HealthManagement.org
LEADERSHIP • CROSS-COLLABORATION • WINNING PRACTICES
The Journal
VOLUME 19 • ISSUE 2 • 2019 • € 22
ISSN = 1377-7629

ELEVATING HEALTHCARE

©For personal and private use only. Reproduction rights belong exclusively to the copyright holder. Email to: info@healthmanagement.org

Special Supplement from GE Healthcare in collaboration with HealthManagement.org

Table of contents

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

Unleashing the full potential of AI

The digital revolution has changed every aspect of our lives – from the way we communicate to the way we live and interact. We are slowly moving towards this transformation in healthcare, where big data, predictive analytics and artificial intelligence (AI) can do for healthare what it has done for other industries.

We have already started to see some of its benefits, from image interpretation to automating workflows and improving operational efficiency. For example, algorithms capable of distinguishing between normal and abnormal pediatric brain MRI scans and NASA-style Command Centers that can provide real-time, predictive and actionable insights, already exist. But this is just the tip of the iceberg.

The explosion of clinical, genomic and imaging data has created a path for precision health –taking the right action at the right time for each individual patient and personalizing the diagnosis, treatment and monitoring based on their unique needs.

By effectively integrating data and analytics across the care pathway, medical professionals and staff can be better supported with insights that enable them to bring care that is more efficient, predictive and individualized.

AI is central to achieving precision health. It can integrate and make sense of the data, helping to improve provider efficiency, increase diagnostic accuracy, personalize treatments, and drive higher quality care.

The promise of AI is exciting but there is still a lot of work to be done, and it's important not to over-promise. Even though these techniques will change the interaction between doctors and patients and change how care is delivered, they should not be overtly noticed. Improving the patient experience, provider productivity, diagnostic accuracy and overall quality of care won't happen overnight or as part of some massive disruption.

The best AI will evolve invisibly with and into the existing care continuum – embedded into workflows, applications and devices already in use today, making way for a more personal doctor-to-patient experience.

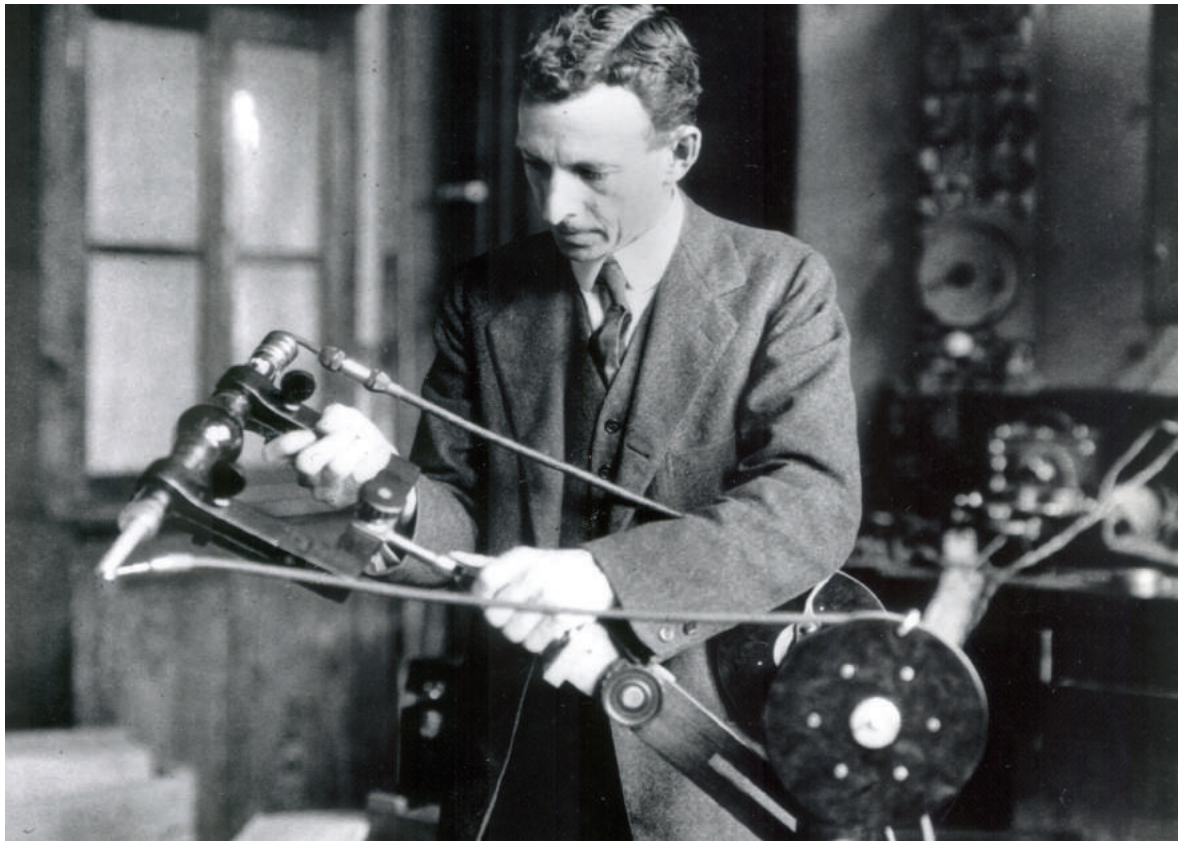
To do AI right, academic institutions, regulatory entities, governments and other industry partners will need to come together – practically, methodically and for the benefit, safety and privacy of the patient. The work to ensure safe, ethical and effective use of AI will never stop – and we are committed to keep at it. ■

Catherine Estrampes
President & CEO, GE Healthcare Europe

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

One of the largest AI platforms in healthcare is one you've never heard of, until now

Newly announced apps and AI-powered devices built on "Edison" demonstrate why an ability to integrate data from millions of systems and devices may bring real change to the healthcare industry



For years, advocates have hyped Artificial Intelligence's (AI) potential to do for healthcare what it's doing for other industries – personalize recommendations, prioritize searches, and tag pictures. Investments have reflected the excitement, with the healthcare AI market expected to reach $6.6B by 2021.

