EFFECTIVE PATIENT ENGAGEMENT
LEADS HOSPITALS TO HIGHER MARGINS

M2M COMMUNICATION RESULTING IN
NEW & EXCITING POSSIBILITIES

IMPROVING LIFE BY CONVERTING
DECADES OF DATE INTO VALUABLE INFO

INNOVATIONS
MOVING Healthcare
UPWARD

Foreward

Dear Readers,

Advancement of an industry is an ongoing process and innovations has always become a subject of discussion. The leaders in the industry are already in line to improve the level of services through the implementation of new and exciting possibilities emerging in the Healthcare sector, and the few left behind are giving a tough thought on it.

With this in mind we introduce the latest edition of Hospital & Healthcare Management and the reading

starts with an eye opening explanation on how hospitals that offer a superior patient experience tend to have 50 % higher margins than their peers. Summarizing that hospitals providing superior experience not only have the opportunity to create happy and healthy patients, but a healthy financial future for themselves as well.

Next is a flashlight on the future of surgery where Mr. Jacques Marescaux speaks about it as well as answer few questions to explains how hybrid operating rooms benefits both patient and surgeons.

Then comes the section of the magazine where the spotlights is on innovations and the new technologies, products and services making healthcare move onwards and upwards.

To start with is a interesting read on M2M Communication explaining how the world appears to have shrunk into a virtual ball where everything is getting connected and so are the medical devices and how this is resulting to new and exciting possibilities in healthcare.

The fourth is a case study on how mobile innovation helped Saint Elizabeth hospital which is providing in-home health care to more than 18,000 people across Canada everyday to enhance mobility solution for in-home care.

The next describes how the doctors of a hospital situated 40 kilometers west of Brisbane in Queensland, Australia, is using a pocket-size visualization tool that allows them to provide immediate bedside assessment. This not only saves cost to the patients but has also reduce the burden on their x-ray department by 10 times as only about 1 in 10 is send to a formal ultrasound saving their precious time.

Similar is a situation for patients diagnosed with cancer when they have to wait for an average of 45 days in Europe between their first visit and treatment start date. Centre Oscar Lambret, a French cancer hospital, implemented an innovative speech-enabled reporting solution and slashed report creation time from 21 days to 3 days to give doctors an unprecedented mobility.

Our next case study decades of research data when converted into valuable medical insight making it more secure and accessible resulted in better medical care and health promotion to improve people's longevity and quality of life.

After years of glaring disparities in the healthcare sector, it is time that the system is streamlined to bring efficient care within our grasp. We, at Hospital & Healthcare Management are committed to keep you in sync with the latest developments in the dynamic field of Healthcare Management.

And with this in mind at the moment we keep accessible and effective healthcare at our top priority. And, with the increasing use of the new technologies and the adoption of innovations we look forward to a healthcare reform.

Until we meet again!!

Yuvraj Sahni
Editorial Department

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Events

Health Care in Asia 2016: The War on Cancer Forum
17 March 2016
The Ritz-Carlton Millenia, Singapore
Organisers   : The Economist Events
Email   : vivianyu@economist.com
URL   : www.economist.com/events-conferences/asia/healthcare-2016

Saudi Health 2016
16 May 2016 - 18 May 2016
Riyadh International Convention &
Exhibition Centre, Riyadh, Saudi Arabia.
Organisers   : Informa Life Sciences Exhibition
Email   : info@saudihealthexhibition.com
URL   : www.saudihealthexhibition.com

LEAP HR Healthcare 2016
06 June 2016 - 08 June 2016
Hyatt Chicago Magnificent Mile, Chicago, Illinois, USA
Organisers   : Hanson Wade Limited
Email   : info@hansonwade.com
URL   : www.leaphr-healthcare.com

HIMSS AsiaPac16
22 August 2016 - 25 September 2016
Queen Sirikit National Convention Center, Bangkok, Thailand
Organisers   : HIMSS Asia Pacific
Email   : syeo@himss.org
URL   : www.himssasiapac.org

14th Annual Barcelona 2016
15 March 2016 - 17 March 2016
Centre Convencions Internacional Barcelona, Spain
Organisers   : eyeforpharma
Email   : hdunn@eyeforpharma.com
URL   : www.eyeforpharma.com/barcelona

Building Healthcare Middle East
30 May 2016 - 01 June 2016
Dubai International Convention & Exhibition Centre, UAE.
Organisers   : Informa Life Sciences Exhibition
Email   : hospitalbuild@informa.com
URL   : www.buildinghealthcare-exhibition.com

Innovating Care Asia Pacific 2016
20 July 2016 - 21 July 2016
Suntec Convention & Exhibition Centre, Singapore
Organisers   : TalentGrid Ventures.
Email   : info@talentgridventures.com
URL   : www.innovatingcare-ap.com

Asia Medical 2011
11th October 2011 – 13th October 2011
Putra World Trade Centre 41, Jalan Tun Ismail,
50480, Kuala Lumpur, Malaysia
Organisers   : Malaysian Exhibition Services Sdn Bhd
Email   : paul@mesallworld.com
URL   : www.asiamedical.org

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LE MARCOM
Brands N Beyond

Effective patient engagement leads hospitals to higher margins & healthy future

Recent Accenture research suggests that hospitals that offer a superior patient experience tend to have 50 percent higher margins than their peers . Hospitals that deliver a superior experience have the opportunity to create happy and healthy patients, as well as a healthy financial future.

A superior customer experience doesn't just strengthen patient engagement — it also correlates to 50 percent higher hospital margins.

Cost cutting has long been the strategy hospital systems have first turned to for improving margins. Patient experience, on the other hand, is often viewed as a cost driver, with limited to no measurable financial upside. However, today's patients "shop" for healthcare services and, like all consumers, they want and will seek out the best possible overall experience when receiving care.

