# The transition towards data-informed healthcare

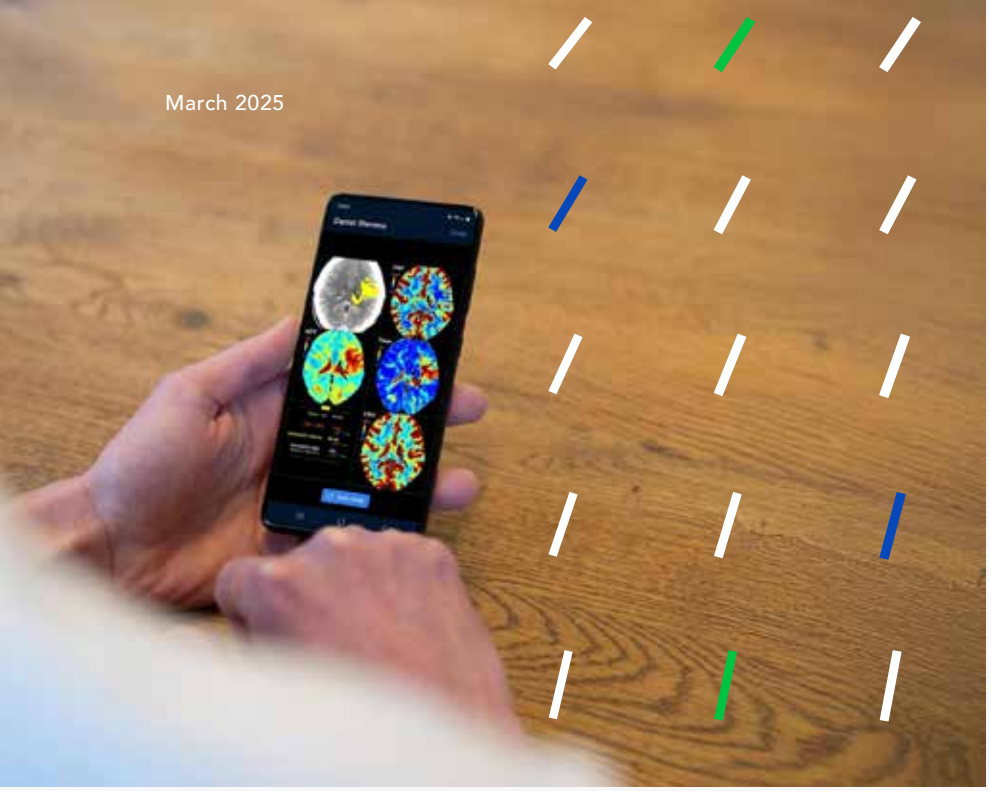
**Henk Marquering is professor of radiology, specialised in artificial intelligence, at Amsterdam UMC, where he focuses on developing methodology and functionality to improve care for both medical professionals and patients, and on bringing relevant AI functionality to clinical practice. He is also co-founder of Nicolab, a company focusing on Neurovascular Image Analysis, with the aim of developing algorithms for clinical decision support. Here, Henk recounts some of the challenges and highlights of his journey through the technologies and ITEA projects to improve the diagnosis and treatment by practitioners and boost quality of life for their patients.**

Henk Marquering

## A revolutionary concept

As part of a wider transition towards data-driven or data-informed healthcare, Henk points out that "data only becomes valuable if a number of conditions are met. For example, data needs to be combined with data from other sources, and needs to be standardised. Moreover, the amount of medical (imaging) data is constantly increasing. Data harmonisation and availability was (and sometimes is) one of the main needs in current healthcare that has been addressed in ITEA projects." As part of the Amsterdam University Medical Center, Henk has been involved in various pioneering ITEA projects, playing a leading role in the co-development of novel IT-based solutions that improve care and diagnosis logistics.

Henk attributes his role in the development of these healthcare advancements in part to his industry and academia mix, having switched a few times between them. "At a certain point," he recalls, "I met some people from Philips who were keen to alleviate the problem of radiological data not being available between hospitals. And we started talking. What came out of that was a project proposal, around the same time as the first cloud solutions emerged. So, we asked: why don't we do the image processing in the cloud? Quite a revolutionary concept at that point in time. Nobody had done it because images are huge and you have to install all these large software packages. Our first solutions really didn't work well. It took a couple of hours before all the software was installed in the cloud. But the value of cloud-based image processing actually became apparent during the ITEA project MEDUSA, which, to cut a long



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story short, generated very successful results."

### Data, data, data

"In MEDUSA, we worked to develop cloud-based radiological image analysis for the fast processing of large amounts of image data years before this became a generally accepted solution," Henk notes. "Similarly, for the 3DPathology project, we've implemented Deep Learning analysis of pathology images in the current workflow. And in PARTNER, diagnostic and prognostic supporting models have been developed based on 'heterogeneous' data which come from different data sources, such as disease history, radiology data and lab tests. In this project, we've also developed models based on data from multiple centres without sharing data. This has a huge benefit in reducing privacy-related risks, a topic that is currently being further addressed in the Secur-e-Health project."

### StrokeViewer

The solutions developed in such projects initially benefit healthcare professionals by improving their capacity to work in an efficient manner. As a knock-on effect, diagnosis and treatment decisions can be made faster and more accurately for patients. One clear example is the cloud-based AI diagnosis of stroke patients, which uses a methodology and concepts developed in MEDUSA and has since been spun by Nicolab, whose solution is now used in many hospitals and has resulted in much quicker stroke recognition and earlier treatment of patients. "The StrokeViewer app we developed in Nicolab had its origins in MEDUSA. Since we were working on stroke, we kept working on that idea, and the combination of stroke and having image processing in the cloud was more or less the basics of a successful product that is used in over 200 hospitals with over 60,000 patients having already been analysed using this 'software-in-the-cloud' app."

StrokeViewer is proving a real step forward in treating patients who have suffered a stroke, enabling better and faster treatment for patients. For example, CT scans are automatically sent to StrokeViewer and then healthcare providers can see these images on their smartphones, supplemented with important, new information. StrokeViewer uses artificial intelligence in medical imaging to make patient care even better. Hospitals use the app to determine whether someone is having a stroke, and this enables care staff to proceed more quickly to provide the right care. StrokeViewer was nominated in the Computable Awards 2023 Digital Innovation category - a strong recognition of the app!

### Keeping a hand on the wheel

The current use of AI and digital twins, though not new concepts in themselves, are certainly contributing to the way forward. For example, the new ITEA project PHRESH focuses on very acute care, collecting as much information as possible in the ambulance so that the data and knowledge are transmitted to the receiving hospital to improve the preparation for the receiving team. "Of course, we are talking about a helping hand here," Henk reminds us, "a tool that has real benefits for patients and for treating physicians. AI is not going to take over, we still need our hands on the wheel, as it were. Sometimes we get information through a phone call, and then it has to go through maybe two to three people before it reaches the treating physician, which means a lot of information can get lost, wrong decisions are made or the teams that are being prepared are way too large. We want to be much more efficient, especially in the acute care situation. If AI and related technologies can help us pinpoint the right treatment for specific patients and get this 'insider knowledge' to the physician before treatment begins, then the chances of a successful outcome improve considerably."