**Bert Vrijhoef & Lotte Steuten:**

**IT as the cornerstone for precision medicine and scientific wellness.**

**Simon Sinek:**

# "There isn't a problem with medicine. There is a problem with leadership!"

**Prince Constantijn of the Netherlands:** "Fewer treatments, more prevention. That has to be the mindset"

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## Cover Story
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'There isn't a problem with medicine. There is a problem with leadership. Leaders must see their hospitals as businesses and manage them like businesses.'

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## WHO: eHealth finally becoming mainstream

The WHO 'Global diffusion of eHealth: Making universal health coverage achievable' report is the third global survey by the WHO Global Observatory for eHealth (GOe). It investigated how eHealth can support universal health coverage (UHC) in Member States.

## Microsoft launches Healthcare NExT

The new strategy Healthcare NExT, is a new program that will integrate research and health technology product development, as well as establish a new model at Microsoft for strategic health industry partnerships.

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# Welcome!

A warm welcome on behalf of the whole crew of ICT&health at the intersection of technology and health(care). Please notice we did not name this magazine ICT&healthCARE, since technology has the potential to influence the health of people beyond healthcare.'

Expect us to provide you with perspectives from patients, family and informal care as well as leaders from industry, healthcare-professionals and governments.

Some of those perspectives are early stage, even first generation products and services, and challenging the status quo, while others have already had their impact in other parts of society and are now being pivoted into health(care).

**Close the gap**

Two years ago publisher Tom Xhofleer took on the challenge to create a Dutch version of this magazine and platform. He saw a niche, ICT&health, which no other title in healthcare focussed on. He has already succeeded in publishing up to 70.000 copies of each edition. The next step is going international, since globalization affects healthcare just as much -or maybe even more- as others areas of industry. Sharing knowledge is needed.

With a great editorial board and an awesome editor in chief Yvonne Keijzers, we'll try to keep you up to date in every edition, but we also want to hear from you. Let us know, for example through social media, which topics you think we should cover.

Who better than Simon Sinek could be our maiden coverstory.

To start with WHY ;-)

Warm Dutch regards,

@lucienengelen
Chair of the editorial board.

**Lucien Engelen**
Chair Editorial Board

Simon Sinek:

# "Never underestimate the importance of the human factor in healthcare!"

In 2011, Simon Sinek spoke at TEDx Maastricht, where he baffled the audience with his view on leadership. Sinek is best known for his Golden Circle concept (2009). Nowadays, Simon Sinek teaches leaders and organisations how to inspire people. As such, we could not wait to speak to him about the changes in and future of healthcare. Yet again, he has surprised us with his insights on leadership en human relationships. "Technology is making us better. But we must remember that we are in interpersonal relationships."

BY LUCIEN ENGELEN AND YVONNE KEIJZERS

**The changes we are now seeing in healthcare, not just in technology but also in leadership, are becoming more and more embedded in every healthcare-related curriculum. Have you seen a change in leadership since your speech at TEDx in Maastricht in 2011?**
"Well, first of all, it's almost embarrassing that I have a career in this. It's obvious that people are not pleased and satisfied with their leaders yet. There seems to be a momentum for this. So yes, I have seen a change. But we still have a lot of work to do. The vast majority of organisations are still operating as usual."

**How does this apply to healthcare?**
"I fear hospitals are some of the worst examples of leadership. It may sound strange, but too many leaders think only of their patients. That's wrong. They have to think of their employees, the doctors and nurses. They have to think of it as a job. They have to manage. And then in turn, the doctors and nurses have to think of their patients."

"The workload in hospitals is massive. Of course, I am mainly talking about the US, but I imagine the situation is the same in the Netherlands. There are too many accidental mishaps, some the result of small, simple mistakes, like a chart being in the wrong place. These things happen too often. In the US alone, there are about 250,000 of these incidents each year."

"I myself have a trauma due to a recent experience. A very, very good friend of mine had a miscarriage. We rushed to the hospital, but she wasn't given any aid until she signed a form after a long time had already passed. She couldn't even go to the bathroom to wash her hands, which were covered in blood. On top of that, she was tested five times. And what was worse, somebody even congratulated her with her pregnancy. Mistake after mistake after mistake. And this ought to be a routine process, nothing extraordinary or fancy. All and all, she was in hospital for 13 hours. It was awful."

"So no, there isn't a problem with medicine. There is a problem with leadership. The leaders must see their hospitals as businesses and manage them like businesses.'

**The interesting thing is that in hospitals in the Netherlands, patients are increasingly treated like partners. We provide patients choices and significance. How do you feel about that?**
"You have to take the patients out of the equation. That is not the issue. The point is: do the staff members feel like their leaders care about them? It seems scary, but that is the right question to ask. This discussion is missing. This topic is never discussed in hospitals. I don't care about the quality of this industry. It is standard in this industry. We have to take care of the people that work in this field first, and then they can take care of the patients."

**People in healthcare are also aging, and now a younger generation is coming on board. What about millennials?**
"A few things are happening to this generation that we tend to neglect. First, they are subject to a different type of parenting than we experienced. They were all little princes and princesses. When they failed at school, their parents merely complained. But as soon as they found a job, this changed. All of a sudden, they have to take care of themselves. And they are not used to that, so they get stressed out."

"Second of all, there is a huge amount of technology in their lives, like cell phones and social media. Every time they receive a notification or a 'like', a little hit of dopamine gets released in their brain. And as you know, dopamine is addictive. Remember, we are talking about kids here. There is no age restriction on using a phone." ▶

"So this is a highly stressful time for young adults. It's like an addiction to alcohol, where every time you drink, you feel better. The same is happening with phones and social media. These kids look great when they are online, but their self-esteem is low. They are like ducks; they look happy, but nobody knows that they are kicking like hell with their little duck legs to stay afloat."

"This addiction to technology is destroying their relationship with other people. As a result, we do see a rising rate of young adults with depression. However, we are only treating the symptoms. It's like having an epidemic level of drug overdoses, but not doing anything about the underlying cause."

"This is going to be a big healthcare problem, and the healthcare system has to deal with that. In fact, it is a twofold problem; healthcare has to deal with this addiction, and we have to include socialising skills in the curriculum of these future doctors and nurses. They have to learn coping mechanisms to deal with real-life relationships."

**Burnout is already a big problem amongst physicians. What are your thoughts on this?**
"More and more people will drop out of jobs in the future. This has everything to do with the quality of healthcare. As such, there should be an emphasis in the curriculum on how to manage real-time conversations and relations in healthcare. People need support and need real communities."

"How can healthcare help them? Firstly, we must start publishing about technology addiction. The topic must be put on the agenda. And secondly, doctors and nurses must learn social skills. We must emphasise the need for a reduction of cell phones use. You see, it's already happening, these people are asking for help. The younger generation needs this."

"I want doctors and nurses to talk to each other, instead of just emailing a note. Magical things happen in interpersonal relationships. It's not just about non-verbal communication. It's about the fact that ideas arise when you talk with somebody. Just talking about a problem can bring new ideas to the table. And that doesn't happen when you only communicate via email."

"Young adults need to learn and be aware of this kind of communication. I can't emphasise enough how important this is."

**Do you think mindfulness techniques can help?**
"Yes, these techniques are great, but the marketing of mindfulness is all wrong. It's great for creating awareness, for being present and providing focus. But we will have to find a way to better communicate this message. People dismiss mindfulness because of the way it looks."

"We will have to communicate about mindfulness by talking about its USPs. It's like the 'people don't want to buy a quarter-inch drill, they want a quarter-inch hole' thing (quote from Theodore Levitt, red). We need to focus on social connection, teamwork, feeling, and talk about these things with these young adults."

**Back to your books and StartwithWhy. I have a question from Raimo van der Klein, the founder of Layar. The golden circle starts with 'why'. But shouldn't it start with 'who'?**
"No, 'who' is so obvious. The golden circle is based on human decision-making. The 'who' is incorporated, it's already there. Why we do things, what we do, and how we do things are all related to 'who'. Without 'who', there is nothing."

So, starting with 'Why', is it possible for an organisation to change this 'why' over time?
"No, once you've established the 'why', you can't change it. But you can change the way to approach your 'why'. Let me give an example. There is healthcare, and then there is caring for your health. It sounds like a small change, but it isn't. The way to get to the end goal of healthier people is very different. Care for health is a broader and much more expansive way to approach the 'why'."

"This is a major insight, because it reflects exactly what we are experiencing in healthcare right now."

**So to recapture and finalise this interview, can you briefly sum up your vision on technology in healthcare for us?**
"Technology is making us better. That is really remarkable. But we need to remember that we are in interpersonal relationships. We must not forget how big the impact of those relationships is. For instance, when a doctor sees a patient who has just emerged from of a crash and is heavily injured, he will probably say, 'he is a fighter, he won't give up.' That sentence alone can really help that patient. We often take these interpersonal and social components for granted, but we must refrain from doing so. A doctor or nurse with good bedside manners provides better care. I am convinced of that."

"Working in healthcare is still an interpersonal job. And most healthcare workers are in this field because they want to help each other. We sometimes tend to forget this. However, feedback, listening, etc., these are qualities we don't want to throw away." ∎

*Publications and books by Simon Sinek et al.*
*2017. Find Your Why: A Practical Guide to Discovering Purpose for You and Your Team.*
*2016. Together Is Better: A Little Book of Inspiration. Portfolio.*
*2014. Leaders Eat Last: Why Some Teams Pull Together and Others Don't. Portfolio Hardcover; 1ST edition (January 7, 2014), ISBN-10: 1591845327, ISBN-13: 978-1591845324.*
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# The Intersection of Personalised Medicine and Technology

BY JOÃO BOCAS, CEO & DIGITAL HEALTH
INFLUENCER AT DIGITAL SALUTEM

**There are plenty of over-the-counter medications for the common cold, headache, and fever, and countless types of painkillers, sleeping pills, and medicine to soothe an upset stomach. However, why do some of these medications seem to work more effectively for other people? Why does a certain cold medicine leave one person incredibly drowsy while having no effect whatsoever on someone else? Why do some cancer therapies cure particular patients but not others?**

The answer is genetics. Advancements in genetic testing provide us with insight into how our individual genomes have a direct effect on how our bodies respond to certain medications. This discovery now has physicians, patients, and scientists realising the value of DNA sequencing and how the data generated from these tests can be used to develop personalised medicine. The efficacy of these types of drug is practically guaranteed, as they have been scientifically designed to suit an individual's unique genetic structure.

Data gathered from genetic testing will lead to the production of personalised medicine and will increase the precision level of efficacy. It will also rule out which specific medications someone's body may have a resistance to, thus rendering them useless to use for treatment. Precious time would no longer be wasted; cancer patients would receive the 'correct' medication for their particular DNA structure right away.

**Limitations**

Although a future where everyone could undergo genome sequencing to determine their specific healthcare needs is ideal, there are still roadblocks to be surmounted before the application of genome sequencing can become standard practice. Here are 3 current limitations:

**1. Clinical use**

The fact remains that certain drugs are effective for the majority of the population. While individualising treatment for a patient is ideal, pharmaceutical companies are not likely to create single doses of medicine for one person; they would rather focus their efforts on developing better drugs for the majority of people.

**2. Costs**

Who pays for genetic testing? Do patients pay for it out-of-pocket depending on their willingness? Will they be reimbursed? Will genetic testing be considered preventive care by healthcare providers, which will not only save lives but also significantly reduce future healthcare costs?

**3. Understanding its value**

How does personalised medicine affect the patient-doctor relationship? Will genetic testing strengthen their bond, or will the need for doctor's visits lessen? And will regular doctor's check-ups be replaced with DNA sequencing tests and the mere pick-up of personalised medication?

While a future with personalised medicine based on DNA sequencing is already within our reach, it seems that incorporating it as a common healthcare practice may need to wait until we have determined if DNA sequencing is absolutely necessary for all or should be reserved for those who will benefit from it most. ∎

*More digital health Insights, trends and global trends at www.digitalsalutem.com*

BY MARTIJN KREGTING

# WHO: e-health finally becoming mainstream

e-health is becoming mainstream worldwide. A growing number of countries now have e-health strategies in place to create a framework for fragmented e-health initiatives. Medical information for patients and their caretakers is becoming more accessible digitally through the use of national electronic health record (EHR) systems. Social media and big data are becoming instrumental in research and treatments.

These are some of the most important conclusions in the WHO 'Global diffusion of e-health: Making universal health coverage achievable' report. This third global survey by the WHO Global Observatory for e-health (GOe) investigated how e-health can support universal health coverage (UHC) in Member States. A total of 125 countries participated in the survey: a clear reflection of countries' growing interest in this area.

The aim of this third global survey on e-health was to explore developments in e-health that have arisen after the last survey in 2010 and examine the role e-health plays in achieving universal health coverage (UHC). The authors of the survey state that it has become increasingly clear that UHC cannot be achieved without the support of e-health. The impetus for the global surveys on e-health was the result of the increasing use of information and communication technologies (ICTs) in support of health services in both developed and developing countries since the early 2000s.