To examine the relationship between patient experience and hospital financial performance, Accenture analyzed hospital income margin data reported to the Centers for Medicare and Medicaid Services (CMS) and survey results from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS). Although HCAHPS is just one of many evaluative tools measuring patient experience, its widespread U.S. adoption makes it a good proxy for health consumer experience

The correlation between the health consumer experience and higher margins is nationwide and exists across all hospital types

The margin increase at urban hospitals is roughly eight times that of rural hospitals, suggesting that urban hospitals with a superior consumer experience achieve nearly double the margins of an average-experience hospital. This difference in correlation could be attributed to many factors – e.g., patients have greater choice in non-rural areas, and select the hospital that offers the best experience; or profitable hospitals, often located in non-rural areas, have the financial means to invest in improving the patient experience.

Prioritizing patient experience

These findings suggest that hospitals could achieve financial success through patient-centric enhancements rather than cost-cutting. For example, Accenture analysis shows that a hospital system earning $2B in revenue would have to cut 460 jobs (assuming a loaded salary of $100K) to achieve the same 2.3 per-

cent margin benefit that improving the consumer experience might bring through revenue growth. The data suggest that leading hospitals are indeed growing profitability by increasing consumer satisfaction, not cost cutting: Among the top 20 percent of patient experience performers, both revenues and costs are growing at an above-average rate, with revenue growth outpacing

> **A superior customer experience doesn't just strengthen patient engagement — it also correlates to 50 percent higher hospital margins.**

Type		Margin increase per 10% increase in HCAHPS score
Ownership	For Profit	+ 3.3%
	Non-Profit	+ 1.4%
Academic	Academic	+ 2.1%
	Non-Academic	+ 1.7%
Geography	Urban	+ 3.4%
	Rural	+ 0.4%
System	Part of a System	+ 2.3%
	Stand-Alone	+ 1.4%

W + 0.8% MW + 2.0% NE + 2.3% SW + 3.5% SE + 1.0%
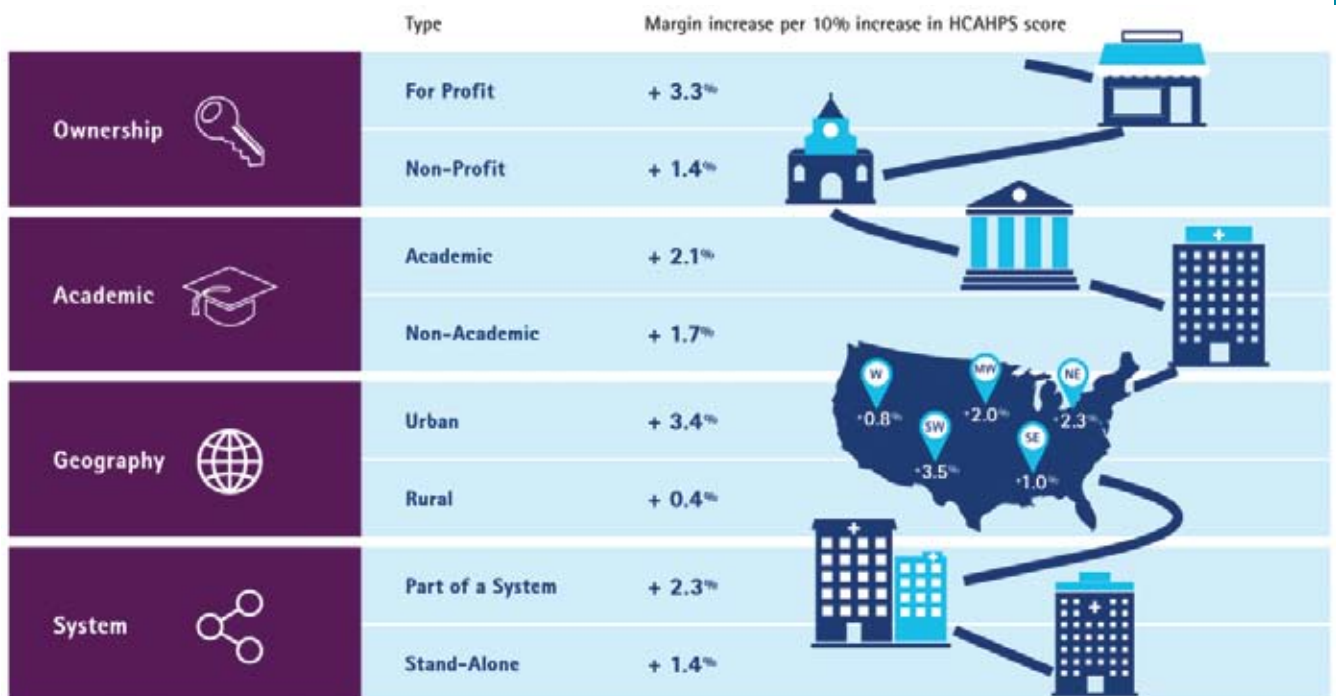
(Figure 1) Sources: Accenture analysis, HCAHPS Hospital Survey, Centers for Medicare and Medicaid Services

Metric	Top HCAHPS Performers	All Other Hospitals	Takeaway
2013 Margin Growth as % of 2012 Margin	9.9%	–4.5%	Hospital margins are growing faster for top HCAHPS performers
2013 Patient Revenue Growth as % of 2012 Margin	10.9%	5.8%	Revenue is growing faster for top HCAHPS performers than for other hospitals
2013 Operating Expenses Growth as % of 2012 Margin	7.8%	4.2%	However, costs are growing faster as well

(Figure 2) Sources: Accenture analysis, HCAHPS Hospital Survey, Centers for Medicare and Medicaid Services

The data suggest that leading hospitals are indeed growing profitability by increasing consumer satisfaction, not cost cutting

the growth in operating expenses *(Figure 2)*

Finally, this correlation is historical and growing in importance over time. Accenture analysis shows that margin increase correlated to a 10 percent improvement in consumer experience scores grew from 1.04 percent in 2008 to 1.72 percent in 2013 – this represents a 70 percent increase. As health consumers increasingly factor experience into their care selection decisions, the financial benefit associated with patient experience can only be expected to increase.

