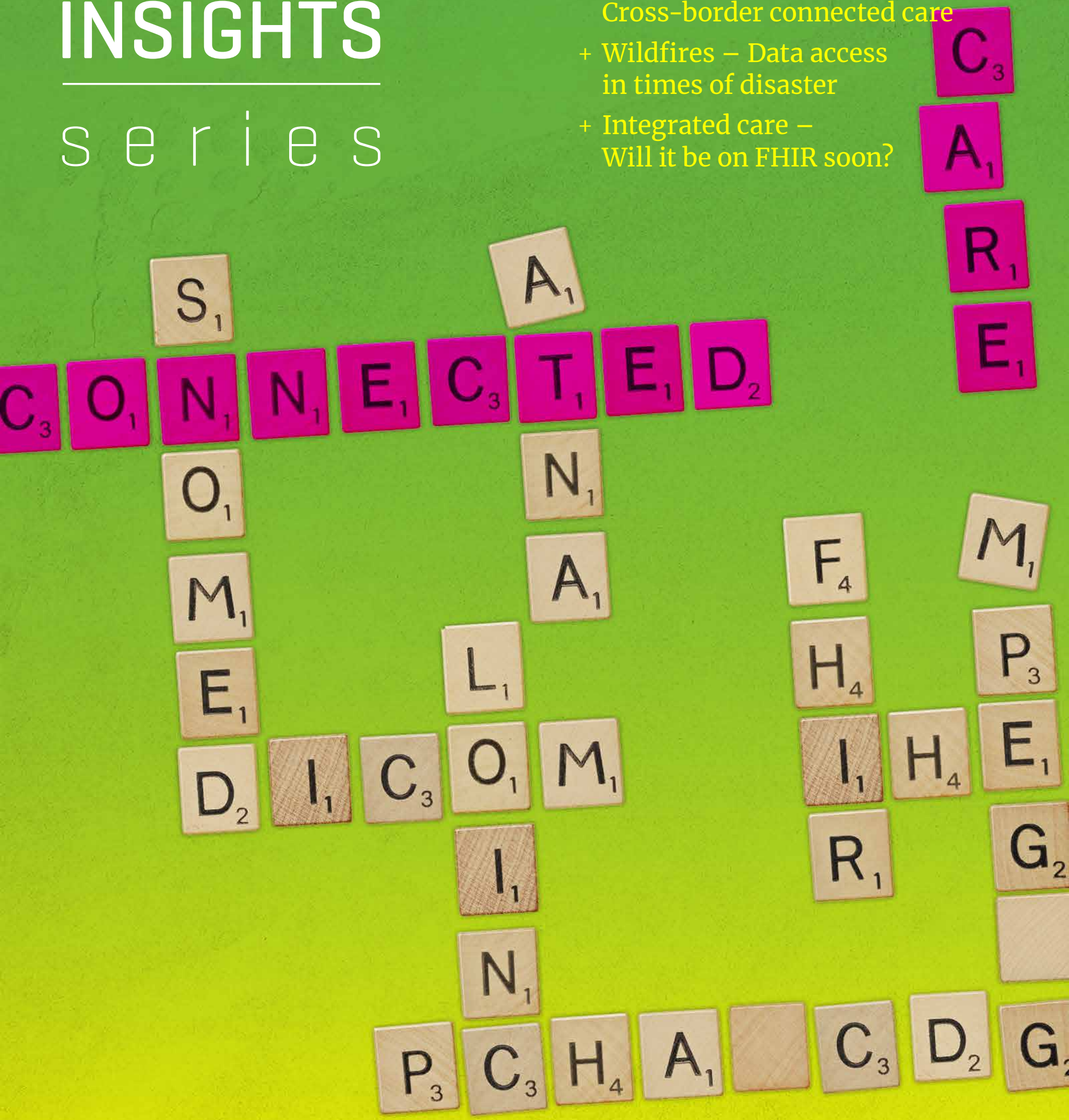
7.4 | MARCH 2019

HIMSS INSIGHTS series

+ Nordic innovation – Cross-border connected care
+ Wildfires – Data access in times of disaster
+ Integrated care – Will it be on FHIR soon?



The pieces fall into place

Philipp Grätzel von Grätz
Editorial Director
HIMSS INSIGHTS

The year 2019 started pretty well for international healthcare IT standards. On the eve of the HIMSS Global Conference, the US government hinted that it was willing to increase the pressure on medical institutions and healthcare IT providers that don't show sufficient engagement in making patient data available. There was also a strong commitment towards using FHIR for APIs.

Meanwhile, in Europe, the European Commission issued the first version of its recommendations for an electronic patient record exchange format, well received by the standardization communities and by many industry representatives. They are full of HL7 and CDA, and towards the end, they touch on HL7 FHIR too. On the semantic side, SNOMED is gaining momentum. LOINC is becoming stronger, and DICOM has been set for years anyway.

This is good news. There are still some people who try to tell us that proper standards for digitally connected care are, if anything, emerging and that it makes sense to wait for them to mature. The reality is: The puzzle pieces have long started to fall into place. Countries and companies that ignore them will be left behind or are already being so.

We are presenting a couple of very convincing examples for making connected care a reality by using international standards in this issue of HIMSS Insights. We also take a close look at a standard that can justifiably be called 'still emerging'. In fact it's brand new, and it addresses the question of how to get 'omics' data into the connected care game. Exciting, especially since it shows how stimulating it can be to let people from outside of healthcare into the arena. Enjoy the read. ■

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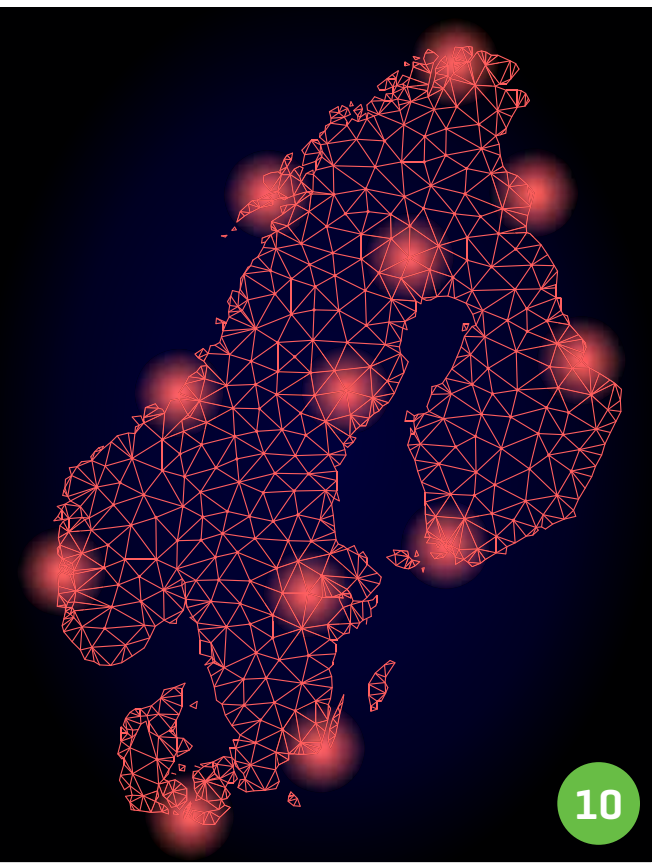


Nordic innovation – Cross-border connected care

Wildfires – Data access in times of disaster

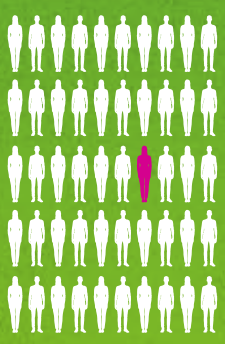
SCREENING FOR HEALTH RISKS – THE CASE FOR THE HEART

Digitally integrating patients into care pathways is especially powerful when tools are used to identify people at risk of certain conditions and apply this knowledge to better tailor therapy or prevention.
There are many places to start. What about the heart? Take a look.

Use Your Algorithm

One in 5 patients in which an ECG deep learning algorithm issued a warning developed severe heart failure within 10 years, compared to one in 50 patients in which the algorithm remained silent.

1 of 5



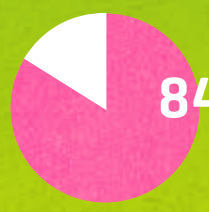
1 of 50

Select Your Implant Patient

Most patients who get an implantable cardioverter/defibrillators (ICD) will never need it. Digital twin models of the heart aim to predict much more reliably who will benefit from ICDs and who won't.

Wear Your Watch

In the Apple Heart Study, 84% of patients in whom the smartwatch algorithm called a warning actually suffered from atrial fibrillation.