The report supplements several other e-health-related WHO documents:
- 'Atlas of e-health country profiles 2015 – the use of e-health in support of universal health coverage';
- 'e-health in the Region of the Americas: breaking down the barriers to implementation';
- 'Results of the Third Global e-health on Survey';
- 'From innovation to implementation: e-health in the WHO European Region'.

**Strategy on e-health in place**
So what are the basic conclusions, other than that e-health is becoming more pervasive and more mainstream?
Well, for one thing, over half of all WHO Member States now have an e-health strategy. Over 90 percent of these e-health strategies reference the objective of universal health coverage (UHC) or its key elements. It is becoming mainstream for countries to have policies for managing information. When well-articulated, e-health strategies should enable the interoperability needed to support people-centred health services for everyone, and a move from disease silos to resilient healthcare systems that can provide UHC. Also, a large number of countries have reported at least one mHealth initiative (83%). mHealth continues to be a dynamic area, the third survey notes. The number of established programs reaching maturity has increased since the 2010 GOe survey. Despite this rapid growth, however, very

few Member States reported evaluations of government-sponsored mHealth programs. As such, knowledge of what works well and which mistakes to avoid is limited.

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## THE CONTRIBUTION THAT ICT IS ABLE TO MAKE MUST BE SEEN AS AN ESSENTIAL AND CENTRAL COMPONENT TO THE PROVISION OF HEALTHCARE AND IMPROVEMENTS TO HEALTH SYSTEMS, NOT AS A MERE ADD-ON.
"

**Telehealth**
The use of telehealth continues to grow, and teleradiology is the most widespread (77%). Other services, such as telepathology, remote patient monitoring, and teledermatology, are also in use in nearly half of WHO countries. By offering care at a distance, telehealth services enable greater equity in health coverage. Mobile applications provide easier access in developing countries; mobile apps give access to information and make local diagnosing and treatment possible.

**Learning the trade virtually**
eLearning is a part of medical students' and doctors' training in over 84% of countries. UHC requires staff with the right skills, and eLearning has the potential to play a significant part in addressing the current skills gap. Only last year, several operations were recorded with 360-degree cameras and live streamed worldwide. This concept can be adapted to be used on a regular basis, to offer large groups of medical students worldwide better access to operating techniques and procedures without having to actually attend physically. Again, this could help give medical students in developing countries a chance to learn their trade, requiring only a fraction of the number of teachers otherwise needed.

**National health records**
Medical information is becoming more accessible as well. National electronic health record (EHR) systems are now reported in 47% of countries. While implementing EHR programs is complex and costly, EHRs have

the potential to provide clinical decision-makers with complete and accessible information for every patient at the point of care, thus improving the quality and timeliness of care, and, by combining all of the information, provide better data regarding the effectiveness and coverage of interventions.
Key international standards are being implemented for interoperability, making it easier for interoperable systems from different providers to exchange information, and thus providing more ubiquitous access on any device at any location, for patients, healthcare professionals, and scientists alike.

**Regulation, legislation**
The extent to which legal frameworks protect patient privacy in EHRs is of great interest as healthcare systems move towards to providing safer, more efficient, and more accessible healthcare.
For e-health to play its full potential part in helping health systems achieve UHC, a sound legal framework is required. A general e-health regulatory environment has been slowly but steadily developing, with great advances in terms of the adoption of health data privacy legislation.
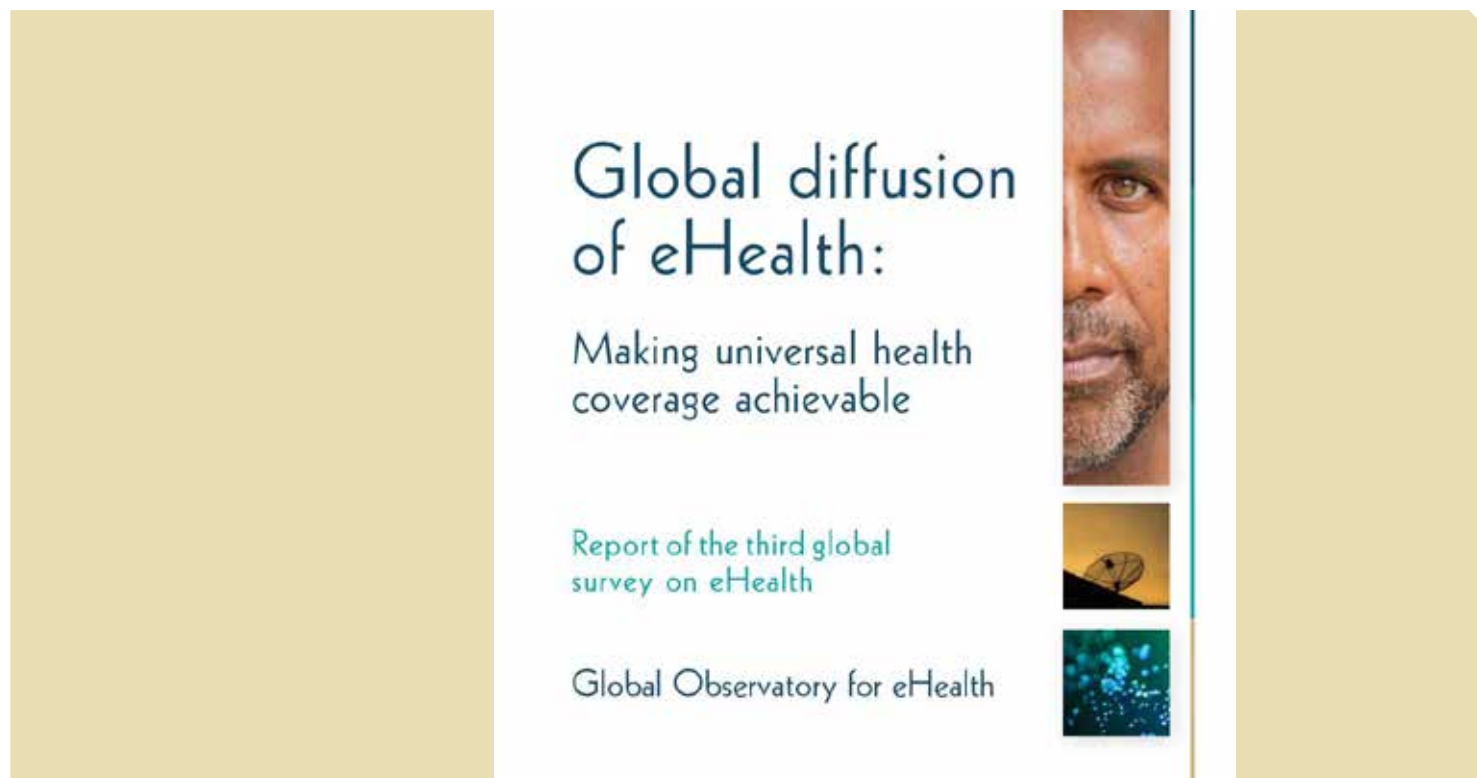78 percent of all countries participating in the survey in total have reported legislation protecting the privacy of personal information. Another 54 percent reported legislation to protect the privacy of electronically-held patient data.

**Use of social media, big data growing**
Finally, social media is rapidly emerging as an advantageous facet for healthcare, as is big data for research and planning. Nearly 80% of countries reported that healthcare organisations use social media to disseminate healthcare-related messages. Social media underpins both the advocacy of UHC, and the promotion of health messages. Individuals and communities use social media primarily to learn about health issues. The potential of social media to support UHC has not yet been fully explored.
A recent example: over the last few years, several studies and social media experts have shown that social media such as Twitter can aid the study of human behaviour and as such may play a role in predicting the outbreak of diseases or supporting public health efforts. Twitter is not just a platform to read news, engage with like-minded individuals, launch insults, or give praise. It is also a far-reaching and revealing digital 'petri dish' to study human behaviour with that may help predict outbreaks of diseases like HIV and inform public health efforts. ▶

*The report Global diffusion of eHealth was published by WHO.*



Global diffusion of eHealth:

Making universal health coverage achievable

Report of the third global survey on eHealth

Global Observatory for eHealth

'Big data' was investigated for the first time in this survey. 17 percent of countries already report having a national policy or strategy regulating its use in the health sector. The use of new analytical tools on big stores of digital data offer healthcare advocates the potential to explore individual, group-level, and national-level analyses of health coverage in support of UHC.

An example: a Silicon Valley Bank survey among 122 health IT company founders, executives, and investors recently concluded that big data technologies like artificial intelligence and the Internet of Things will have the biggest impact on healthcare provision and investment in 2017. 46 percent of participants in this survey believed that big data would have the greatest impact on healthcare over the next year.

## Barriers and progress
Improvements in information systems to support health and healthcare face many hurdles. Some of these are reflected in the findings of the survey, such as the need for a trained workforce skilled in using e-health solutions, the need for proper governance, funding, etc. Fundamental to overcoming these barriers is the understanding that in the 21st century, the contribution that ICT is able to make must be seen as an essential and central component to the

provision of healthcare and improvements to health systems, not as a mere add-on. e-health is now an integral part of achieving improvements in healthcare.
Over the past decade or so, the impetus to strengthen health systems with better information and ICT has resulted in significant progress. The early pioneers of e-health have seen their work taken up, replicated, and developed. There has been a substantial increase in the number and range of solutions, particularly with the advent of mHealth. However, the process of embedding e-health everywhere still has a long way to go, in terms of both coverage and functionality. The image that is now presented is still quite mixed, with progress reflecting different national or local priorities.

## About UHC
Universal Health Coverage (UHC) is part of the post-2015 agenda geared to meeting the Sustainable Development Goals (SDGs) which the UN General Assembly adopted in September 2015. Goal 3 is to 'ensure healthy lives and promote well-being for all at all ages' and its 8th target is to 'achieve universal health coverage', so that all people will receive the high-quality health services they need without having to suffer financial hardship.
The Global Observatory for e-health (GOe) believes that herein lays an opportunity for e-health to support a comprehensive and coherent approach to health, and support integrated, people-centred health services. ◼

**Effective e-health standards and practices**
The 58th World Health Assembly in May 2005 resulted in the first e-health strategy for WHO. This resolution urged Member States to plan for appropriate e-health services in their countries. That same year, WHO launched the Global Observatory for e-health (GOe), an initiative dedicated to the study of e-health, its evolution, and its impact on health in countries. The Observatory's mission is to improve health by providing Member States with strategic information and guidance regarding effective e-health practices and standards.

According to the GOe, e-health is the use of information and communication technologies (ICT) for health. It is recognised as one of the most rapidly growing fields in the health industry today. The report looks at e-health foundations built through policy development, funding approaches, and capacity building in e-health through the training of students and professionals. It also examines specific e-health applications such as mHealth, telehealth, electronic health records systems and eLearning, and how these contribute to the goal of UHC.

# The International Editorial Board of ICT&health

The content of ICT&health INT is, both online and offline, compiled in collaboration with international specialists of our editorial board. We are honoured to have medical specialists, doctors, physicians, scientists, patients, government officials and innovation leaders on board. Chair of the Editorial Board is Lucien Engelen , Director REshape Center for Innovation at Radboudumc.

BY YVONNE KEIJZERS

# e-health & legislation:
# "The law offers room for responsible innovation"

Hardly a day goes by without the media writing about privacy concerns in the healthcare sector. Are such concerns becoming an inhibiting factor, or are things not as bad as all that when it comes to the flexibility of the law? Frank Simons (lawyer) and Hanneke Later-Nijland (lawyer, trained as a pharmacist) of the international law firm Bird & Bird: "We often apply old rules to new technology. Sometimes, that leads to problems."

The Dutch government is going all-in when it comes to eHealth. Its goals for 2019 are ambitious: 80% of all chronically ill patients and 40% of all other Dutch people must have direct access to their own medical data by then, 75% of chronically ill patients and vulnerable elderly people must be able to conduct measurements themselves in combination with remote monitoring, and anyone receiving care and support at home must be able to communicate with a care provider 24 hours a day via a display if they need to. Minister Schipper reiterated these goals in late 2015 as part of the eHealth progress report. [1]

Simons and Later-Nijland describe the pitfalls in the regulations for entrepreneurs and healthcare providers in the field of eHealth. Examples include rules pertaining to medical devices and privacy.

Later-Nijland: "eHealth software (or modules thereof) can qualify as medical device, because it may be used to, for example, reach a diagnosis or treat an illness. Think of triage software or

Electronic Prescription Systems (EPS). In those cases, software developers find themselves in fairly strictly regulated waters. The CE hallmark cannot be overlooked, because the Healthcare Inspectorate (HI) conducts rigorous inspections and imposes hefty fines.