Better healthcare CRM, better margins

Hospitals that are the fastest to adopt patient experience and digital health best-practices (Figure 3) will be best positioned to improve their reputations, reap the financial rewards and outperform their peer

INSIGHT DRIVEN HEALTH
Six practices hospitals can adopt to better engage the health consumer

High performance. Delivered.

PUT PATIENTS FIRST

Use what you know about the patient to create experiences people appreciate. Personalize communications, interact with patients via their preferred channels, and always relate medical information and advice to their individual situation.

CONTINUOUSLY INNOVATE

Recognize the future of health care extends beyond the four walls of a traditional care setting. Challenge yourself to find better ways to address your patients' needs through new technologies and unprecedented collaboration that push the limits of traditional care.

INSPIRE YOUR PEOPLE

People do great things; processes do little things. Help everyone in the organization understand the crucial role they play in making patients healthier and happier, and align rewards and incentives to achieve common goals.

MAKE IT EASY

Guide patients to the right doctors to get the care they need when and where they need it, and help them understand how much care will cost in advance. Empower patients to do these things on their own, but make yourself available as their health advocate when they need. You.

EMBED DIGITAL EVERYWHERE

Recognize that you must meet your patients wherever they are and wherever they go. Develop both internal and external patient-facing digital capabilities that go beyond traditional back-office systems, websites, and mobile applications.

BUILD TRUST AND LOYALTY

Demonstrate that your first priority is your patient's health and welfare. Ensure personal health information is secured. Design digital interactions to build confidence and simplify messaging to create dialogue rather than diagnosis. Build relationships across the care continuum to deliver coordinated care and improved outcomes.

HOSPITAL

(Figure 3)
*Sources: Accenture analysis.*

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About Accenture Insight Driven Health

Insight driven health is the foundation of more effective, efficient and affordable healthcare. That's why the world's leading healthcare providers and health plans choose Accenture for wide range of insight driven health services that help them use knowledge in new ways- from the back office to the doctor's office. Our committed professionals combine real world experience, business and clinical insights and innovative technologies to deliver the power of insight driven health.
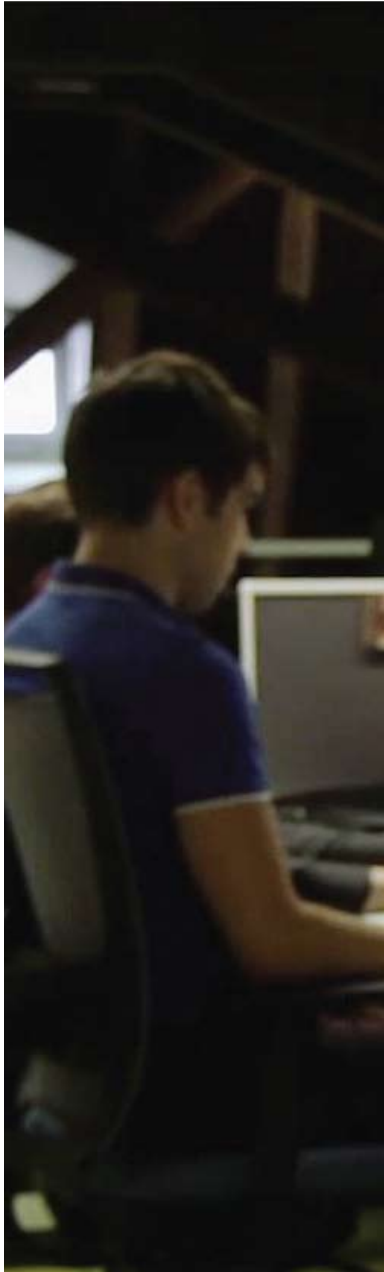
How Hybrid Operating Rooms Benefits Both Patient and Surgeons

Professor Jacques Marescaux, France, has revolutionized surgery and continues to push the envelope with unprecedented research and training ideas. He believes that hybrid ORs and augmented reality in surgery can improve patient care in the future.