84 %

Check Your Pump

In the Medolution project, an app-based telemonitoring system for LVAD implants helped to detect pump thromboses on average four days earlier. This could help to avoid costly replacements.

Sources: Attia ZI et al. Nature Medicine 2019. doi: 10.1038/s41591-018-0240-2
Turakhia M et al. ACC 2019, New Orleans.
Reiss N. ESC Congress 2018, Munich.

Q. What are the top 3 benefits of connected health?

SAUDI ARABIA

Connected care enables consumer empowerment

Key benefits of connected health are empowerment and innovation, as smart wearables and technology can be utilized by consumers according to Manal Almalki, Assistant Professor at Health Informatics Dept., Jazan University in Saudi Arabia.

SINGAPORE

Clinicians can collaborate 'on the go'

A patient-centered approach is improved through connected care by enabling clinicians to collaborate more flexibly, while their productivity also increases says Julian Koo, Co-founder & CEO of Jaga-Me in Singapore.

UK

Connected health for best possible citizen care

Research for breakthrough treatment and formulating up to date policies are just a couple of the benefits that connected health can provide for Dr Layla McCay, Director of International Relations, NHS Confederation, UK.

BELGIUM

Tracking patients 24/7

The ability to track patients around the clock, along with leveraging real world data to utilize predictive tools will be major benefits of connected care according to Belgian-based futurist, Koen Kas.

Source: Shuttestock/Grisha Bruev

iCAN – FINLAND'S PRECISION ONCOLOGY TOOLBOX

A new personalized cancer research center in Helsinki capitalizes on an existing data lake, as well as Finland's extensive health data registries to digitally-integrate lifestyle and biology. iCAN, one of the country's six new 'flagships' created as part of the government's stimulus initiative, hopes to combine diverse technological modalities to contribute to a moonshot in Europe.

By John Otrompke

“Finland is a country of thousands of lakes, ecosystems and registries.”

Miikka Korja, CIO, iCAN

“The reason why iCAN has started in Finland is that our unique location offers the opportunity to combine digital health records with more classic cell and molecule-based cancer research.”

Tomi Makelä, application coordinator, iCAN

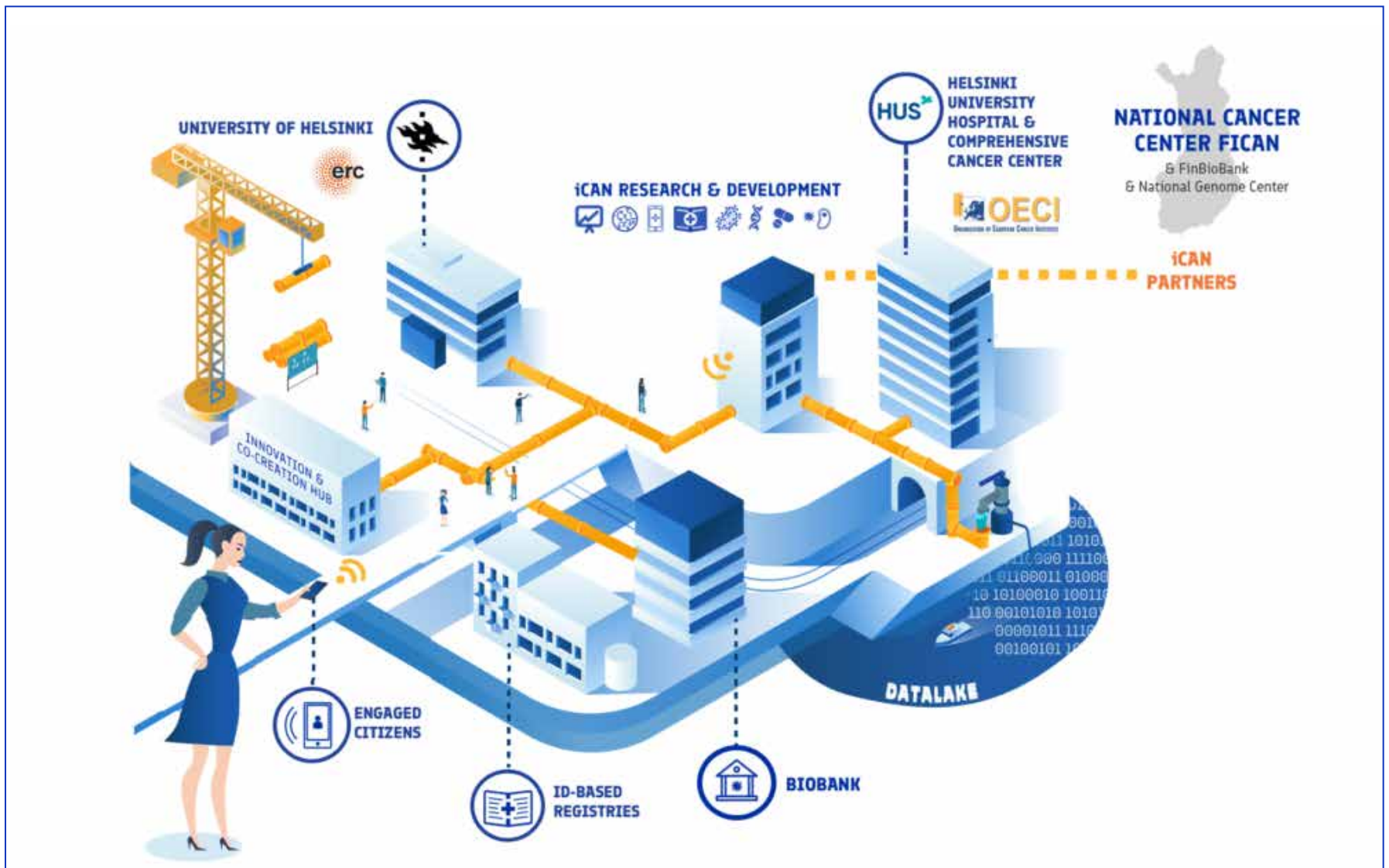
Endowed with €11m from the Academy of Finland, the University of Helsinki recently announced the creation of iCAN **(the Digital Precision Cancer Medicine Platform)**, a research center which intends to make use of an existing data lake and other faculties to create a precision cancer medicine toolbox.

“Finland is a country of thousands of lakes, ecosystems and registries,” said Miikka Korja, MD, PhD, associate professor of neurosurgery at Helsinki University Hospital and CIO at Flagship iCAN. “All data gathered from various sources can be integrated at an individual level by using the social security number; every Finnish citizen has one.”

Korja had already assisted Tieto Corp. (based in Espoo, Finland) **in the creation of the data lake**, made easier by the fact that 100% of Finnish providers use electronic health record systems; Finnish patient data has been digitally stored for over a decade. “The iCAN was just announced. These are the early steps of a novel ecosystem,” Korja added.

“The project is starting,” said Tomi Makelä, MD, PhD, professor at the University of Helsinki and iCAN’s application coordinator. So far, iCAN has put together a team of 44 principal investigators, including several computational biologists, and it expects to expand, said Makelä. “The reason why iCAN has started in Finland is that our unique location offers the opportunity to combine digital health records with more classic cell and molecule-based cancer research,” he explained.

Additionally, Finland’s national personal health information storage system recently offered free portability; for example, citizens can upload data from wearable monitors and transfer the data to their provider. Although not formally related to iCAN, Finland is also the site of the FinnGen, an effort to



Schematic of Flagship iCAN, with data lake: iCAN, Finland's new center for precision cancer research, will make use of a recently-created data lake and other unique resources to spearhead the drive to cure cancer.

Source: iCAN

create a genomics browser which would interrogate 10% of the Finnish genome, a public-private partnership that receives funding from pharmaceutical giants GSK and Sanofi.

Other advantages include the fact that the Hospital District of Helsinki and Uusimaa (HUS) is one of the largest hospitals in Europe, with over 3.6 million patient visits per year and an average of 640 clinical trials taking place at any given time, according to Makelä. iCAN also enjoys the presence of the first comprehensive cancer center in Scandinavia accredited by the Organization of European Cancer Institutes. What's more, Finland has a very isolated population. "So the genetics is simpler," he added.

It should be noted that Helsinki will also be the location of this year's **HIMSS Europe & Health 2.0 European conference** taking place from 11-13 June.

“We have 26 companies so far that have expressed interest in working with iCAN, including pharmaceutical and IT companies, ranging in size from IBM to start-ups that are developing health apps in oncology in connection with hospitals”

Jari Niemelä, PhD, rector, University of Helsinki

DATA FLOWS FREELY IN THE LAND OF SKY-BLUE WATERS

“The most important part where iCAN hopes to make a difference is in data flows. Currently a major obstacle in utilizing hospital data in general is that there are a lot of bottlenecks,” Makelä commented. “The other part is data integration. The data lake provides basic healthcare information, and now we will integrate it with data from new sources, such as genotype sequencing and drug sensitivity data,” he said.