An example of when eHealth objectives and legislation appear to be in conflict is the exchange of patient data between healthcare providers. Last year, when the HI determined that the continuity of healthcare for vulnerable elderly patients was lacking, the Minister responded by ordering that "every healthcare provider must have their electronic files in order and various systems in the chain must be able to exchange information between them" [2] At the same time, the Dutch Senate was discussing a newly proposed law concerning the electronic exchange of patient data after the National Federation of General Practitioners sounded the alarm. That proposal would impose such strict demands for data exchange so as to make the situation entirely impractical. The government appears to be making contradictory demands.

Later-Nijland: "Privacy and proper healthcare do not have to get in each other's way. Even more so, the Personal Data Authority has emphasised the fact that personal data protection is an integral part of patient care in an open letter to all boards of directors."

Still, it sometimes appears to be impossible in this field to offer high-quality, innovative care, while also following the strict rules that are in place. Later-Nijland and Simons believe that can feel restrictive. However, if companies gather proper and practical information beforehand, they can save themselves a lot of misery in the long run. Regulatory compliance should be integrated into product design: in short, 'regulatory compliance by design'.

Simons: "An important task awaits legislators and oversight committees. The current laws are not so bad. They leave room for responsible innovation." Consider the process of obtaining permission from patients for data exchange, which is what the proposed law in the Senate is about. Current laws already set clear requirements for patients' permission. Another example is big data, which involves doing research using large quantities of medical data. "Privacy concerns are justified here, but the response should not be to simply create some new laws. Current laws already offer sufficient guidelines for these situations," says Simons. "The law states, for example, that no more information than is necessary may be collected, that privacy must be safeguarded, and that appropriate security measures must be in place. The way these regulations are formulated leaves room for responsible innovation. At the same time, it calls on healthcare providers' or researchers' own responsibility to protect patients' privacy. After all, what do 'no more than necessary' or 'appropriate measures' mean?"

Are hospitals or research organisations even able to keep track of everything anymore? "It may seem complicated," Simons says, "and sometimes it is. However, providing good healthcare is an inherently complicated process. That is why healthcare facilities bring in good physicians and nurses. It makes perfect sense for them to also contract good lawyers and privacy specialists who can contribute to their privacy policy. I would advise any organisation involved in the field of eHealth to invite their attorneys and privacy officers to think about potential privacy risks from the very onset of the development of new policies or products. That can prevent a lot of trouble down the road," Simons emphasises. "This is becoming increasingly important, especially with the upcoming new European privacy laws" (see sidebar). ∎

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[1] *Parliamentary Papers II 2015/16, 27529, no. 134*
[2] *Parliamentary Papers II 2015/16, 31765, no. 167*

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**New EU privacy laws as of 2018**
After three years of negotiation, the EU reached an agreement late last year about new European privacy laws. The new EU laws will likely enter into force in 2018, replacing the existing national privacy legislation.

**Notification requirement and fines**
The Netherlands is slightly ahead of other countries when it comes to these new European rules. A notification requirement for data leaks and higher fines for privacy violations were already introduced on 1 January 2015. In 2018, a similar form of notification requirement will enter into force in all EU countries and the Netherlands' authority to fine violators will be extended to fines of up to € 100,000,000 or 5% of annual global revenue for serious violations.

**More focus on compliance and 'privacy by design'**
This new European privacy law focuses on compliance. Organisations that process personal data must be able to demonstrate their compliance with privacy regulations, for example by keeping records pertaining to their data processing activities and by establishing clear, written agreements with suppliers. Organisations that process confidential information or large quantities of data – which is all too common in the healthcare industry – must also conduct a Privacy Impact Assessment (PIA) beforehand and appoint a Data Protection Officer (DPO). The new law calls for everyone to focus more on 'privacy by design', meaning that privacy protection will need to play an increasingly large role in product and policy design. For example, consider the implementation of privacy-improving technology such as pseudonymisation. Pseudonymisation is explicitly mentioned in the new European law as a method to protect personal data, although it is often insufficient by itself to truly anonymise data.

Medical device or not?

When does software qualify as a medical device?

"There are several steps to determine whether software qualifies as a medical device," says Hanneke Later-Nijland.

1. Does it concern computer software?
2. Does it concern standalone software?
3. Does the software have any functions beyond storage, compression, or simple queries?
4. Is said function designed for the benefit of the individual patient?

If the answer to all of these questions is 'Yes', you end up at the most pertinent question of all: is the software intended to be used on people to diagnose, prevent, safeguard, treat, or alleviate illness?

These devices must have a CE hallmark, which indicates that they meet the so-called essential requirements.
"In order to acquire a CE hallmark for a Class I medical device, companies can draw up their own EG declaration of conformity. In the case of a Class II device (or higher), the product has to be evaluated by a certified body selected by the company itself (e.g. Dekra). Finally, the company must make any so-called technical documentation (including a product description and risk analysis) available to the supervisory body."

The Healthcare Inspectorate (HI) oversees compliance with the Medical Devices Act and imposes (large) fines when software manufacturers do not comply with the law.

**About Bird & Bird**
Bird & Bird is an international law firm (with over 1,100 attorneys worldwide) with a strong focus on high-tech and regulated sectors, including Technology & Communications, Life Sciences, Media, and Energy & Utilities.

# Microsoft launches Healthcare NExT



**Health worldwide represents one of Microsofts' fastest growing segments. At HIMSS, the company made clear in which direction this is leading.' The new strategy Healthcare NExT, which the company enrolled last March, will give partners an important role.**

BY YVONNE KEIJZERS

Healthcare NExT will integrate research and health technology product development, as well as establish a new model at Microsoft for strategic health industry partnerships, according to the company.  Through these collaborations between health care partners and Microsoft's AI and Research organization, Microsofts' goal is to enable a new wave of innovation and impact, using Microsoft's deep AI expertise and global-scale cloud.[1] In this Partner program, Alliance member receive training and access to Microsoft technologies, engineering expertise and data sets.[2]

**Transforming patient and clinician empowerment with UPMC**
UPMC [3], will be the first planned strategic research partnership for Microsoft's Healthcare NExT initiative. UPMC is one of the largest integrated health care delivery networks in the United States. The $13 billion Pittsburgh-based system is comprising more than 25 hospitals, a 3 million-member health plan and 3,600 physicians. Microsoft considers it a core partner in their efforts to improve health care delivery through a series of projects, starting with a focus on transforming clinician empowerment and productivity.

**Virtual health templates**
Microsoft Office 365 Virtual Health Templates provides new functionality to connect people and providers through voice, video and messaging in any interface or application, powered by Skype for Business. The open source templates make it possible for industry partners, developers and enterprises to build solutions to provide care for every patient, anywhere. ∎

*References*
[1] *global-scale cloud*
[2] *Microsoft AI in Health Partner Alliance*
[3] *University of Pittsburgh Medical Center*

**Partners of Microsofts' Healthcare NExT**
Additional collaborations from Healthcare NExT include partners applying the cloud, AI and research to problems in health care:
- HealthVault Insights is a new research-based project. It is designed to allow partners to generate new insights about patient health, drive adherence to care plans and encourage patient engagement powered by the latest scientific advances in machine learning. Tribridge and System C & Graphnet Care Alliance are building on HealthVault Insights to create innovative solutions for patient adherence to provider care plans.
- Microsoft Genomics wants to make the sample-to-answer process fast and easy through an Azure-powered genome analysis pipeline and an orchestrated ecosystem of innovative partners including BC Platforms and DNAnexus.
- Microsoft's AI health chatbot technology is also a research-based project that will enable partners to build AI-powered conversational health care tools. MDLIVE intends to use the health bot technology to help patients self-triage inquiries before they interact with a doctor via video.
- Project InnerEye is a research-based, AI-powered software tool for radiotherapy planning. The goal of the project is to allow dosimetrists and radiation oncologists to achieve 3D contouring of patients' planning scans in minutes rather than hours. The assistive AI technology gives experts full control of the output accuracy while enjoying high levels of consistency and potential cost savings.

# Health at a Glance: Europe 2016



BY YVONNE KEIJZERS

We need more effective, accessible, and resilient health systems; that is the outcome of the Health at a Glance: Europe publication by OECD and the European Commission. This initiative aims to strengthen country-specific and EU-wide knowledge on health issues. The content, including the selection of key indicators of health and health systems, was agreed upon by the OECD and the Commission, and based mainly on the European Core Health Indicators (ECHI) and the Joint Assessment Framework on Health, while also incorporating the 2014 Commission Communication on effective, accessible, and resilient health systems as a reference framework.

Life expectancy in EU member states has increased by more than six years since 1990, rising from 74.2 years in 1990 to 80.9 years in 2014, and yet, inequalities persist both across and within countries, according to the recent publication. People in Western European countries where life expectancy is highest live over eight years longer, on average, than people in Central and Eastern European countries where life expectancy is lowest. Moreover, large inequalities in health and life expectancy also persist within countries between people with higher levels of education and income and more disadvantaged people. This is largely due to different exposure to health risks, but also due to disparities in access to high-quality care.

### e-health

The report emphasises that improvement in the adoption of digital technology in both the primary care and hospital sectors is needed throughout Europe to fulfil the vision set out in the European Commission's eHealth Strategy. Demographic change, rising chronic disease and multimorbidity, along with fiscal pressures, are putting the medium- and long-term sustainability of European health systems to the test. In order to rise to the occasion, health services must become more effective and efficient. Healthcare is an information-intensive endeavour, and adoption of digital technology and eHealth can greatly enable such improvement. While health system digitalisation is complex, and can be costly, the potential long-term benefits in promoting efficiency gains must also be considered. These include improved quality of care, better planning and resource allocation, and enriching the evidence base for health service delivery and policymaking.

### Wide range of action needed

More than 1.2 million people in EU countries died in 2013 from illnesses and injuries that might have been avoided with more effective public health and prevention policies or more timely and effective healthcare. A wide range of actions is needed to address the many environmental and behavioural risk factors that lead to premature deaths from diseases such as acute myocardial infarction (heart attack), lung cancer, stroke, as well as alcohol-related deaths and other potentially avoidable deaths. Notable progress has been achieved in reducing tobacco consumption in most EU countries through a mix of public awareness campaigns, regulations, and taxation. However, more than one in five adults in EU countries continue to smoke every day. It is also important to step up efforts to tackle the harmful consumption of alcohol and the issue obesity, which are growing public health issues in many EU countries. More than one in five adults in EU countries reported heavy drinking of alcohol at least once a month in 2014. And one in six adults in EU countries were obese in 2014, up from one in nine in 2000.

The quality of care has generally improved in most EU countries, and yet disparities persist. Improved treatments for life-threatening conditions such as heart attacks, strokes, and several types of cancer have led to higher survival rates, but there is still room for improvement in many countries in terms of the implementation of best practices in acute care and chronic care. ∎

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# IT as the cornerstone for precision medicine and scientific wellness

At the 11th Precision Medicine World Conference in Silicon Valley (22-25 Jan) [1], a plethora of precision medicine technologies, many of which are IT driven, were presented to a predominantly US-based audience. At the conference, the challenges that these technologies face in terms of clinical implementation (e.g. for cancer prevention, diagnosis and treatment), evidence development (e.g. early health technology assessment), and regulatory and reimbursement aspects were discussed by recognised innovation leaders, top global researchers, and medical professionals.

Precision medicine, personalised medicine, and individualised medicine are hard-to-miss buzzwords in today's academic and public discourse about healthcare. With this surge in attention, a huge variety of definitions of precision/personalised/individualised medicine have emerged. To shed light on the vagueness of these terms, Schleidgen et al.2 have defined them in summary as interventions that "seek to improve stratification and timing of healthcare by utilising biological information and biomarkers on the level of molecular disease pathways, genetics, proteomics as well as metabolomics". And yet, undaunted by the occasionally heated debates about its definition and scope, precision medicine has become one of the core areas of public research funding and pharmaceutical research investment. [2]

## Implementing Precision Medicine: powered by people, made possible by IT
During the 'Implementing Precision Medicine Programs' session, the role of IT was illustrated and discussed by examining experiences in cancer care. For precision medicine to satisfy expectations, IT is crucial. Examples of topics include how IT solutions are crucial for analysing and integrating vast amounts of complex data they this can be interpreted and presented as clear and actionable information to healthcare providers and patients. An example of such a solution is N-of-One PrecisionInsights, which aims to help healthcare providers interpret data from biomarkers to characterise cancer

objective of serving different types of customers with targeted solutions presents IT services with another major challenge in precision medicine.