"People see smart computers all around them – Apple's Siri, Amazon's Alexa, Tesla's self-driving car – and they think healthcare should be the same. Obviously, healthcare is far more complex, requires much higher accuracy, and has less margin for error," said Dr. Michael Blum, Associate Vice Chancellor for Informatics, University of California, San Francisco (UCSF).

However, disparate efforts, different systems, massive amounts of data and layers of complexity have meant the industry remains largely unchanged. Fortunately, most hospitals have at least one thing in common: imaging machines – the technology radiologists use to scan, diagnose and treat patients and the largest generator of healthcare data. A staggering 90 percent of all healthcare data comes from imaging technology, yet 97 percent of it goes

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

> By alerting the clinicians immediatly, [the algorithm] would allow us to actually speed up the timely diagnosis of a potentially life-threatening condition.
>
> *Dr.Rachael Callcut,*
> Associate Professor of Surgery, UCSF & Director of Data Science, Center of Digital Health Innovation

unanalyzed or unused. Given these statistics, many argue this medical tech is a prime contender for AI.

New information announced today may prove just that. "Edison," a nod to the breakthrough inventor and General Electric's founder, is an intelligence platform built to connect data from millions of imaging devices. It has quietly been spurring apps and AI-powered devices that are showing real results.

In fact, these apps and AI-powered devices are already said to be helping clinicians improve scan consistency, detect and prioritize acute cases, and extend the lifecycle of devices. The platform's ability to add value to hospitals' existing infrastructure, so technology that was installed previously can now be upgraded to have new analytics and AI capabilities, may be why it has flown under the radar as it quietly amasses results.

"This isn't about some flashy gadget or moonshot AI," said Keith Bigelow, Senior Vice President of Edison Portfolio Strategy at GE Healthcare. "Edison powers pioneering but practical technologies that improve the workflows and devices of today and target the greatest pain points in the system."

At hospitals like the University of California, San Francisco (UCSF) Medical Center, clinicians were looking for opportunities to read STAT chest X-Rays faster – exams reserved for potentially life-threatening circumstances – so they could diagnose critical patients quicker.

Dr. Rachael Callcut, Associate Professor of Surgery at the University of California, San Francisco (UCSF) Medical Center and Director of Data Science for the Center for Digital Health Innovation, partnered with her radiology colleagues and GE Healthcare to create an initial algorithm that can detect pneumothorax, a condition which strikes nearly 74,000 Americans each year[1] and can be deadly if not diagnosed quickly and accurately.[2] The challenge: a patient with this condition could wait between two to eight hours for his or her X-Ray to be read.[3]

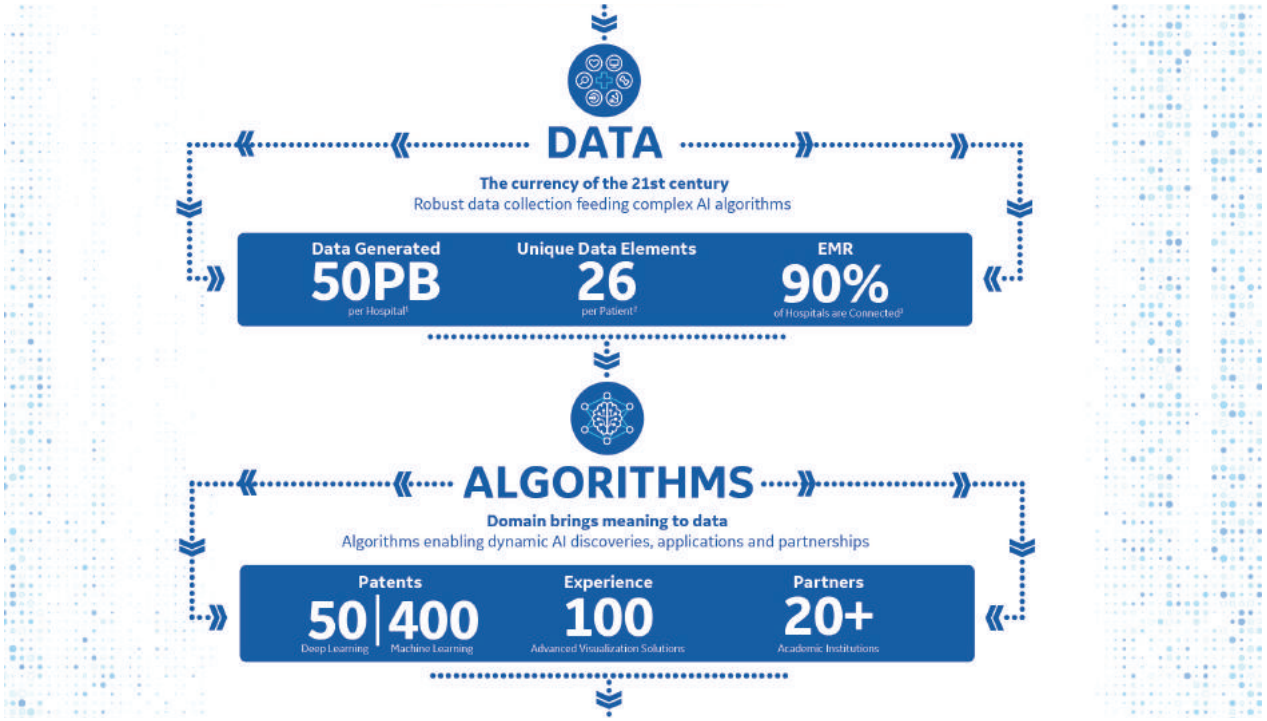
Today, Dr. Callcut and the UCSF team's use case and data science approach has become a suite of algorithms, known as Critical Care Suite* on the mobile Optima XR240amx X-Ray system, powered by the Edison platform, that can alert the clinical team of potential pneumothorax cases as soon as the patients are scanned, so they can prioritize reading them.

