



CANADIAN Healthcare Technology

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TranQool connects patients and mental health therapists by using secure videoconferencing. The patient-driven system gives persons



seeking help more options when it comes to therapists and appointment times.

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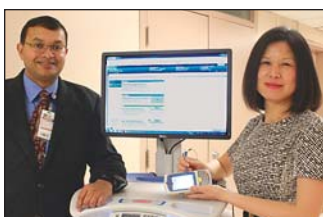
Canadians pioneer IoT

Created in Hamilton, Ont., and now transplanted to Vancouver, iUGO Health is making inroads in the United States with a system that monitors wearables, and uses voice technology.

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Nurse-led med management

North York General Hospital has pioneered Closed Loop Medication Management as a way of reducing adverse drug events. The project has been a great success, with dra-



matic improvements being registered. A key factor was involving a wide variety of clinicians and stakeholders, especially nurses.

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PHOTO: THE HOSPITAL FOR SICK CHILDREN, TORONTO

3D printing unfolds in hospitals and universities

Clinicians at the Hospital for Sick Children, and researchers at the University of Toronto, have been developing 3D printing technology for medical applications. For its part, Sick Kids has become a world leader in producing 3D models of pediatric hearts, enabling surgeons to see unusual and unexpected structures during practice runs -- before they conduct actual operations. **SEE STORY ON PAGE 16.**

‘Doctor in your pocket’ launches in Ontario

BY JERRY ZEIDENBERG

TORONTO – Trouble getting a quick appointment with your GP? Tired of waiting two hours at a walk-in clinic to see a doctor?

If you're an Ontario resident, you can now sign on with Akira, a mobile telehealth service that enables you to reach a board-certified physician within minutes. You can text-chat for many problems, but if needed, the doctor can also turn on the video so you can see each other – all on your smartphone.

“A video call can be done on the spur of the moment or at a pre-arranged time,” said Dustin Walper, who launched Akira in May with co-founder Dr. Taha Bandukwala, a radiology resident at the University of

Toronto. Walper is an entrepreneur and has raised \$500,000 in start-up capital from investors who include Tobias Lütke, one of the founders of Shopify.

Many of the problems that patients typically see a doctor for can be treated using text or video, Walper said. These include

You can text for many problems, but if needed, you can also videoconference with the doctor.

anxiety or depression, urinary tract infections (UTIs), rashes, and the flu.

Doctors at Akira can write prescriptions and send them electronically to the patients' pharmacies. The medications can also be delivered, if desired, as Akira has an arrange-

ment with PopRx for free, same-day delivery of meds to homes and offices.

Moreover, Akira's physicians can provide patients with requisitions for lab tests, and they will provide quick results. “We get the results here, and then we contact the patients,” said Walper. “We've had next-day follow-ups.”

Notes about encounters, prescriptions and lab tests can be sent electronically or by fax to the patient's regular physician, so there is a complete record with the family doctor.

Walper sees Akira as a supplementary service and recommends that all patients should have a clinic-based GP as their main physician – for in-depth, in-person exams and to ensure their records are all kept in a centralized place.

Akira, however, can fill in the gaps when

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Telehealth service enables you to reach a physician within minutes

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it's hard to get an appointment or inconvenient to leave the home or office.

The company bills itself as the 'doctor in your pocket', as you can contact a physician on your smartphone within minutes, just by tapping the app.

Akira is a privately run service that's available for \$9.99 per month – with unlimited access to a physician. Six doctors and two nurse practitioners are currently working with Akira; all of them are employed in family practices three or four days a week, but they dedicate one or two days a week to Akira, where they interact with patients via using chat and videoconferencing.

The clinicians are paid by the day by Akira. This model is allowed under the Canada Health Act and OHIP's regulations, Walper said.

Records created by physicians are all encrypted and the data is stored in Canada. Patients are able to retrieve copies of their own records – to show other physicians or for their own purposes.

Chat and video visits with doctors have already caught on in the United

States and in many European countries. In the U.S., hospital and clinic giant Kaiser Permanente is delivering a large portion of its primary care this way, and many pharmacy chains have allied with telemedicine companies to offer access to online physicians. The cost is typically US\$50 per video visit.

By contrast, Akira is more like the Netflix of medicine, charging patients \$9.99 per month and offering unlimited access to clinicians.

"\$50 a pop [in the U.S.] is a lot of money, and it often acts as a disincentive to see a doctor," said Walper. "People are avoiding visits to save money."

Akira's patients can contact its doctors continuously, until their problems are resolved.

The company launched after running a three-month pilot, with 2,000 patients. During this time, the patients had 750 encounters with the online doctors.

A good deal was learned during the test. "Most people seem to prefer texting, especially when they're at work," commented Walper, who explained that people at work don't want to be overheard discussing

problems with a doctor. "And they don't want to be seen taking off their shirts, to show a rash, when they're in their glassed-in offices."

About 25 percent of the cases involved dermatology, something that can be treated using telemedicine. Indeed, the still cameras and video used today in smart-

Akira is like the Netflix of medicine, charging patients \$9.99 per month and offering unlimited access to doctors.

phones are more than adequate for capturing images of a rash or lesion.

At his office, Walper demonstrated how these images can be enlarged by a physician to get a close-up view.

He also demoed the sign-up procedure for Akira. After downloading the app from the iTunes store or Google Play, patients go through a short registration and medical history using an online Q&A. This includes listing their medications, allergies, illnesses and hospitalizations. They also

provide Akira with a photo of themselves, for identification purposes, which is part of the app.

The patient then goes into a chat with a doctor; if the doctor is busy, a chatbot comes up that can begin taking notes about the problem at hand.

If the doctor is really tied up, he or she can alert the patients and let them know when they will be available – say, in ten or twenty minutes.

After the encounter, the patient is asked to rate the doctor and the online experience on a scale of one to five. In the beta test, Walper said, almost all of the patients gave at least a 4.5.

One of the physicians working with Akira is Dr. Paul Frydrych, a GP who also practices family medicine at the Humber River Family Health Team, in Toronto. Dr. Frydrych recently completed a residency in the United States, and has a good deal of experience with electronic medical records and telemedicine.

He gives Akira high marks for the quality of its system. "It's the first I've seen that uses Open Notes," said Dr. Frydrych, referring to a leading-edge U.S. system that gives patients secure access to the clinical notes that doctors have made about encounters with them.

By providing patients with these notes, they're better able to remember what was discussed during the encounter, and can follow through with instructions much more accurately.

"We believe that patients are more engaged and motivated when they have access to their records," said Walper. "It helps them follow through with their medications and care plans."

It also allows them to share information with other members of their care team, meaning that everyone is on the same page.

A team of software developers works at Akira's downtown Toronto office on enhancing the system. Already, it contains an extensive electronic record, including SOAP notes, along with its video and chat capabilities.

"We're following all of the privacy and medical guidelines," said Walper. "But we can move fast to test new things."

Currently, the Akira solution is available only in Ontario, but Walper says the plan is to soon expand to British Columbia and Alberta.

In Canada, medical services are delivered on a provincial basis, and the physicians providing care in BC and Alberta through Akira will need to be provincially licensed. Eventually, he hopes to have the solution available across the whole country.

"We'd like to see everyone in Canada using a service like this."

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Online mental health solution enables individuals to find therapists

BY JERRY ZEIDENBERG

TORONTO – When a group of over-worked and highly stressed engineers needed to see therapists, they found it was virtually impossible to get an appointment.

Unfortunately, the clinicians weren't available during the hours when the busy engineers could spare the time.

The solution?

Being engineers, they built a web-based therapy and counseling system called TranQool.

It works by connecting everyday people with therapists via secure videoconferencing – all of the video and text is encrypted. The participants can see each other on their screens, and talk for 45 minutes or more. But the client can remain in his or her home or office – there's no need to trek to the clinician's office.

Launched in early 2016, the system already has 18 therapists conducting sessions and another 60 in the pipeline, says co-founder and business development manager Saeed Zeinali.

Zeinali was one of those harried engineers who needed a helping hand. He was working in the oil and gas industry, flying constantly between Alberta and Ontario and working under intense pressure.

He needed someone to talk to, but couldn't seem to get an appointment.

Zeinali and a few colleagues realized that others must have the same dilemma. Indeed, the solution is now used by more than 50 individuals, and the number is steadily growing.

"I believe digital health is going to change the way care is delivered, and mental health might be the best place to start," says Zeinali. "When it comes to mental health, a lot of the therapy is done through talking.

"And you don't always need to see a therapist in person for that. You can do it using video."

He demonstrated the TranQool system at the recent Ontario Centres of Excellence (OCE) Discovery conference, which was held in Toronto in May.

He noted the solution specializes in Cognitive Behaviour Therapy (CBT), which has become one of the major forms of psychological assessment and treatment. "CBT is an evidence-based therapy that works as effectively over video as in person for the set of problems that we address.

Zeinali points out that TranQool is not being used for more severe forms of psychological problems, such as bipolar conditions or schizophrenia. "TranQool is more on the side of prevention than intervention," he says.

It is effectively used for conditions like depression, social anxiety and eating disorders. Currently, TranQool is addressing nine different problems.

The therapists on board are all registered, masters-level social workers or clinical psychological associates. They're not physicians, though, and they can't prescribe medications.

TranQool takes pains to screen the therapists, checking their resumes and conducting phone and video interviews. Around 40 percent of applicants have passed the stringent requirements, Zeinali said.

At the Discovery conference, Zeinali demonstrated how a person would sign-on to the system.

To start, you need only enter an email and password. You then indicate which problem you need help with by using an easy-to-navigate menu screen. "We're lucky to have been connected with OCAD," said Zeinali, referring to the Ontario College of Art and Design. "Being around them



Babak Shahabi, Product Lead; Chakameh Shafii, CEO; Saeed Zeinali, Business Development lead, at TranQool.

helped us to have a better design mindset."

The system then suggests three different therapists from whom the user can choose, based on the user's need and preferences. TranQool shows you their pictures and provides information about their backgrounds and the languages they speak.

Once you select a therapist, you can then see their schedules – when they're busy and when you can book an appointment.

As a telehealth application, clinicians and patients can find appointment times that are mutually agreeable – and they can conduct the sessions using videoconferencing that's available on any computer, right from the client's home or office.

The cost of an appointment is \$80 for 45 minutes. "That's around half of what our own therapists charge for their in-person sessions," says Zeinali. He notes the

service is reimbursable, and that insurance companies have agreed to reimburse clients when they use TranQool.

He said the therapists like the system because it helps them fill up empty spots in their schedules and puts them in the frontier of the movement towards technology use.

TranQool is targeting people in the 18-44 age group, many of whom are students or people who are just starting their careers. Zeinali cites a PwC study that found 72 percent of people in this demographic would rather see a therapist using online video.

The company is publicizing the service at university and college campuses, where students are often stressed but can't find a therapist. Physicians like the service, too, says Zeinali. "Doctors want to know where to direct their patients, where therapy is available at a reasonable cost."

InnoCare offers EMR plus modular business services

BY ROSIE LOMBARDI

InnoCare Healthcare was recently launched in Canada to offer a novel combination of EMR software and administrative services to rehabilitation and medical clinics. The Hamilton-based company is a spin-off from PT Health, one of the largest national rehabilitation companies in Canada, which spent years perfecting its EMR software and business model.

"InnoCare is actually EMR software plus business process outsourcing for all backend administration, like call centres for reception, payroll, HR, and so on," says Heather Shantora, CEO of InnoCare.

"Now that it's an independent company, InnoCare provides these services to any independent clinic, and not necessarily rehab or physiotherapy clinics. Any kind of healthcare clinic – medical, dental, midwifery – can use our services."

At present, there are about 300 clinics operating in seven Canadian provinces that use the InnoCare EMR software component, and another 250

that use InnoCare's business process outsourcing services.

Shantora points out that InnoCare is flexible enough to allow clinics to pick and choose whatever combination of software and services they need. "It's modular. If you only want online booking and call center services, for example, we would tailor a package for that."