In his recent interview for Siemens Magazine Marescauz answers few of the very interesting question on Hybrid operating rooms and how is it beneficial for both Patients and Surgeons.
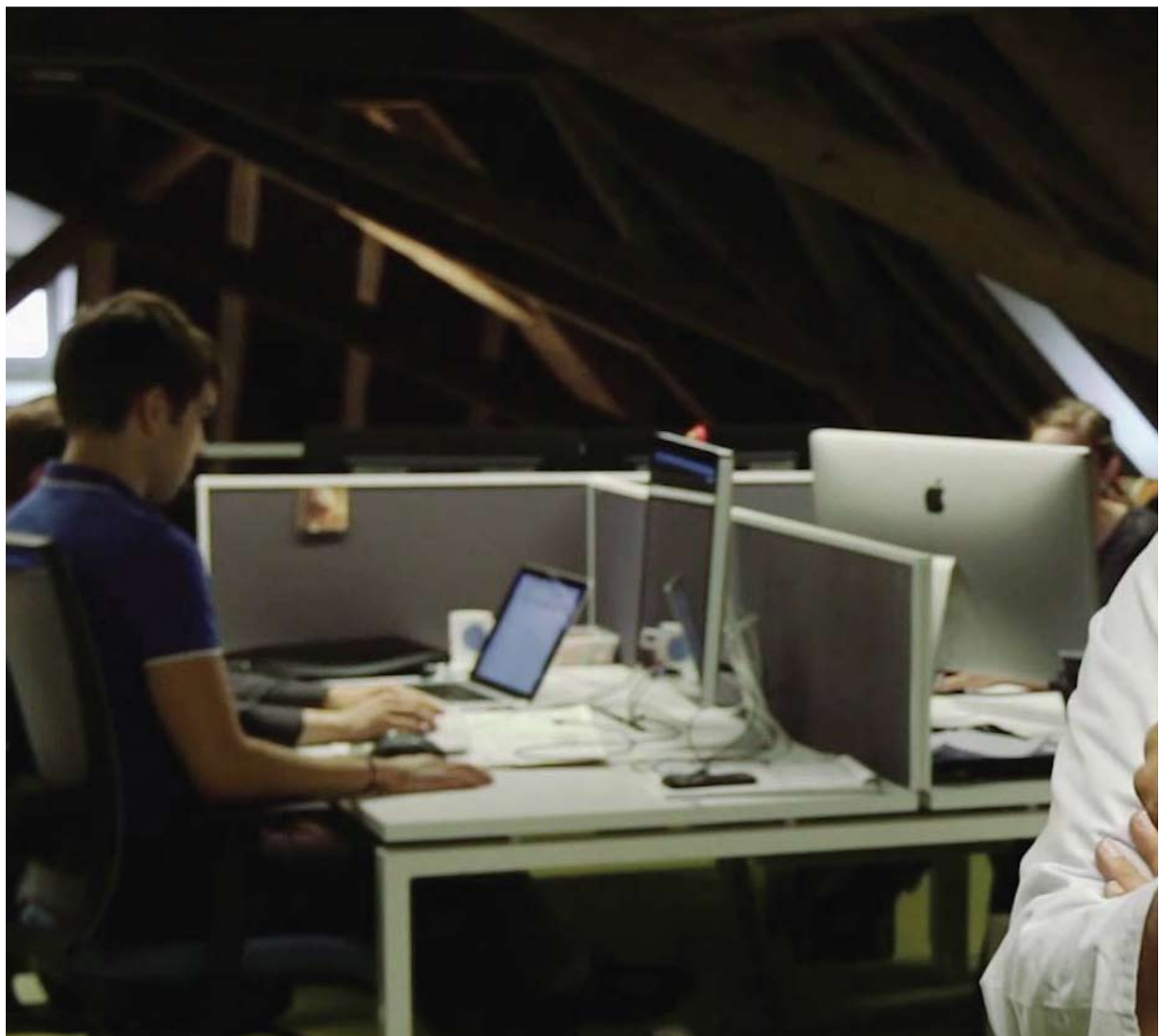
WHAT IS YOUR WISH FOR THE FUTURE OF SURGERY?

The real success for surgery will be the day when you really don't need surgery anymore in some cases. My wish is that imaging progresses and that targeted therapy continues to develop.

How would you define a hybrid operating room?

You always have a treatment to propose to your patient. Especially in the case of cancer. We can propose flexible endoscopy, laparoscopic surgery, or interventional radiology. During the operation, surgeons want every possibility to take a closer look inside the patient. Using flexible endoscopy plus surgery, or flexible endoscopy plus 3D image guidance, or interventional radiology plus surgery – that is the idea of the hybrid operating room.

How can we optimize patient care in the future?

One core topic in optimizing patient care is the availability of all patient data from before, during, and after surgery, along with the option of combining this data. Several projects
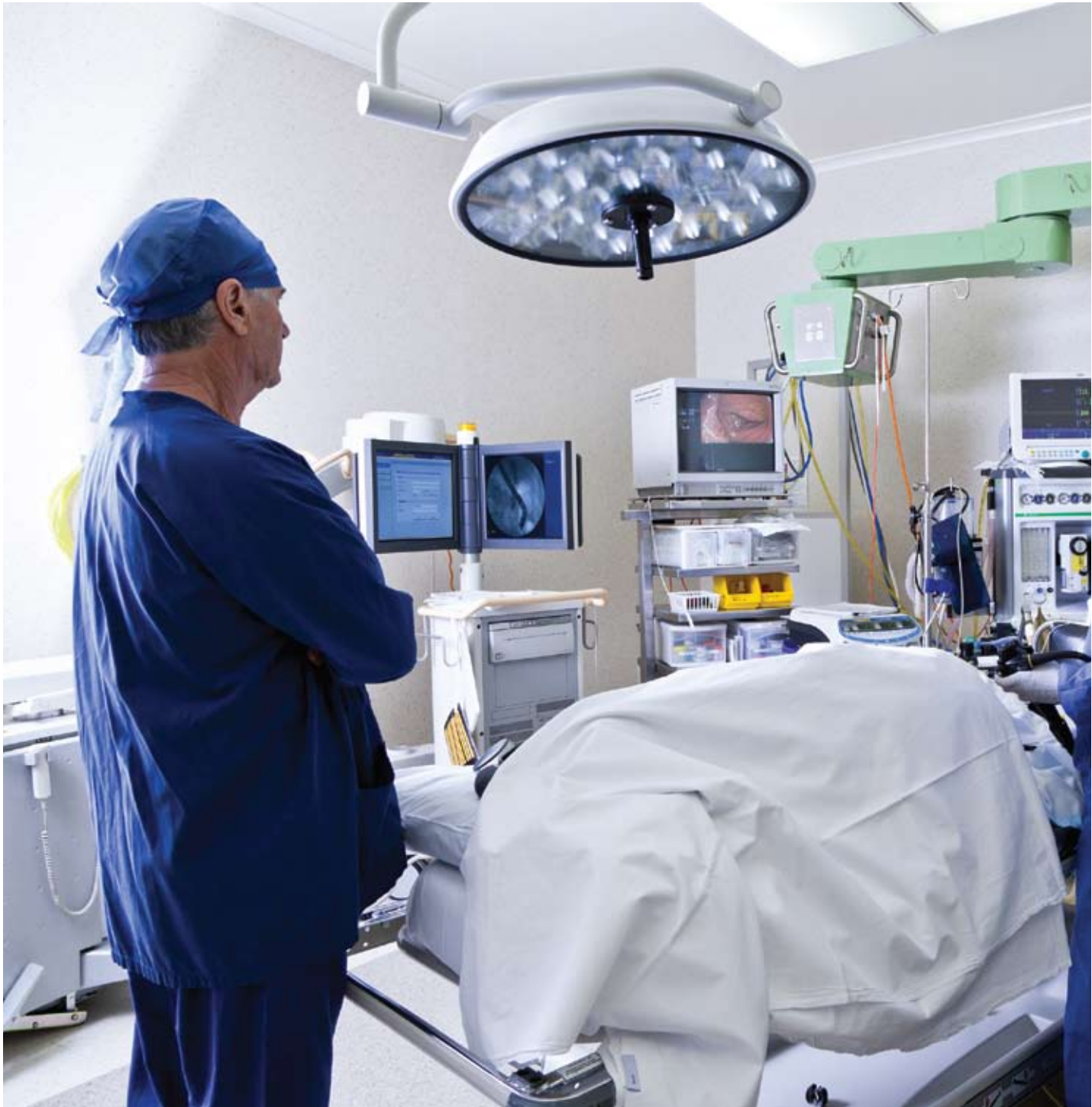
are underway that aim to superpose image data from different imaging modalities. The fusion of image data from an endoscopic camera with DynaCT data, and the fusion of ultrasound images with preoperative CT data are both particularly valuable for minimally invasive procedures.