"The concept behind this was to develop an algorithm using artificial intelligence (AI) that could actually learn how to find pneumothorax on a chest X-Ray," Dr. Callcut said. "And by alerting the clinicians immediately, it would allow us to actually speed up the timely diagnosis of a potentially life-threatening condition."

To validate the algorithm in different clinical environments, UCSF and healthcare institutions from all over the world, including St. Luke's University Health Network, Humber River Hospital in Toronto, Canada, and Mahajan Imaging in New Delhi, India, worked alongside GE Healthcare to replicate the initial work carried out in acquiring and annotating images.

Elsewhere, Edison's access across multiple MRI systems enabled developers to create a workflow – called AIRx* — that uses deep learning and anatomy recognition to learn from a database of more than 36,000 brain images. And,

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.



from this, they could reduce a manual step that previously plagued radiologists during brain scans. It is also designed to increase consistency between scans and between techs, which can help lower the chances of patient needing to be recalled due to incorrect slice placement. Consistency is particularly important when doing longitudinal assessments for neurological disease.

Bigelow emphasized Edison's ability to upgrade existing infrastructure like CT machines to the latest software, rather than replacing these large, critical pieces of hospital infrastructure.

"With access to the latest applications and services, an older version of a mobile phone becomes just as valuable as the newer version," Bigelow said. "In a way, this is what Edison brings to healthcare technology."

Edison's makers say its goal is to continue quietly, humbly but effectively unleashing value for a wide variety of professionals across the healthcare system. Hospital executives can benefit from upgrading existing devices, and clinicians who use Edison apps can be assured by the fact that algorithms were developed with and validated by a best-in-class ecosystem of clinical and technology partners. Developers who use Edison will benefit from a common integrated platform that brings together globally diverse data from across modalities, vendors and care settings.

GE Healthcare says it ultimately plans to open the platform and 100+ services to more developers and partners, which could accelerate both the development and adoption of AI technology.

It was Thomas Edison, the inventor after whom the platform is named, who famously said, "I have not failed. I've just found 10,000 ways that won't work."

The healthcare industry needs this perseverance, but it also needs progress – fast. Embodying this mindset, Edison powered devices and applications are accelerating innovation and improving patient care.

"Thanks to advances in computing power and data science, we have entered a new era of medicine," Dr. Blum said. "We now have a tremendous opportunity to improve the quality and efficiency of care, and prevention and prediction for an individual are finally going to be possible." ■

[1] https://www.bmj.com/content/348/bmj.g2928

[2] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4205574/

[3] Rachh, Pratik, et al. "Reducing STAT Portable Chest Radiograph Turnaround Times: A Pilot Study." Current problems in diagnostic radiology (2017).

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

How do you serve more patients without adding staff or beds? Here's one hospital's answer

UK hospital announces first-of-its-kind hospital Command Center in Europe to improve efficiency and patient care

Every day, up to 400 people come through the Emergency Department (ED) doors at Bradford Royal Infirmary (BRI) in northern England. The hospital serves 500,000 people who live in Bradford and communities across Yorkshire, one of the largest regions in all of England. Over the last decade, ED attendances have grown by more than 40% to 125,000 ED attendances, driving a bed capacity rate that routinely exceeds 96%*.

It all paints a clear picture of the growing demand on the region's healthcare system. That's why BRI, part of Bradford Teaching Hospitals NHS Foundation Trust, is pioneering the first Command Centre of its kind in collaboration with GE Healthcare.

This BRI Command Centre will operate like an air traffic control centre, using advanced technology and Artificial Intelligence (AI) to efficiently move patients coming into the ED into, through and out of BRI. With this advanced functionality, the Centre should help BRI cut waiting times, treat more patients, improve the patient experience, and reduce pressure on staff.

Specifically, the Command Centre aims to decrease patients' length of stay, reduce the need for additional wards and beds – especially during peak winter times – and reduce cancellations for non-emergency surgery.

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

It should also help the Trust meet national emergency care access standards, which require that 95% of patients are treated, admitted or transferred within 4 hours. What's more, it will shine a light on increasing demand, pressure and risk that may affect the quality of care that patients receive – prompting interventions and proactive action.

"Demand for services is growing at Bradford Teaching Hospitals every year" said Professor Clive Kay, Chief Executive of Bradford Teaching Hospitals NHS Foundation Trust. "The Command Centre will enable us to optimise our use of resources and improve how we move patients around the hospital for treatment and successful discharge. Around 350-400 patients come through our A&E every day, and relieving pressure on our 6,000 staff means they can spend more time delivering care, and less time organising care."

The BRI Command Centre

One of the secrets to the Command Centre's internal workings is what GE Healthcare calls a Wall of Analytics, a literal wall visible to all who step inside the centre that processes real-time data from multiple source systems across the hospital and triggers cross-functional staff co-located in the Command Centre to take action.