On the software side, InnoCare's EMR component has been designed specifically for rehab clinics – but could be used by any type of clinic that needs basic patient record-keeping and other generic features typically found in most EMR systems: charting, billing, online booking, scheduling, reporting, and so on.

However, InnoCare is not attempting to compete with the mainstream EMR systems most physicians use, explains Shantora. "We're not trying to compete in that space. However, there are a lot of surgeons, in particular, orthopods, who practice at physiotherapy and rehab clinics, so it would be appropriate for them to join our EMR."

InnoCare has unique features not

found in other EMR systems designed specifically for allied health, says Shantora.

"In our sector, you may need to bill several entities for services: OHIP, the employer's insurance company, a private insurance carrier, and out-of-pocket. We



Heather Shantora

have a billing integration feature that can do all that with one click to process the claim." The feature also tracks the insurance coverage offered by various company plans, she adds. "If, for example, the patient has an employee health benefit, the system would tell us right away if it's a 20 percent co-pay, and whether it is approved. InnoCare is actually the only rehab EMR in Canada that does that."

Shantora notes this is a major benefit for rehab clinics. "At the end of a therapy session, billing typically involves a 15-

minute phone call to insurance carriers, and the patient has to hang around until it's all sorted out. We offer a much better experience."

Beyond software, InnoCare also offers a wide variety of outsourced business processes in another business line called InnoCare Assist. Small clinics that can't afford receptionists, bookkeepers or other administrative support staff can avail themselves of these services to manage their practices.

"We have a centralized call centre, billing department, payroll services and other business processes that independent clinics would have to do themselves. We have so many clinics in our InnoCare system that it ends up being much cheaper than if everyone did it themselves."

This aggregate power also brings another huge benefit to clinics: the ability to get group insurance for all the clinic's employees.

"It's extremely expensive to get employee health benefits. But we've leveraged the group buying power of all our

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After winning Canadian hackathon, iUGO scores success in the U.S.

BY ROSEMARY MACVICAR-ELLIOTT

NextGen Partners of San Antonio, Tex., recently signed a US\$1.22 million contract with Reliq Health Technologies Inc. of Vancouver for professional services and a limited license to Reliq's proprietary iUGO Health (formerly CareKit Health) platform. The deal covers the development of a consumer-focused mobile health app, Mindful Health, for San Antonio residents.

iUGO was designed at the e-Health Conference hackathon a year ago, in Toronto, to give providers and families real-time access to patient data collected in the home. The idea is to support earlier intervention and reduce emergency room visits and hospital readmissions.

Moseda Technologies, later renamed Reliq Health Technologies Inc., bought iUGO for \$2 million in shares and performance warrants in February, only eight months after the hackathon.

Reliq is a publicly traded company focused on developing innovative mobile health and telemedicine solutions for community-based healthcare.

"It's been quite an experience since the sale. It's been very exciting," said Leo Godreault, the Hamilton, Ont. RN who founded iUGO, and is now Reliq's Vice President, Products. iUGO collects patient data via wearables, sensors and a proprietary voice technology hub.

"Our virtual care platform (iUGO) uses a high-tech, low-touch approach to provide quality healthcare in the home while reducing the cost of care delivery," said Lisa Crossley, Reliq's CEO. "Working in conjunction with NextGen Partners, we will be able to leverage our existing platform to



Leo Godreault and Giancarlo De Lio's Reliq Health, collects data via wearables, sensors and voice tech.

create a customized mobile health app that will allow the residents of San Antonio to proactively manage their own health."

Under the terms of the agreement with NextGen, Reliq will receive an upfront payment of US\$450,000.

iUGO pilots: The company is also moving ahead with iUGO through pilots, expected to launch late this summer, with congestive heart failure (CHF) patients from Sacred Heart Health in Florida and post-surgical patients from The Feldman Institute, an interventional pain management clinic in Louisiana. Patients involved in the pilots will be outfitted with iUGO when they're discharged from hospital.

Leo said iUGO offers the advantage of automatically collecting biometric data for patients, via smart devices and sensors, rather than patients having to input it.

A wearable, such as a bracelet, will alert the patient about times to carry out tasks like taking blood pressure and temperature and being weighed. If the patient doesn't respond to these prompts, the smart devices, like a smart scale, in the iUGO system, will issue reminders when it senses the patient is nearby. "The idea is to work within a person's life rather than taking them out of their environment."

The iUGO team continues to be based in Hamilton, at the McMaster Innovation Park.

Hackathon roots: Leo said the platform probably wouldn't have happened without the e-Health Conference hackathon, where the idea for iUGO originated. Leo and his team worked on the platform throughout the eight-week development hackathon period and benefitted from input from

Ontario Telemedicine's Network (OTN's) Dave Greenwood, a hackathon mentor, who helped them shape the prototype at event meet-ups.

At the conference, the team and their platform benefitted in several ways. "The feedback we got from conference attendees reaffirmed that we were doing something that was needed," said Leo. "We heard comments like, 'Whoa, why isn't this already a thing?'"

As part of the hackathon, after pitch night, hackathon mentors and digital health experts meet with participating teams to offer feedback and suggest ways to improve their prototypes.

Then, the teams spend the next 24 hours doing fine-tuning on the trade show floor. Leo's team also took away input from industry leaders, such as a suggestion to incorporate a feature to assist with monitoring patients who wander, for future consideration.

The conference trade show was another plus. "The trade show gave us insight as to where we would fit in and how we could place ourselves among vendors," said Leo. "We could see a gap that our platform could fill and go for it." The platform won two hackathon awards.

Leo said good timing and relationship-building have been key to iUGO's success to date. "We're definitely hitting a nerve with most people we've talked to and we've built valuable relationships early."

For more information about the e-Health 2016 Conference hackathon, visit www.e-healthconference.com.

Rosemary MacVicar-Elliott is a communications manager with COACH: Canada's Health Informatics Association.

Reacts improves ultrasound training via telehealth platform

BY NEIL ZEIDENBERG

Many physicians looking to acquire practical ultrasound training face the challenge of finding competent mentors, and enough cases from which to learn. For some, it means taking time off work and away from family to travel and participate in seminars or workshops.

This doesn't guarantee competency, especially if upon return to work there are no cases to practice, and no mentor to provide feedback. What if you could practice your ultrasound techniques while staying put, and have a quality mentor available – remotely?

"The Reacts platform allows experts and trainees from medical and non-medical disciplines to interact live or offline for remote assistance, training, supervision or communication," said Dr. Yanick Beaulieu, cardiologist-intensivist, president and CEO of Innovative Imaging Technologies Inc. (www.iitreactions.com).

Reacts (Remote-Education-Augmented-Communication-Training-Supervision) is a secured, integrated col-

laborative platform that's ideal for both medical education and clinical uses. With its live video streaming and multi-media tools, it allows people to communicate and interact, teach and discuss collaboratively – all from remote locations.

"It has interactive features, and the real-time video feed from any ultrasound machine can be connected to Reacts (via the computer's USB port) using off-the-shelf converters.

You can also use images and video clips to show normal and abnormal cases. The goal is to combine all the multi-media in order to provide richer live or asynchronous training," said Dr. Beaulieu.

Even when remote supervision is unavailable, users can sit at the patient bedside, connect to Reacts, plug in a webcam, describe what they're doing, save and send it via store-and-forward mode to the instructor to analyze later.

"Learners need competent mentors, and continuous interactive education to maintain practical skills and knowledge of bedside ultrasound. Their work needs to be reported, corrected and optimally

supervised to develop adequate experience from each procedure performed," said Dr. Beaulieu.

In April, Dr. Jason Waechter, an intensivist-anesthesiologist, Clinical Associate Professor at the University of Calgary and founder of TeachingMedicine.com, provided a six-hour bedside ultrasound course for critical care physicians at Foothills Medical Centre in Calgary. Most of the course was dedicated to

Dr. Beaulieu helped with the training of critical care physicians in Calgary from his office in Montreal.

hands-on scanning, allowing participants to practice their echocardiography image acquisition skills.

"It was a one-day course with a focus on how to obtain cardiac ultrasound images," said Dr. Waechter. "There were six instructors, 11 students and 11 standardized patients – one for each station."

One of the stations was supervised remotely by Dr. Beaulieu from his office at

Sacré-Coeur hospital in Montreal, by way of the Reacts application. He provided remote one-to-one supervision and feedback to the trainees who rotated through that station.

With a webcam directed on the torso of a model and the video feed of the ultrasound machine connected to Reacts (through the USB port of the computer), he interacted with participants by indicating structures with virtual pointers, superimposed pictures onto live scans to explain cardiac anatomy, and gave instructive points about normal/abnormal cases by comparing video clips with live scan images.

Dr. Waechter believes the learning experience was equivalent to having a live instructor. "If you had a live instructor, they could physically hold your hand with the probe and move it. Being remote imposes limitations, but Reacts application is versatile enough to overcome the limitations of being a remote instructor. It was 'as good' as having him there."

And it's definitely superior to practicing alone without feedback. "We chose Reacts because it simulates a 'live' bedside instructor," said Dr. Waechter.

Evident EHR powers hospital's rise to HIMSS Level 6 and Meaningful Use 2

BY ROSIE LOMBARDI

Cullman Regional Medical Center, a 145-bed medical center in North Alabama, has been a steadfast user of Evident's Thrive EHR for more than a decade. The Thrive system was implemented back in 2004, when Cullman broke away from a larger hospital network and needed a local EHR system of its own.

Thrive's performance has been strong over the years, says Cullman's CIO, Jonathan Etheridge. "In fact, one of the first major decisions that I had to make when I assumed my role last year was whether or not we were going to take advantage of Meaningful Use funding to replace our system. After we did due diligence on a couple of other systems, we concluded it was best to stay with Evident."

Several factors played into the decision to stay with Thrive, says Etheridge. "Thrive still meets our needs. We had no difficulty in attesting for Meaningful Use stage 1 in the first year, while other health systems needed two or three years to do that."

Thrive's developers had the foresight to include features in 2004 that the hospital knew it would need for the long haul, he says. "My predecessors at Cullman were looking for a system that had advanced features. Evident already had many modules like CPOE and nursing documentation that are considered standard today under Meaningful Use but were pretty visionary at the time because they were not offered by many competing products."

Other major decision factors: The system cost about 20 percent less than similar systems at the time, and Evident promised and delivered on a five-month implementation schedule, compared with the typical two year time-frame required by other vendors.

"The up-front support from Evident made a real difference in meeting the five-month go-live schedule," says Etheridge. "Evident was exceptionally helpful from the initial walkthrough to getting equipment ordered and set up. There was a solid plan in place for meeting the deadlines and ensuring milestones were achieved."

Evident and Cullman have worked closely together over the past 11 years, and this has allowed the hospital to play a role in evolving the system. Says Etheridge: "Because of our strong relationship, we're able to exercise some influence and have some say in how the system is developed."

The integrated nature of the Thrive system has also been an advantage. "It's superior to others that are essentially a bunch of clinical modules cobbled together in an attempt to provide care across the spectrum."

Thrive's unified interface design and optimized workflows for every user role helps when it comes to training. "We're able to get new nursing staff up and running on the system with a minimal amount of formal training," says Etheridge. "We only offer eight hours of training with the nurse educator, and then we trust daily on-the-job training to take over from there. At most other hospitals, new nurses need a week or two of dedicated classroom time."