## Scientific wellness
The switch to seeing patients as active stakeholders in precision medicine has resulted in yet another new buzzword. 'Scientific wellness' can be described as an approach that provides people with the information and tools to take control of their wellbeing, with the aim of shifting healthcare provision from a primary focus on disease to a more comprehensive focus on both wellness and disease. As such, IT-driven data collection and analyses are aimed towards accelerating diagnostics and improving prognoses through forming a better understanding of the complex mechanisms of disease, taking into account genetic predisposition, environment, and lifestyle. This unlocks opportunities for individual as well as population health management in terms of health promotion, disease prevention, and treatment. One example here is Arivale, a systems approach that gathers, connects, and analyses data about one's body and life in order to assess the individual's wellness potential and to translate person-level data into actionable recommendations to help the individual achieve their personal goals.[4] On the greater population level, such systems enable identification of patterns and predictors of disease and wellness that are nearly impossible to study using traditional research methods.

generate such evidence are lacking. Due to the prospects of low (cost-based) prices and poor intellectual property protection, it is unrealistic for these companies to invest in 'ideal' studies to demonstrate clinical utility. Lack of such evidence reduces not only payers' willingness to reimburse tests; no or insufficient reimbursement also discourages clinicians' willingness to use tests or invest in IT tools at all. Therefore, opportunities to generate value from precision medicine (i.e. health gains and cost savings) are lost, making this a public policy issue. The use of methods for early value assessment and research prioritization [7] is recommended to payers and developers, in order to move towards more realistic evidence requirements and value-based pricing policies.

To conclude, the conference illustrated that IT is a vital cornerstone for precision medicine, as it helps 'connect the dots' in increasingly complex and personalised care pathways, and enables the collection and analysis of vast amounts of data that inform crucial health and care decisions on both the individual and the population level. However, bringing precision medicine to its full fruition will require a better alignment of economic incentives, and the permitting of appropriate assessment of and reward for its added value. ◗

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## WITH THE INFLUX OF TECHNOLOGY IN HEALTHCARE, HEALTHCARE PROVIDERS' COMPETENCIES NEED TO BE ENHANCED.

sub types and identify the most relevant list of therapeutic options. [3] The innovators and medical professionals on the conference stage also emphasised the use of IT to train professionals in precision medicine and support its implementation. With the influx of technology in healthcare, healthcare providers' competencies need to be enhanced to ensure that the technology will be able live up to our expectations. In addition, precision medicine developers need to increasingly consider patients and their caregivers as the end users of their products, acknowledging that patients are increasingly called upon to be proactive regarding their own health and wellness. The

## Assessing and rewarding the value of Personalised Medicine: get real!
The 'Economics of bringing precision medicine to the clinic' session [5] focused on how to assess and reward the added value of precision medicine, most notably of genomic tests (e.g. MammaPrint to predict breast cancer recurrence [6]) and IT tools (e.g. N-of-One [3]), considering the unsustainable economics at play and the pricing and reimbursement challenges they create. The session highlighted the fact that payers often demand evidence from large, randomised studies on efficacy (and sometimes on the costs of care) before deciding on reimbursement. However, incentives for diagnostic or IT companies to

# Data from 1 million patients available through Cancerlinq

BY YVONNE KEIJZERS

One in four deaths in the US are caused by cancer. The disease is responsible for the death of 590,000 people per year [1]. Analysing and comparing the huge amount of data submitted by individual patients can help reduce the number of deaths resulting from cancer. That is the aim of Cancerlinq. This platform recently reached the milestone of 1 million patients. Unstructured, anonymised data from all of these patients will be available for doctors and research.

In 2013, a group of oncologists, united in the American Society of Clinical Oncology, decided to build a database to contain a huge amount of data concerning patients, types of cancer, and treatment methods. These days, the database contains data from one million US patients from 39 states, and the time has come for a move to Europe. "Cancerlinq is an American initiative, but its membership is international. Our aim is a collection of data from three million patients in 2017," says CEO Kevin Fitzpatrick. "For the time being, we are focusing on common cancer types like lung cancer and breast cancer."

## Real-time feedback

Using Cancerlinq allows doctors to get real-time feedback on their treatment and obtain insight from anonymised data from thousands of patients. The analysis tools also make it possible for physicians to personalise treatment methods. For example, the data provides them with more information regarding the side effects of treatment. Lastly, researchers are able to compare groups of similar patients from the anonymised database.

According to Fitzpatrick, such comparison has now become possible because the data pool is large enough. "Currently, only 3 percent of all cancer patients participate in clinical research. With Cancerlinq, we can basically make use of information regarding all patients," Fitzpatrick explains. The huge database full of data runs on the SAP platform. With big data analysis tools used unlock data from EPRs, things like more in-depth study of men with breast cancer are possible, simply because there is more data available about men with breast cancer. "The database now includes data from 400 cases of men with breast cancer," says Fitzpatrick. "We know from classical literature that so far, research regarding this type of cancer has been conducted using research groups of no more than 200 to 300 cases."

## Support for doctors

Cancerlinq's purpose is to provide oncologists with real-time feedback using a pool of data: big data. This system also enables support for doctors' decisions and the establishing of benchmarks. For example, doctors can search by origin, environment, lifestyle, DNA, age, gender, but also a combination of these search terms. Cancerlinq is unique in that it uses the existing patient records for these search questions and scientific research. "We really need this kind of big data," says professor Vivianne Tyan-Heijnen, medical oncologist, head of Medical Oncology

and Chairman of the MUMC+ Oncology Commission. "It's the only way to win the fight against cancer. Oncologists around the world have now embraced peer-to-peer reviews. We do not want to work in separate silos anymore, but want to work together, because we want to do our work as best we can. In addition, we are dealing with an aging population, in which cancer is becoming more common. As such, new methods of diagnostics and treatment are desperately needed, simply because in the not-too-distant future, there will not be enough employees available to take care of all these people."

Tyan-Heijnen strives for use of Cancerlinq at the MUMC and wants to open up the dialogue with US organisations. "Membership provides a wealth of information. We simply do not have such a large collection of patient data in the Netherlands. Also, within in a larger partnership such as the Oncology Network Southeast Netherlands (OncoZon), we have only limited access to data groups. As a result, research on rare cancers in particular, such as breast cancer in men, is more difficult. With this global collaboration, we hope to find solutions faster. In addition, we may be able to achieve the goal of personalised medicine use sooner this way. ' According to Tyan-Heijnen, participation provides an additional benefit, namely that manual data collection, which is still the standard in many cases, will belong to the past with Cancerlinq. "We currently manually extract data from a variety of sources. That takes up an enormous amount of time. Using an existing data pool gives us a real advantage. '

## Data security

Dutch hospitals want data from their patients to be stored safely, preferably in Europe. "I agree with that," says Fitzpatrick. "Data concerning Dutch patients should be on a secure server in the Netherlands or in Europe. That's certainly possible. And all of the data is anonymised anyway. Doctors can ask questions (a query) using a certain dataset and the database will tell them whether a similar query is available with an answer. So there is no need to share personal data." Tyan-Heijnen adds: "It is also possible to analyse anonymised patient data and then encode it, after which the data can be exchanged. These datasets can then eventually no longer be traced back to a certain hospital." In any database, large or small, the quality of data is essential. Collecting all of this data, from electronic patient records and other sources, is an art in itself." We are working on ensuring the quality of the data with independent

third parties that analyse data," says Fitzpatrick. He also mentions possibilities for collaboration with other parties who are looking for treatments for cancer. "For example, IBM uses machine learning to analyse data from a single patient. We in fact do quite the opposite, by collecting as much data as possible. Both systems should be able to work fine alongside each other. That is a discussion that we should be having."

## Exchanging medical data on top of agenda

Data sharing between different systems is not always easy and not always possible. According to European ICT professionals, the safe exchange of digital (medical) data within an organisation and with third parties is their main concern and focus at the moment. HIMSS Europe concluded as much in a study conducted amongst 500 staff members in healthcare and e-health in six European countries. About 54 percent of participants considered the exchange of medical data to be the biggest trend for 2016/2017. "Legislation and the exchange of data from different IT systems also pose a challenge for Cancerlinq. These types of problems are solvable, as long as the Board can provide sufficient funds.' ◼

*Kevin Fitzpatrick, CEO Cancerlinq*

**BY BART COLLET**

# Clinical research does not have to be inhumane

Last year, one person was left brain-dead and five were admitted to a French hospital during a clinical study for an experimental drug produced by Bial [1]. These events are recent and close to home, tragic and inhumane. Clinical studies are basically inhumane in and of themselves. Consider the facts; one hundred test subjects in group A are given a drug, while another one hundred people in group B are given a placebo. Each group is virtually identical in composition (age, gender, etc.) and the study goes on for several months.

The test subjects regularly have their blood samples taken and their blood pressure measured, are weighed and asked to say "Aaaa." Based on the extremely limited amount of data that has been collected, people then try to decide what the impact of a certain drug will be.

Are you kidding me? What about relevant environmental variables? On the day of the test, any of the following could have influenced the results: the subject having eaten a kebab with a lot of leeks and paprika,

run a marathon, had a bad day at work, felt butterflies in their stomach, drank ten cups of espresso, or gotten hardly any sleep. Moreover, was it a hot day? Was there a lot of pollen or smog in the air? Was the test subject a single woman, and was the physician conducting the interview a very friendly man who happened to look just like George Clooney?

Does the test subject have a low pain threshold, do they thrive on just a few hours of sleep each night, do they suffer from an undiagnosed illness or a certain genetic defect in their bloodline that no one knows about? And what about the long-term consequences after those initial few months?

**Modern technology?**
Knowing that such studies make very little use of modern technology (mobile, wearables, sensors, etcetera), one cannot help but respect the people conducting these studies. They are the ones who have to draw relevant conclusions from a limited amount of data collected with a limited set of tools. Furthermore, they must follow complex procedures with the utmost care and have an extraordinary eye for detail.

Ideally, we would be able combine a test subject's historical data with new data collected from and around the test subject around the clock. This data would then be subjected to real-time analysis, and based on that analysis, the thousands of test subjects participating in a study would then receive real-time feedback.

**That is an impossible task!**
For now, at least. Besides several applications for collecting data, such as Apple ResearchKit and Validic, some startups exist that are looking to simplify this process. For example:

## UNDER ARMOUR HEALTHBOX

A heart rate monitor, an activity tracker, and a scale. What is so special about these devices? Well, in this case, they work as one complete platform, rather than an optional collection of devices that still need to be connected. This product is specifically tailored to athletes looking to achieve a certain goal. And as for what this has to do with clinical studies, both the integrated platform and the feedback lead to better follow-up regarding measurements and the subjects' general condition during a study. The platform would therefore be perfect for clinical research.

If a few more measurements were added, the HealthBox would earn three peppers, but for now, we'll have to give it two.

## COHERO HEALTH

A medical device developer has developed a connected device that can track lung function and medication compliance in real time. Validated connected health platforms are something pharmaceutical companies are really interested in. Cohero is working with Koneksa Health and Entra Health, among others, businesses that are conducting clinical trials using connected devices. Cohero plugs into those platforms for remote patient monitoring for clinical studies, both in pharmaceutical pipeline programs and at academic medical centres.

## MOLECULAR MATCH & TRIALREACH

Cancer patients want information. Suppose they are looking for the best possible treatment based on their DNA and/or the description of their illness. This might lead them to a clinical trial testing a new drug that may help them.

## KENSCI

This is not a company focusing on clinical trials as such, but could potentially provide a lot of added value for them. KenSci has built a platform for predictive risk management, powered by machine learning. Their bold claim is that they can help detect who will get sick and how.

## AICURE

It goes without saying that the regular use of medication is extremely important for clinical trials. However, how can researchers be sure that people take their medication on time? AiCure may have come up with a solution. Their AI Platform provides an intuitive control program that uses facial recognition and sensors in patients' smartphones to confirm whether they took their medication.

AiCure works with pharmaceutical companies on compliance. Together, they strive to help patients stay on track.
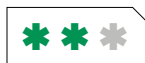
## MEDWATCHER

What is the best way to follow up and report on the side effects of drugs, vaccines, and medical tools? MedWatcher offers a great solution. MedWatcher is a suite of tools designed to offer the public, physicians, and regulatory scientists more insight into the potential risks of medical products. MedWatcher collects and visualises side effects via online sources, including individual reports, social media, patient communities, news media, and the FDA. Furthermore, their mobile app allows users to report events directly to the FDA. The company's private web app 'listens' to social media from the background, looking for signals or expressions of potential side effects. MedWatcher covers all US drugs, devices, and vaccines. Its creators are hard at work to expand the service to include the EU.

## VITALCROWD

VitalCrowd is a new collaborative platform designed to connect patients, healthcare providers, and physicians with researchers. VitalCrowd is going to become a continuously evolving platform aimed at getting the ecosystem involved in health research. VitalCrowd attempts to achieve that goal by rewarding users for certain efforts in several ways. At the same time, the platform provides continuous feedback that allows researchers and developers to dynamically update their developments or research. ∎



**Bart Collet** is a partner at HealthStartup, a partner at Advance Healthcare, owner and manager of Huis Vandecruys, owner of Inovasi, and member of the editorial board.