This constantly pulls in streams of data from multiple systems at the hospital. Advanced algorithms will help staff to anticipate and resolve bottlenecks in care delivery before they occur, recommending actions to enable faster, more responsive patient care and better allocation of resources. The data will be displayed on multiple high-definition screens in the Command Centre, as well as on tablets and mobile devices, providing 24/7 support to busy medical teams across the hospital.

> "Relieving pressure on our staff means they can spend more time delivering care and less time organizing care. The Command Center will enable us to maximize the use of recources and improve how we move patients around the hospital to successful discharge.
>
> *Professor Clive Kay,*
> CEO of Brandord Teaching Hospitals NHS Foundation Trust.

A combination of historical Trust data and real-time data will be fed through the system. Using GE's proprietary Hospital of the Future simulation, algorithms and AI, the system will generate predictive analytics that will help staff recognise patterns in real-time and predict what will happen in the next 24 to 48 hours.

With the data they need at their fingertips, staff will spend less time navigating through different IT systems to get the information they need to make quick decisions. The Command Centre also provides a single, agreed view of the status of the hospital and helps staff to prioritise tasks.

The future of healthcare

Industry experts say that this type of digitisation is not only inevitable but is only the beginning. Deloitte's Center for Health Solutions report cites centralised digital centres to enable decision-making as one of the major changes the hospital of the future will need to implement in order to function in a world of evolving technologies, demographic shifts and economic changes.

In 2017, Humber River Hospital (HRH) in Canada implemented a Command Centre to address similar patient flow problems as BRI. Despite an 8% increase in patient visits to the Emergency Department, the Centre helped HRH reduce the time a patient in the Emergency Department waited for an inpatient bed by 33%.

Johns Hopkins Hospital was an early adopter of the Command Centre, which helped them transfer patients to other hospitals 60% faster, reduce wait times in the ED by 25%, and time spent waiting in the operating room for a post-surgical bed decreased by 70%.

Oregon Health & Science University (OHSU) was first to leverage GE Healthcare's Command Centre to support better management of sepsis care. Each patient within OHSU's electronic medical systems gets a sepsis risk score. If the score is higher than a given level, it will display on the sepsis tile, indicating that the patient may have sepsis or is at risk, at which time the "mission controller" actively monitors if the appropriate actions are being taken by the bedside nurse and provider teams to asses for sepsis and treat sepsis if present.

The Command Centre at BRI is scheduled to open in spring 2019 and expand services over a four-year period.

cqc.org.uk/sites/default/files/new_reports/AAAH1903.pdf. ■

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

Analytics in the real world: How one radiology practice is helping patients get an MR exam, faster

Combining applied intelligence, analytics and technologies enabled a radiology center in Germany to reduce patient wait times for an MR exam from 6-8 weeks to just 1-2 weeks

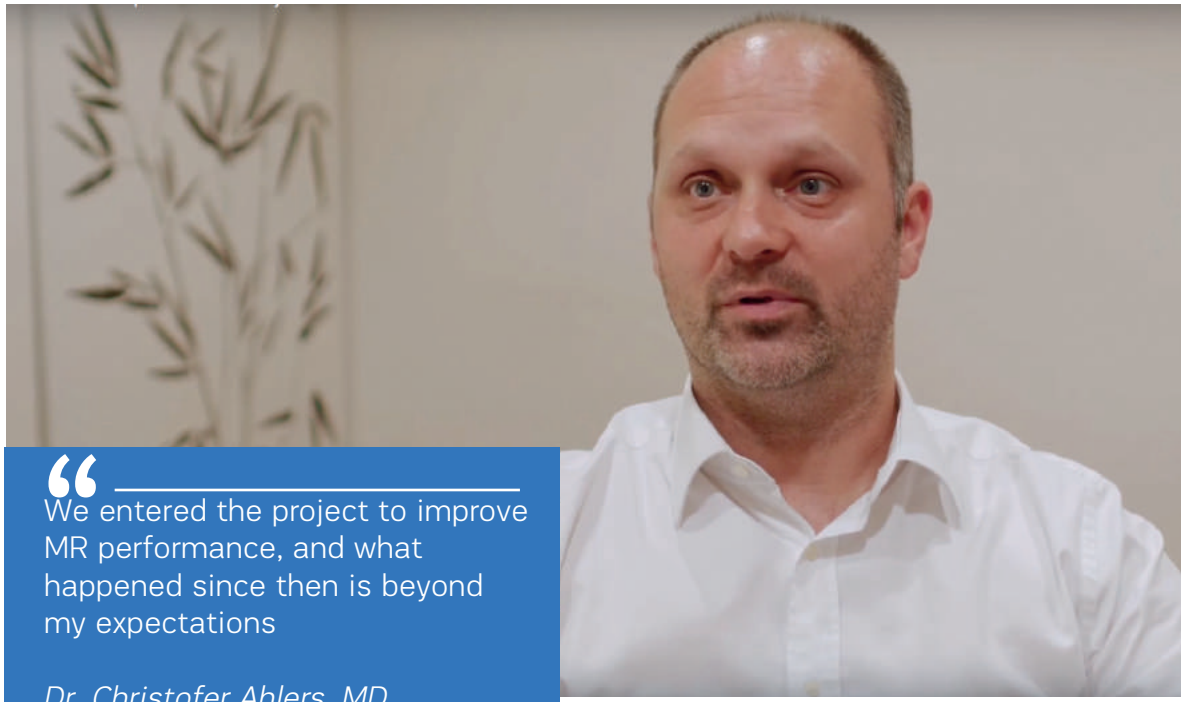
Radiomed, a private practice with nine locations across west-central Germany, recently led a pioneering project combining digital tools with MR technology to increase productivity and quality in imaging.