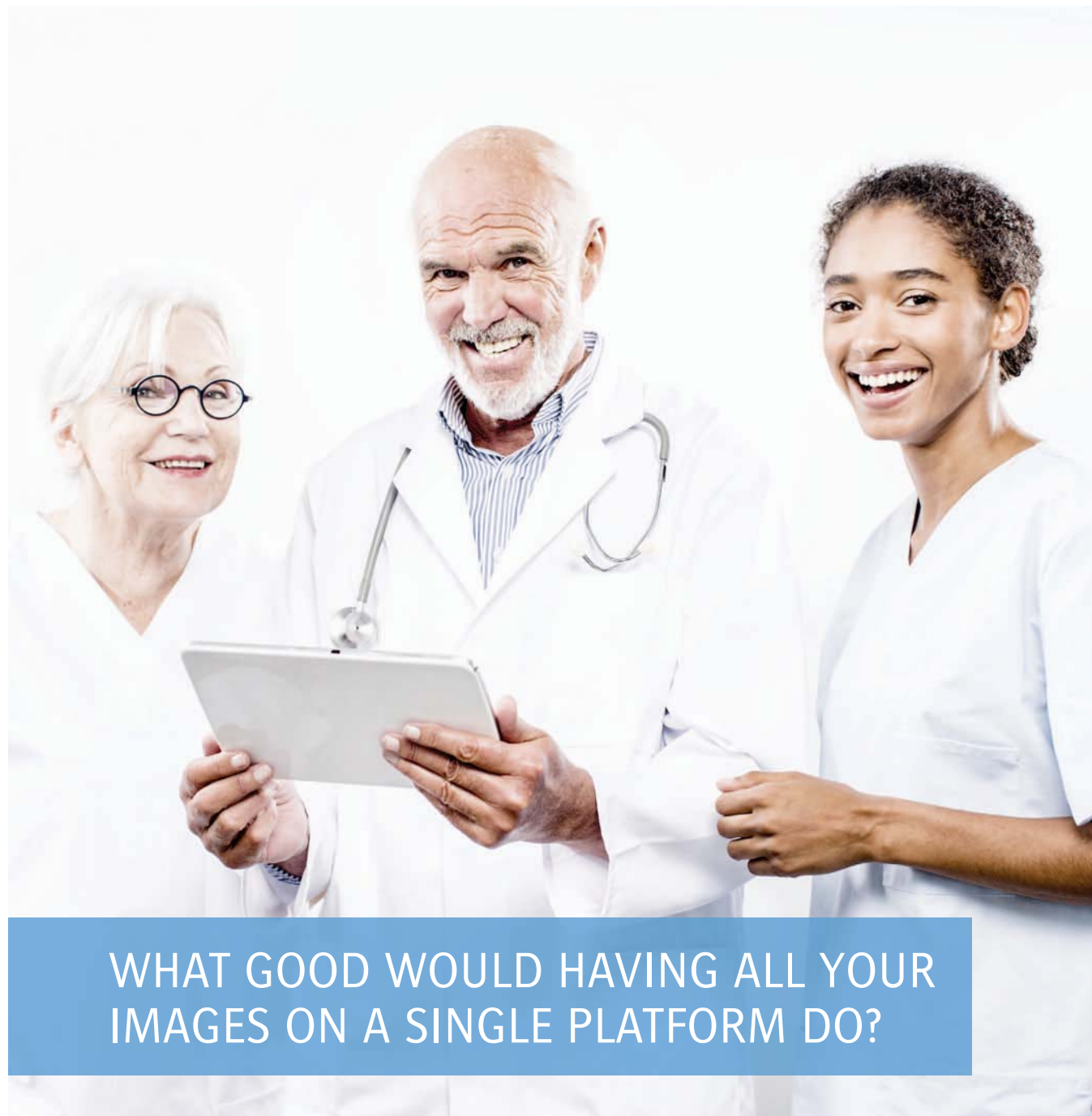
Thrive can be customized to meet the needs of various users. The nursing module is a case in point.

"The ability to create e-forms and customized flow charts means we can tailor the system precisely for each unit," says Etheridge. "No information or buttons are presented to the nursing users that aren't consequential to doing their jobs. It makes it easy to train them because what's on-

screen is exactly what they need to treat and chart the patient."

In addition to the Thrive EHR, Cullman uses add-on modules developed in-house and some specialty modules provided by other vendors. Integrating these with the core Thrive system has been straight-for-

ward. "We've just gone live on a new ED information system and we had no problems integrating it," says Etheridge. "We've regretted needing to increase the complexity of our interface environment but there were no technical challenges getting the two systems to talk to one another."



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Australia's Telstra, Mach7 partner to build complete view of patient

BY REUVEN SORAYA

Imagine a beautiful blue sky Saturday in your local township. Parents cheer on a fast-paced and physical youth lacrosse tournament. Bumps and bruises are part of the game, but today, 14-year-

old Connor sustains an uncommon injury – an injury that will require significant care coordination on and off the field.

Connor has a yet undetected congenital kidney defect that reveals itself when a high velocity lacrosse ball hits his lower back. Connor falls to the ground writhing

in pain – it becomes apparent to the coaches that this is no ordinary injury.

Connor is rushed to the local community hospital where his medical history is taken and he is examined. Tests including a CT scan are ordered. Connor and his mother wait for answers. It's Saturday, mak-

ing it more challenging for the clinical team to locate a reading radiologist with the necessary expertise to review the complex case. Delays mount as teams struggle to get Connor's images into the right hands.

The images reveal that the focused impact of the ball caused severe damage to Connor's kidney and ureter. The local hospital is not equipped to handle the necessary surgery. Connor's CT scan images are copied to a CD and Connor, his mother and the CD are transported to the closest trauma centre, 50 miles away.

Treatment delays mount: When Connor arrives at the trauma center, doctors are unable to access the diagnostic images stored on the CD that are vital to Connor's timely treatment. Whether this failure is due to human error or system incompatibility, it doesn't matter, time is critical. Connor must have the CT scan performed again – adding time and expense that should have been completely avoidable.

Despite the missing images and additional time added to his treatment plan, Connor's story ends well. His emergency surgery is a success and he is even able to join his classmates for his 8th grade graduation ceremony just a week later.

Solving a common healthcare problem: Connor's story is true, and is all too common. Healthcare teams struggle to manage and share patient records across facilities, regions and sadly, even across departments in the same facility. Getting the correct records to the correct clinical and diagnostic experts at the right time challenges nearly every healthcare organization worldwide. It is estimated that one in five hospital admissions in the US, one in six hospital admissions in Australia and one in 12 hospital admissions in Canada requires duplicate diagnostic tests because health professionals have no access to previous test results. Duplicate exams are costly, time consuming, and can expose patients to unnecessary radiation and treatment delays.

Partnering to bring the patient into focus across clinical environments: In Australia, Telstra Health, a division of Telstra, Australia's largest telecommunications and information services company, is tackling the problem of image accessibility for reading radiologists, clinicians and patients. Telstra Health expanded their network services offering to support their mission of delivering connected healthcare for everyone. The new solution is changing the way radiology and imaging is delivered across Australia – increasing access and convenience for both patients and providers.

Deploying a hybrid architecture: The solution utilizes a hybrid architecture which delivers the benefits of both a cloud-based and on-site solution. The service, managed and hosted by Telstra, relieves imaging facilities from setting up private clouds and elaborate on-site hardware and software infrastructures. Costs are reduced and infrastructure upgrades are avoided. Imaging procedures are transmitted and shared using Telstra connectivity and the power of Mach7 Enterprise Imaging Platform.

This powerful Platform, consisting of Mach7's Communication Workflow Engine and Vendor Neutral Archive (VNA) with built in XDS registry and repository,

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eHealth Saskatchewan streamlines radiology with province-wide RIS, PACS

BY DIANNE DANIEL

Medical imaging workflow throughout Saskatchewan is moving along faster, safer and more efficiently following the successful implementation of a province-wide electronic strategy.

More than 95 percent of the province's public medical imaging sites, spread across 12 separate health regions, are now using a unified Radiology Information System (RIS), and a consolidated Picture Archiving and Communication System (PACS).

The strategy was first laid out at the start of the new millennium, as part of the integrated electronic health record (EHR) initiative following the Canada Health Infoway blueprint. Beginning in 2007, the province standardized the Cerner Millennium RIS and Philips IntelliSpace PACS, and Saskatchewan has now rolled out implementations at the majority of publicly-owned medical-imaging facilities.

"By leveraging a province-wide approach, Saskatchewan has made best use of precious resources and funding to deliver improved diagnostic imaging tools to clinicians, regardless of location," said Andrew Ferlejowski, Director, Western Canada for Cerner. "Ultimately, access to tools and clinical information will mean improved outcomes for patients across Saskatchewan."

Paul Maindonald, Manager of the Medical Imaging Program at eHealth Saskatchewan (eHealth) estimates that as many as 770,000 studies per year are currently handled by the standardized RIS and PACS solutions for the public sector. eHealth has also begun to integrate studies from community based providers into the provincial repositories, estimating growth to more than 1.2 million, once community-based providers are also brought on-line.

A provincial repository allows faster access to medical images and reports, resulting in quality improvements, as clinicians can make quicker decisions about care plans and patients are not left waiting. These improvements benefit both the patient and the provider.

Prior to implementing a province-wide RIS and PACS, each region had its own medical imaging workflow. Most relied on modality-specific software, such as X-ray, MRI, CT scan, or ultrasound. And, if radiologists and clinicians required access to images from another region, they would send for a CD – a process that could lead to lost disks or inability to read files.

The new approach with centralized repositories is a lot more efficient. When a patient registers for a diagnostic imaging exam, a message is sent to the RIS, which then issues an order for scheduling. Once the exam is complete, images are sent to the PACS where they are accessed by radiologists for reporting purposes.

The final report and images are stored in the repository, which are distributed to ordering providers, as well as made available to clinicians through the Provincial Electronic Health Record Viewer (eHR Viewer).

Another exciting advancement for healthcare in Saskatchewan is the Citizen Health Information Portal or CHIP – a new pilot program launched in February 2016, supported by Canada Health Infoway. CHIP

enables more than 1,000 participants to take a more active role in their own health, by giving them private access to their personal health care information. Participants will have access to CHIP until the pilot ends in August 2016. If CHIP, or a similar program, is made available to all Saskatchewan resi-

dents in the future, the program would include added features, such as giving residents access to their Radiology reports.

Maindonald explained that a great deal of effort goes into ensuring accuracy, as well as compliance with the province's privacy legislation.

"Privacy and Security is a core component of all eHealth initiatives," said Maindonald. In order to move forward with centralized repositories, a Privacy Impact Assessment (PIA) was completed to ensure the system capabilities were clearly understood and auditing processes were established."

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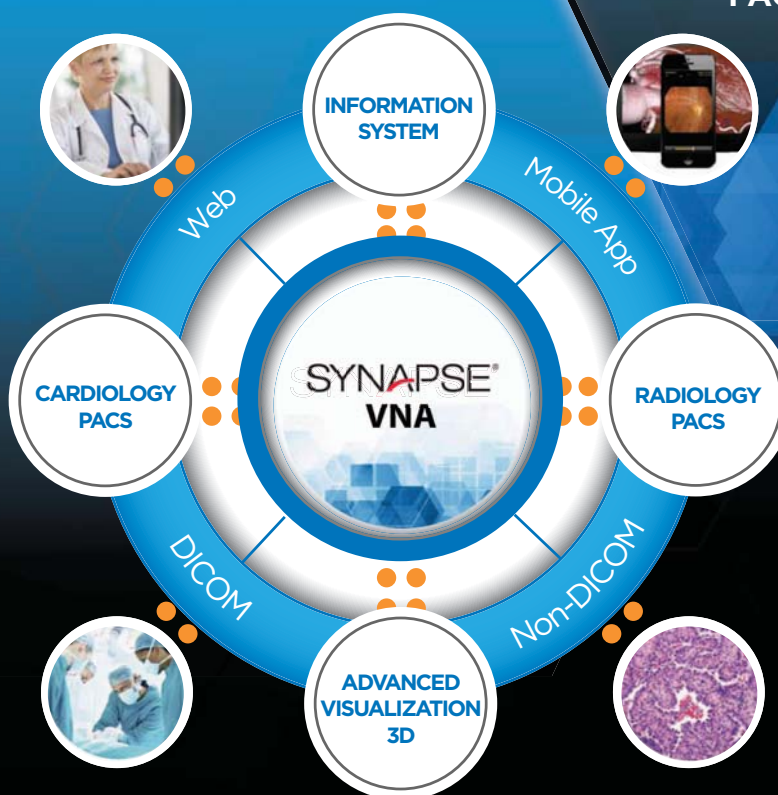
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Object Store delivers scalable, secure and mobile access for health data

There is an emerging trend in data storage within healthcare environments. That trend is the need for more scalable and extensible storage solutions that offer high degrees of security and availability at lower cost than traditional storage solutions.