*Reference*
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# Blitab Technology named as Best Digital Wellbeing scaleup



**The Vienna-based scaleup Blitab Technology has been awarded first place in the Digital Wellbeing category of the EIT Digital Challenge. The EIT Digital Challenge aims to identify the next wave of Europe's top scaleups - fast growing startups who are ready to scale-up their operations – to help them grow internationally and raise funding.**

BY YVONNE KEIJZERS

Blitab Technology wowed the judges at the finals competition held during the EIT Digital Innovation Day at the High Tech Campus in Eindhoven, the Netherlands, with the world's first Braille tablet device that creates tactile Braille and graphics for blind and visually impaired people in real-time by using small physical bubbles instead of a screen display, thereby improving the social wellbeing and digital inclusion. The company will receive access to EIT Digital's pan-European innovation network and the chance to benefit from the business growth support provided by the EIT Digital Accelerator and additionally €50,000 in cash.

Second place went to Qompium from Belgium whose application FibriCheck detects cardiovascular arrhythmia's via a smartphone app. Patients only have to place their finger for 60 seconds on the camera of their smartphone to detect the pulse waveform. The UK-based company Amiko was awarded third prize. Amiko develops digital care solutions for patients with chronic respiratory conditions. The device-plus-platform solution combines sensor technology with smart monitoring for personalized medication management.

 "Over the years, the EIT Digital Challenge has identified some of the best digital scaleups in Europe. It shows that Europe not only has an abundance of startups with innovative ideas but also entrepreneurs with great ambitions to enter other markets. We are impressed by Blitab Technology, FibriCheck and Amiko and their technologies. We think they will have a real impact on the Digital Wellbeing landscape in Europe and we look forward to getting to know them better," explains Dominik Krabbe, EIT Digital Challenge Lead.

In total, ten digital technology companies from across Europe competed in front of an international expert jury for the opportunity to benefit from the EIT Digital innovation network. The three top teams have been invited to an exclusive two-day event, held by the EIT Digital Accelerator in Berlin in December.

Here, Blitab Technology, FibriCheck and Amiko will have the chance to meet the winners from the other categories, connect with EIT Digitals' unrivalled ecosystem during a networking evening and discuss their growth strategies with international EIT Digital experts during workshops.

The EIT Digital Accelerator comprises a team of experienced business developers and fundraising experts. They operate from 13 cities across Europe as well as a hub in San Francisco. Since 2012, they have supported more than 200 startups in accessing new markets and helped them raise more than €75 million in investment to date. ▪

# Patients expect more from data sharing than is possible

There is a gap between patients' expectations of what is possible in the area of medical information sharing and the limitations the healthcare industry still faces, a recent survey by Transcend Insights concludes[1]. According to this population health management company, a vast majority of patients (97 percent) believe it is important for any healthcare institution, regardless of type or location, to have access to their full medical history in order to receive high-quality care. They also believe that this should be possible in the digital age we live in.

BY MARTIJN KREGTING

Patients also rated the factors they deem most important for receiving personalised care. Top priorities include having access to their own medical records (92 percent) and the ability for care providers to easily share and receive important information about their medical history at whichever location they require treatment (93 percent).

## Significant gap

The survey suggests a significant gap between the level of information sharing that patients expect and the level that is possible in fact today, Transcend Insight writes. While the healthcare industry has undergone rapid digitization in the last decade, a way to effectively share medical information and communicate across many different healthcare information technology systems — a concept often referred to as interoperability —has remained elusive.

The survey refers to a recent interoperability study conducted by the American Hospital Association, stating that only a quarter of all hospitals are able to functionally exchange (find, send, receive, and use) clinical information with external providers. Another study published in the Journal of the American Medical Association found that only 34.8 percent of specialists receive information about a patient from their referring primary care physician (PCP), even when the PCP does attempt to share patient records. In other words, data is not traveling with patients wherever they go, despite the importance that patients attach to open access to their information.

"For us as an industry, the time has come to move beyond viewing interoperability as a philosophical challenge or a problem that we'll eventually get the hang of," said Thomas J. Van Gilder, MD, JD, MPH, Chief Medical Officer and Vice President of Informatics and Analytics at Transcend Insights. "This survey shows us that patients consider proper information sharing to be an essential element of high-quality care. It's time that we live up to those expectations by giving care providers and healthcare systems the tools they need to stay connected regarding patient care."

## Benefit of doubt

The survey does suggests that patients tend to give their care providers the benefit of the doubt concerning data sharing and the their medical records' ability to travel with them. When respondents were asked whether or not their doctors could easily share and access important information about their medical history – whenever or wherever they needed care – 72 percent of patients said they believed that this is in fact happening. Unfortunately, due to ongoing setbacks in connecting the sprawling healthcare system, this type of open access to records is rare. ∎

Other key findings in the survey:
- 64 percent of patients say they use a digital device (including mobile apps) to manage their health and 71 percent believe it would be helpful for their doctor to have access to this information as part of their medical history.
- Patients are more likely to trust the healthcare they receive from a medical professional when he or she has access to their full medical history (38 percent versus 27 percent).
- A majority of patients surveyed believed that provider access to their full medical history is important to receiving high-quality care, with 87 percent of respondents indicating that PCP access, in particular, is extremely or very important to receiving high-quality care.

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See more news on our website
www.ictandhealth.com Medicine, USA

BY YVONNE KEIJZERS

## Prince Constantijn of the Netherlands:

# "Startups do not benefit from regional fragmentation"

**"The Dutch startup ecosystem has a lot of potential; we have excellent knowledge institutes and universities, a stable government that encourages innovation, good infrastructure, and highly educated people. We measure up to top international levels in a lot of areas. The challenge for us lies in translating existing knowledge and technological expertise into scalable business models, "says Prince Constantijn of Orange in office Startup Delta B Amsterdam.**

The Startup Delta's mission is to improve the startup climate in the Netherlands, and in doing so, indirectly improve it in Europe as a whole. If all of the players in the ecosystem are better able to find one another, exchange information, and stimulate regulations, the Netherlands will be able to take the lead as a knowledge economy. Today's start-ups will have a big impact on tomorrow's competitiveness. Prince Constantijn of Orange spoke to us about the startup climate.

"Look, a startup is just a name. It's a mentality: a company that wants to innovate using a scalable and transformative business model. The technology is not key; the business case is key. You want to do more than simply a pub on the corner; you want to go the Starbucks route," says Prince Constantijn. "Rapid growth is essential: a monthly growth of 40%. Add to this the drive of wanting to create a product with which to change the world. Having a goal like that is important. For example, you are here to make the best possible care available to everyone. And you have a product, service, or platform. If you have those two, it does not matter whether you call yourself a startup or a scale-up. "

"In the health care world, this scaling problem is recognized by many startups." The most important thing is that startup customers must be willing to pay for the product or service. Only then can startups attract investors and scale up in earnest. In the Netherlands, this means that insurers must reimburse these services. With all of the new services available these days, such as those in the field of preventive care, this is not easy, because the line between what is

> ## HOW DO YOU KEEP PEOPLE HEALTHY? FEWER TREATMENTS, AND MORE PREVENTION.

and what is not a medically healthy lifestyle is blurred. Someone said to me once: "Health care these days is neither about health nor about about prison care; it's about sickness and cures. It's about 'care' and 'health'. How do you keep people healthy, and how do you keep them out of the hospital? Fewer treatments, and more prevention. That has to be the mindset. Such a mindset fits much better with entrepreneurship. But there is still a lot to be done, particularly when it comes to achieving a proper exchange of information and linking systems between hospitals and the ecosystem surrounding them to enable better integrated care."

**Diagnostics upscaling**
Prince Constantijn also sees many positive developments. "Companies in the healthcare industry are scaling-up in terms of diagnostics, medical devices, implants, the effective use of nanotechnology, 3D printing, and robotics. We also see dramatic exits in pharma, but that is a very specific business model. The real question is how to make intelligent use of this, so that resources are used better and care is cheaper. It is difficult to scale up In the Netherlands, because everything is so fragmented. The

health insurers who still manage the overall relationships with the healthcare industry and patients could play a bigger role. "

Another way to facilitate innovation in healthcare is by having startups structurally get inside the walls of healthcare institutions. However, Constantijn has his doubts. "That's possible, but something must also change in the culture, the attitude towards innovation. Startups are also vulnerable to high (administrative) costs, expensive tests, and strict procurement rules." Procurement arrangements are another key to a potential solution, according to the prince. "Just look at SBIR contracts, where the requesting party presents a problem and anyone can present a proposal. On the basis of these proposals, a number of suppliers are selected. They then build and test a prototype together. This approach ensures that the costs stay low. In addition, the client pays a portion of the costs. Only once the prototype is proven to work, will the investment grows and are you able to scale up. That is different from a traditional contract, which gives exact product specifications, and where everyone involved knows that you will only get a big supplier. "

### Startups do not benefit from fragmentation

"We need to think about things from a demand viewpoints much more: what do the patient and client need? 'Disruption' in healthcare will come as soon as the data regarding cost and quality of care is made public, and if healthcare providers and insurance companies make sure that the user is their real focus, focusing on superior service and added value."

"

# 'DISRUPTION' IN HEALTHCARE WILL COME AS SOON AS THE DATA REGARDING COST AND QUALITY OF CARE IS MADE PUBLIC.

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### Transparent care

Therefore, care must be much more transparent. As an example, Constantijn cites Australian-based company Lorica Health. "They perform data analysis based on invoices and evaluate the quality and cost of treatments, doctors and hospitals. They discovered that there is a negative correlation between quality and price in Australia. People think that if they pay more, they get higher quality services or products, but that is not the case. We need those kinds of insights."

Unfortunately, transparency is difficult, because it is scary. "The fear of transparency is enormous. Fear of the damage it will do if people all go to the same hospital. Fear that hospitals will be left with only complex surgeries and treatments. During the transitional stage, all these excesses are likely to occur to a greater or lesser extent, but then, a new equilibrium will establish

itself. The availability, exchange, analysis, and visualisation of data is crucial for transparency. ICT is a tool. Healthy people think the idea of sharing information is scary, but patients do not. Just take a look at what is happening at Kaiser Permanente in the US. They use a closed system data model with unprecedented opportunities for research, diagnosis, and service. "

Healthcare professionals have yet to make an impact, according to the prince. "There is still a lot of training needed to teach health professionals about how to deal with data – the healthcare industry is by no means unique in this. "Data security is a real issue. You do not want data to get out on the streets. Companies and institutions have to invest in this issue. A single lost USB stick can undermine patients' confidence, and have you right back at square one." ∎

### Technology is the future

The impact of technology on society is enormous and is only increasing, according to Prince Constantijn, including in healthcare. Virtual reality (VR), robotics, and artificial intelligence (AI) are fully developed. But technology is going to become much more user-friendly. Nowadays, there are only separate systems, but eventually, they will all merge. People will be able to share data with the system in a hospital via their smartphones. "

Ultimately, it is important to keep an eye on the human scale. "We are human, after all. But if we can solve the global problems of climate, health, or food using artificial intelligence, I think we should capitalise on that. And anyway, it is difficult to stop the progress of AI. These are problems that we have to solve globally."

Tom Lawry, Director Worldwide Health at Microsoft:

# 'We have plenty of data, but we need to make better use of it'

Are healthcare leaders ready for innovation? Do they know what to do with te pile of data they are staring at? According to Tom Lawry, Director Worldwide Health at Microsoft the issue today in health is not lack of data, but making better use of it. 'We have more data than we are using right now. One of the tresholds is because it's stuck in silos.'

BY YVONNE KEIJZERS

There is a big push in moving health to cloud in order to benefit from the awesome capabilities that allows for rapid innovation. Another push for Microsoft are advanced Analytics and AI, according to Tom Lawry, Director Worldwide Health at Microsoft.
But yes, there are some hurdles, like the before mentioned silos. 'Clinical and health leaders are sometimes stuck in old mindsets and workflows, and that's another hurdle for applying big data. They stay in the realm of what they know and are comfortable with. Furthermore it is important to note that health and medical data is doubling worldwide every 24 months. So, data is indeed becoming the

new currently for health. We must move towards harnessing the power of this data to improve both outcomes and costs.'

**A broader view**
The tools that allow us to bring this data together, in ways that allow for agile innovation are growing. "But, to make this happen, leaders must look and think beyond their EMRs and current processes. For example: we recently supported an initiative at Upsalla region in Sweden called the "innovation race", [1] which brought clinical and health leaders together to go through a rapid process innovation race, using Lean

Six Sigma principles to specifically look at how to re-engineer care processes to be better utilizing data. The results include nine specific change initiatives now being pursued [1]. But the biggest push is to get health leaders to raise their "intellectual bar" for what to expect from the data available to them. Part of the challenge is the growing adoption rate of IT among clinicians. They must see it as making them better at what they do rather than replacing them.' ▪

*Reference*
[1] *Innovation Race Upsalla*

BY MARTIJN KREGTING

## Jeroen Tas, Chief Innovation and Strategy Officer, Philips:

# "New healthcare calls for technological, behavioural, and cultural changes."

This year, over fifteen billion devices will be connected and more than three billion health apps will be downloaded in our world. In spite of all of the rapid developments in the field of healthcare and wellbeing, technology alone is never the answer. "It is more important to create new forms of more preventative healthcare by working together with all parties involved," says Jeroen Tas, recently appointed as Chief Innovation & Strategy Officer at Philips.