The program brings together two of the top trends in MR imaging: applied Intelligence, helping doctors find and consolidate relevant data that has the potential to improve patient care and boost workflow, and data-fueled analytics, to dig deeper into that data to make business decisions for improved efficiency and patient care.

"We entered the project to improve MR performance, and what happened since then is beyond my expectations," says Dr. Christopher Ahlers, in Wiesbaden, Germany. "We've been able to increase productivity while maintaining quality, and in some points improving quality because we now spend time on things we feel are most important."

Radiomed sees approximately 150,000 patients and conducts 35,000 MR exams every year. In February 2016, Dr. Ahlers partnered with GE Healthcare to develop the MR Excellence Program.

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.



> We entered the project to improve MR performance, and what happened since then is beyond my expectations
>
> *Dr. Christofer Ahlers, MD,*
> Radiologist and Managing Partner at Radiomed

Now radiomed has analyzed data from its seven MR systems to improve workflows and protocols, significantly reducing waiting time while reducing stress among the clinic's staff.

The program started by defining several key performance indicators that would give radiomed insight into productivity and quality of care. GE then built an IT-based solution that brings together machine data from the MR system during the scan, image data from the PACS, and patient data from the RIS. It then aggregates this data and displays it in a dashboard, where management can analyze workflows, machine utilization, protocols and referral patterns to draw conclusions about productivity and workflow.

As a result, the practice saw up to 30% increase in productivity and increased MR scans from about 120 per week to about 170 per week. What's more, patient wait times for an exam dropped from 6-8 weeks to just 1-2 weeks.

"It doesn't help if you're scanning faster when you don't adapt your scheduling," says Dr. Ahlers. "The paradigm change is to actually real-time monitor what you're doing, and to iteratively look at where you lose your time to make this a sequential adaption process. This makes the whole process much more dynamic."

Although streamlining the patient experience was the key goal, radiology techs at radiomed reported benefits too.

"Due to better scheduling, we don't have to take so many overtime hours. Through this simplification, we have less stress and it is more pleasant working," says Julia Köhler, radiographer at radiomed.

"I must admit, I am deeply impressed by what has been achieved," Dr. Ahlers says. "It opens insights into our workflows and productivity that I couldn't imagine one year ago. This project will have a tremendous impact on how we work in the near future and will make us rethink what we do in MR."

This actionable data is critical to keeping up with faster imaging technology and is part of the larger shift to dynamic, analytics-based business decisions.

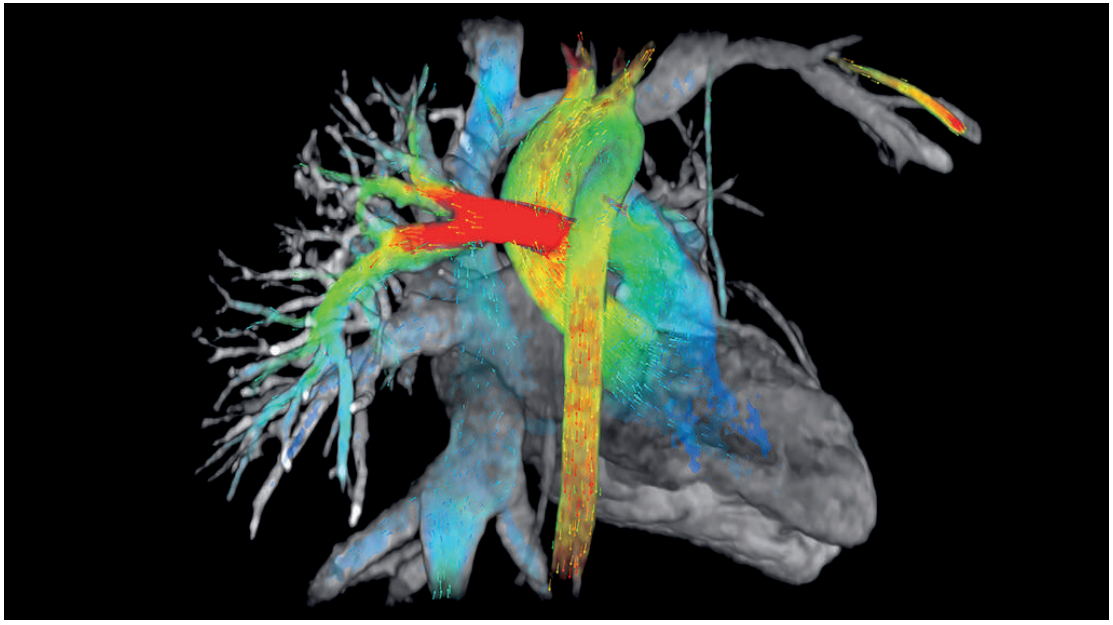
Dr. Ahlers will pilot a similar CT excellence program later this year, and he expects to have actionable data by the end of 2018.

"Doing this together with GE opens the door to implement these ideas into an IT-based solution," he says. "Besides selling equipment, GE continues to improve the spectrum of services they offer that really make all of this a holistic approach to radiology, and we really appreciate that. We don't buy only a machine anymore, but we also have a partner onboard that helps us to optimally use our systems and to deliver the best possible care to our patients." ■

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

This cardiac software originating from a Stanford basement is now one of the top of Artificial Intelligence solutions available

Dr. Albert Hsiao aco-developed the new ViosWorks MR software package to help speed up cardiac MRI exams



It all started with a simple request made in the depths of one of the nation's best hospitals

"Hey, I want to show you something."