At the same time, there is a drive to

tear down the existing silos of data from across departments to allow secure access to that data from many types of platforms and places. Coupled with this is the increasing needs of a mobile workforce and the ever-changing world of application software providers.

An Object Store is a solution that helps meet those needs. An Object Store is an emerging alternative to file-based systems and is ideal for storing large volumes of unstructured data or, files of all types. An Object Store structures data or files to optimize search capabilities – files

such as medical records including patient files, email, images, video, audio and files from custom or independent healthcare applications.

This includes the storage and classification of files with file standard meta data – such as file name, size and date stored – to custom metadata defined by the end-user for uniquely identifying the file for specific use cases such as migration of legacy systems and/or deep search requirements needed to better enable analytics.

Technically, an Object Store decouples data from its physical location through the use of object IDs and uses flat and infinite namespaces to make object storage scalable.

It provides a foundation for data longevity techniques, such as archive and deep archive intended for decades of storage access, available at the edge of your fingertips rather than through time consuming data retrieval solutions.

Object Stores are being used for vendor neutral or independent clinical repositories that include advanced data storage; data classification and workflow capabilities that make healthcare data available regardless of location.

They are also used for many types of applications and through multiple types of devices, from fixed to mobile. The core value of an Object Store for clinical repositories include things such as:

- Scalability – systems that scale to hundreds of petabytes
- Advanced Data Ingestion – from multiple sources and applications
- Security – enabling access from multiple locations and mobile devices
- Data Life-Cycle Management – through the automation of retention and data deletion policies
- Cost Reduction – through shared infrastructure with secure multi-tenant control
- Mobility – for access of data from anywhere at anytime

Hitachi has developed an Object Store that is recognized as the most mature in this market and specifically meets the needs of healthcare and other industries. Based on the Hitachi HCP solution, the Hitachi Clinical Repository (HCR) supports the storage of data to local and remote platforms, as well as, to public cloud offerings, such as Google or Azure, ensuring that the custodian always remains in control of the data and its location.

The Hitachi HCP is currently being used across multiple healthcare verticals. One such example is a world famous clinical practice that includes clinical care, education and research to more than 400,000 patients per year.

This healthcare organization wanted to store data inexpensively, maintain that data for 25 years, as well as provide seamless access to public cloud services. As a result, they implemented a Private Cloud based on HCP with Hybrid Cloud capability.

Object Stores provide core capabilities that include massive scalability to hundreds of petabytes, meet enterprise-class healthcare security requirements, and offer access to data from anywhere at any time. For additional information, please contact: Glen.Lomond@hds.com or Tyson.Roffey@hds.com



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Document management solutions integrate paper into electronic systems

BY DIANNE DANIEL

Last year, Lennox & Addington County General Hospital (LACGH) in Napanee, Ont., became the first Canadian facility to install a new version of Agfa HealthCare's ECM system, designed to handle scanned paper documents as well as diagnostic findings, modality print-outs, microfilms, invoices and other administrative records.

Colin Catt, manager of Information Systems at LACGH, says the goal was threefold. First, the hospital wanted to back-scan and pick up paper charts.

Second, it was looking for a business continuance model so that an alternate chart could be available in the event that its Meditech electronic medical record system went down, no matter how unlikely that is.

And third, it needed a method for bringing what Catt calls "orphaned modalities" into its electronic record, components such as emergency room or operating room ultrasound images, colonoscopy pictures or biopsy images.

"You have to decide what is most useful, and the list never ends," he says. "The install was done last year but we're always adding pieces and we always will add pieces to it."

Rather than collecting miscellaneous pieces of paper and sending them to a central Health Records department for scanning, LACGH implemented a real-time model where floor clerks scan information as patients are processed.

For example, if a patient arrives at Emergency with chest pain and an electrocardiogram is administered, the paper report generated is scanned and attached to the electronic patient record while the digital ECG itself is stored in the Agfa system. Back-scanning of historical records is also completed whenever a patient is treated at hospital.

LACGH is largely a paperless environment. When physicians dictate directly into Meditech, their notes are automatically copied to the Agfa system using the HL7 interface. "I have yet to find something I can't add one way or another – either electronically or automatically – and that's a big deal for us," says Catt. "Now we know that given a catastrophic failure, patient care can be sustained."

Meanwhile, on the Prairies, the Five Hills Health Region in Moose Jaw, Sask., started its electronic content management journey in the fall of 2015 by implementing the Perceptive Content Toolkit from Lexmark.

Serving a population of 54,000 in an area that extends from Lake Diefenbaker to the U.S. border, the region is responsible for acute care, long-term care, home care, mental health and addiction services, public health, ambulatory services and primary healthcare.

The move to Perceptive Content coincided with the grand opening of the Dr. F.H. Wigmore Regional Hospital in Moose Jaw, a state-of-the-art facility designed using lean principles. Knowing that storage space for paper files would be limited, Rod Cochrane, director of IT, decided a scanning strategy was necessary.

After sorting through historical records to remove outdated files that no longer had to be kept, Cochrane's team found there was in fact room for all relevant historical

information to be brought to the new facility. They're now feeding it into the Perceptive Content Database on a case by case basis, starting with Emergency patients.

When patients arrive in the ER, their paper charts are extracted from health records and brought to the unit. When

they are released, the records are sent back to health records for scanning. Once the charts are in electronic form, they will be attached to the region's Sunrise Clinical Manager electronic health record; the solution was set to go live in early June.

Scanning is a three-step process. After

the initial scan, the chart is sent to a quality control queue where a clerk checks to make sure the information is legible. From there it is sent to a linking queue where the scanned chart is attached to the appropriate patient using unique patient identi-

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Next-gen seniors: Catalysts for a healthier Canada



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Like many octogenarians, Dr. June Fisher's mobility was an impediment to going to the market and other day-to-day activities that younger adults take for granted. As Chief Elder Executive for Aging2.0 (a San Francisco-based global network on a mission to accelerate innovation to improve the lives of older adults around the world), the retired MD provided guidance to students competing in a mobility design challenge hosted by Stanford Center on Longevity. Her advice: "Design with me, not for me!" The resulting City Cart won top prize in the international competition and serves as a combination walker and shopping basket, allowing those with mobility issues to walk, shop and return home without assistance.

This example speaks to the mounting requirement to address the needs of our aging population in a customer-centric (vs technology- or clinician-centric) fashion. And this applies across a broad range of needs, as mobility challenges are among many others that beset people as they age. Dementia, Alzheimer's and chronic disease also feature prominently, and along with them come increased demands on family and friends and additional strain on the healthcare system.

The economics of our greying population

Globally, the number of individuals aged 65 and over is expected to triple in the next 30 years from 524 million to 1.5 billion.ⁱ In the US and Canada alone, approximately 10,000 people turn 65 every day and it is expected that by 2020 a total of 40% of the population in the two countries will be over 50 years old.ⁱⁱ

As governments and healthcare systems around the world confront the wide-ranging ramifications of this greying population, key challenges emerge:

- Due to well publicized budgetary constraints, governments and current healthcare systems will struggle to fund the new, longer-than-average life expectancies. In fact, projections from CIRANO's Vice President, Public Policies, Pierre-Carl Michaud indicate that by 2050 costs for long-term care facilities could, if left unchecked, reach \$87.5 billion and homecare costs could reach an additional \$59 billion, representing 100% of government spending in today's dollars.ⁱⁱⁱ
- Families and friends of ill individuals, often referred to as informal caregivers, will increasingly be called upon to provide healthcare and related support services to their loved ones as they age. It is estimated that 50 million individuals in the United States and Canada provide an average of 20 hours or more per week of care for sick family or friends, while 20 million provide more than 40 hours.
- Individuals will want to age with grace and dignity, remain socially connected and supported, yet the majority will want to do so while staying in their own home for as long as possible.
- Faced with an epidemic in aging-related brain diseases such as Alzheimer's, caregivers and health systems alike will desperately require tools and technologies to provide better care to those living with the disease.

The challenges are clear and significant and, fortunately, the environment and conditions to address them are improving, specifically:

- Despite (or perhaps because of) their vulnerability, patients as health consumers, are demanding better healthcare experiences.
- New technologies and innovations are coming to market.
- The healthcare system, which since mid-century has measured its efficacy on access to acute care, has no choice but to adapt and is becoming more focused on home and community-based care vs. in-hospital settings.

Wanted: A unified 'healthy aging' marketplace

People's needs are holistic and a unified approach is needed. As Marianne Le Roux, who serves as a Vice-President of Project Development at Groupe Santé Sedna asserts, "you can't split the life of a person into categories. Their needs are holistic and, to meet them, we need to act locally. Social services, health-related requirements, appropriate food and medication – all are equally important and interconnected."

Currently there isn't an identified market that takes a holistic approach to meeting the needs of seniors with a set of integrated end-to-end services. As it stands, innovations are emerging within discrete markets.

"The opportunity is to connect industries together and link to healthcare providers and the health system. It will result in a reduction in healthcare costs and create a healthy aging culture at the same time," says Stephen Johnston, Co-founder of Aging2.0.

"...you can't split the life of a person into categories. Their needs are holistic, and to meet them, we need to act locally."

Marianne Le Roux, Vice-President of
Project Development, Groupe Santé, Sedna

Staying connected and making technology aging-friendly

The consumer market emphasizes products that provide better support to seniors in their everyday lives and that keep them connected socially and to their informal circle of care. In particular, mobile apps and services that teach seniors how to use technology, or that make it easier to use, are coming to the forefront.

Some standouts include websites such as Techboomers.com that offers online tutorials on how to use popular websites like Facebook. Another, Breezie, is a software solution that provides a simple, uncluttered and intuitive Internet experience for seniors. And mobile apps, such as Zilio, serve as a one-stop memory organizer, digital diary and collaboration app that lets family members remotely provide assistance, receive notifications, share information and coordinate activities.

Integrating solutions to allow aging in place

Integrated technologies that promote safety, security and generally support better home and community based care delivery have great promise. The demand for these individually is clear and also suggests that making this integration happen is a necessity. Some compelling evidence includes:

- 41.4 million people over the age of 65 live at home in North America.
- 85% of people over 55 years old want to remain in their present home for as long as possible, even if there are changes in their health.^{iv}
- 67% of Boomers would be willing to pay \$25 to \$500 a month on technology if it meant they could stay at home rather than move to a care facility as they got older. An additional 13% would pay \$500 or more.^v

A safe and secure home

Safety and security in the home is the most cited primary concern to be addressed to allow for seniors to age in place. Passive activity sensors, monitoring important places such as the refrigerator or the front door, provide seniors the ability to live more safely at home while tracking location and sending alerts in case of a fall or medical emergency.

Remote patient monitoring such as telehealth and digital health devices allow seniors to better self-manage their care, track medications and help reduce or address progressions of chronic disease through better in home or community health interventions.

Connecting to care teams

While active seniors can make consumer choices among solutions that will meet their needs, those who are managing chronic disease or living with Alzheimers require deeper connectivity.

Online tools for mental health, diabetes and even lung disease equip patients with tools to self-manage, but also provide ways to connect with a coach and healthcare team for needed support and access to the right resources in the healthcare system.

Beyond apps and digital health platforms, deeper clinical connectivity can be delivered with home health monitoring technologies or virtual care. Patients are digitally connected directly to care teams who are able to monitor their health metrics remotely and intervene before an acute health event occurs.

However, in the context of a 'healthy aging' marketplace, there is additional work to be done to integrate these innovations with the healthcare system. As economist

and CIRANO Associate Vice-President, Joanne Castonguay notes, "We build innovative products and services without actively integrating them properly into the healthcare system. In so doing, we weaken the value of the investments."