"e-health applications can significantly improve patients' lives and our healthcare system. However, if we do not focus enough on the changes the use of these applications requires from patients, healthcare providers, and organisations, we will never be able to take maximum advantage of the opportunities these innovative digital technologies have to offer."

In light of today's health-related developments, these improvements are desperately needed, Tas claims. "If the healthcare sector – from producer via service providers to users – does not quickly change its ways, an urgent situation will arise in multiple areas in the years to come. The world's population continues to grow, and yet even today, five billion people have limited or no access to medical care. The first-world population is ageing and its average lifespan is increasing, putting unsustainable financial pressure on healthcare systems. COPD, heart conditions, and diabetes are on their way to becoming chronic lifestyle diseases that affect millions of people."

**No doomsday prophet**
Still, Tas is not a doomsday prophet. His position within an organisation that monitors over one million patients in their homes every day leads him to believe that new digital technology, data, and data analytics offer major opportunities for making healthcare future-proof, allowing the elderly to live independently for longer, and offering people more options for self-managing their health.

Tas also believes that the current rate of technological innovation has the ability to radically improve the healthcare sector, which might lead to a less complex, less expensive healthcare sector that can structurally improve patients' wellbeing. "When technology and a desire to change the healthcare sector's structure come together, a lot of possibilities open up," Tas says. "At Philips, we have witnessed the truth of that in practice."

The challenge is to adopt a structurally different approach and safeguard it as part of new processes: a healthcare system that is increasingly connected and more preventive, organised around integral healthcare networks. The patient should be the primary focus. This kind of vision for the future, and the changes that it requires, must be designed and embraced by all parties involved in the process.

**Transformation to increasingly preventative healthcare**
Philips is hard at work to support hospitals and governments during this transformation

into an increasingly preventive healthcare sector, using new digital healthcare innovations, e-health programmes, and healthcare transformation experts. Patients will have access to data about their own health, with healthcare in alternative locations set up as it is at home.

For example, the organisation has population health management solutions via a new business unit that focuses on analysing and offering personalized program for specific groups of patients. These are solutions that allow people to actively manage their health, using a combination of medical wearables, sensors, and health coaching programmes. Additionally, Philips is developing programs that will allow healthcare providers to monitor patients in their homes, to prevent their health from starting to deteriorate as soon as they come home from the hospital. Personalized methods for each patient are the primary focus, both during patients' stay in the hospital and after (hospital to home). Big data and intelligent algorithms that can recognise changes to patterns in the context of the disease are an important aspect of this new method.

Currently, around fifty percent of all people who take medication for chronic afflictions do not take their medication correctly. Every year, this leads to around 20,000 hospital admissions in the Netherlands alone, which in turn results in 85 million euros in healthcare costs. Solutions such as Philips' Medido (which tells the patient via an e-health device how much medication to use and when to take it, and can automatically alert their home care specialist when things go wrong) can increase compliance to over ninety percent.

Philips is also seeing positive results from monitoring at home the relatively small category of patients who need the most and most complex care. A concrete result from such e-health programmes in the United States, the United Kingdom, and the Netherlands is that the number of emergency hospital admissions has declined by over fifty per cent, while healthcare costs per patient have dropped nearly thirty-five per cent. Intelligent algorithms help the healthcare provider analyse the data acquired via at-home monitoring.  This leads to better insight into which patients require the most urgent attention, which allows for timely intervention when a patient's situation worsens. These types of technology provide people with access to a wealth of important health data. The challenge is making this data usable and relevant to patients and healthcare providers. All of these solutions offer the possibility of significant cost reduction while also positively affecting quality of life.

**Devices alone re not enough to affect behavioural change**
Jeroen Tas: "Simply giving someone a device is often not enough to achieve a structural behavioural change. This applies to people who are already suffering from an illness and to those who are still healthy. That is our technological developers are working with designers and behavioural scientists. The data acquired from patients at home is not just combined with the data acquired in the hospital to create better insight into those patients. We make the data comprehensive and usable for both patients and physicians via personalised coaching programmes that help people manage their complex afflictions. Direct support for healthcare providers, fellow patients, and family and friends also plays an important part in these programmes. Measuring and monitoring should be combined with motivating: explaining to users how they can actively improve their health and wellbeing with different behaviour. It is best to start doing that as early as possible and to focus on disease prevention."

"
## SIMPLY GIVING SOMEONE A DEVICE IS OFTEN NOT ENOUGH TO ACHIEVE A STRUCTURAL BEHAVIOURAL CHANGE.
"

Tas uses himself as an example. "I am part of a support group for people with high blood pressure, which is another common chronic affliction for many Dutch people. For each person, we examine the best way for them to keep their blood pressure under control. After all, there is no one-size-fits-all solution. Next, everyone is coached to help them implement and maintain that behavioural change. Sending a coach in to visit people once in a while is not always necessary, because you can determine how things are going based on the measurements. Sometimes, communication at a distance is sufficient, and sometimes, it can also be helpful to send a coach around for an intervention, such as when the situation is clearly deteriorating. In short, the trick is to find an optimal mix of human interaction from a distance and face-to-face contact."

Tas emphasises the necessity of reaching new insights together about how to better and more efficiently structure healthcare processes. Naturally, everyone holds one piece of the puzzle, but no one has a complete view of the patient and which healthcare process would be best for them. "Everyone focuses on their own piece too much. The specialist, the GP, the hospital, the home care and welfare organisations, governments, rehabilitation centres, etc. The questions involved have become too complex for any one body or person to answer them on their own. The different roles, responsibilities, and shared goals must be made transparent and clear."

**Optimal healthcare approach for diabetes in the Tilburg area**
This is a challenge, but there is no lack of goodwill. In various regions in the Netherlands, Philips is working with healthcare providers and health insurance companies on ways to optimise healthcare processes. One example is the area of the city of Tilburg in the South of the Netherlands, where – as elsewhere – increasing numbers of people suffer from type-2 diabetes. All relevant parties sat down together to develop new processes intended to optimise the healthcare approach and the use of patient information: hospital managers, internists, GPs, home care organisations, government bodies, and diabetes patients.

Tas: "It was not easy. Compromises had to be made, methods that had been around forever had to be updated. Everyone had their own ideas on how to improve the situation, which sometimes led to clashes. Eventually, however, they managed to develop a new multidisciplinary approach with new processes to go with it, which has led to improvements for all parties. The GP's role, for example, has changed from someone who only handles referrals to someone who can draw up a treatment plan in consultation with specialists and healthcare providers."

**Contributing to a better approach to healthcare**
Based on this shared design, healthcare providers and health insurance companies can restructure the practical situation, e.g. the establishing of new contracts and agreements. Next, processes can be improved further and set up to make use of innovative technology. Philips will mostly occupy the role of facilitator at first. "We will refrain from introducing our technology and supervisory programmes until later on in the process. That is not the position we want to occupy right from the start. We want to use our expertise and insights to contribute to a better approach to healthcare." ■

# HIMSS Women in HIT aims for inclusion in health and IT

**We are increasingly dependent on technology. A need for skills and an educational gap is emerging in this field. To ensure that this problem is addressed, HIMSS founded the HIMSS Women in HIT community, a network group focused on bridging the gap between genders. They emphasise that Women in HIT is also about intersexuality, minorities, lesbian/gay people, and people with disabilities. Inclusion of all people is their mail goal.**

BY YVONNE KEIJZERS



*Wilson, Senior Advisor at FTI Consulting EU / Managing Director at Health Connect Partners*

The pay gap in healthcare is not something people are willing to talk about. However, the gap was still there in 2015 [1], all over Europe; in the Netherlands, women earned 15% less than male employees. In Germany, the gap was 19% and in the UK 24%. This is something that needs to be fixed, if we want women on to get on board in Health IT. HIMSS recognised this problem and thus founded HIMSS Women in HIT. However, contrary to its title, this network group is not just about women. It is about working towards inclusive healthcare, where everybody can find a decent paid job.

### Education option
### Educational options
Petra Wilson is Senior Advisor at FTI Consulting EU / Managing Director at Health Connect Partners [2]. She was the first chair of the HIMSS council in Europe in 2008 and was very involved in how HIMSS was established in Europe. "One of the things that was very evident at that time was that Health IT was dominated by men - and sadly that has not changed significantly. It is important to address this and bring more women into Health IT . One of the particular experiences that I bring to this is that when I worked for CISCO, I did a lot to make sure that school girls had access to information about careers in informatics at crucial decision points in their

school careers, We focused on girls between the ages of 9 and 12 to spark their interest in IT and tech, before they make the important decisions regarding secondary school. Health IT must be an attractive education and career option at these early stages if we want to address the needs of the Health IT employer!"
"We need to ensure also that if we get young women interested on the relevant university courses, we then attract them into the Health IT profession - and to do that we need to do our bit to address the issues such as the gender pay gap and the diversity in the workplace. That is why out HIMSS initiative is primarily about women, but not not just about women. We need to build diversity in ages, ethnic origin, academic background etc., if we really want to be successful in Health IT. ,." she explains.

### Increasingly big problem
Maxine Mackintosh, co-founder of Healthtech Women UK with over 11,000 members currently, is also a member of the HIMSS Women in HIT community. She is clear about the focus of the group: "HIMSS is taking a stand as an industry leader by engaging in the gender gap discussion. That will be the main goal for the first year. HIMSS has several channels to communicate this message: events, brochures, articles, and other media around this." The first actions will be to

balance panels as much as possible at all events, hold networking drinks events so that people can meet each other, and create content around this.

Mackintosh: "It's important to focus on women versus broader diversity at the beginning, because this is the lowest-hanging fruit. I've heard that in the Netherlands, there is a much more balanced approach towards technical positions and culture in schools. In the UK, the idea that technology is for boys only still exists. The problem starts at schools. I get the impression that in the Netherlands, the culture is much more balanced. But CEOs are almost always men, wherever you go."

What role can HIMSS play in this discussion? "Obviously, if you have 20 women sitting down together to discuss this topic, it's very easy for the discussion to escalate into how to address international gender equality challenges. The main question should be 'what are the specific challenges within health and innovation?' Maintaining focus is important. Obviously, we are not going to solve gender inequality as whole, as a group. As such, we have to put the most important challenges on the table and understand how to address them: what little bit can HIMSS do to make a difference, and what kind of role can HIMSS play?"

Mackintosh is clear that this is about championing: "It's about better health for more people. You need to make a stand, and that can sometimes be risky. I'm young and don't have a current career to worry about, as I am independent as an entrepreneur and PhD student. But you need to be precise and careful in terms of the language you use. If you are too aggressive, you tend to alienate precisely those people you want to reach." ∎

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*Mackintosh, co-founder of Healthtech Women UK*



**Nominees**
Seven women from across the globe recently learned that they are the inaugural recipients of HIMSS's Most Influential Women in Health IT Awards. The judges selected them from more than 140 nominations.

The HIMSS Most Influential Women in Health IT Awards recognise influential women at all stages of their careers. The Awards celebrate those female visionaries harnessing the power of IT to transform health and healthcare and are unique among power lists and award programs in that they are inclusive of all women of influence, no matter their position in the health IT field.

The inaugural recipients of HIMSS's Award are:

**Shareefa Alabdulmunem**, MSc CPHIMS Head of eServices

**King Faisal** Specialist Hospital and Research Center, Saudi Arabia

**Marion J. Ball**, Ed.D, FHIMSS, FACMI, FAAN, FAHIMA, FCHIME, FMLA Senior Advisor, IBM-Center for Computational Health, USA Professor Emerita, Johns Hopkins University

**Rachelle Blake**, PA CEO and Managing Director Omni Med Solutions, Germany

**Christina Caraballo**, MBA Senior Healthcare Strategist Get Real Health, USA

**Karen DeSalvo**, M.D., MPH, MSc Acting Assistant Secretary of Health US Department of Health and Human Services, USA

**Karen Guice**, M.D., M.P.P. Acting Assistant Secretary of Defense for Health Affairs US Department of Defense, USA

**Lisa Stump**, MS, RPh, FASHP Chief Information Officer Yale New Haven Health and Yale School of Medicine, USA

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Mackintosh and Wilson are convinced of the value of the Women in HIT network. Awareness is key, and due to the network putting this on the agenda, it is very valuable.

1. It is great for the individual members, because it raises their public profile.
2. It allows for role models to be observed by others.
3. It raises points of discussion. This is going to be on the agenda.

These 3 points are very valuable. We think profiling individuals can be really beneficial, because it allows you see them as a person. It is authentic, and that is a very powerful thing when sending out a message.