Anja Brau was finishing up a meeting in the basement of Stanford Hospital with Dr. Albert Hsiao, MD, PhD, then a radiology resident at Stanford. Hsiao, who has an undergraduate degree in Computer Science and PhD in Bioengineering, wanted to show her the cardiac software he wrote to visualize 4D blood flow data acquired from an MRI sequence developed at Stanford to capture cardiovascular flow and anatomy in a single scan. He'd been playing around with the code in his free time for years, but he thought he finally had something to share.

Brau worked for GE Healthcare, a longstanding partner of Stanford and doctors like Dr. Hsiao in developing new MR technologies to help diagnose heart disease. When she looked at Dr. Hsiao's computer screen, she immediately knew they were looking at something special.

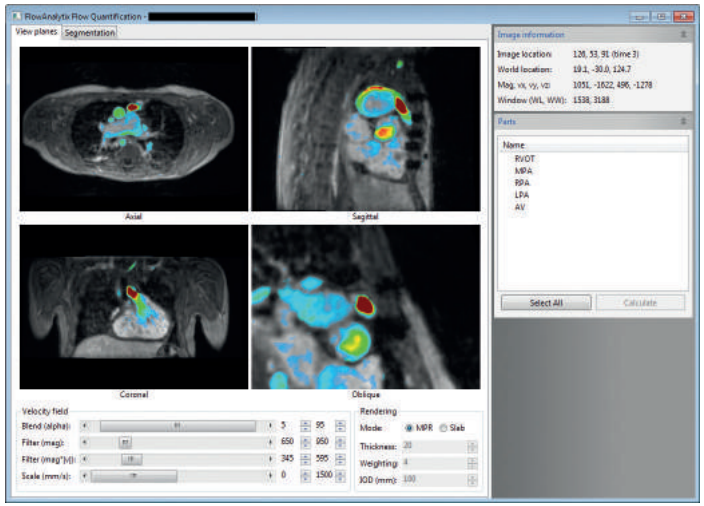
"I remember he showed me these color flow 3D renderings of beating hearts. I said, 'Where did you get this?' and Albert said, 'I wrote this.' It was amazing – it was already much better than what we were looking at with other software packages."

Hsiao, Brau, and others worked together to refine the imaging software for clinical use and now it forms the foundation of ViosWorks, a groundbreaking new MR software solution that can complete a scan of cardiovascular anatomy, function and flow in 10 minutes or less – significantly streamlining cardiac MRI exams that historically took an hour or two to perform.

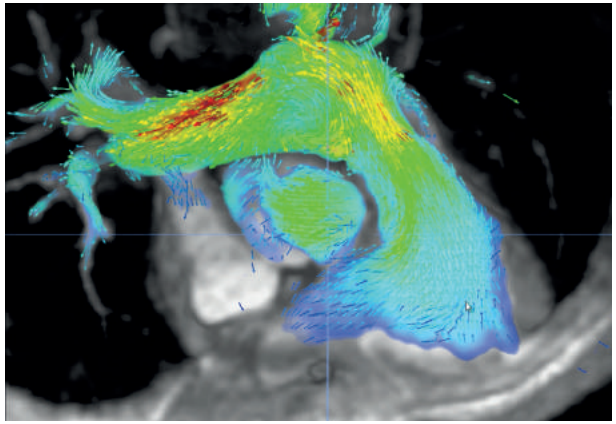
ViosWorks helps physicians see the heart like never before by displaying results in 7 dimensions: 3 in space, 1 in time, and 3 directions of velocity. It shows the blood

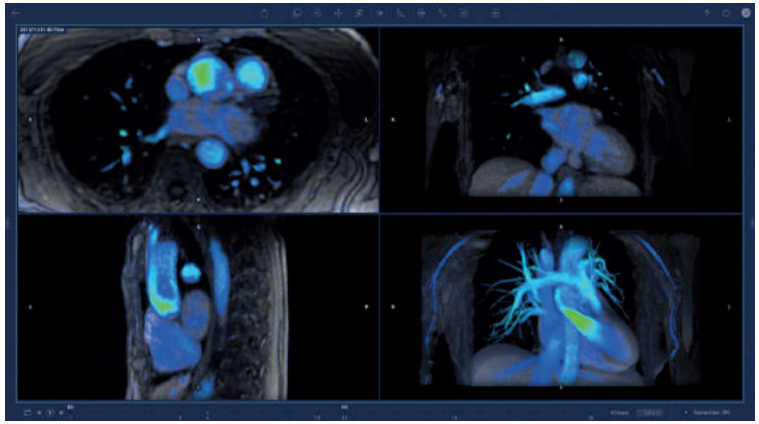
©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

Hsiao working on the code for what would become ViosWorks



Screenshot of the prototype interface that Albert wrote in the basement at Stanford





Screenshot of the ViosWorks interface measuring cardiac anatomy, function and flow

flow in the heart as a moving image, much like a 3D animated movie, and allows clinicians to rotate and view the image from any angle.

Offering quantitative measurement of blood flow, ViosWorks can help clinicians tell whether blood is flowing through the heart the way it should be or whether there are cardiovascular anomalies that may require surgical intervention. Conventional MR techniques to measure flow are limited to 2D cross-sectional views of the anatomy rather than a full 3D volume and are very time-consuming to acquire and analyze.