How will surgery evolve from now?

A few years ago, all the companies developing imaging technology were focusing on the radiology department. Today, it is totally different. Surgeons want to look at all the details of the picture. They no longer depend on the radiologist's interpretation. For surgeons, the Artis zeego is a fantastic tool. You have everything you want in real time. But in the future, many surgeons still might not have access to a hybrid room. So they will need to have at least an intraoperative ultrasound system – that will be a good first step.

What is the role of 3D patient data in that respect?

Virtual reality is one of our institute's most important tools. It translates real data into digital data, thus allowing us to turn a medical scan into a virtual 3D clone of the patient. The surgeon can then prepare the procedure on the patient's virtual clone, as these simulations are becoming increasingly realistic. During the intervention, augmented reality provides a transparent view that should soon allow for the automation of complex surgical movements. This automation will only be possible with developments in the field of surgical robotics.

What opportunities do you see for augmented reality?

To me, augmented reality is the most important improvement for treating patients. One example is complex pelvic surgery, in which surgeons must see the different structures they have to preserve: the urethra, the vessels, and the nerves. In some complex cases, it is impossible to see these three elements. Therefore, we want to have the best image of each structure before the operation. The concept of augmented reality makes everything transparent. We need to have an intraoperative imaging system that allows us to see all details, even if the organ moves. I'm sure that if we can show that it is an additional benefit for both the patient and the surgeon, it will be mandatory for a hospital to have a hybrid OR. What we have to prove now is its efficiency.

WHAT SKILLS WILL SURGEONS OF THE FUTURE NEED?

In the USA, there is a lot of specialization, but the majority of surgeons are generalists working in smaller hospitals. I think that surgeons in Europe are more specialized today. One example is that we have "hepatobiliary surgeons" working with surgeons who only do transplants. And the future will probably bring even more specialization.

Can you give us an example of how you could prove that efficiency?

Today, a lot of money is still paid out in the event of complications. If we prove that a surgeon has a better view during the operation and that we can thus decrease the complication rate, then paying two or three million euros for a hybrid room is not too much. You will never be the "gold standard" in the future without this new OR concept.

What advice would you give to decision-makers planning an operating room?

The most important thing is to have enough space for all the devices and to give the team access to the patient. It is impossible to know what kind of equipment we will need for each surgical discipline in the future. But for general surgeons, it is important to collaborate with several disciplines on the same platform. If you can perform several steps in one operation, you don't need two or three anesthesias for the patient.

So what will be the real challenge?

All surgeons like new technologies – and the operating room of tomorrow, with all its robotics, will look like the cockpit of an airplane. You will have the robotic system, the 3D visualization, and a lot of screens. You will push the button and the technology will work for you. It will be very easy. But it will be a challenge for surgeons to know everything about radiation protection. Today, surgeons don't have enough knowledge of radiation. We want to organize courses to help them understand how best to manage the new kind of OR. WeBSurg is a platform for that.

To what extent do robots change operating rooms?

We are still in the prehistory of robotics. At the moment, the robot just improves a surgeon's abilities. Sure, it is more precise, but that is really just "peanuts." However, there is another advantage that will change everything: A robot interface can analyze 1,000 signals per second. When you combine the preoperative image and 3D image guidance with the skill of the surgeon, it will be a huge benefit for the patient.

So are we on the way to the ideal operation?

Today, the 3D image that we take from the CT scan gives us the option of doing the operation before the operation. It is like producing a movie. You do one minute of the operation, then you stop. Then you do another minute, stop again, and then cut the best parts together. The mixture of the imaging and the abilities of the robotic system could really lead to the ideal operation. Maybe we will have automatic surgery in 20 or 30 years' time.

What is your wish for the future of surgery?

The real success for surgery will be the day when you really don't need surgery anymore in some cases. My wish is that imaging progresses and that targeted therapy continues to develop.