The data lake will contain information on at least two million patients, Makelä noted. The team is also collecting data from “living biobanks” - mini-cancers that are grown outside of the patient. Korja confirmed that “the ecosystem is huge.” He advised that the data lake contains data from all 21 hospitals in HUS, but that it was difficult to combine data from all of the various sources in HUS.

“We had electronic health records dating 30 years, housed in 60 different computer systems or databases. But integrating the databases at the hospital was part of the data lake project. Now they are all on the same EMR, and we are in the process of launching EPIC,” he said.

“As an important proof of concept, the pilot project that iCAN is working on now is in the hematology area,” Korja continued. “iCAN is very much involved in clinical trials,” said Makelä, adding that the initial hematology clinical trial will involve hundreds of patients, and will be followed by scheduled trials in colon cancer, breast, and then ovarian cancer.

NORDIC INNOVATION – CROSS-BORDER CONNECTED CARE

Digitally connected care scenarios need both privacy and accessibility of data. The Estonian eGovernment infrastructure X-Road took on this challenge at the turn of the century, and several countries are now adopting the structure, creating one of the first ever cross-border healthcare data exchange platforms. If the ideas of the Finnish innovation fund SITRA become reality, it might evolve into a far broader data exchange economy for healthcare, dubbed IHAN, along the lines of the international IBAN system in banking.

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By Mélisande Rouger

“The identity of each organization and technical entry point is verified using certificates that are issued by a trusted certification authority when an organization joins an X-Road ecosystem.”

Petteri Kivimäki CTO, Nordic Institute for Interoperability Solutions

The X-Road infrastructure was implemented as a national data exchange layer in Estonia in 2001 and in Finland in 2015, to facilitate the transfer of data and documents between the different information systems used across public services and eventually the citizens.

Since 2018 the Nordic Institute for Interoperability Solutions (NIIS) is responsible for the development of the X-Road core software for the two countries. X-Road is a centrally managed distributed data exchange layer between information systems that provides a standardized and secure way to produce and consume services. X-Road ensures confidentiality, integrity and interoperability between data exchange parties, Petteri Kivimäki CTO at NIIS, explained.

“The identity of each organization and technical entry point is verified using certificates that are issued by a trusted certification authority when an organization joins an X-Road ecosystem. The identities are maintained centrally, but all the data is exchanged directly between a consumer and provider” he said.

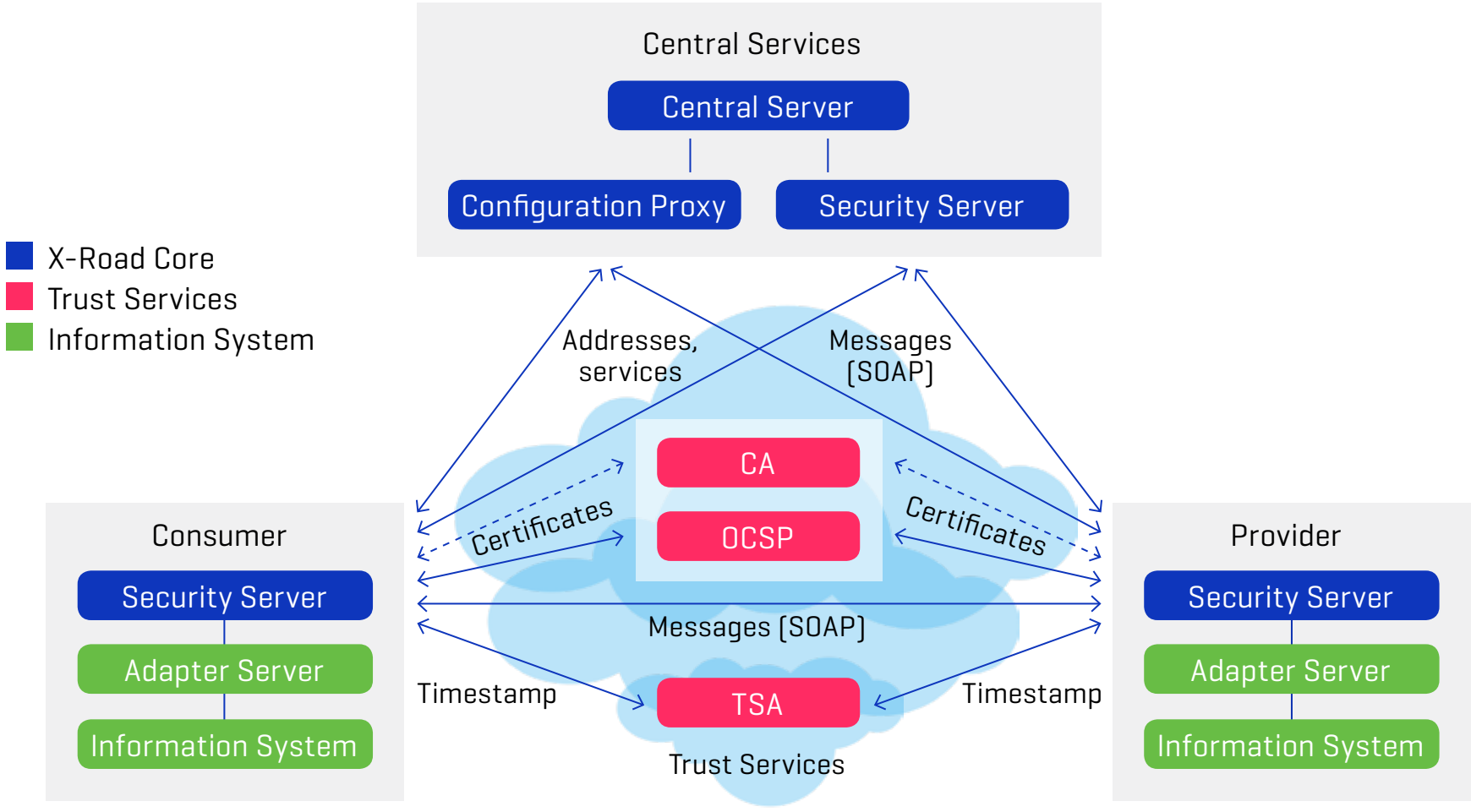
OUT-OF-THE-BOX SOLUTIONS IMPROVE DATA FLOW

X-Road technology provides multiple things out-of-the-box regarding data exchange: organization level authentication, machine-to-machine level authentication, standardized messaging model, logging of messages, non-repudiation of messages, access rights management, message routing and transportation layer encryption.

“X-Road is special because it’s an out-of-the-box solution for a national data exchange layer. It’s one of the few technologies that are ready to be implemented on a national level,” Ville Sirviö, CEO at NIIS said.

Using the X-Road has enabled both Estonia and Finland to save time by not having to develop case-by-case solutions and to go virtually paperless.

An overview of the X-Road architecture



Source: Nordic Institute for Interoperability Solutions

"X-Road is special because it's an out-of-the-box solution for a national data exchange layer. It's one of the few technologies that are ready to be implemented on a national level"

Ville Sirviö, CEO, Nordic Institute for Interoperability Solutions

"Thanks to X-Road, we save a stack of paper the height of the Eiffel tower every month! It helps saves time too. Last year almost 1 billion queries were made on X-Road. Assuming that 5% of these queries would have had to be handled by a human operator, we saved 1,407 working years in a single year," Kalle Killar, deputy secretary general of E-services and Innovation at the Estonian Ministry of Social Affairs said.

The eHealth system is the second most popular service used on X-Road, with roughly two million queries from doctors and patients each month. With this infrastructure, a patient's health data is fully accessible to both physicians and patients, and moves freely between healthcare providers, enabling seamless continuity of care.

"Estonia and Finland successfully began the exchange of digital prescriptions this year via the eHDSI system, but we could

> *"Estonia and Finland successfully began the exchange of digital prescriptions this year via the eHDSI system, but we could exchange a broader and richer data set using our joint X-Road infrastructure"*
>
> Kalle Killar, Deputy Secretary General of E-services and Innovation, Estonian Ministry of Social Affairs

exchange a broader and richer data set using our joint X-Road infrastructure," Killar added.

Although legislation remains an issue, the X-Road has been proven to work in Estonia for almost two decades, some obstacles must be overcome before it can deliver its full potential. In particular, legislation on data exchange and privacy is a tough nut to crack.