"There's a bit of a learning curve to how to use it since it is such a paradigm shift from 2D flow imaging, but once physicians learn it, they love it due to its speed, simplicity, and intuitive 3D representation of cardiovascular health," says Brau.

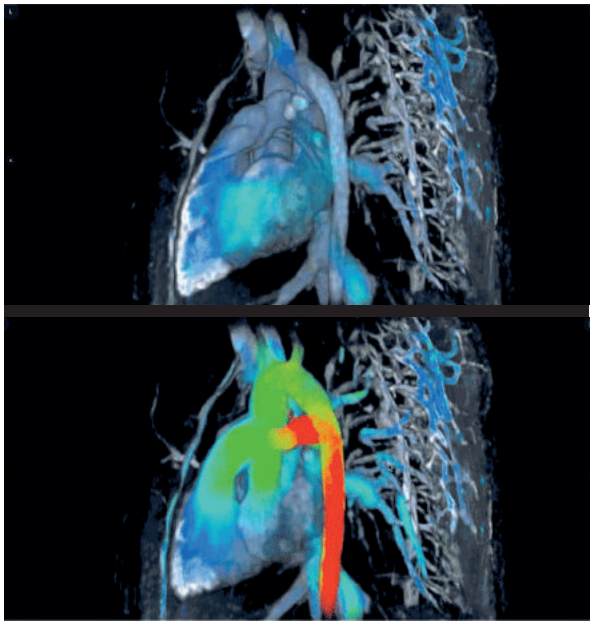
Dr. Hsiao uses his technology in clinical settings nearly every day. "It's a little bit anticlimactic because it's so routine now. I hardly even think about it," he says. "The exams are really simple. We can typically get the clinical exam done in under a half an hour and have time to spare for developing the next great technology. And it's all because of ViosWorks."

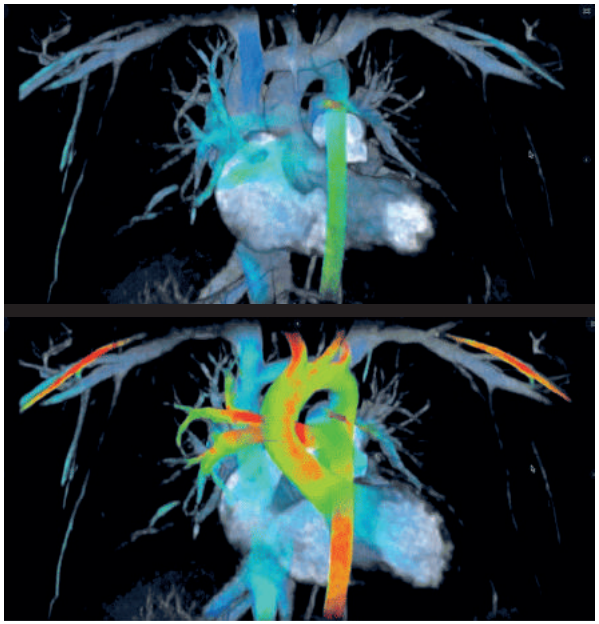
The software and algorithms in ViosWorks not only help speed up the cardiac imaging process, it provides high quality images. Plus, patients don't have to hold their breath, and the faster exams mean that facilities can serve up more patients in the same time.

Dr. Hsiao says the relationship between GE and Stanford was the first step in making ViosWorks a reality.

"The whole concept of collaboration between GE and Stanford [and now GE and UC San Diego School of Medicine, where Hsiao is currently assistant professor and associate

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.





director of cardiovascular imaging for the Center for Translational Imaging and Precision Medicine] is really core to why this was even possible. It proves how long-term academic-industry partnerships can be really fruitful," he says.

AI and the future of MR

ViosWorks is powered by Arterys, the company Dr. Hsiao co-founded in 2012 to specialize in web-based medical imaging analytics powered by Artificial Intelligence (AI). It offers innovative cloud supercomputing and AI assistance to accelerate physicians' day-to-day workflow.

When Dr. Hsiao first started adjusting Stanford's MR scanners to capture information for his software, they captured so much raw data that hospital computers couldn't efficiently process it all into images that doctors could interpret.

To address this hurdle, Dr. Hsiao and Arterys looked to the technologies behind modern 3D video games to distribute large amounts of 3D data across many graphics processing unit (GPU) cores. Along with this approach, Arterys was able to develop a cloud-based system to manage and rapidly process the gigabytes of MR data behind each cardiac image.

"In many ways, Arterys broke the mold on how image analysis is done and what the infrastructure is to support it. We're just beginning to scratch the surface of what is possible for that infrastructure, and Arterys continues to add analytics," says Brau.

Arterys was the first company to receive FDA-clearance for an AI algorithm on the cloud, which they developed to measure the size and function of the heart. In the past, to measure the function of the heart, Dr. Hsiao drew circles on the images to measure the size of the heart's chambers.

"We were basically a bunch of highly paid kindergarteners using the equivalent of Microsoft Paint," he says. "Now we've trained an AI algorithm to calculate the heart volumes and function, which is a lot more efficient use of time."

"There is a lot of data that is inaccessible to us in the images. Since we only have so much time to render a diagnosis or analysis, we are only able to use a fraction of that information clinically. AI can help us get to that, to potentially be a tool that can automatically gather quantitative data, better predict prognosis and help us sustain our patients longer before resorting to heart transplantation," says Dr. Hsiao.

"We can apply AI to take on the world's most extreme kindergarten circling exercise on the thousands of images that we collect in a single exam," he says. "Piece by piece, we're taking down these mind-numbing tasks, giving them to AI, and making the physician more useful so more time can be focused on the patient."