But as stated before, the problem is more extensive. It's about much more than gender diversity. The women's issue is simply our low-hanging fruit, the thing to start with. The greater discussion is about intersexuality, minorities, lesbian/gay people, people with disabilities, etc. It is about inclusion. It is about people who aren't generally represented in leadership positions.

That is something to be aware of; gender is only a part of the puzzle.

# Augmented Reality Visor to Dramatically Improve Surgery

**Employing new photonics technology, European scientists are developing a new Augmented Reality surgical visor in a bid to improve the accuracy of interventions, showing aesthetic and medical data while superimposing a patient's x-ray in perfect unison with their body, so that surgeons will never having to look away during an operation, and surgery times will be reduced by over 20 minutes for every 3 hours.**

BY YVONNE KEIJZERS

The VOSTARS ('Video Optical See-Through Augmented Reality surgical System') medical visor is a head-mounted display (HMD) system that is capable of superimposing the patient's x-ray images in perfect 3D unison on their anatomy [1]. The visor also presents a patient's aesthetic data, heart rate, body temperature, blood pressure, and breathing rates, conveniently in the surgeon's field of vision, in an attempt to increase accuracy by allowing the surgeon to focus on the operation and reduce time by ensuring they never have to look away.

The project predicts a significant improvement of intervention accuracy coupled with a reduction of the time patients spend being operated on and under anaesthesia by at least 11%.

Although Augmented Reality for surgical procedures has been talked about in academic and industrial research since the 1990s, a tool combining a surgeon's natural perception with patient data has not yet been widely implemented.

The use of photonics components, such as the small, high-luminous micro display, the LED optical waveguide, and the array of microns used to project a 2D x-ray image in front of the user, has been fundamental in realising what was once a science fiction notion.

Project coordinator Dr Vincenzo Ferrari, a biomedical engineering researcher at the University of Pisa's Department of Information Engineering, explains: "With this state-of-the-art, highly ergonomic visor, we intend to provide all of the information required to improve surgery. The primary goal is to reduce not just surgery times, but also the time spent under anaesthesia and the costs involved in any operation."

> **WE INTEND TO PROVIDE ALL OF THE INFORMATION REQUIRED TO IMPROVE SURGERY. THE PRIMARY GOAL IS TO REDUCE NOT JUST SURGERY TIMES, BUT ALSO THE TIME SPENT UNDER ANAESTHESIA AND THE COSTS INVOLVED IN ANY OPERATION.**

"For the patient, this means saving 20 minutes for every 3 hours of surgery time and the guarantee of an extremely accurate intervention," said Dr Ferrari.

In the same way that a front-facing camera on a smartphone records moving images, the VOSTARS system works by capturing what the surgeon sees using a head-mounted camera. The system then 'merges' this real-time footage with the patient's medical images, from CT, MRI, or 3DUS scans.

The central processor, using the most advanced registration techniques available for surgical navigation, then presents a real-time hybrid image to the surgeon on the visor 'dashboard'.

Ferrari: "Imagine driving with a sat-nav system: we know how to drive and roughly where to go, but with real-time information such as speed, xdistance, and time presented to us, we can take the most efficient route in the quickest time, and perhaps drive more safely too. However, rather than having that information on a small GPS screen, the important patient data, like the surgical target in the anatomy, aesthetic info, breathing and heart rates, for example, is all integrated instantly into the surgical visor. A clinician can move freely while still seeing the patient, the hybrid x-ray image and all of critical data all at once in a surgical 'dashboard' on the inside of the screen. The surgeon, the patient, and the procedure are all joined as one." ∎

**Reference**

[1] More information can be found on the VOSTARS website http://www.vostars.eu

## About Photonics21

Photonics21 is the European Technology Platform (ETP) for photonics, a branch of technology encompassing all of the products and processes related to the emission, manipulation, and detection of light. Photonics is integral to a wide range of industries, including the medical, healthcare, transport, manufacturing, and telecommunications industries.

'Photonics21' was founded in December 2005 to bring the community of photonics researchers and industries together. The European Commission defined photonics as one of the five European Key Enabling Technologies (KETs) in September 2009. Shortly thereafter, the European Research & Innovation Program 'Horizon 2020' invited Photonics21 to become a 'Public Private Partnership' (PPP). The Photonics 21 Association, a legal entity under Belgium law, became their private contract partner in November 2013 in a Public Private Partnership (PPP) in conjunction with the EU Commission.

Today, Photonics21 represents more than 3000 personal members from all over Europe and abroad. Our members are experts working in the photonics industry, research organisations, and universities, who actively engage with us to develop a joint photonics strategy for future research and innovation in Europe.

With the global photonics market having grown from a value of €350 billion in 2011 to €447 billion in 2015, photonics remains a strong industry. The European photonics industry, estimated to be worth €70 billion, occupies considerable global leadership positions and employs over 300,000 people directly.

## Hybrid AR headset

The VOSTARS scientists at are building a hybrid of the two existing AR headset approaches that combines all of the benefits of both a video see-through (VST) system and optical see-through (OST) head-mounted display.

Fabrizio Cutolo, engineer and expert on wearable augmented reality systems, believes neither VST nor OST alone are suitable for operating on a live patient: "For operating on a real person, it was clear to us that the benefits of OST and VST systems could be combined to make a hybrid device."

In 'optical see-through' (OST) systems, such as Microsoft HoloLens, the user has a direct view of the natural environment, with the computer-generated images superimposed on the user's field of vision via a semi-transparent mirror. This gives the user a more natural experience, superimposing small amounts of virtual information onto the real world.

With 'video see-through' (VST) systems (such as the Oculus Rift headsets), the user is submerged in the virtual world, seeing through a closed head-mounted display (HMD) paired with stereo cameras, experiencing life through screens. Since VST systems capture the footage as seen by the user in real time, they are good for aligning the real and virtual worlds.

"For something as critical as an operation, we needed the naturalistic feel of OST, while at the same time having the fluid interaction of the VST. Therefore, we had to make a brand new device from scratch, rather than expanding on existing technology. Thus, the VST-OST Augmented Reality hybrid was born."

Now 3 months into this 3-year project, VOSTARS aims to have a working prototype of the hybrid device ready by May of 2018. The project will first undergo trials for a number of procedures to the head, including maxillofacial (jaw and face) surgery, neurosurgery, ENT (ear, nose and throat) and orthopaedic surgery, and VOSTARS hopes for it to be available to end users within the next 3 years, and enter mass production by 2022.

Coordinated in Italy at the Department of Information Engineering and the EndoCAS Center for Computer Assisted Surgery (Pisa University), the VOSTARS project received a grant of €3,816,440 from Horizon 2020 via the Photonics Public Private Partnership.

Participants from four European countries include: (Germany) SCOPIS GMBH, Charité - Universitätsmedizin Berlin, Sankt Gertrauden Krankenhaus GMBH, Technische Universitaet Muenchen, Pilotfish GMBH; (Italy) Alma Mater Studiorum-Universita Di Bologna, Scuola Superiore Di Studi Universitare E Di Perfezionamento Sant'Anna; (United Kingdom) VREO Innovation; (France) Optinvent, Commissariat A L'Energie Atomique et aux Energies Alternatives.

BY YVONNE KEIJZERS

# Outlook and opportunities for telemedicine in Africa

Ken Research Private Limited recently published a report titled 'Africa Telemedicine Outlook and Opportunities'.[1] This report provides an analysis of the current e-health scenario in Africa, covering market challenges and success case studies by individual countries and at the multinational level. The report discusses the current health scenario of different countries such as South Africa, Kenya, Ghana, Nigeria, Uganda, Botswana, Cameroon, and Ethiopia. It also provides current e-health scenarios and future government plans for development of e-health space in all countries. The report pinpoints trends and developments, growth drivers and major restraints, and challenges within the industry to come to understand the current market dynamics in the industry.

Despite improvements, the health of large portion of African is still not on par. The continent is deprived of the healthcare conditions, which could be justified by the basic indicators of health such as high child and maternal mortality rates, children's low birth weights, and poor sanitation and healthcare access. e-health, and especially mHealth, represents a major opportunity for this continent, not only because it connects people through space and time, but also because it gives them access to technological innovations, diagnosis, and measurement apps.

According to a report by mHealth Alliance, there are now more mHealth initiatives in Africa than in any other region in the world. Most of these aim to tackle problems regarding neonatal health and communicable diseases. One interesting initiative is StartSomeGood, a crowdfunding enterprise, which has funded initiatives like the Kenyan initiative Penda Health. Penda Health provides sexual and reproductive healthcare to women from lower-income households. The Samahope website similarly uses crowd sourcing to focus on healthcare issues such as brain injuries and cleft palates.

### The government's supporting role

The Ken Research report describes the role of the government so far as having been supportive in implementing e-health policies. This stance is supported by the fact that a number of national e-health policies such as RAFT, m4RH, and others have been initiated by governments. According to the research company, the rising level of mobile and Internet penetration and increasing number of awareness programs run by governments and NGOs are helping to improve the healthcare scenario in Africa via telemedicine. However, this has not done much to provide a positive impetus for the growth of the e-health sector in the region. The main reasons for the lack of growth are the lack of proper infrastructure for ICT, the problems of collecting data through several platforms due to lack of data uniformity, incomplete health records from the lowest level of health facilities, and lack of technical staff to support e-health initiatives.

**Africa Telemedicine Outlook and Opportunities**

### South Africa

One of the countries the report focuses on is South Africa. Telemedicine in South Africa still offers possibilities as a tool to support the provision of healthcare, especially in rural regions of the country. Regulations do not allow patients to have conversations with doctors through telemedicine platforms, but even conversation between doctors in rural hospitals with specialist doctors in a specialised hospitals would help enable better diagnosis and treatment. Moreover, telemedicine has generated considerable interest in innovation among academics, researchers, private enterprises, and health professionals, as evidenced by the noteworthy achievements made by the public health domain in South Africa.

mHealth could be considered the most successful type of telemedicine in South Africa, one which has revolutionised healthcare in this country. ∎

Key Topics Covered in the Report:
- Current Health Condition of Africa as a whole as well as on the individual country level for South Africa, Kenya, Ghana, Nigeria, Uganda, Botswana, Cameroon, and Ethiopia
- Investment requirements for telemedicine in Africa
- Growth Drivers, Trends and Developments, and Challenges in the African e-health Market
- Current e-health initiatives on the individual country level for South Africa, Kenya, Ghana, Nigeria, Uganda, Botswana, Cameroon, and Ethiopia
- Future Government Plans for South Africa, Kenya, Ghana, Nigeria, and Uganda
- SWOT Analysis of African telemedicine market
- Successful case studies on both country and regional levels
- Analyst Recommendations and Optimal Working Model

*Reference:*

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BY DR TOM VAN DE BELT

# More dynamically collect data = more dynamic informed consent?!

We are able to gather more and more data, which is made possible by technological progress: devices can measure much simpler and faster nowadays. Moreover, patients and non-patients record information about their health, for example with their smartphones and wearable devices. Apart from the fact that this multitude of data can improve health care for the individual concerned, it also provides a wealth of information for scientific research. We have previously explained in ICT & Health that if you want to make this data available for the latter, there must also be an option for the users (both patients and non-patients) to optimally record information and control who sees what data. Stan Wine of the Radboud University Nijmegen Medical Centre's Radboud UMC REshape & Innovation Center recently presented the first version of an app that makes this possible.

In scientific research, it is the task of the researcher and / or doctor to fully inform potential participants about a study and its potential (health) risks, so that participants can make a carefully considered decision about participating. A situation in which the researcher fully informs the participant and they decides to join is depicted above (informed consent). This relates to one study, and often to one method of collecting data or limited data.

Stan: "You can use a variety of wearables paired with your Personal Health Record (PGD). It makes sense for people not to want to share the mutltitude of data that emerges in its entirety. Patients and non-patients should be given the possibility to make that choice. This way, people can make their amount of steps and heart rate available for research, but not their blood pressure and location information, for example. "

**Sufficient user options**
The challenge for Kazakhstan was to build an application with sufficient options, taking into account not just all of the variables, but also the period for which data is made available and the people, institutions, or studies to which data is made available. For example, a person might want to make their data for academic centers, but not for commercial parties. On the other hand, it must also be an app that is user-friendly. Stan set to work, based on Esther Rake's report, supplemented by the knowledge and shared experiences of researchers, lawyers, patients, and physicians.

The app (shown in the picture) allows users to be effectively informed of research, including the use of videos and infographics. They receive information regarding privacy issues and where the data is stored. When people first use the app, they can choose between several options, from 'strict' (sharing little data) to 'free' (sharing virtually all data).

Obviously, the app also indicates specifically which information people do and do not wish to share, and for how long they wish to make it

> ## 'THE APP ALLOWS USERS TO BE EFFECTIVELY INFORMED OF INVESTIGATIONS, AND THE USE OF VIDEOS AND INFOGRAPHICS.'

choices they have made at any time, or revoke their consent. The app is currently being tested by a select group of patients with chronic myeloid leukemia (CML), so that after further improvement, it can also be made available to other patients and for scientific evaluation. The Kazakhstan presentation will soon be made available via the ICT & Health website.