"The discussion around data protection is important. But occasionally legislation regarding data of a private person can be even stricter when it comes to digital. Some people consider paper to be safer, which is a totally wrong way of looking into it," Sirviö said.

A number of challenges also arise today that did not exist when the technology was created. After the collapse of the Soviet Union, Estonia had to build everything from scratch; it did so using the X-Road and transferring the data over the public internet. But in Finland and elsewhere, certain types of patient data cannot that simply be shared over the internet.

"We have certain limitations regarding the exchange of sensitive data in Finland, which make the exchange of the health data challenging. Security requirements are very high. The higher the requirements, the more complicated the implementation," Kivimäki said.

Nevertheless, NIIS is looking for new members to join the non-profit association developing the X-Road, most likely starting with Iceland. The institute is also actively exploring possibilities in other European countries and regions.

A DATA EXCHANGE ECONOMY

The Finnish Innovation Fund Sitra is taking the prospect of data sharing internationally even further with the creation of a proper data exchange economy, dubbed IHAN, along the lines of the international IBAN system in banking.

> *“We need to make people understand that they should care.”*
>
> Jaana Sinipuro,
> IHAN project director, Sitra

The idea behind the International Human Account Network (IHAN) is to design an international protocol for a fair data economy, to enable personal data exchange on a European level and beyond, by focusing on consent base data sharing using the possibilities created by the GDPR for data portability.

“We are trying to create a mechanism for data consent, so that users can give their authorization when they transmit their data from one data holder to the next, by expanding the existing data set with consent based data content. Our goal is to achieve a fair services label or brand, to guarantee people that their GDPR rights are getting fulfilled when using services wearing the brand, so that they can trust these services,” Jaana Sinipuro, IHAN project director at Sitra explained.

One scenario for healthcare could be a significant improvement in quality of life, thanks to increased access to personal information. “For example combining your nutrition data, i.e. from grocery stores, with training data and health records would become possible if your personal trainer or health coach gets consent to request data from data holders,” Sinipuro said.

Sitra is working with different academic research institutes and technical communities to define new business models, develop the technology for consent base data sharing, and find government models and legislative frameworks. Pharma companies are also taken into account in the project, to explore potential collaborations for creating enriched data sets for real-world-evidence.

Sitra’s most ambitious task, arguably, is to change the mindset of policy-makers, citizens and companies. “We want to create awareness of citizens of their digital rights and introduce ethics into software designs. We need to make people understand that they should care. Their everyday life now is just data and these data are used, but they don’t know how or what for. Using the proper tools, they could,” she concluded. ■

GENOME DATA FOR INTEGRATED CARE – ENTER THE VIDEO PEOPLE

Integrated care scenarios that put the patients in the driving seat require more than just giving them access to medical documents. An AI-powered health data universe for precision medicine will have to make molecular data available – in a way that is suitable for mobile computing. Fiction? Some innovative minds are pushing ahead with a new compression format for genetic data. MPEG-G might come to your smartphone soon.

By Philipp Grätzel von Grätz

Mikel Hernaez is director of Computational Genomics at the Carl R. Woese Institute for Genomic Biology at University of Illinois at Urbana-Champaign.

The size of a human genome data set depends on many factors. In any case, it is huge. An estimate often given says 100 gigabytes for the original raw data set. It can be even more, depending on how fully a "full" genome is sequenced. Files of that size are difficult to handle on conventional computers, but even moreso on mobile devices. If we adhere to the vision that the smartphone will become the modern citizen's personal steering wheel for all health and disease related tasks, the question arises around how to make genomics (and other -omics) data available on such platforms.

Mikel Hernaez, Director of Computational Genomics at the Carl R. Woese Institute for Genomic Biology at University of Illinois, is among those who are trying to provide an answer to this question. Hernaez is part of a standardization initiative, in which the Moving Picture Expert Group (MPEG) and the ISO Technical Committee 276 are joining forces: "Our goal is to produce MPEG-G, a new open standard for genomic information representation. It is expected to aid significantly the storage, transmission, and most importantly, the processing of raw and aligned sequencing data."

> *"Our goal is to produce MPEG-G, a new open standard for genomic information representation."*
>
> Mikel Hernaez, University of Illinois

MPEG-G USE CASES INCLUDE PRIVACY RULES AND SELECTIVE ENCRYPTION

Together with colleagues, Hernaez has recently authored the first comprehensive publication on the MPEG-G work on the bioRxiv preprint server. He sees a considerable need for a new genomic compression standard: "Genomic data is still largely stored using compression algorithms that perform poorly in practice. I believe that the fact that most existing compressors are not guaranteed to be long-term maintained poses the largest barrier for adoption of genomic data compression technologies." With MPEG-G, this will be different, according to Hernaez: "Given its ISO standard designation, it is guaranteed that a file compressed according to the MPEG-G specifications will be accessible for life."

Next to long-term performance guarantees, another strength of MPEG-G is that it addresses a wide array of use cases. These include selective access to compressed data according to several criteria, genomic studies aggregation, enforcement of privacy rules, selective encryption of sequencing data and metadata, annotation and linkage of genomic segments, and incremental update of sequencing data and metadata. "Some of these use cases are not or only partially covered by other technologies, for example enforcement of privacy rules and selective encryption. This is a major breakthrough. The current genomic data files do not include any type of implicit security mechanisms to ensure that the person or system accessing the file has been granted permission by the owner of the data."

> *"The true advantages of MPEG-G do not lay in the compression capabilities per se, but in the 'wrapper' developed around the core compression technology."*
>
> Mikel Hernaez, University of Illinois

CONVINCING PEOPLE IN BIOLOGY REMAINS A CHALLENGE

Developing a new standard from scratch is not easy, of course: "A main challenge has been and continues to be the interdisciplinary nature of the project," Hernaez points out. "The expertise of the people involved in this project ranges from biology, to engineering, computer science and genetics. As you can imagine, working in such an interdisciplinary environment is quite challenging."

In addition to organizing interdisciplinary issues, there is another challenge: MPEG is a standardization community that has its roots, as most readers will know, in video compression. "Developing MPEG-G is also about convincing people in the biology space that the 'video people' are capable of producing a great new format for compressed representation of genomic information," says Hernaez. In fact, not all people involved in MPEG-G are 'video people', with Hernaez himself, an expert for computational genomics, being the prime example. "But it is still a challenge. We hope that with the release of the first implementations of the standard we will convince people to, at least, try it."

> *“I believe that the fact that most existing compressors are not guaranteed to be long-term maintained poses the largest barrier for adoption of genomic data compression technologies.”*
>
> Mikel Hernaez, University of Illinois

HOW MUCH CAN A GENOME BE SHRINKED?

The “video background” is in fact helpful to a certain extent, says Hernaez: “Some aspects of MPEG-G are vastly different from video-coding, for example the modelling part. But on the other hand, the current entropy codec used in MPEG-G has been partially borrowed from video-compression.” One of the aspects that has been criticized after the first MPEG-G publication in autumn 2018 was that there weren’t any comparisons to existing standards in terms of compression performance.

For Hernaez, this is a misunderstanding of the intentions and the scope of the MPEG-G work: “The true advantages of MPEG-G do not lay in the compression capabilities per se, but in the ‘wrapper’ developed around the core compression technology. This wrapper really promotes competition and interoperation across different solutions. Having said this, we can have a tentative measure of the compression capabilities that MPEG-G could achieve by looking at the technologies specified in the specifications. For example, the SPRING technology, that is included in the MPEG-G standard, can achieve a 25-fold reduction of raw sequencing data size on data generated by the newest Illumina sequencing machine.”