"We build innovative products and services without actively integrating them properly into the healthcare system. In so doing, we weaken the value of the investments"

Joanne Castonguay,
Associate Vice-President, CIRANO

Reducing isolation

One of the often overlooked benefits of solutions for successfully aging in place is the effect of social isolation. With isolation comes depression, anxiety, declining mobility, high blood pressure and increased mortality.^{vi} In fact, isolation is the single highest impact factor on an individual's health and it is essential that solutions support an individual in reducing social isolation.

Aging in place also means safe and efficient access to networks and resources that support other daily living activities.

As Stephen Johnston states, "it's not about having people isolated and living alone in big houses. It is about building communities that allow people to connect with each other. And it's about having access to a broad set of services that haven't really been delivered in concert before. Not only technology and clinical care, but transportation services, food delivery, social connection and home maintenance – all of the necessary elements that keep people happily in their own home and connected to their community."

A new model for a healthier future

There is a great urgency to discover and support innovations to address the challenges presented by aging populations. When Canada's current health system was conceived, it did not anticipate these challenges and, like the health systems in other developed countries, was designed for episodic care of a younger population; not the ongoing and longer-term care for those managing multiple chronic conditions.

The health system – and indeed our society's very approach to aging – must fundamentally change by transitioning to a model centred on primary and community care, aging in place and one that reinforces healthy behaviors and prevention.

"...it's about having access to a broad set of services that haven't really been delivered in concert before... all of the necessary elements that keep people happily in their own home and connected to their community."

Stephen Johnston, Co-founder, Aging2.0

ⁱ World Health Organization. National Institute of Aging. Global Health and Aging. October, 2011.

ⁱⁱ Extrapolated from: Financial Post. Welcome to Old Age, Boomers. William Hanley. December, 2010.

ⁱⁱⁱ 2015 François Laliberté-Auger, Aurélie Côté-Sergent, Yann Décarie, Jean-Yves Duclos, Pierre-Carl Michaud; Utilisation et coût de l'hébergement avec soins de longue durée au Québec, 2010 à 2050

^{iv} The National Post. Canada Census 2011: Aging Population a Potential Health Care Time Bomb. May, 2012.

^v Phillips and The Global Social Enterprise Initiative at Georgetown University. Aging Well Working Session Series: Family Matters in Caregiving and Technology Adoption, Summary Report including the Survey Highlights from "Is Technology the Key to Aging Well?". April, 2015.

^{vi} Phillips, as above.



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Nurses drive NYGH's 'closed loop medication administration' success

BY ANDY SHAW

TORONTO – The North York General Hospital (NYGH) “closed loop medication administration” system, or CLMA for short, is helping NYGH rack up some impressive benefits, including:

- Preventing over 2,300 medication errors in the first year of implementation – in conjunction with other elements of NYGH’s advanced EMR, including its computerized provider order entry (CPOE);
- Achieving a 95% barcode scanning compliance rate for the 110,000 doses the hospital scans on average per month;
- Raising adverse-drug event prevention accuracy rates, in physician medication reconciliation of admission and discharge records, from an average of 8% to over 80%;
- Improving turnaround time for STAT medication orders for serious and life-threatening cases by 83%.

“It’s important to know that CLMA is part of a broader clinical information transformation project, we call ‘eCare,’ that the hospital has been undertaking since 2007,” says Sumon Acharjee, the hospital’s Chief Information Officer, who joined NYGH in January 2015.

The clinicians’ e-care efforts made NYGH the first community academic hospital in Canada to climb to Level 6 certification of what’s called the HIMSS EMR Adoption Model (EMRAM).

Now NYGH and CIO Acharjee are preparing to reach the very peak of EMRAM certified approval, Level 7.

“NYGH didn’t start its eCare project with the specific goal of being certified by EMRAM, but it’s a bit of serendipity that EMRAM criteria and our eCare objectives of excellence in providing patient-centred,



Sumon Acharjee, CIO at NYGH, and Linna Yang, are leaders of the hospital's trail-blazing CLMA project.

safe, high-quality healthcare are all aligned,” says Acharjee.

Patients coming in through NYGH’s automated front doors are entering a hospital that has demonstrated fewer preventable errors, better adherence to best practices and lower patient mortality rates than many others.

What they may not know is how much of those patient benefits are thanks to its nurses and their dedication, especially to reducing medication errors.

Former director of clinical informatics, Sonia Pagliaroli, an 18-year NYGH veteran who began there as a labour and delivery nurse, was instrumental in the development of the hospital’s Wireless on Wheels computer carts that assist nurses on their shifts.

The WOW’s hand-held bar-code reading scanner crucially closes the loop left open in paper-based prevention techniques of the past. It does so by confirming electronically

that a medication, with a certain dosage, at a specific time for the right patient is, indeed, the intended and correct one.

Linna Yang, is now taking the interim lead on new CLMA developments at NYGH.

Yang, a former cardiac nurse, capped nine years of hospital informatics work with an MHI degree in the subject before putting both her clinical experience and technical expertise to work at NYGH three years ago.

“We use our clinical knowledge to bridge the gaps between the clinical world and the IT world,” says Yang. “We make sure whatever we implement fits the clinician’s workflow.”

While Yang knows how much nurses have contributed to NYGH’s admirable climb up the e-health heights, she’s quick to point out they should not overshadow contributions of other clinical mountain climbers: “To have our CLMA work, we need physicians, pharmacists, all our allied

health partners, and we need IT people to connect everything. We need a full team.”

Despite rising awareness of medical errors in general, and medication mistakes in particular, such mishaps continue in the healthcare system. In the United States, the landmark 1999 study, *To Err is Human*, estimated that up to 98,000 Americans die each year as a result of medical errors.

More recent reports, including one published this year by researchers at Johns Hopkins Hospital, suggest there are as many as 250,000 medical error deaths annually, making them the third leading cause of death in the country.

A Canadian study done over a decade ago, by researchers at the University of Toronto, suggested some 23,000 Canadians die each year from clinical miscues.

While work still needs to be done on the causes of medical errors, one major reason is well known: interruption. It is something even dedicated nurses are prone to.

“The problem is nurses are very busy people,” observed Pagliaroli before departing NYGH. “But while they are trying to give the best care they can, they are constantly being interrupted – and that’s when adverse events like medication errors can occur.”

So now, brooking no interruptions is a best-practice at NYGH, especially while nurses are engaged in patient care using CLMA software supplied by Cerner, bedside hand-held scanners by Zebra (formerly Motorola) and WOW carts by Rubbermaid.

Because every nurse has a cart while on a shift, they are never interrupted by another nurse borrowing it. The nurses use the system’s hand-held scanner at the bedside to read the bar codes on the medications, as well as the codes on patients’ arm bands to confirm that all is in order.

The all-electronic system closes the

CONTINUED ON PAGE 23

REBOOTING eHEALTH

Decadal rant on security: Are we waiting for a disaster?

BY DOMINIC COVVEY

It seems my blood boils at least once every 10 years. I think I know what the problem is: a realization that we have a human foible that is persistent and potentially deadly. This shortcoming is that we first innovate, and then and only then do we develop policy to manage those innovations.

Our policies related to computer and communications security are like that. They are developed almost as an afterthought and only after what are sometimes devastating effects on individuals or even whole populations.

Hark back to the development of nuclear weapons during World War II. These are probably the most heinous interventions developed by human kind. You have an enemy? Evaporate them! With few exceptions, ideas regarding the control of nukes were only tabled after they were developed.

Even then only a relatively few insider scientists stood up and spoke up about

their inhumanity and immorality. The result was that these weapons were used to incinerate almost 200,000 people in Japan.

Sure, the argument was to shorten the war. However, targets were chosen to enable the assessment of the amount of damage they would do, so cities were targeted. Even now, policy related to nuclear weapons lags and we still exist under their threat every single day.

I lived through the 1950s and, in keeping with the U. S. Civil Defense slogan “duck and cover”, I hid under my desk in school every Wednesday at noon. For me, that threat was a real one.

We and our predecessors have implanted computers and communications systems at central points in human society.

They control traffic and manage oil pipelines. They allow us to remotely run high-speed trains in places like Vancouver (controlled from Montréal, I believe). They allow advanced airplanes to fly. Sometimes these systems are so complex that pilots don’t know how to manage or

override them despite years of training.

At one time there was the possibility that they would control President Reagan’s Star Wars program, intercepting incoming nuclear-armed missiles. David Parnas, a Canadian computer scientist,



Dominic Covvey

pointed out that this techno-fantasy would only be fully tested in the first 15 minutes of a thermonuclear war ... and I think we all know what the testing would show. Our deployment of computers is both subtle and ubiquitous. Computer-based devices are being placed virtually everywhere to control almost everything and will be linked together by a network.

These devices include medical sensors to control insulin pumps and implanted defibrillators. They will oversee nuclear reactors and the interconnected power

grid. Literally every piece of equipment will become a computer node.

For those not familiar with the term, this is called the Internet of Things or IoT. The potential for vulnerability is mind-boggling.

However we don’t have to look to the future. We already have demonstrated vulnerability in our hospital and practice-based systems. We have it in the systems of companies that support our healthcare, our banking, our commerce, our communications and just about everything else.

So we already have a significant problem and virtually every day we hear about intrusions into or shutdowns of these systems. There is absolutely no question about the fact that society stands virtually naked in terms of its systems and there seem to be many out there who wish to take advantage of our nakedness.

Sure, we have the potential of reducing this vulnerability. However, doing so requires almost geologic change in the way we design, architect and develop them.

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Red Hat and Mindful Experience: the hidden healthcare providers in your hospital

Innovative, open infrastructure from Red Hat, when paired with partners like Mindful Experience, can produce savings of up to 75% when compared with the traditional systems in many hospital networks. **By Gregory Mezo**

Every new hospital built today starts not with a brick and mortar architecture designed to house patients and care providers, but rather with an information architecture to harness the latest technology.

Today and in the future, it's digital technologies that will drive the best possible patient outcomes, along with caregiver effectiveness.

While new hospital builds are exciting examples of the fully realized vision of technical progress, many innovations can be achieved in our existing healthcare institutions. Increasingly we're talking about 'digital healthcare' in our hospitals and clinics.

Healthcare and open source technology

The parallels around healthcare delivery and open source are remarkable. Everyday, healthcare practitioners share their most important knowledge and techniques with colleagues locally and around the world. They're growing their treatment capabilities in a steady flow of in-

providers and consumers like healthcare must participate in the open source world; ideas are born and delivered now in days or weeks. Collaboration on these projects is no longer planned and deliberate – it is spontaneous and dizzyingly quick. Traditional, proprietary development is simply being outpaced by the open source methodology.

So how do we get to "Digital Health"?

Red Hat software and managed service provider Mindful Experience are partners committed to delivering the most innovative digital hospital solutions, with an eye on radically improving information sharing and delivery capabilities in hospitals.

Red Hat is a software and services company best known for delivering open source software solutions like the Linux operating system. Our open source development model is a rapid, highly innovative, and cost-efficient approach to making software that's well-suited to the critical IT demands of the healthcare in Canada. Many of you may be nodding your heads right now, as Red Hat Enterprise Linux is well-known in IT circles – but perhaps not as well-known are its solutions for Platform-as-a-Service, Infrastructure-as-a-Service, Open Storage, Application Integration and Mobile capabilities.

For its part, Mindful Experience is a managed services provider specializing in building an ecosystem (applications, systems, and networking) that reaches patients with the smart devices and systems they are already using instead of forcing them to change their tools. The continuum must be ubiquitous.

Mindful Experience's Medical Grade (IaaS) platform will allow you to host these modern day, customer-facing applications, while containerizing each solution to provide secure, robust, and reliable solutions. The platform could be expanded to support regional hospitals and clinics without needing to perform a core upgrade.

Controlling costs without sacrificing innovation – be Mindful

Around cost, we see that Red Hat solutions paired with a MSP partner like Mindful Experience can attain savings of up to 75% against the traditional infrastructure present in many hospital networks. By performing the renovation to open source solutions like Red Hat Enterprise Linux, healthcare providers also free themselves from lock-in, as all open source solutions are inherently portable; the software itself is freely available.