SIEMENS

INNOVATIONS RESULTING TO NEW POSSIBILITIES IN HEALTHCARE

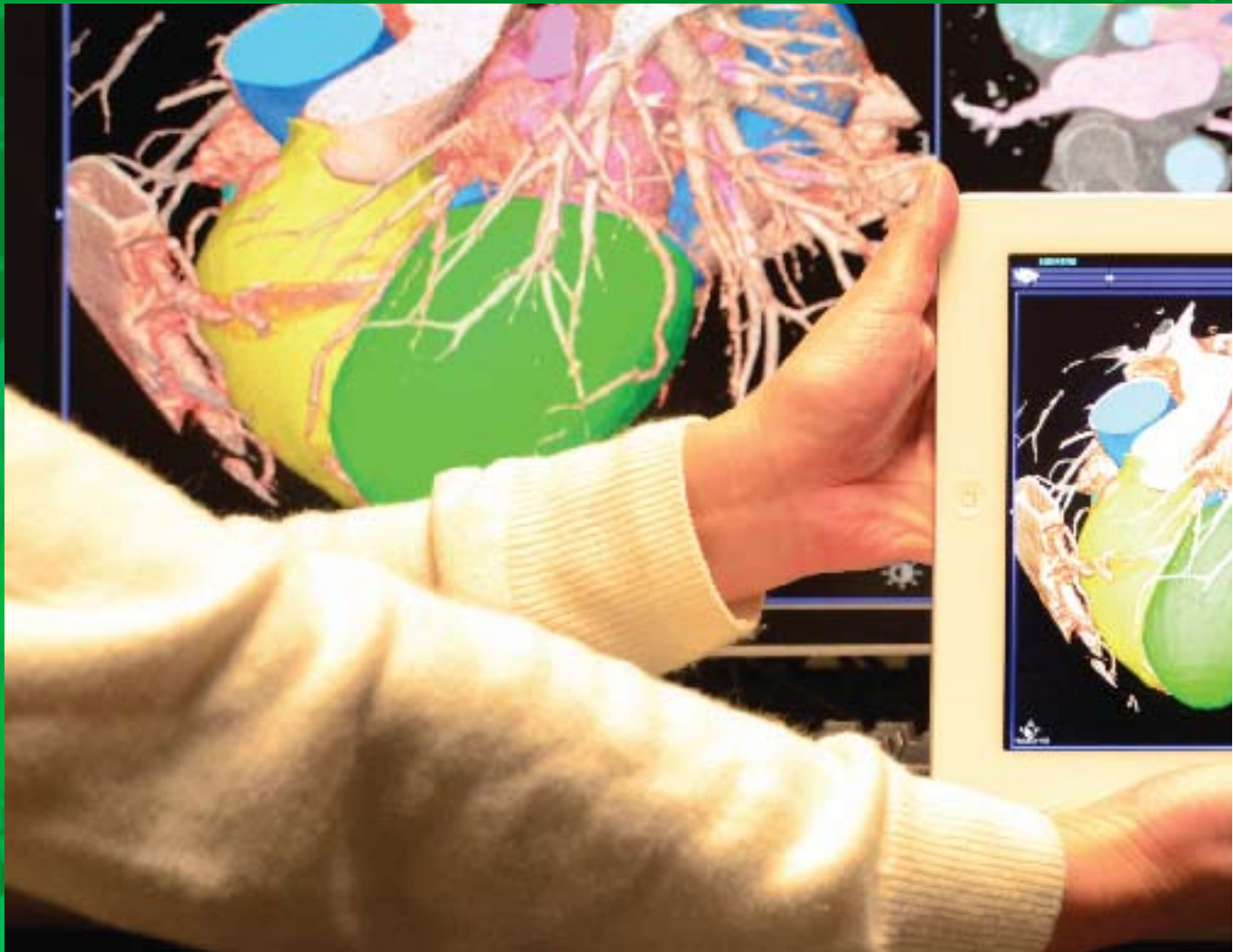M2M communication resulting in new & exciting possibilities in healthcare.

Mobile innovation to provide a powerful, secure mobility solution for in-home care.

Innovation in visualisation saving patients to proceed to a formal ultrasound.

Speech-enabled reporting solution strengthened Patient Care.

Improving quality of life by converting decades of date into valuable info.

M2M communication resulting in new and exciting possibilities in healthcare.

The world appears to have shrunk into a virtual ball. People are getting connected through devices; machines are getting connected; and today, even homes are getting connected. Everything in the world is getting connected. So, what about medical devices? Well, they too are.

The world of healthcare is also on the threshold of disruptive changes, happening due to the proliferation of mobile devices and the ever-increasing connectivity between them. Technological advancements in networking and telecommunications have led to the emergence of new products, services, business avenues and models that were hitherto unheard or unthought of. The latest addition to this ecosystem of connectivity is machine-to-machine communication also called, in short, M2M communication.

WHAT IS M2M COMMUNICATION?

Machine-to-machine (M2M) communication is an umbrella term used for any technology that enables two machines to transfer data and information between them without human intervention. Medical devices can be connected and made to talk with each other, enabling the transmission of vital data between them. This transmission results in new and exciting possibilities in healthcare, especially in areas such as patient care, patient monitoring, medical device maintenance, manufacturing and making an efficient medical supply chain.

This whitepaper provides an overview of the various factors that are now influencing the direction of medical devices toward M2M, and the elements that are driving its growth, evolution, adoption and proliferation. It will also look at some of the challenges involved and provide a few exciting use cases.

WHY SHOULD WE STOP AND TAKE NOTICE OF THE M2M WAVE?

According to IDC, there were 9.1 billion connected Internet of Things (IoT) units in 2013. Cisco estimated that in 2003, there were nearly 500 million connected devices: In 2012, this number rose to 8.7 billion. It projects that by 2020 there will be 50 billion connected devices, showcasing

the exponential growth of the M2M ecosystem.

This includes medical devices, hospital equipment, cars, electric and lighting poles and a variety of household equipment such as televisions, refrigerators, washing machines, doors, air conditioners, heaters, manufacturing equipment, trucks and pallets—the list is literally endless. Take into account all the associated data, interfaces, platforms, frameworks and services that grow with it, and this would be a gargantuan growth of an entire ecosystem at an astonishing pace. Undoubtedly, the world has to take advantage of it. Data generated and communicated through connected machines can be considered to be more reliable, accurate, structured and cleaner when compared to other data pools like the unstructured data of social media or human-generated data. Thus, data flowing from connected machinery is more preferable for building robust and secure applications.