This would mean that the 100GB genome mentioned in the beginning could be reduced to about four gigabytes. An even bigger reduction in size would be possible, if lossy compression is permitted, a mode in which – again in analogy to video-compression – some precision is lost without affecting downstream analyses. Hernaez points out that, since MPEG is part of ISO, the standard development process is open for anybody interested in contributing. To make it easier, some of the academic partners involved in MPEG-G have recently created a group called MITOGEN (Mutual Initiative to Tackle Optimal Genomic ENcoding) to share openly all software developed by the groups involved. An open source encoder/decoder based on the MPEG-G specifications called ‘Genie’ is also under development. ■

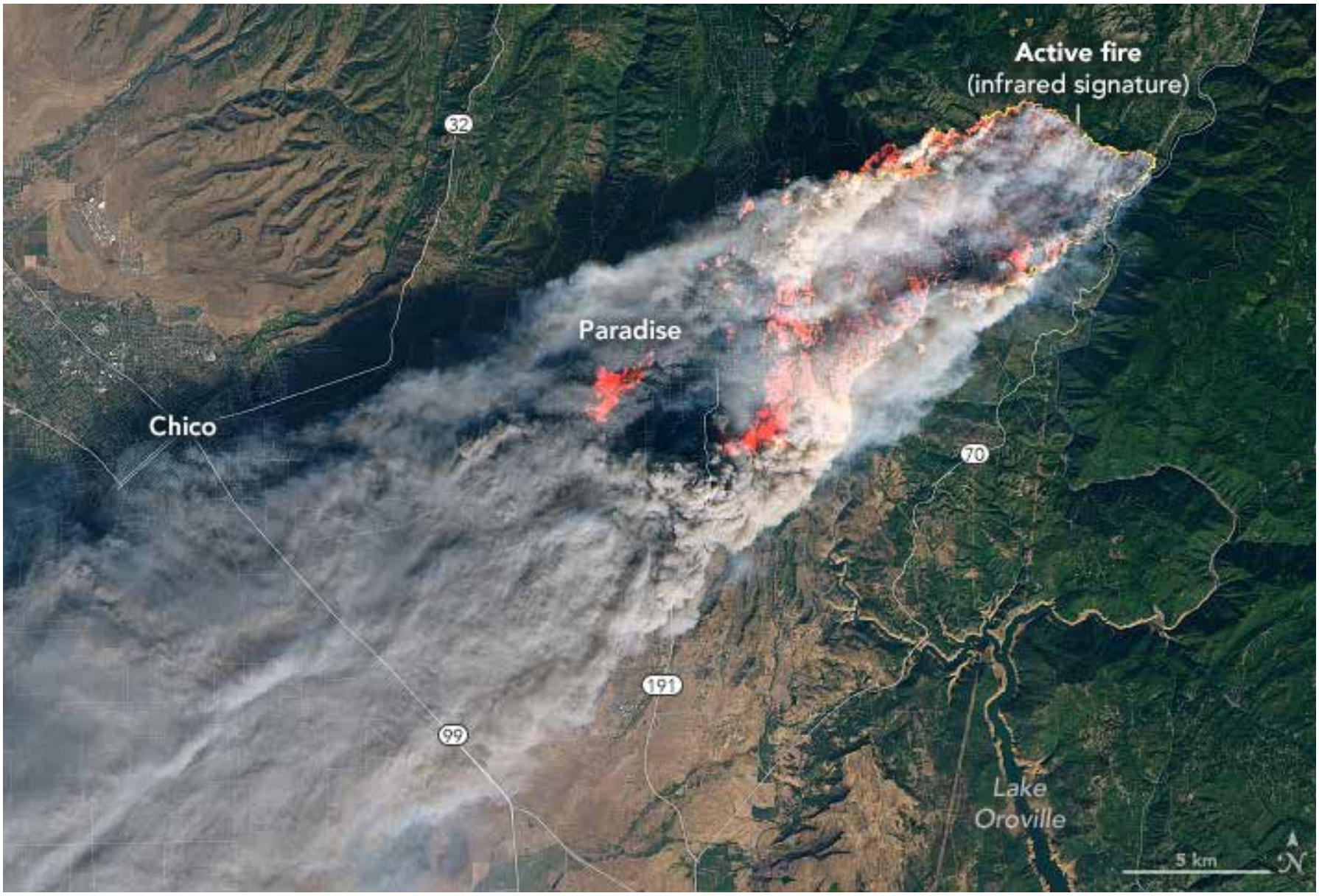
WILDFIRES – DATA ACCESS IN TIMES OF DISASTER

The PULSE tool connects existing health information exchange organizations and other data sources to be used during disaster scenarios.

By Beth Sanborn

Corona, CA USA – July 19, 2018: A wildfire burns and smoke rises in the forest near homes on the south city border close to the Cleveland National Forest.

Source: Shutterstock/Tim Gray



NASA Earth Observatory image of
Camp fire by Joshua Stevens

When it comes to responding to disasters like the wildfires that ravage California every year, caring for displaced patients is hard enough, especially in the last two years that have brought record loss of life, destruction and chaos. It gets even worse when clinicians lack access to patient data.

In California, however, officials worked to solve that problem by creating the Patient Unified Lookup System for Emergencies, known as PULSE.

ACCESSING PATIENT DATA VIA PULSE

The service is a web application that connects existing health information exchange organizations and other data sources to be used explicitly during disaster scenarios.

“The tool relies ‘extensively’ on IHE profiles for the query for documents function. It will also be integrated with the FHIR base healthcare directory managed by Sequoia.”

Mariann Yaeger, CEO, Sequoia

Adventist Feather River Hospital

Source: Adventist Feather River health system

Robert Cothren, executive director of the California Association of Health Information Exchanges said the tool is designed to provide healthcare volunteers with electronic health information for victims and evacuees of disasters during the ongoing situation or shortly thereafter. The tool can be activated in response to a declared disaster, be it regional or statewide, provided the crisis is large enough that normal infrastructure can't deal with it.

PULSE is deployed to areas or alternative healthcare facilities where care is being delivered on an emergency basis, such as evacuation centers with some medical capabilities, field hospitals etc. Its two critical user roles are self-explanatory: search for patient records and retrieve patients' records. Then, if found, the tool allows its user to view that information. The user types in patient demographics and the system searches a large number of potential facilities to gather information on that patient.

According to Mariann Yaeger, CEO of Sequoia, the tool relies "extensively" on IHE profiles for the query for documents function. It will also be integrated with the FHIR base health-

A ribbon-cutting ceremony for the reopening of the Adventist Feather River Clinic, a milestone in the system's road to recovery following the fire.

Source: Adventist Feather River health system

care directory managed by Sequoia. It utilizes the industry standards IHE XCPD, IHE XCA, IHE XUA, IHE ATNA, HL7 FHIR, W3C XML-Dsig, W3C XML, IETF X.509 and IETF TLS.

The tool is intended to be used for injured victims that are being transported for acute care as well as minor injuries who can't get care from their usual primary care physician, as well as those displaced who need care for chronic conditions.

Most disaster operations are on paper in those alternative facilities, and so PULSE might be printing out some of that paper information and adding it to the paper records for the facility.

Developed through funding and oversight from the Office of the National Coordinator for Health IT and the California Emergency Medical Services Authority (Cal EMSA), PULSE was originally deployed in July 2017 for the Santa Rosa wildfire and again that December for the Ventura wildfires.

More recently, PULSE played a pivotal role in Butte County, where the Paradise community was ravaged by the Camp Fire. PULSE was literally the heartbeat of EMSA's operations on the ground, allowing volunteer providers to access patient information and get them the care they needed, especially medications, said Leslie Witten-Rood, program manager for

> *“It’s a new system that needs to be exercised and we are still learning some things about PULSE … we are looking at making PULSE available nationally.”*
>
> Robert Cothren, executive director of the California Association of Health Information Exchanges

California EMS Authority and part of the team sent up to Butte to deploy PULSE.

The key thing for her, and a major takeaway as far as the pivotal role the tool can play, was helping to get prescriptions when people had frantically fled from their homes with only a little bit of medication or none at all. That was one of the impactful things in the shelters and a major way that PULSE helped boost the quality of care providers in the field delivered.

One patient whose information she looked up had two more days of his insulin left. She was able to work with doctors there by showing them his records so that they could get him a supply of his much-needed prescription. She added that many people suffered major smoke inhalation and will now need treatment for asthma.

“There are patients that never had asthma before who now have asthma who will need albuterol and will have medical needs they never had before,” she said. PULSE will have that information ready when those patients need medication.

WHAT’S NEXT FOR PULSE

Like almost any technology, PULSE is still evolving, said Cothren. They are looking for ways to improve it, including dealing with connectivity issues during a disaster. Another scenario being evaluated, and one especially applicable to California, is looking at how first responders would use PULSE in a building collapse during an earthquake where large numbers of victims are coming in through first responders.

It’s clear from its deployments so far that PULSE’s potential is huge. “It’s a new system that needs to be exercised and we are still learning some things about PULSE … we are looking at making PULSE available nationally. There are many areas of the country that experience large scale disasters and need critical information on patients and PULSE was designed to work in areas outside of California and we are looking at ways we can get it working beyond that point,” Cothren said. ■

What do you think?

Could PULSE work effectively in your region during natural disasters or do you have any other tools that you’d recommend?

GET IN TOUCH
to let us know your thoughts

INTEGRATED CARE – WILL IT BE ON FHIR SOON?

Integrated medical care needs integrated healthcare IT. HL7's FHIR standard is on the verge of becoming the international benchmark for integrated care scenarios – with healthcare systems and, increasingly, software vendors embracing it worldwide.