As Luc Villeneuve, Country Leader at Red Hat Canada, said in a recent industry interview, "A massive portion of healthcare budgets are being spent on



Luc Villeneuve, Country Leader at Red Hat Canada.

legacy vendors, requiring you to buy a license and their technology. By contrast, when you look at Software- or Platform-as-a-Service with a subscription model in the cloud, the price equation changes totally."

By standardizing on an open infrastructure that benefits from the innovation and cost savings of open source, resources can be redirected to new projects and to attaining even higher levels of patient care. A great example of this renovation is Boston's Beth Israel Deaconess Medical Center, which leveraged a modernized Red Hat virtual data centre to save not only money on operations, but also re-deployed many staffers to move away from maintenance activities to new projects. Read more about this customer here: <http://red.ht/1UfFuXH>

So what can this collaboration deliver for your research group, clinical team or hospital administration? Let's delve into two of the areas that Red Hat and Mindful Experience collaborate on regularly to deliver exceptional results: information integration and mobile application development and delivery:

King's College Hospital Network, UK: Information for everyone

Integration platforms allow traditional electronic health information systems of record to share information seamlessly with a limitless list of feeder sources – they make up the backbone of many hospital information networks. In 2014, with time running out for its aging integration hub, King's College Hospital (KCH) NHS Foundation Trust needed a new middle-ware platform that would allow over 50

hospital systems to exchange critical patient information quickly and reliably. With timing and budgetary constraints, they reached out to Red Hat and implemented an integration hub based on Red Hat JBoss Fuse that offers better reliability, speed, and manageability than its predecessor. The new system easily supports the hospital's current needs, and KCH can expand integrations as needs change in the future. Read more about KCH here: <http://red.ht/1Z2WP7M>

mHealth: Mobile changes everything

Consider the sea change happening with mobile – the fact that we can now deliver apps to individual healthcare workers and patients on a (nearly) ubiquitous device. Typically these apps no longer require long training periods for their users to become familiar with their use.

How to capitalize on this newly emerged opportunity? One place to start is considering how a new "app" will work in your healthcare context: clinician engagement, administrative simplification, collaboration, research support, executive reporting and more. Transitioning toward a fully mobilized and successful healthcare organization requires a cohesive strategy and an open platform.

Mobile app design must take into account many of these target audiences and use-cases, with an eye on the many capabilities on offer by the devices themselves (cameras, GPS, accelerometers) that can lend themselves to brand-new services like remote monitoring, diagnostics or location specific information delivery such as "find my nearest" healthcare resources.

Designing, developing, distributing and maintaining these apps across thousands of devices that are of varying age and technical specification is a novel challenge to many Canadian IT shops, who are just now getting their feet wet. Into this challenge, Red Hat has launched its Mobile Application Platform, which provides for some very powerful advantages over traditional IT-centric application models. Check out a five-step plan for mHealth here: <http://red.ht/1sAMzsK>

To learn more about Red Hat and Mindful Experience solutions, training and engagements, please contact the author: Gregory Mezo mezo@redhat.com



"A massive portion of healthcare budgets are being spent on legacy vendors, requiring you to buy a license and their technology. By contrast, when you look at Software- or Platform-as-a-Service with a subscription model in the cloud, the price equation changes totally."

– Luc Villeneuve,

Country Leader at Red Hat Canada

formation – all done with professionalism and at no cost. In the open source world, a similar sharing process is taking place around solving technology challenges, with a community of professional developers contributing to millions of different software projects; their only goals are to add capabilities and fix "bugs".

So why does open source matter so much to the Canadian healthcare world? Two very straightforward reasons: innovation and cost efficiency.

On the innovation front, we see every day the use of cloud services built on open source – it is the common denominator of the cloud. Every major cloud service today (think social media, broadcasting) is underpinned by open source projects such as Linux, Apache, Node.js, Openstack and many others.

To capture this innovation, technology

Made-in-Canada, 3D technology is solving problems of the heart

The Hospital for Sick Children and the University of Toronto are world-leaders in 3D printing for healthcare

BY DIANNE CRAIG

A tiny polymer heart the size of an adult ear, with an even tinier patch stitched on to it, provides deep insights to the surgeon preparing to operate at Toronto's Hospital for Sick Children. But this is no ordinary model of a typical baby's heart.

It's an exact replica of a particular infant's heart – including the patient's own complex congenital defect. The intricate model enables a difficult operation to be rehearsed, and reduces the risk well before the child's scheduled surgery.

Nearby, in a chemical engineering lab at the University of Toronto, a team is growing living heart cells, not in a petri dish, but on a unique polymer scaffold that effectively tricks the cells into thinking they are growing as part of a living heart, and so they start beating as if they were. The tissue eventually may be used as replacement tissue, but currently is highly valued for use in testing new heart drug compounds.

These are two of the latest Canadian-driven developments that use 3D-printing technology as an aid in solving heart-related medical issues.

At The Hospital for Sick Children, Dr. Glen Van Arsdell, cardiovascular head and Dr. Shi-Joon Yoo, a cardiac radiologist who leads the hospital's Division of Cardiac Imaging, launched a program that scans the hearts of very young patients with congenital defects and creates 3D-printed replicas on which surgeons can practice incisions and sewing patches or performing other operations.

Developing the model hearts, made of a polymer resin, starts with CT, MRI and ultrasound scans with sectional imaging, so they can view all the multiple structures overlapping each other through projectional images.

"After the CT and ultrasound, we do sectional imaging so we can see the inside of the body in detail. We can decide to do 3D reconstructive, or volume rendering. But it's on the computer screen," says Dr. Yoo. With a polysial replica, it's a different story: "When you have the complex geometry in your hand, it's easier to understand," he adds.

Communication between the radiologist and the surgeon is improved dramatically as well. "It can take 15 to 20 minutes to explain what is in the images, and with these replicas we don't have to explain," says Dr. Yoo.

The ability to use a replica heart for surgical training is particularly useful when dealing with tiny infant hearts. For example, explains Dr. Yoo, "The Norwood Procedure for hypo-plastic left heart syndrome. The geometry is complex, and you're dealing with a very tiny heart. Any surgeon has difficulty learning how to do it. So the training is incredibly important."

Before, says Dr. Yoo, a lot of patients were at risk when surgeons needed to learn this. Now, with practice, they can significantly reduce the risk. Also, he adds, "If the surgeon understands the exact anatomy (he/she) doesn't have to spend time exploring during the

surgery." Even assistants can gain a better understanding of what's going on, what the operation is doing for the patient by studying the replica hearts. "All this together leads to better outcomes," he adds.

Doctors graduating from medical school can wait up to 15 years before even getting to participate in surgeries involving certain types of infant heart defects. A big reason for that is the lack of hearts to practice on, that have to come either from animals or donors who have died. In an educational setting, notes Dr. Yoo, no one has to die to provide a heart. "We can show the full spectrum of congenital heart defects and we can send the hearts anywhere in the world."

Asked about similar efforts involving 3D-printed hearts, Dr. Yoo, who has a reputation as the foremost expert in this area, said "A lot try to copy it, but it is really not copy-able. You need to invest a lot of time. What is in the images is not 100 per cent of it – you need an intellectual component added and also years of practice."

The cost of developing the replicas can also be prohibitive. From scratch it would cost about \$1,500 for each piece, but when considered as a business the cost would be about \$5,000 each," he explains.

Clearly 3D-printing of replica hearts provides radiologists and surgeons with deep insights that assist in achieving better outcomes. Asked whether there might be a time when a 3D-printed heart could replace a human heart, Dr. Yoo said "It's not at the applicable stage. Eventually I think so."

The team led by University of Toronto tissue engineer Milica Radisic, who was named to the Royal Society of Canada's new college and is a fellow of the American Institute for Medical and Bi-

ological Engineering (AIMBE), is using 3D technology in a different way. They are using 3D-printed scaffolds as a support structure for growing swatches of living heart tissue.

"We build living heart tissue and liver tissue in the lab," says Professor Radisic, who, along with her team has been working on this achievement for the past 10 years.

While most other efforts to build heart tissue are



Dr. Milica Radisic's team, at the U of T, is using a 3D printed scaffold to grow heart cells.

conducted in a petri dish, using a 3D-printed scaffold to encourage growth is unique. "A petri dish is just a petri dish. The cells sit at the bottom. It's pretty rigid," explains Dr. Radisic.

The scaffold, made of polymers and hydrogel, provides a more natural growth environment. The 3D polymer scaffolds called AngioChips, or person-on-a-chip technology, are built by Dr. Radisic's students in a clean room – similar to the environment used for building computer chips.

"We didn't want to harvest blood vessels," says Dr. Radisic, adding that they also wanted a stable structure to use. "We created branch and blood vessels out of polymer," she says. AngioChip behaves like vasculature, and around it is a lattice for other cells to attach and grow. The original design for the scaffold was enhanced significantly, with pores that blood vessels can grow through, by Boyang Zhang, a PhD student in Radisic's lab.

Asked about the source for the growing heart cells, Dr. Radisic said, "One problem with the heart, and using induced Pluripotent Stem cells (iPS cells) obtained from an adult to grow heart tissue, is we cannot take cells out of your heart. They don't divide after birth – well, they don't divide fast enough. They divide very, very slowly and no one's figured out how to make them divide faster. That's why we have to use stem cells."

"We are reprogramming the stem cells we obtain from the foreskin of newborn babies at Mt. Sinai Hospital," explains Dr. Radisic, adding that the only difference beyond that to make the heart cells, in addition to using the 3D scaffolds, is that they also apply hydrogels and electric stimulation to the stem cells.



Dr. Shi-Joon Yoo, cardiac radiologist and Dr. Glen Van Arsdell, cardiovascular head at SickKids

What Canada can learn from Israel: strategy, leadership and innovation

BY JENNIFER MACGREGOR

We are facing a global healthcare crisis, and each country is working to address the needs of its citizens. To sustain our healthcare system in Canada, we need to do a better job of leveraging digital health and build an ecosystem that shares clinical information across the continuum.

Together with representatives from our client, Fraser Health Authority, we visited and learned from healthcare organizations in Israel, a country that is succeeding with a digitally connected model of healthcare.

There is a high level of connectivity among Israel's four Health Maintenance Organizations (HMOs), enabling clinical data integration for all 8 million citizens. Ultimately, this access to connected information enables better care and better results.

Four factors contributing to Israel's success with healthcare: Compared with Canada, Israel spends a smaller percentage of its GDP on healthcare and achieves better outcomes, measured by life expectancy and infant mortality (Source: OECD 2015

data). There are four main factors that help contribute to Israel's success with healthcare:

- Innovative and entrepreneurial spirit. From the ministerial levels to the HMO to individual teams, Israeli organizations embrace innovation.

It's part of the national character and is a starting place for every decision. They look at what's working and build on it, with remarkable speed.

- Strong national and local leadership. Israel has a transformative national vision. The Ministry of Health devised a National Digital Health Strategy, which is a comprehensive plan to meet present and future needs of their healthcare system, while assuring system-wide equity. Israel has made national investments to close information gaps.

- Concrete guiding principles and governance. Because the future of healthcare rests in personalized medicine, Israel's approach is centered on patients and enabling them to fully participate in their own care. The governance structure enables Israel to instantly bring many stakeholders to the table and drive the project forward.

- Solid technological foundation. In less than three years, Israel rolled out the Allscripts dbMotion connectivity platform to connect all the medical records of eight million citizens. This effort has enabled clinicians to share medical information across the four HMOs. Today, there are more than 100,000 users securely accessing clinical information each month, viewing more than six million pages to date.

Inspired by Israel's innovation: Following our visit to Israel, Fraser Health is breaking new ground. It's adding more clinical domains to its Unified Clinical Information system, powered by Allscripts dbMotion.

It is also working with technology entrepreneurs and innovators, and is embarking on a continuity of care program

aligned with the primary care home strategy for British Columbia.

As of January 2016, Fraser Health clinicians can query the Provincial Laboratory Information Solution (PLIS) for patient lab test results. This capability represents a significant technical achievement. It is the

first time Fraser Health has accessed a database that sits behind the Health Information Access Layer (HIAL).