**Monitoring the use of medication with smart pills**
Providing the right dose of medicine is important: not just to ensure that a sufficient amount of active substance is ingested, but also to prevent an excess thereof and any resulting side effects. The latter applies in particular for certain types of pain medication (opioids), for which an overdose (overdose) can lead to death in a very short amount of time. Researchers in the United States have developed and assessed a sensor (smart pill) that can monitor the dosage of medication in the body.

Smart pills are not new. There are already smart pills with tiny cameras for intestinal research [1]. Additionally, Hopman et al.'s research group did research using a smart pill that kept track of the participants' core temperatures during the Nijmegen four-day march. This smart pill is also wirelessly readable [2].

For a recent study by Chai et al., adults who visited the emergency department with a fractured limb were invited to participate in the study [3]. After a short training session, they received an external box (receiver) to wear during the study.

The receiver counted the number of pills they had taken and sent this information to a secure online cloud. This allowed both the caregiver and the patient to keep track of the amount of used medication, such as the number of pills and the intervals between

taking them, allowing the caregiver to intervene in case of an overdose.

A total of 10 subjects took 110 pills, which were registered 96 times (87%). Patients' responses regarding the use of this equipment were positive. Therefore, the researchers concluded that a solution such as this one could be put into practice in due course, particularly for medication with increased risks. ∎

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BY ULCO SCHUURMANS

# Smart Healthy Cities

**Smart Cities are a hot topic. The primary concerns are issues such as sustainability and energy consumption, health (e-health), mobility, living environment, safety, sensor-controlled infrastructure with the Internet of Things (IOT), and the exchange of Big Data. There is even a digital agenda (DAS) where governments can publish their plans and approaches.**

The term 'Smart City' is popular among politicians, the providers of the technology involved, and researchers, as well as among the citizens who want to live in a smart and comfortable city. A lot of municipalities around the world have similar aspirations. After all, this is about the economic and social challenges of tomorrow. There is, however, quite a gap between fashionable promises and concrete approaches. The topic of health (e-health) is often underrepresented or left out altogether. In practice, fragmentation (of approaches, standards, compatible infrastructure, and coordination) is common and every department tends to follow its own DAS and insights. Terms like sensor city, smart urbanism, dataism, and info sphere living are mentioned and people are afraid of cyber security going off the rails.

**Transition to society 3.0**

According to experts and those in the know, the concept of Smart Cities brings us to the brink of a new industrial revolution [1]. This is no mere hype; we are steadily moving towards an IT society, society 3.0. This process is happening in two ways:

1. More and more data and IT technology is becoming common practice. Smart IT technology is simply becoming part of our everyday lives, ranging from automatic lampposts, traffic lights, and environmental monitoring (environment and safety) to working in intelligent buildings, home automation, and driving in smart cars;
2. Technology is ever advancing. This involves 'thinking in new boxes' (instead of 'out of the box'). Innovative solutions already exist. They just have to be implemented and integrated within the Smart City concept. Consider, for example, the traditional analogue AV technology, which is now turning into programmable IT IP concepts (audio-visual meets IT). Robotisation, home automation solutions in the streets and in buildings, and intelligent modes of transport – from cars to drones – are also on the rise.

**Smart Health in the City**

Health and cities have had close ties through various laws and legislation for decades. The Preventative Health Act stipulates that

municipalities must strive to improve and safeguard their citizens' health. They must also be in charge of their efforts in this area. The PHA does not merely cover the allocation of walkers, personal health budgets, and funds; it also involves detecting and taking stock of health problems and providing civilians with the right information. Additionally, beliefs about being in charge, active participation from inhabitants in the event of health issues, and preventing said issues also play a part.

All of that is becoming more and more smart. Laws, technology, and active participation by civilians in the process to create Healthy Cities together create a recipe for potential success. It is a matter of first integrating these changes into one's own world, before putting them into practice and actually working with them.

## The new boxes
What are the aforementioned new IT and technology boxes for Smart Healthy Cities? Monitoring, safeguarding, and improving a healthy environment is an important challenge. From a technical perspective, this can be achieved with sensors, IOT, and automatic regulation of the infrastructure. However, various economic interests and people's mindset are also factors to consider. For instance, if unhealthy air quality levels are detected in a

smart manner, and yet, the situation is allowed to continue, that would lead to friction.

## Consumer, collective, and professional e-health
Consumers, e-health, and collective prevention come together to safeguard and improve Health, Lifestyle and Well-being (HLW). Think of, for example, the Quantified Self, Dashboarding, and HLW management for people's EHRs. Is additional care required? In that case, professional e-health is brought in.

Big Data and the IOT can help map, analyse, and satisfy HLW needs and care up to the local level in the City. If a Smart Health City knows what its inhabitants need, they will be able to live at home longer while being healthier and enjoying a higher quality of life with the help of home automation. Caring for socially weaker individuals and have-nots also plays an important role. Online supervision, robotic caretakers/coaches, interactive communication (video calling), and the social welfare that IT provides are obvious aspects of the smart society 3.0.

## Participation
Active civilian participation is an important factor for the success of the Smart Healthy City. In the 3.0 society, civilians can do more on their own than they might think. They

can truly make a difference for other people and interactively exert effective influence on the healthy living environment in their Smart City. It is a two-way street, however; the smart citizen leads the way, motivated and supported by the Smart Healthy City and its government. ◼

**Technology is the future**
Ulco Schuurmans is Advisor at Zorgbelang Brabant.

# Headlines in short

On our website www.ictandhealth.com you'll find news and indepth articles on digital health, science and innovations.

## ELECTRONIC PILLS MEASURES BODY TEMPERATURE

BodyCap, a French e-health startup based in Caen, France, has won European CE Mark to introduce its e-Celsius swallowable wireless thermometer. e-Celsius is a miniaturised electronic pill that communicates wirelessly accurate measurement of core temperature.



CE Marking indicates a product's compliance with the applicable EU regulations and enables the commercialization of medical products in 32 European countries. The certification, like the FDA stamp of approval, is needed before any medical device can be launched commercially.

Designed to monitor patients' core temperature, the e-Celsius looks like and is ingested like a regular drug capsule. As it moves down the GI tract, every 30 seconds the device wirelessly transmits data to an 'e-Viewer' that displays the readings and records the temperature during the pill's journey.It also  sends alarms if temperature is under or above customisable thresholds.

## www.ictandhealth.com

## 3D MODELLING AND IMAGING HELPS SURGEONS WITH COMPLEX OPERATIONS

Surgeons at Intermountain Medical Center in Salt Lake City use 3D technology to care for a patient with a unique anatomy. Credit: Intermountain Medical Center



3D modelling and imaging can help surgeons prepare for and execute complex operations. The Intermountain Medical Center in Salt Lake City recently proved this. Surgery on a patient with abnormaly formed and placed kidneys was made a lot easier with help from the Intermountain Healthcare's Innovation Lab, by creating 3D reconstructions of Nance's anatomy.

A kidney usually roughly has the shape of a kidney bean – or the other way around – hence the name. In the case of Wes Nance, his kidneys had a different shape, plus they were positioned atypically inside his body. To make matters more difficult, he had roughly a dozen painful kidney stones. Removing these kidney stones would be complicated.

To find a solution, Jay Bishoff, MD, medical director of the Intermountain Medical Center Urological Institute in Salt Lake City, collaborated with a team from Intermountain Healthcare's Innovation Lab. "In working with Dr. Bishoff, we were able to produce multiple advanced 3D images and models that not only helped him plan the best approach for Wes' surgery, but he was able to use those images in the operating room to find and remove the kidney stones, despite Wes's complex anatomy," explains Billy Prows, manager of Intermountain Healthcare's Innovation Lab.

## 40 PERCENT OF THE HOSPITALS WILL ROLL OUT DIGITAL TRANSFORMATION INITIATIVES IN 2017

IDC expects the number of hospitals undertaking a form of digital transformation to grow fast in 2017. While only 10 percent of healthcare providers and payers are currently working to digitize themselves, the market research firm estimates a big surge in the months ahead.

Healthcare organizations will make great strides in terms of technological renewal, both in terms of workflow and patient care. Digital transformation, the new hype in the world of IT, will embed itself in healthcare institutions in 2017. In a new survey, IDC, in projects that while only 10 percent of providers and payers are currently actively executing digital transformation initiatives, this number will reach 42 percent among providers in the next year.

Not only that, 58 percent of payers (such as healthcare insurance companies, government agencies) will be undergoing digital transformation in the same time, according to the survey by IDC Health Insights research director Jeff Rivkin.

## TELECARE CREATES NEW CARE NETWORK FOR OLDER PEOPLE

Research suggests that technology has allowed older telecare users to feel safe at home and less alone.
PhD researcher Gigliola Brintazzoli is researching how care in person and care at a distance both interconnect with how older people perceive themselves in their own home. Her research project so far suggests that technology has allowed older telecare users to feel safe at home and less alone. It suggests that, while care at a distance is quite complex, it offers a way for older people to have an alternative care network.



The group of older people needing care keeps growing, due to ageing. However, the group of people being able to take care of them keeps getting smaller, due to people living apart at greater distances, more women in paid employment and new family structures. Telecare could provide a solution to this problem. PhD researcher Gigliola Brintazzoli decided to research this matter. She interviewed and observed 16 older telecare users so far. Het first outcomes suggest that telecare might not be as cold as it seems.

## APPLE WANTS IPADS IN ALL HOSPITALS

Tech-giant Apple is making moves to place iPads in every hospital. The company strives to become a platform in the healthcare industry, collaborating with developers to create apps. (photo: Apple)
Tech-giant Apple is making moves to place iPads in every hospital. The company strives to become a platform in the healthcare industry, collaborating with developers to create apps. The introduction of software services CareKit, ResearchKit, and HealthKit should make it easier for patients to pull together disparate health information such as steps, sleep, and heart rate in one place.



The healthcare industry is an interesting one for Apple and its iPads. Not only do hospitals and health systems tend to buy devices in bulk; they also provide a way to connect with patients. iPhones and iPads have been in use in some hospitals for several years, but its only now that the company is making moves to get a tighter grip on the market. Eventually, the company wants to help patients have digital health information at their fingertips by making a shift to mobile instead of USB-sticks and CD-ROMs.

## YOUR SMARTWATCH CAN TELL YOU WHEN TO CALL IN SICK FOR WORK

Wearables like the Apple Watch can someday be used to predict the risk of a medical condition before symptoms appear.

Wearables are ushering a new health future, where a smartwatch can sense a medical problem and alert a person or a caretaker. There are already several commercial devices on the market that attempt to do just this, like the iBeat Life Monitor. Other tests have shown the accuracy of an Apple Watch measuring a person's heartbeat.

New research confirms the usability of wearables, according to the National Institute of Biomedical Imaging and Bioengineering, Bethesda USA. Researchers supported by the National Institutes of Health revealed the ability of wearable biosensors, similar to the Apple Watch or Fitbit, to detect physiological changes that may indicate illness, even before symptoms appear. The findings, published earlier in 2017 in PLoS Biology, may open the door to new ways to manage and monitor health, especially for those with limited access to doctors or clinics.

Society changes through technology at a rapid pace. Healthcare is no exception!
A high quality technology solutions is a need within the healthcare sector.
The Innovation Partners of ICT & health are experts in this field. They have the
knowledge and expertise to expand the quality of care.

**Interview mr. Hussian Al Mahmoudi,
CEO American University of Sharjah Enterprises**

# Mr. Hussain Al Mahmoudi, CEO American University of Sharjah Enterprises:

## 'The Netherlands and UAE are partners in progress'

The Netherlands have a lot to offer to the world, according to Mr. Hussain Al Mahmoudi, CEO AUS Enterprise in Sharjah, the third largest city in the United Arab Emirates. 'Your knowledge institutions are excellent and you can offer a lot to the world. You have the world's best knowledge institutes, your Startup ecosystem is great and your innovations, also in healthcare, are among the best of the world. You don't have to be modest about this. You have to learn to think BIG'.

# Bambi Medical on the road to improve premature baby care in hospitals

Every year 15 million babies are born prematurely in the world. Preterm babies are extremely vulnerable and at risk of deterioration of health. It is vital to keep them warm in incubators. Nowadays, this is done in hospitals at specialized Neonatal Intensive Care Units (NICU), where in parallel with keeping the babies warm, their vital signs – cardiac function (ECG), temperature and respiration – are constantly monitored. An innovative solution is - the Bambi-Belt.  The Bambi-Belt is a soft fabric, skin-friendly, wireless monitoring device that accomplishes the same functions as wired electrode systems currently implemented in NICUs.

## Also:

An interview with Mahiben Maruthappu, London-based doctor and Co-founder of multi-award winning technology company Cera. Formerly advised the CEO of NHS England on £100 billion of health spending.How is it possible to transform the sector of healthcare in a digital way?

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