By Philipp Grätzel von Grätz

There is no shortage of healthcare IT standards as we all know. But up until now, there has not been a universally agreed upon standard to allow mobile apps and web applications to access healthcare data or to share it easily.

THE ONC PROPOSES INTEROPERABILITY RULE THAT REQUIRES FHIR

Such a standard is desperately needed. In the US, Congress has made it mandatory for healthcare IT companies that participate in the Health IT Certification Program of the Office of the National Coordinator for Health Information Technology (ONC) to provide application programming interfaces (API) that enable accessing and exchanging healthcare data "without special effort".

In the middle of February, the ONC became more specific. It proposed a rule that, for the first time, states that the agency intends to make HL7's Fast Healthcare Interoperability Resources (FHIR) mandatory as an API standard of choice. FHIR, the National Coordinator Don Rucker wrote in a related blog post, seemed to "clearly emerge" as an API approach in the app economy.

But is "emerge" really the proper word to describe the current state of FHIR? In fact, it increasingly looks as if the critical mass has already been achieved. FHIR, it seems, is here to stay. The recent announcement of the Veteran's Administration to leverage open APIs and HL7 FHIR to expand health data access for Veterans is as much a case in point as is the fact that Apple has decided to make FHIR one of the healthcare IT standards of choice for its mobile health applications.

"We have chosen HL7 FHIR because it is modular and very practical to manage via RESTful interfaces."

Gökce Banu Laleci Erturkmen, SRDC Software Research & Development Consultancy, Turkey

TURKEY: NATIONAL INTEGRATED CARE SOLUTION WILL BE FHIR-BASED

But FHIR is on the rise not only in the US but also in Europe, and there, too, much of the FHIR-hype is about integrated care. An excellent example is Turkey, where a national integrated care solution for the management of chronic diseases is scheduled to be going live during the summer. "It is a GP-based system for which the Turkish Ministry of Health has defined criteria for the screening and monitoring of hypertension and diabetes and for cardiovascular risk assessment," said Gökce Banu Laleci Erturkmen of Ankara-based SRDC Software Research & Development Consultancy. The Disease Management solution as an integrated care system is being developed by TURKSAT, INNOVA and SRDC partnership on behalf of the Turkish Ministry of Health.

In diabetes screening, for example, the system identifies patients who are older than 40 years and who don't have a diabetes diagnosis. For these patients, the GP will get a screening reminder every three years. If diabetes is found, a care plan will be initiated by the GP, who will act as a 'Care Plan Manager'. When talking to HIMSS Insights, Erturkmen

Source: BIH/Stefan Zeitz

“Without interoperability, big data technologies and AI applications won’t be able to keep up with their promises, and precision medicine will remain no more than a vision.“

Sylvia Thun, director of eHealth and Interoperability, Berlin Institute of Health, Germany

explained that the core data management layer of the platform will be based on HL7 FHIR, and the platform will utilize an HL7 FHIR repository called onFHIR.io.

The care plan, for example, will be made accessible to other doctors – the ‘Care Plan Viewers’ – through the web-based integrated care solution, and it will be stored in HL7 FHIR Care Plan model. A patient summary, that is retrieved from the Turkish national health information management system, will also be mapped to FHIR. And clinical decision support services, implemented though FHIR-based CDS Hooks specifications, run on top of the FHIR repository to propose individualized care strategies, including goals and treatment plans, to the GP.

REASONS FOR FHIR? IT’S MODULAR AND EASY TO MANAGE.

“The Turkish Ministry of Health has a policy to use international standards in all of its projects including eNabız – the national PHR – where standard based coding systems such as ICD10 and LOINC are used. Furthermore, the national telemedicine system architecture is based on 14 different IHE integration profiles which utilize HL7 and DICOM. Hence, when we needed to design a common data model for the new chronic disease platform, and our first decision was to base it on an international standard as well,” said Erturkmen. “We have chosen HL7 FHIR because it is modular and very practical to manage via RESTful interfaces.”

HL7 has recently published the release 4 of its FHIR standards framework. Erturkmen continued: “We wanted to base our infrastructure on the latest official release, so we immediately switched to FHIR R4 once it was available. As our FHIR repository dynamically interacts with the FHIR Foundation resources, it took us no more than a single day to upgrade.”

With FHIR R4, the base platform of the standard has passed a normative ballot and can now be submitted to the American National Standards Institute (ANSI). Another important feature of FHIR R4 is that it is more mature and future

implementations of FHIR will be backward compatible from now on. This should give another boost to FHIR implementations, since institutions or health systems that decide to use FHIR don't risk non-conformance in future releases anymore. Instead, they should be able to simply upgrade to new releases.

As far as new FHIR releases are concerned, HL7 has already given a brief outlook on FHIR R5, which the organization plans to debut in the second half of 2020. Among the new features of R5 will be – according to current plans – improved data standards for epidemiology, specifications related to genomic reporting, and a better integration with financial processes. FHIR R5 should also provide access to a complete patient record, and more content will be moved to normative status.

"FHIR is the gateway to AI and machine learning."

Aashima Gupta, global head of health care and life sciences, Google Cloud

NO INTELLIGENCE WITHOUT INTEROPERABILITY

Interestingly, another push towards cloud- and mHealth-compatible interoperability standards could be the advent of artificial intelligence (AI) solutions both in the US and in Europe. "What is interfering with a true digitization of healthcare is not that we don't have proper algorithms. What is missing is international standards and interoperability. Without interoperability, big data technologies and AI applications won't be able to keep up with their promises, and precision medicine will remain no more than a vision," said German interoperability expert Sylvia Thun, director of eHealth and Interoperability at the Berlin Institute of Health (BIH).

What do you think?

Is FHIR the answer to achieving integrated care?

GET IN TOUCH
to let us know your thoughts

Thun's statement was echoed at the HIMSS Annual Conference in the US, where representatives from IBM, Google, and Microsoft said that they consider FHIR to not only be a tool for health data exchange, but also an important entrance gate for AI and machine learning applications. It was an important part of Google's healthcare strategy to teach clouds to speak the language of healthcare, specifically HL7 FHIR and DICOM, said Aashima Gupta, global head of healthcare and life sciences at Google Cloud: "FHIR is the gateway to AI and machine learning." ■

Pushing healthcare to new boundaries

All over the globe, innovative thinkers and doers are working to reform health and care through IT and technology. Get to know some of them.

AUSTRALIA

FHIR will set data free, empowering both patients and providers

FHIR is key to interoperability and better data access, says FHIR product director for HL7 International Grahame Grieve.

NETHERLANDS

Robotics creating more ethical healthcare issues

Aimee van Wynsberghe, co-founder of the Foundation for Responsible Robotics, discusses what we should do with robotics to improve life for patients and caregivers.

US

HIMSS CTIO touches on consumerization of healthcare, interoperability

Steve Wretling, Chief Technology and Innovation Officer at HIMSS, says the interoperability discussion moves beyond technology to cover policy and process.

SOUTH KOREA

Demand for healthcare IT solutions, single data platform growing

There are promising opportunities for transformation, especially in Asia and Middle East, says Hee Hwang, CIO of Seoul National University Bundang Hospital.

HIMSS TV features programming from major HIMSS events and many of the industry's thought leaders.

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WANT TO INTEGRATE CARE? LISTEN TO THE PATIENT

Integrated care and interoperability is complex as long as you think of it as something that has to be managed by experts. It becomes pretty easy once you let the patient have a say.

By Philipp Grätzel von Grätz

“The truly disruptive thing about these approaches is the reimbursement part. There is no complexity at all.’

Philipp Grätzel von Grätz, HIMSS Insights

I have recently talked about or listened to people talking about digitally integrating care. At the crux of these discussions has always been that integrating care is a complex endeavor, that crafting reimbursement schemes – outcome-based or not outcome-based – is challenging, and that it takes time and the necessary expertise to achieve the optimum results.

WHO IS REALLY PUTTING ON THE BRAKES?

This kind of talk has been going on in healthcare systems around the world for years now. The longer I listen to it, the more I get the impression that most of those very people who advocate complex reimbursement schemes for digital care scenarios are in fact the ones more interested in retaining the status quo – which they would, of course, never admit. It is one of the funny or, depending on the perspective taken, tragic aspects of the early 21st century healthcare and healthcare digitization discourse that those who consider themselves innovative and lateral thinking are often the very same people who put on the brakes when it comes to taking courageous decisions.

The good news is that times are changing. In 2018, both Sweden and France have introduced a rather ambitious change in the reimbursement of telemedicine. In both countries, patient-initiated consultations of doctors can now be both in-office or virtual. If the patient goes for a virtual consultation, they will use an app with video-conferencing, and usually end up on a telemedicine platform that connects the patient to a doctor on duty – not in some service center, but usually a doctor in private practice who dedicates part of their working time to offering teleconsultations.