The HIAL helps organizations sharing information by providing common services, such as user authentication, and logging and auditing accesses.

Inspired by Israel's innovation, I look forward to many advances in connectivity from Canadian healthcare organizations in the coming years.

Jennifer MacGregor is Managing Director, Canada, for Allscripts.



Jennifer MacGregor



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Managed ICAT services: A tool to achieve health system transformation

BY DENIS CHAMBERLAND

It is possible today to create a technologically “Smart” hospital environment where advanced technologies are integrated and transform care delivery. The main features of a “Smart” hospital depend on the preferences of a particular health system, but can include:

- Establishing a common framework to exchange information to automate workflows;
- Optimizing information exchange through a software platform that facilitates the interoperability of information shared across multiple devices;
- Automating and making systems and devices interoperable;
- Leveraging predictive analytics to make new intelligence available to assist decision making;
- Creating ambient intelligence that recognizes the presence of humans;
- Making the hospital context aware so devices recognize individuals or situational contexts;
- Enabling a degree of semi-autonomous (customized) functions;
- Making all functions available through mobile devices; and
- Enabling a platform that allows for pervasive computing (works on any device, location, or format).

Innovations in pervasive computing and ambient intelligence now make the Smart hospital a possibility, allowing hospitals to re-organize their care delivery model to embrace a connected health strategy that leverages digital communi-

cations and the Internet of Things (IoT).

The IoT is a new, pervasive computing paradigm in which everyday objects become capable of both adding information to the network and responding to information from the network, and interacting with each other in ways that help to improve patient outcomes.

The Internet of Healthcare Things (an official mark of Mackenzie Health) builds on the IoT, and allows a health system to deploy a compelling patient healthcare strategy.

Such a strategy is enabled today by some key functionalities, including: Information Communication and Automation Technology (ICAT); the use of IP addressable communications and medical devices, sensor systems, embedded systems, intelligent building systems, and hospital information systems, and; a blend of bidirectional communication and cognitive analytics.

Ultimately, the goal of the Smart hospital is to transform the hospital experience to make it patient-centred, staff-centred, and hospital-centred.

The Smart hospital should also be designed to integrate with other initiatives structured to improve patient health and safety, whether provincial, federal, local, and of course with the strategies, in Ontario, of Local Health Integration Networks (LHINs).

Finally, the Smart hospital should focus on innovation, and driving improvements in healthcare delivery, hospital process redesign, efficiency, and financial performance. As noted above, the Smart hospital

is a flexible concept that can be adjusted to include and reflect the aspirations of individual health systems.

Having a Smart hospital vision is critical, but having the right platform to enable the Smart hospital vision is equally important. The Managed ICAT Services (MIS) platform brings the pieces together to deliver important components of the vision.



Denis Chamberland

Built on the Managed Equipment Services (MES) platform, which has been successfully implemented several times in Canada, the MIS platform includes, among other features, a flexible, long-term program, ranging from 10 to 15 years; a predictable equipment and services investment plan (ESIP) and services model that guarantees equipment replacement (refresh); a stable payment stream which is equalized throughout the term; a contract that allows for the transfer of risk to the party best suited to manage it; and a structure that ensures higher accountability and coordination between the parties.

With MIS, a single service provider manages the purchase, implementation and support of equipment and services from multiple suppliers, and consolidates maintenance and services. A service desk function is set up for ICAT-related issues

and technology upgrades. To incent and sustain the desired level of performance, financial penalties are applied against performance deficiencies.

The MIS model establishes a long-term, sustainable operations-focused partnership, one that facilitates stable, predictable pricing for the term of the contract, and in which various risks are transferred to the service provider – such as implementation, pricing and service risks. Importantly, the MIS model encourages innovation and forms the bedrock on which the Smart hospital vision rests.

In this model, the MIS service provider is required to actively support the delivery of the Smart hospital vision, as defined by the health system. The service provider provides the information technology expertise and advice needed to help the health system achieve its data exchange and interoperability objectives.

The MIS service provider also supports the delivery of the health system's planning principles, some of which may include, for example, optimizing the patient and family experience through the eyes of the patient; organizing the services so they maximize the efficient delivery of quality patient care, and; supporting change through flexible facility design.

Denis Chamberland is a member of a multidisciplinary advisory group that works with health systems in Canada on a wide range of managed services projects, including MES and Managed ICAT Services (MIS). He can be reached at dachamberland@gmail.com

Mobile apps can drive patient engagement for Zoomers today and beyond

BY SCOTT HERRMANN

As we all know, healthcare is transitioning to Outcome-Based Payments (OBP) in Canada and North America, meaning increasing the quality of care for patients, and demonstrating better patient outcomes via patient engagement.

We also know that patient engagement and technology go hand-in-hand. It's an elementary observation, and with Zoomers, we all know that mobile technology is more or less how they roll. With the new OBP environment the time has come for community care agencies to plan a way to reach their clients beyond the typical face-to-face encounters.

Multiple technologies can be chosen, but some will not be as thorough as others. Only a mobile application is robust and comprehensive enough to engage the client on a regular (even daily) basis and capture real-time symptom data.

Client portals and/or telehealth have been the more common methods to lead agencies to better client communications – but mobile health applications have moved to the forefront of patient engagement and proactive care management.

We will compare what we have seen from the near past and how it compares with mobile health applications

that are available today for patient/client engagement.

Web-based patient portals: In the past few years the use of a web-based patient portal has emerged as a way to share information. The usage for the common online portal would be for the care team, the client, and the family and friend's caregiver network to easily access new information. This keeps everyone up-to-date on the latest information and communicates the clients' plan of care.

This approach has worked if the right method is used and if there was consensus from the all parties involved as to what data was provided by what party. However, just looking at the process is cumbersome: the client has to get online, open a browser, go to the site, log in, and potentially free-form type their issues each day, or whenever they are instructed to provide additional details.

Sometimes the portal has basic surveys based on their needs and/or chronic conditions to explore how the client is feeling that day, but it is not robust enough for the agency to truly triage a situation in real-time and act accordingly.

It may not help with early interventions and keep a client from entering the hospital. Plus, the caregivers from the agency need to make sure they too are keeping up on the latest information and

observations from their last visits.

Or the portal must take the information via its back-office system and push it to the portal for others to see.

This, too, can lead to issues since what the caregivers write in their visit notes may be inappropriate for the client to see and read.



Scott R. Herrmann

So the community care agency may need to review their care notes prior to posting in the client portal. A manual edit process involving too much time. While this approach is better than solely relying on caregiver's notes, it lacks consistent patient engagement and real-time communication with the agency.

Telephony-based systems: Patient-reported data via telephony, remote patient monitoring, and even tele-visits help providers of home care to increase quality of care and achieve better outcomes – there's no doubt. All of this is informational data that providers can receive and monitor, improving their client's health as they age.

Yes, you may be wondering, “But

what about the generation that never fully immersed itself in the digital and mobile technology of this age? Are they limited by their technical disability to supply the necessary data?”

Valid questions, but let me ask you in return – Can they answer a telephone and press or say “yes” or “no”?

To anyone who has an elderly influence in their lives, we know they can. These basic skills would be applied to answering basic care plan questions based upon their disease or co-morbidities. For instance, “did you take your medications today”? The questions and corresponding answers relay to a dashboard and the community care agency gets basic info from the questions.

This info can then help to keep the client healthy and provide proactive care data to the home care team. Now we can see client engagement for the oldest in our society, because we provided this person the right, albeit older, telephony technology.

So, by sharing information telephonically, with their care team they can truly be a partner in their care, directly impacting their quality of life.

Some of the issues that may occur with telephony, one of which I call “intrusive technology.” What if the client is

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Document management solutions integrate paper, electronic systems

CONTINUED FROM PAGE 11

fiers. The third step is to destroy the paper chart, though Cochrane is quick to add they haven't actually done that yet.

"It's a huge adjustment," he says, noting that "one of the big challenges related to document management is creating a source of truth for each document." It's still work in progress, but Cochrane's goal is to let the Perceptive Content Database manage all forms centrally, including admission forms, consent forms and lab work forms.

All changes will be tracked and anyone who needs to be alerted will be notified automatically, removing the need to email and eliminating the confusion that can happen

when changes are manually done on paper.

He also aims to reach a point down the road where electronic forms are considered "living documents." Several patient documents still need to be completed by hand, explains Cochrane, and he would rather see them available on mobile devices or bedside terminals with the ability to accept electronic signatures.

Moving beyond clinical areas, Cochrane is also starting to decrease the paper load in administrative areas as well. Two scanners are set up in Health Records to handle patient information, while two additional scanners are operating in Human Resources and Public Health respectively.

Making personnel information available on-line means directors or managers

no longer have to make the trip to Moose Jaw to pull a file, he explains.

"Sometimes document management is overlooked," he says. "We're working to-

Everyone wants to get to a paperless environment, but to achieve it, you must have your processes aligned.

wards trying to improve processes, speed up patient wait times, and every little bit helps."

At LACGH in Napanee, one benefit to extending the paperless strategy is that the hospital is one step closer to attaining Level 6 on the Healthcare Information and

Management Systems Society (HIMSS) Analytics Electronic Medical Record Adoption Model (EMRAM). "The closer you get to it, the more gaps you see," says Catt, noting that between Levels 3 and 5 a lot of paper still exists. "Everyone wants to focus on getting to a paperless environment but it's really a big picture move. To really get the benefit out of it, you need to have your processes aligned."

Before implementing the Agfa ECM system, LACGH went through the process of mapping all documents still in paper form and determining where they should go. One reason for selecting Agfa, says Catt, is that it offered an enterprise path focused on a much larger end goal than simply getting paper "in."

"Our Agfa solution looks more like what we have with our PACS," he says. "It's looking at a single point of entry to get imagery and all of these other components to fit into that puzzle, instead of having different systems we have to interface to. It was that bigger picture vision that appealed to us."

One area Catt is now exploring is how to feed in documentation from community doctors so that ED physicians will have more patient information. He also plans to develop an interactive patient portal.

Australia's Telstra, Mach7 partner to build complete view

CONTINUED FROM PAGE 8

provides standards-based archiving and communication, eliminating the need to maintain disparate, department-specific silos of patient information.

In addition to DICOM files, the VNA supports all other file types, including JPEG, PDF, video and more. Using standards, imaging data is normalized, consolidated and accessible regardless of location or system used to capture the data. Unlocking this data from proprietary storage architecture creates the foundations for a clinical ecosystem with plug-and-play accessibility for best-of-breed clinical applications.

Capital Radiology, a leading diagnostic imaging provider in Australia, has already deployed the solution to nearly all of their 72 clinics with great success. Chris Geron, CIO of Capital Radiology, said that the solution has changed the way radiology is delivered.

"Telstra's enterprise imaging service provides Capital Radiology with a flexible and robust solution to better manage our

large amount of imaging data. Our business workflow requirements change regularly but using this platform we can adjust our workflow rules within seconds and deliver images to clinicians promptly."

Eric Rice, CTO of Mach7 added, "Mach7's vendor neutral architecture and Telstra's mission-critical network is bridg-

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Reuven Soraya is Sr. VP, International Sales, at Mach7 Technologies.

Mobile apps can drive patient engagement for Zoomers

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not home or does not answer a scheduled call – what do we assume?

Are they down for the count or did they just not want to be interrupted? That leaves a dilemma for an agency to make the decision to send someone to check on them, or at a minimum, manually calling back and making sure they are well.

One other point about telephony patient engagement solutions, is that it gathers the information based on yes and no questions

and answers, maybe even a scale or range of 1 to 9 (think pain scale). BUT it cannot provide any guidance back to the patient to help them understand their current symptoms.

As a whole, for our current, truly elderly generation, telephony is the best option for them. It is simple for clients to understand and provides a measure of patient engagement. However, there is an option that far surpasses telephony and or web portals – an option that is not just useful, but necessary for the next generation, the boomers and zoomers.

