### BXT-model

The three factors must be in balance when implementing any new digital options. These three factors form our BXT model.



- Business stands for the organization in relation to the new possibilities. The impact of new applications, access to information, communication with patients, the changing division of roles between hospital and patient, etc.
- eXperience revolves around positive experiences of employees and patients so that added value is recognized, willingness to change and applications are used.
- Technology is the realization of innovations through innovative technologies such as artificial intelligence and robotics and the creation of the conditions that are needed to implement those innovations quickly.

## Contacts



**Jan Willem Velthuijsen**

Chief Economist

T: +31 88 792 75 58

M: +31 6 2248 3293

E: [jan.willem.velthuijsen@pwc.com](mailto:jan.willem.velthuijsen@pwc.com)



**Chantalle Wullems-Beister**

Partner Risk Assurance

T: +31 088 792 14 13

M: +31 6 1094 4483

E: [chantalle.wullems-beister@pwc.com](mailto:chantalle.wullems-beister@pwc.com)



**Willeke Bakker**

Partner Advisory

T: +31 088 792 45 69

M: +31 6 1089 3182

E: [willeke.bakker@pwc.com](mailto:willeke.bakker@pwc.com)



**Sander Visser**

Partner Advisory

T: +31 088 792 35 16

M: +31 6 2279 3120

E: [sander.visser@pwc.com](mailto:sander.visser@pwc.com)

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