SKIP COMPLEXITY. DON’T MANAGE EVERY DETAIL.

The truly disruptive thing about these approaches is the reimbursement part. There is no complexity at all. Doctors get exactly the same amount of money, no matter if they teleconference with a patient or if they see him or her in-office. And the out-of-pocket co-payment on the patient side is exactly

the same too. So in France and Sweden at least, it is at the discretion of patients and doctors to decide on their way of interacting. There is no managed care pathway, and there is no complex reimbursement scheme attached that favors one type of consultation over the other.

From a payer perspective, there is a certain risk involved for sure. It could be that the total number of consultations increase. But it is equally possible that in-office consultations reduce in correlation to teleconsultations going up. Or it might be that the total number of consultations rise, but that quality of care rises too, making it an investment that is worthwhile. All this can be analyzed and should be analyzed in those countries that have taken the bold step to resist complexity.

“All this doesn’t mean that I strive to get rid of personal consultations. But I only want to have them if there is a reason, if I get added value from them.”

Stephanie, patient advocate

It is obvious that being able to contact a doctor electronically is what patients want. The number of patient-initiated teleconsultations in Sweden has sky-rocketed once they were available. France will likely witness a similar development. So what if we listened to patients even closer? After all, patient-initiated teleconsultation is only one aspect of digitally integrated care. There is much more.

PATIENT, WHAT DO YOU WANT?
A TYPE 1 DIABETIC IS ANSWERING.

I was lucky enough to be able to attend a digital diabetes event in Berlin in February. On this occasion, I listened to one of the most convincing outlines of the future of digitally integrated care that I have ever heard. It was just a brief statement, given by a young female type 1 diabetes blogger. Unlike in the US, type 1 diabetics in Germany and in many other European countries don’t get automated insulin delivery systems reimbursed by the statutory healthcare systems at the moment.

The patient, Stephanie, told a pretty impressed audience how with a little help of the internet, she recently built a do-it-yourself closed-loop diabetes care system that, to a certain degree, decides autonomously on the amount of insulin necessary. She did so using an insulin pump, a flash glucose

monitoring system and some open source software and algorithms available online.

Stephanie built her DIY medical device completely at her own accountability, of course. She might well run into trouble with her insurance company. And there are doctors who would refuse to treat her. But she is happy and the results were fantastic. Her quality of life and sleep quality at night in particular has risen. Furthermore, her blood sugar levels are far more constant now than they have been before.

TRUE EMPOWERMENT IS ABOUT SPENDING LESS TIME ON DISEASE, NOT MORE.

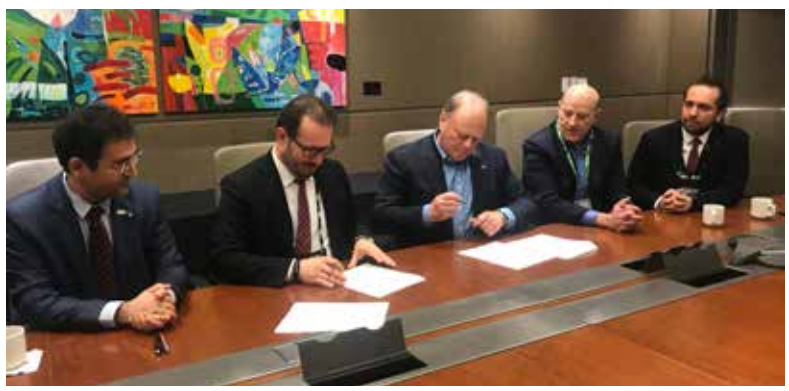
What's next? What many chronically ill patients expected from digitization, said Stephanie, was not to be motivated and empowered, with the result that, in the end, they spend even more time on their disease than before. What they really wanted was to forget about their disease. Things should run on autopilot as often as possible. In order to free the mind from disease-thinking, care steps should be automated or taken over by a healthcare system that truly places the patient at the center.

Here is what Stephanie said: "I want to visit my diabetes specialist much less often. I want to do all routine encounters by video-chat. I want to receive prescriptions digitally. I want medications and other materials sent to my doorstep. I want screening examinations to be organized automatically, and I want relevant documents to be stored automatically in my electronic patient record. All this doesn't mean that I strive to get rid of personal consultations. But I only want to have them if there is a reason, if I get added value from them." This is not complex, but very straight-forward. ■

Patient 2.0 – HIMSS Liège

Following the success of the HIMSS19 Delegations in Orlando, the HIMSS Dutch and French Communities will reconvene in Belgium on 2-3 April at HIMSS Liège to introduce the concept of Patient 2.0 and bridge the gap between their expectations and assumptions. In addition to interactive discussions, attendees can take part in a guided tour at the University Hospital of Liège. The event will incorporate the VIII eHealth Roadshow, giving a number of promising and innovative SMEs the opportunity to present their digital health solutions in a series of short pitches to a panel of hospital CIOs and more than 250 delegates.

Turkish Ministry of Health signs five-year plan with HIMSS to boost digital excellence in hospitals



Turkey has made significant progress in the digital health space with the continuous progress in HIMSS EMRAM standards and digital hospital stages in the last decade. With two EMRAM Stage 7 and 164 EMRAM Stage 6 hospitals, it showcases Europe's success to the rest of world. Hosting ministry delegations, exhibitors and visitors from more than 25 regional countries at HIMSS Eurasia EMRAM Educational Conference and Health IT Exhibition in 2018, Turkey convened a number of high level professionals across the industry. In February at HIMSS19, the Republic of Turkey Ministry of Health and HIMSS signed a 5-year collaboration agreement to continue working together on a national scale.

Launching the HIMSS Turkish Community is one of the next steps in providing digital technology integration in health service delivery, to contribute innovations at a global scale.

HIMSS introduces EMEA Partner Innovation Exchange scheme

HIMSS unveils Partner Innovation Exchange (PIE) program for the EMEA region. HIMSS has announced that it is launching an initiative to build a network of expertise and learning for the digital health community in the EMEA region.

The PIE program will bring together key stakeholders to "work towards improving healthcare through information and technology," according to HIMSS EMEA strategic partnerships project manager Loida Lleonart.

"This program is designed for non-profits, professional associations and academic organizations. The reason we launched it is to create a platform of knowledge and exchange, and to consolidate strategic synergies with our partners," Lleonart told *HIMSS Insights*.

Members will be able to collaborate on research and have access to professional development opportunities and resources from the HIMSS eLearning Center, among others. In less than two months, 16 partners have now joined the program, including Sitra, the Finnish Diabetes Association and the European Union of Private Hospitals.

#BalanceForBetter: Where women in health and technology see the future

Digital health has often been seen as the future of healthcare, but a recent Rock Health report revealed that women only make up 10.2 percent of digital health CEOs, posing questions about where women fit into this new evolution of healthcare.

For International Women's Day, which this year focused on promoting activities that work towards building a gender-balanced world through the #BalanceForBetter campaign, find out what women in the health and technology space think about what that means for them.

MERCY – Enterprise imaging platform supports ‘anytime, anywhere’ radiology

Offering access to best-of-breed technology through a PACS as Service model could bring improved efficiency, and greater care to hospitals across the US.

By John McCormack

Growth often has its awkward stages. The uncomfortable reality is not lost on leaders at Mercy in the US. The health system, which includes more than 40 acute care, managed and specialty hospitals as well as 800 physician practices and outpatient facilities in Arkansas, Kansas, Missouri and Oklahoma, was experiencing some pangs a few years ago, as it found itself with a hodgepodge of imaging technology that had come into play at various points throughout its history.

Having been an early adopter of electronic health records (EHRs) to integrate and standardize operations across Mercy’s providers and points of care, it was now time for the health system to take a similar enterprise approach to imaging.

“It’s like using Netflix to read imaging exams [for radiologists]. They’re not downloading any studies to their workstation; those studies are rendered at the server level and the workstation is used merely for display.”

Steve Bollin, regional vice president of radiology support services, Mercy

“We had nine separate PACS (picture archiving communication systems) and 13 radiologist groups. And, we only had a single long-term archive that was supporting all of that. It was a real big challenge for us,” said Larry Aubry, vice president of business partnerships for Mercy Technology Services.

With this collection of disparate technologies, radiologists were struggling to efficiently “get the right images in front of them at the right time,” Aubry noted. System lock-ups and crashes were becoming increasingly common and difficult to deal with. And, the imaging platform didn’t look as if it would be able to support innovative initiatives such as teleradiology moving forward. Perhaps most troubling, the system, as it stood, was not optimally serving patients.