Mobile health apps: We find ourselves firmly planted in today's mobile world of applications where the Boomer/Zoomer generation lives. They know technology, they want to use mobile technology and see it as a way of life that the older generation missed out on.

They will want a mobile application for their care management. This generation, my generation, whether part of the greater care team or a client, will always use mobile devices, as will the generations that follow.

From athletic fitness builders to health-conscious foodies, "there's an app for that." So why not have one for connected care where the client could track their own health and keep up with their care providers? Non-intrusive, proactive "nudges" that can truly impact and lower the cost of care, and allow agencies to gain advantages over their competition in community care. What if an agency provided a smart mobile app for their clients?

Think about it. In most cases, only providing the app is necessary, as the people now all have a smart mobile device, so upfront cost is limited.

A proper community care and senior living app can streamline communication, record client-reported data, and simplify the monitoring process.

Important information could be associated with clients based on their personal profiles linked to their log-in information. Now there is full connection to clients via the convenience of the app on a device that they're bound to use at least once a day – a non-intrusive connection where the client could at any time provide information for everything the telephony service or patient portal could ask.

Scott R. Herrmann is Director, Sales and Strategic Solutions for Medocity. Contact him at: sherrmann@medocity.com www.medocity.com

Dominic Covvey

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Security is a result of two major undertakings. First, is the development of bulletproof, enforceable and enforced policy that raises security to the proper level consistent with the importance of the systems and people it protects.

Second, is the development of systems where security is a fundamental feature, not a jury-rigged afterthought used to plug holes originally built into systems.

Security issues are not new. I dug up from my library an IBM report from 1974, over 40 years ago! The report is on data security and data processing. It identifies the vulnerabilities that systems have and proposes policy and development to address these. In a succeeding article I will review what the report suggested so long ago, but has been largely unheeded by industry and us.

Back in 1979, I had the opportunity to work with Justice Horace Krever on the Report of the Commission of Inquiry into the Confidentiality of Health Information. Justice Krever identified signifi-

cant problems and made many recommendations. I will also review these.

It is important to recognize that, at the time of the IBM or the Krever reports, the threat was vastly lower than it is now. Neither of the reports addressed denial of service attacks, hacking, phishing, trojans or many of the current challenges faced by systems or whole networks. Also vastly

How many people need to be embarrassed, injured or die before we treat security as fundamental and essential?

less information existed and the Internet wasn't even a fantasy.

Think of what the world would be like if civil engineers built bridges without regard for the knowledge we have today about their environment, the strength of materials, stresses, wind loads and the deterioration of components.

Sure, bridge construction went through times, as has the airline industry, where some of the risks and material characteristics were unknown, or

not known to some. The Tacoma Narrows Bridge collapsed due to the wind and the phenomenon called 'aeroelastic instability'.

The British Comet airliner broke up in the air due to a phenomenon called 'metal fatigue'. Hundreds of people had to die near Washington DC before radio altimeters and an electronic voice repeating "Pull up! Pull up!" were put in airplanes. We, quite horrified I expect, have come to realize that it often takes a disaster and bodies on the ground to stimulate an innovation in safety!

The question for all of us in eHealth is: should we recognize the importance of security policy and build security into our now highly distributed and ubiquitous systems? Or do we need to experience one disaster after another? Or maybe we just need a bigger disaster to stir us.

How many people have to be embarrassed, injured or die before we treat security as fundamental and essential, and build it into our systems?

Dominic Covvey is President, National Institutes of Health Informatics, and an Adjunct Professor at the University of Waterloo.

Nurses are drivers

CONTINUED FROM PAGE 14

loop-holes scooted through in the past by hand-written paper forms, unrecorded verbal orders, and manual interventions.

"If you don't have a CLMA system in place, you not only have physicians' hand-written orders and others manually transcribing the medication record. The pharmacist must also read the record and manually dispense the order," observes Yang of places where medical errors can blossom. But worse yet: "Without CLMA, when the medication reaches the floor there is no final check for errors."

Yang admits CLMA can, despite being all electronic, slow things down.

"It does take more time for doctors to put their orders in the system, but once they do, there's less potential for error. When the doctor writes the order, the nurse sees it, the nurse scans it, and automatically charts it. That's what's considered a closed loop," says Yang.

But all that wasn't put in place at NYGH overnight to immediate applause.

Pagliaroli, Yang, and their team didn't take technology offered to them by vendors, and just plunk it in and say here it is so go use it. To start with, they staged an introductory event with NYGH nurses and

pharmacists and asked questions like: How do we currently give medications? What are the problems with this process? Then all together they started to map out future visions of designing and implementing the best possible CLMA system for NYGH.

After that foundational event, NYGH's informatics team staged simulations and got the devices into nurses' hands in a "Device Fair" where they were encouraged to try the various types of software and hardware and to also suggest improvements.

But it wasn't these successes that gave fi-

nal shape to NYGH's CLMA. Rather it was failure, or rather the fear of it.

They did what is known as a FMEA, a failure mode and effect analysis. In this session, the CLMA team asked themselves: What's every possible thing we can think of that could go wrong?

After listing all such points of possible failure, the FMEA process calls for scoring the probability and severity of each potential problem and then ranking them. You then devise a "mitigation plan" for each to reduce the chance of that problem ever arising.

In future, NYGH's closed loop medication administration system promises to get even smarter about how it works and who uses it. Currently, the CLMA does not reach into the Emergency Department – where its benefits could be extended.

As always, NYGH will scale the informatics heights by small, carefully considered steps: "We always do incremental improvement; we learn; then we optimize; we make sure the technology does not get in anyone's way; and we do plenty of training before anything is ever implemented."

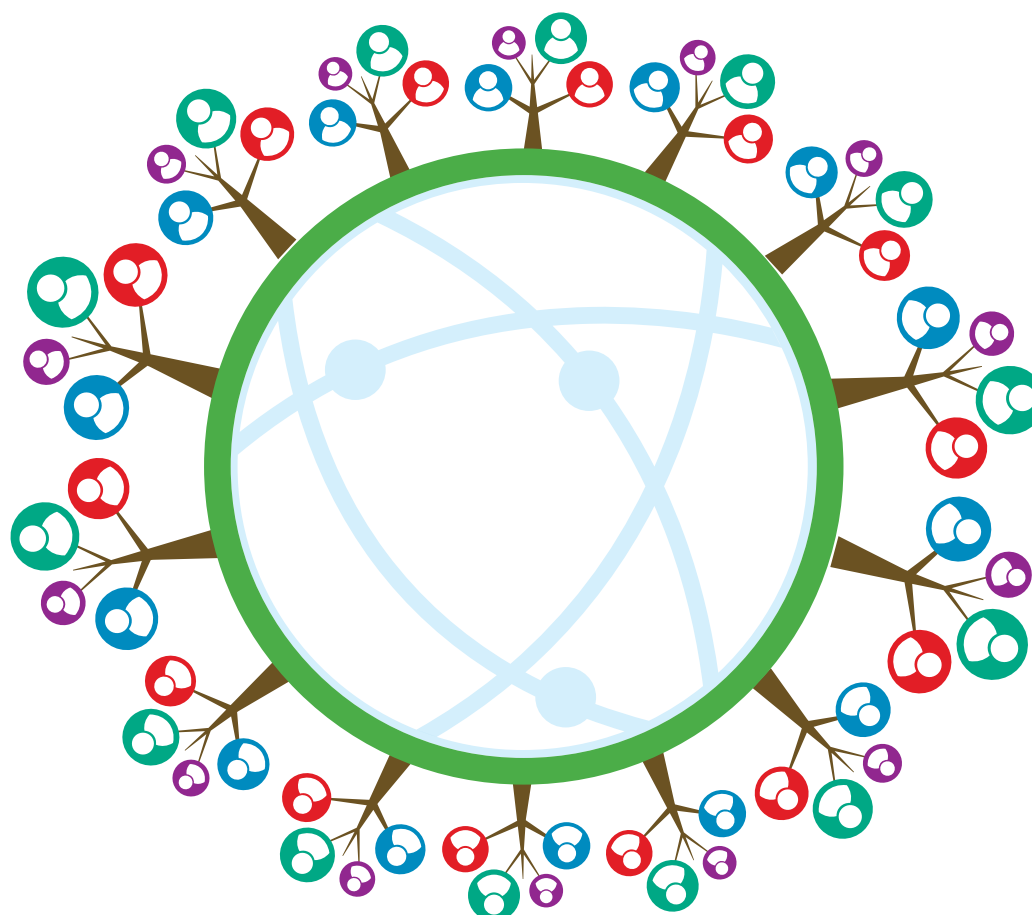
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CONTINUED FROM PAGE 5

clinics to let them buy in at a fraction of the cost. That's really important, because therapists are on their feet all day, lifting, pulling and doing physical labour. They're really at risk for injuries, and they should have coverage in case they get hurt."

Most clinicians want to focus on providing great patient care, not on administration. And even clinics that can afford support staff would prefer they focus on patients and not paper work.

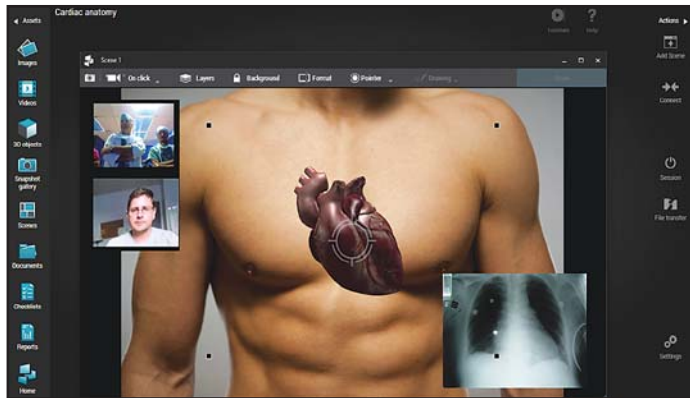
"With InnoCare, clinics can have a smiling receptionist at the front, and she won't be too busy processing invoices to attend to patients. It really increases customer satisfaction when all the staff focus on patients instead of administrative work. And we can answer their phones in the evenings and weekends, so patients can always reach a human being."

The company also offers more complex human resources services. "Most clinics don't have a HR specialist but they do need help. We can help with training and keeping them up-to-date in terms of legislative changes, policies and procedures. If there were a complex termination or just an incident you weren't sure how to handle, we could offer expert advice."

Clinics that sign onto InnoCare's services also get marketing help via a listing on the company's website. "Our clients get listed on our website, which gets 30,000 unique visitors a month to our website. That helps them get visibility and new patients."

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Reacts – a digital collaborative platform that brings remote interaction to the next level through “hyperpresence”



In their day to day clinical environment, health care professionals constantly need to interact with their patients and colleagues, wherever they may be. They need to share knowledge and expertise, reassure their patients, train and assess the competency of their students. What they need is a tool that allows them to remotely interact in a dynamic, engaging and user-friendly way. Reacts was created with this perspective in mind.

Reacts (“*Remote Education Augmented Communication, Training, Supervision*”) helps improve access to care, decreases costs, and improves efficiency and satisfaction among both patients and health care professionals. It has been designed to meet the highest performance and security standards of the medical industry.

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- Share virtual pointers to direct attention to anything on live streams
- Connect and stream multiple video feeds simultaneously, using any medical device that has a video output
- Securely share your applications or your desktop screen
- Share instant messages, files and documents easily and securely
- Manage your files and multimedia elements from your Reacts library
- Store and retrieve files centrally, with 2 GB of cloud storage per licence
- Perform virtual guidance by superimposing semi-transparent images, 3D objects, or live video streams onto a remote user's live stream
- Take snapshots or video recordings, and add annotations to any image, video, or asset
- Create checklist and report templates to ensure a standardized approach to care or to document your virtual encounters
- Use Reacts in simulation sessions to capture and record multiple video feeds that can then be reviewed offline for briefing/debriefing purposes



Reacts goes beyond the medical world. It can be used in several other fields such as education, field services, public safety, business, and any other area in which interactive, multimedia collaboration is needed.

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