The figure below shows that IoT would majorly rely on M2M communication in the future. We are going to witness a network that is dominated by machines, and M2M data traffic will overtake all other data streams on the internet. Machines, not humans, would be the major data generators and consumers on networks. Hence, M2M is being used synonymously with IoT and

is being seen as the next big thing with the potential to create new revenue-generating streams for product manufacturers, system integrators, IT vendors, Cloud vendors, among others.
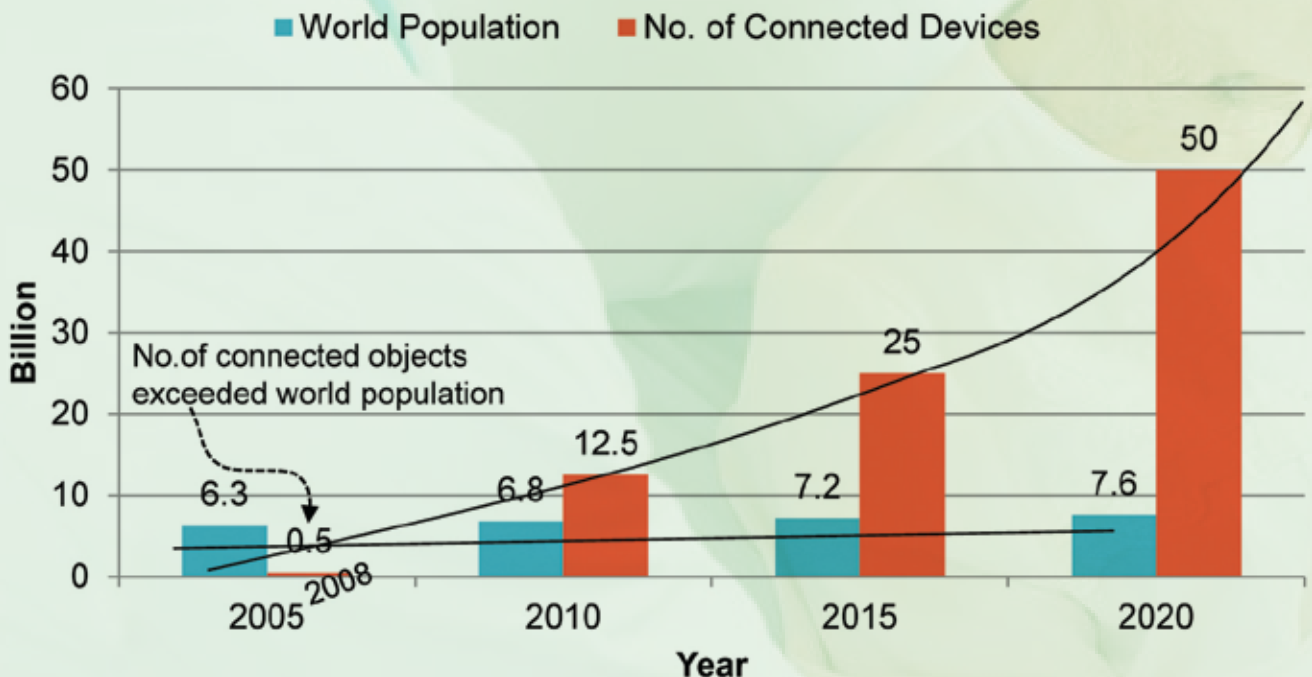
WHAT IS MAKING THIS HAPPEN NOW?

Wireless Connectivity Boom

With the exponential rise of wireless technologies and standards like Wi-Fi, Bluetooth, ZigBee and Z-Wave, several efficient network-connectivity topologies, which were previously infeasible, can now be implemented economically because using a wire that incurs cost is unnecessary. Wireless connections can be achieved with more redundancy and lesser latency, thus making them more reliable and robust than wired networks. They are designed to use bandwidth efficiently, consume minimal power and get easily configured within a demarcated area, irrespective of the device's exact physical location. Such designing makes these connections an ideal choice over wired networks and ensures wire-free, cost-effective, hassle-free additions of machines to the network.

Advanced Sensor Technology

New technologies and advancements in the design and miniaturization have made—and are making—sensors cheap-

er, smaller, faster and more responsive. There is a ubiquitous range of sensors currently available, including the temperature sensor, pressure sensor and ambient light sensor that can be incorporated easily into the devices.

IPv6

The emergence of IPv6—the latest Internet Protocol (IP) version—is paving the way for IoT. Unlike IPv5, the latest version ensures that there is a limitless number of IP addresses made available. With IPv6, an IP address can be made available for each and every machine that can be connected to the network.

Cloud Technologies

The emergence of the Cloud technology has ensured a high availability and uptime of data round the clock. Devices can remain connected, generate and consume data and provide analysis, alerts and actions at all times. The technology is undoubtedly the major enabler for this, and all the subsequent layers of interfaces, applications and analysis are built on top of the machine-data layer on the Cloud. Moreo-

M2M communications have profound effect on the medical device field, as connected medical devices can bring in revolutionary changes.

ver, many chipset manufacturers have come up with intelligent operating systems within the embedded chips, which can provide seamless data integration with the external Cloud.

The age of data and analytics

Keeping pace with the rise in the data generated, there are competing developments in data science and analytics to handle humongous data. New technologies aimed at handling and analyzing big data not only manage huge amounts of data, but also seek them as a source of hidden insights for adding value. It would not make sense to have a rapidly growing data footprint without these technological augmentations to support, enable and derive value out of it.

WHAT NEW CHANGES CAN WE EXPECT IN MEDICAL DEVICES?