Soon, he believes these advancements in AI will be applied to many other diseases, such as cancer.

"If we could combine imaging and genomic data, it would be powerful," he says. "We simply don't have the ability yet to sort through the massive amounts of individual patient data that comes from the combination of these two sets of technologies. But we are beginning to see the promise of AI to handle this data. That's where we will be able to give patients much more precise treatments that are tailored to them and their specific tumors." ■

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

The immunotherapy hurdle – and why doctors could soon predict how each patient will respond

A partnership between Vanderbilt University Medical Center and GE Healthcare will create AI-powered apps to enable safer and more precise immunotherapies

> One of the biggest challenges for treating patients with immunotheraby is when I sit in a clinic room, the patients across from me, and I can't necessarily tell them who is going to benefit and who is going to get side effects form that immunotheraby.
>
> *Dr. Travis Osterman,*
> DO Assistant Professor in Biomedical Information
> and Hematology & Oncology, VUMC

When two doctors oceans apart were jointly awarded the Nobel Prize in Physiology or Medicine for their work in immunotherapy – the breakthrough treatment that turns the body's own immune system against the cancer – the world cheered. Their efforts had ushered an entirely new way of treating devastating cancer and

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

new pharmaceutical drugs that helped patients with no other hope achieve remission.

Little doubt exists about the tremendous contributions these scientists made to medicine and patients' lives. They had succeeded where others had frequently failed, grinded through years of trials when others had given up and proved to the world the power of a previously untested therapy.

Today both say they want to continue their work to ultimately treat more patients.

But despite the rapid advancements and excitement surrounding immunotherapies, there is a looming challenge that doctors and researchers are dealing with in trying to treat their patients clinically.

Many of those patients who stand to receive the immunotherapies researchers work so hard to find may not respond to the treatment and could also experience severe side effects, such as inflammation in internal organs, infections, hormone or gland problems and more[1]. No matter how effective a treatment is in the lab or in trials, to date it has been exceedingly difficult to know which patient will respond well or reject a given treatment.

Additionally, it takes an average of 12 years[2] and costs almost two billion dollars[3] to bring a drug to market, where it can be fully administered to patients. In many cases, patients who aren't the right match for specific treatments are recruited to participate in clinical trials, creating unnecessary expenses, severe side effects and slowing down approvals of new therapies.

"We don't want to give a therapy that has a high likelihood of doing more harm than good. This is a big problem in immunotherapies. We're relying on very primitive tools right now," said Dr. Park, M.D., Ph.D., Director of Precision Oncology, Vanderbilt University Medical Center.

Dr. Park's organization, Vanderbilt University Medical Center (VUMC), announced it is forming a partnership with GE Healthcare to address this hurdle to making immunotherapy mainstream. Together, the two institutions will create Artificial Intelligence (AI)-powered apps and positron-emission tomography (PET) imaging tracers to predict how individual patients will respond to immunotherapies – in advance, before treatment.

"The partnership will hopefully allow us to have more precision in who we can treat. It will allow us to predict whether they're going to have a response and equally important, whether they are going to have any side effects," said Dr. Park.

By creating multiple diagnostic tools, VUMC and GE Healthcare seek to enable safer and more precise cancer immunotherapies. This would help physicians to better target immunotherapies to the right patients and avoid potentially damaging, ineffective and costly courses of treatments.

This will be achieved by retrospectively analyzing and correlating the immunotherapy treatment response of thousands of VUMC cancer patients, with their anonymized demographic, genomic, tumor, cellular, proteomic and imaging data. The two organizations will co-develop AI-powered apps drawing on this data to help physicians identify the most suitable treatment for each individual patient.

"We think that there are probably answers in all of the data that we collect, and we're going to work with GE Healthcare to sift through that data and use cutting edge technology to try and find the answers to those questions," said Dr. Osterman.

As part of the partnership, the two institutions will also develop new PET imaging tracers. These apps and tracers will help physicians to stratify cancer patients for clinical trials, with the hope that the PET tracers will also be used to monitor the efficacy of immunotherapies in everyday practice.

The first AI app prototype will be available by the end of 2019 and the PET tracer proof of concept by the end of 2020.

The partnership adds to the increasing list of ventures between academic institutions and health tech creators to accelerate the development of potentially life-saving treatments. In August, a center jointly funded by GE Healthcare and the Swedish government announced it would help cell therapy company BioLamina develop and fine-tune its manufacturing processes so it can scale and more quickly deliver treatments to market. Similarly, inside the Center for Commercialization of Regenerative Medicine's labs in Toronto, funded by $40 million from GE Healthcare and the Ontario government, scientists are paving the way for manufacturing cells that can turn into any kinds of cell needed in therapy – in bioreactors.

"As we become more adept at treating and preventing cancers, the disease will no longer be a life-ending tragedy for so many patients. Rather, cancer will become a chronic condition that can be effectively managed without limiting a person's vitality or lifespan," said Jeff Balser, MD, PhD, President and Chief Executive Officer of Vanderbilt University Medical Center, and Dean of Vanderbilt University School of Medicine. ■

[1] https://www.cancer.net/blog/2018-02/what-you-need-know-about-immunotherapy-side-effects

[2] https://www.sciencedirect.com/science/article/pii/S2452302X1600036X

[3] https://www2.deloitte.com/us/en/pages/life-sciences-and-health-care/articles/measuring-return-from-pharmaceutical-innovation.html

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

Supported by an unrestricted educational grant

Produced by MindByte Communications Ltd

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.