“We have patients who transfer between facilities. And it was difficult to transfer images. In some instances, you could burn a CD and send it with a patient but if that didn’t happen, we were having to repeat studies,” said Steve Bollin, regional vice president of radiology support services at Mercy. These duplicate studies would then result in additional costs for the health system and additional radiation for patients, two situations the health system wanted to prevent.

ASSEMBLING THE PIECES OF THE PUZZLE

Leaders realized that Mercy needed a new enterprise imaging platform that would enable radiologists to read images “anywhere, anytime,” and support various upgrades that could enhance patient care. Yet they wanted to keep the current working model intact. “Our radiologist groups each have their own contracts with each of the hospitals they read for. We weren’t looking to change that radiologist model,” Aubry said.

While Mercy executives wanted to maintain those relationships, they still sought to better utilize radiologists across the healthcare system and help address radiologists’ burnout.

“We wanted to be able to leverage our subspecialty capabilities. We have radiologists who are trained in neuro, musculoskeletal

“With images rendered on the server side, the studies launch to the workstation up to four times faster.”

Toni Dudley, executive director, IT radiology team, Mercy Technology Services

and breast imaging – and offering those capabilities remotely through our system would enable us to get better diagnosis up-front for a wider variety of patients. By being able to offer these reading services at our smaller facilities, not just our larger facilities, patients would not need to travel to alternate sites for imaging. As a result, we could minimize delays and eliminate duplicative imaging,” Bollin remarked.

Leaders also recognized that Mercy needed to take advantage of looming innovations. “We wanted to position ourselves for the future. We knew decision support and artificial intelligence were coming – and we wanted to take advantage of these advances,” Aubry said.

To accomplish such goals, Mercy needed to move toward a new enterprise imaging platform. After reviewing options from multiple vendors, Mercy leaders and radiologists chose a variety of best of breed technologies, including the Visage Imaging enterprise imaging platform, Medicalis Workflow Orchestrator from Siemens Healthineers and Nuance’s Powerscribe 360 speech recognition and reporting.

In fact, Mercy Technology Services (MTS), the information technology arm of the health system, is not only providing the imaging platform to Mercy hospitals but it’s also offering it in a PACS as a Service model to hospitals across the country. Hospitals can choose to subscribe to the bundled services or to various needed components. The technologies are securely hosted in MTS’ cloud, making it ideal for small to mid-size hospitals and health systems looking for efficiency and cost-effectiveness.

For radiologists, “it’s like using Netflix to read imaging exams. They’re not downloading any studies to their workstation; those studies are rendered at the server level and the workstation is used merely for display. They are not storing any protected health information on there. It just quickly loads and streams the images that the radiologist needs or wants to read and the radiologist doesn’t have to worry about

Includes more than 40 acute care, managed and specialty hospitals as well as 800 physician practices and outpatient facilities in Arkansas, Kansas, Missouri and Oklahoma.

Source: Mercy Technology Services

anything else. They're not waiting on relevant past studies; all priors are at their fingertips. They're not swivel chairing from one system to the other. And they're able to manage their workload on a single workstation," Bollin said.

The Medicalis Workflow Orchestrator makes it possible to create a single worklist by integrating information from multiple EHR systems. The Workflow Orchestrator provides radiologists with a single sign-on process, empowering them to access all relevant patient information by logging onto just one application. In addition, radiologists can depend on the system to implement desired workflows based on target service levels, sub-specialty reading and many other characteristics.

As such, the Workflow Orchestrator can help diagnostic accuracy by supporting remote reading by the most appropriate radiologist, regardless of their physical location; reduces unwanted variations by normalizing, optimizing and standardizing information from multiple IT systems on a single integrated platform; and increases workforce productivity and efficiency by auto-assigning exams to the right radiologists through workload balancing capabilities.

EMPOWERING CLINICIANS TO DELIVER BETTER CARE

Perhaps best of all, the Workflow Orchestrator makes it possible to improve patient care. Overall, the health system is experiencing a shorter time to treatment because attending and referring physicians have access to study results much faster. Consider the following examples: with mammography, radiologists need to compare the current study to the prior study to see if a breast cancer is developing. Typically, radiologists would have to wait a few hours to access the prior study to make this comparison. As such, they would either wait a considerable time to confirm that the cancer classification that they are seeing is not a cancer but a normal part of the patient's anatomy or they would recommend moving forward with a biopsy – something that caregivers don't want to do and patients definitely don't want to experience, if not necessary. With stroke patients, the timeliness of getting a CT or MRI

Mercy's radiologists have decreased report turnaround time by up to 50 percent.

Source: Mercy Technology Services

study turn-around is directly tied to quality of care. Indeed, the faster a study can be read and treatment decisions can be made, the more brain tissue clinicians will be able to save.

While the Workflow Orchestrator makes relevant studies as well as information from the EHR immediately available, the other components of the imaging platform also help to improve efficiency. The new "streaming" PACS, for example, launches all present and past images for all modalities regardless of size in the blink of an eye. Voice recognition makes it possible to more quickly edit, review and produce reports. The three tools combined remove friction for busy radiologists and reduce the time to treatment.

"We monitored radiologists' workstations to see how quickly our image load time was with our previous PACS, compared to our current PACS, and it was cut in half. We are talking seconds here, but multiplied over thousands of studies that's a huge bonus. This speed comes largely from not having the local work station churn with all the studies downloaded to it. With images rendered on the server side, the studies launch to the workstation up to four times faster," said Toni Dudley, executive director, IT radiology team, Mercy Technology Services. With all of the components working together, Mercy's radiologists have decreased report turnaround time by up to 50 percent.

In the final analysis, the new enterprise imaging system is eliminating much of the discomfort that radiologists formerly experienced. "Time lags. Missing images. Multiple systems. Those are all things that cause distractions and hurt radiologists' efficiency when they need to be focusing on patients. Now, radiologists have all the pieces of the puzzle to help them really make a better diagnosis. And that simply leads to improved patient care," Bollin concluded. ■

"Now, radiologists have all the pieces of the puzzle to help them really make a better diagnosis. And, that simply leads to improved patient care."

Steve Bollin, regional vice president of radiology support services at Mercy

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HIMSS DM: Actionable Insights to Digital Maturity

14-15 May 2019, Manchester, UK

In a joint collaboration, HIMSS and the Salford Royal NHS Foundation Trust have designed a Hospital Tour on the ward and in the Salford Digital Experience Center with a first-hand look at their digital transformation, their Allscripts EMR, followed by a Networking Dinner to celebrate the launch of HIMSS DM. On the following day, we will host a full educational summit to explore all the key learnings from Salford and around the world, interactive sessions on innovation and actionable insights to utilise in the real-world.

MORE INFORMATION

HIMSS & Health 2.0 European Conference

11-13 June 2019, Helsinki, Finland

Mark the dates in your calendar. Following an undeniably successful collocated event in May 2018, HIMSS and Health 2.0 continue to strengthen their ties and have chosen one of the most innovative countries worldwide to host the 2019 conference. The HIMSS & Health 2.0 European Conference will be held on 11–13 June 2019 in Helsinki, Finland.

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Swiss eHealth Summit

12 September 2019, Bern, Switzerland

The Swiss eHealth Summit 2019 takes a look at the time after the introduction of the Electronic Patient Dossier (EPD) and presents innovations, ideas and projects that will shape the future of Swiss healthcare. The decision makers and executives in Swiss healthcare will meet in the Kursaal Bern, on 12 September 2019.

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CONTRIBUTORS

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Beth Sanbourn (US) comes to healthcare journalism and HIMSS Media from the world of TV reporting where she spent four years before becoming the managing editor of *Healthcare Finance News* in November 2015. She has reported on everything from revenue cycle to social determinants of health and hospital disaster preparedness.

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7.5: MAY 2019
DIGITAL TRANSFORMATION

Healthcare providers need to embrace digitization and automation in order to stay competitive and meet the increasing demands made on them by regulators, payers, and not least demographic change. What are the big digitization and automation topics that hospitals will have to address in the years to come? And who is leading the pack in making the future a reality today? An issue around security, logistics and procurement, clinical pathways, and the internet of medical things.

7.6: JUNE 2019
PATIENT EMPOWERMENT

For practical reasons, for legal reasons, and for privacy reasons, the patient, and not an individual healthcare provider, is the data hub in any digitally integrated healthcare ecosystem. But patient centricity and patient empowerment don't simply come into being. Innovators, health authorities, and health and social care providers need to adopt a new mindset. An issue on personal health records, data ownership, and patient rights.

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