M2M communications have profound effect on the medical device field, as connected medical devices can bring in revolutionary changes. This can add a whole new dimension to patient care, physician interaction, medical device usability and maintenance. Umpteen avenues in services, innovation and business can be opened up. A few such use cases have been detailed below.

Predictive Maintenance of Medical Devices

The medical devices that are used to treat or diagnose life-threatening conditions are quite complex and ex-

Figure 1: HCL's high-level M2M platform
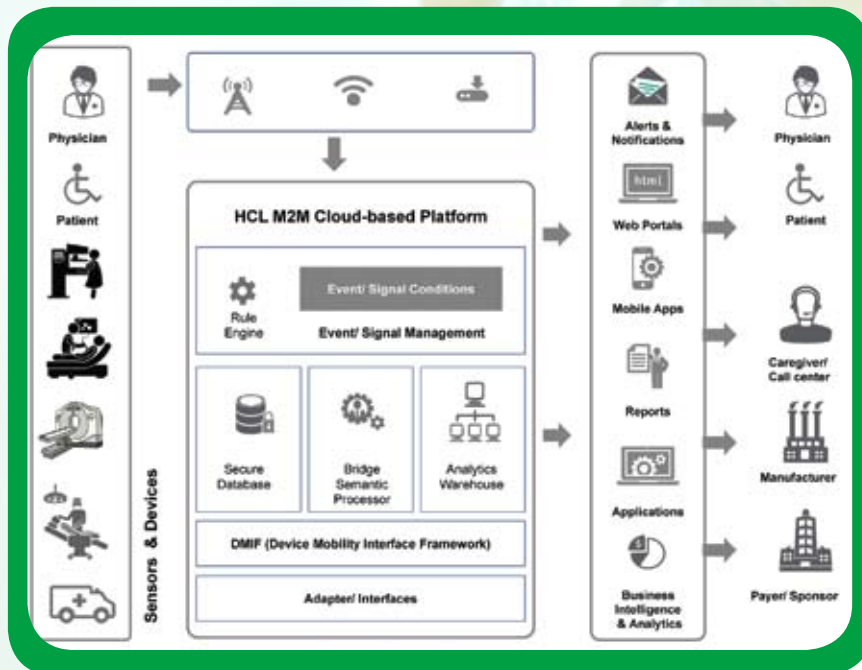
pensive. They need to be operated by highly skilled personnel and need to be in the best of conditions at all times for giving accurate results. Error tolerance in such devices is near zero: This is a very difficult feat to achieve, given the wear and tear involved. The best way to do this is through their proactive maintenance, and M2M is the best that technology has to offer for this purpose. Connected medical devices can continuously stream data regarding their usage, which can be stored on a secure Cloud. Monitoring and collecting usage data can be done round the clock and can be analyzed in real time to check the need for scheduled maintenance. Based on the real-time analysis, future faults or failures can be predicted and averted beforehand, and the required parts or spares that are worn out or damaged can easily be found and replaced. This would greatly reduce the maintenance costs for hospitals or device owners.

Intelligent Manufacturing

Imagine a scenario where all the medical devices are connected, and M2M data is available in real-time. Device usage statistics can be analyzed to establish usage patterns and can be integrated with the manufacturing department of a medical devices company, providing it the insights into which parts are getting frequently worn out, which ones need more inventory and which ones need less. Based on prolonged and historical usage patterns, insights can be drawn into design changes that are required to make the devices more efficient and less prone to error or repair. These inputs, received in advance due to the integration of M2M data with the ERP, would help streamline production and reduce inventory

Smart medicine dispensers can record the time and date when the medication is taken and can alert the patient when she/he forgets to take it.

costs, thereby enabling the organization to maintain a lean and agile supply chain.

Smart Hospitals

In the current scenario, hospitals are the sole operators and owners of medical devices. In the future, where these devices will not merely be machines but data generators and recorders in a connected network, both the hospitals and the device manufacturing and assembling plants would have a view or access. Hospitals can pass on some of the burden of monitoring and maintaining the devices to their manufacturers or third-party organizations assigned for this purpose. Hospitals or medical practitioners can concern themselves with only using these devices rather than spending valuable time on their maintenance. More advancements can even lead to medical devices being offered as a service rather than being sold as a device. In this case, hospitals or medical practitioners will not own the device, but only pay for its usage while the device would be owned by its manufacturer or product vendor. This can usher in rapid changes in developing countries owing to the economic feasibilities.

Automatic Alerting Systems

Smart medicine dispensers can record the time and date when the medication is taken and can alert the patient when she/he forgets to take it. GPS-enabled, smart medical devices can be worn as a watch and provide continuous location details of patients, suffering from Alzheimer's disease, sleep walking, epilepsy, to name a few. These devices can send alerts or warnings to the concerned medical practitioner or caregiver whenever the patient moves out of the safety confines or when found to be suspiciously stationary.

Emergency Medical Services (EMS)

In case of emergencies, even before patients arrive at the hospital, their information can be sent remotely to the hospital so that it can be ready with the necessary equipment for initiating treatment.

Remote vital sign monitoring from a hospital environment

Wirelessly enabled miniature devices can be embedded into patients with chronic illnesses like diabetes, hypertension and Alzheimer's disease so that their vital signs can be remotely monitored by physicians without the patients actually visiting the hospital. This can be made possible with the continuous data stream that is broadcasted by these wireless-embedded devices that can be built according to a wide number of wireless protocols currently available such as ZigBee and Z-Wave.

Post-marketing Surveillance of Medical Devices

The devices can be monitored for their safety and efficacy even after they are approved for use. The data generated and streamed by the embedded chips in these devices is far more accurate and reliable than human input data. Apart from the above scenarios, there are several other areas such as medical imaging, image-guided surgeries, operating room logistics and smart ICUs in hospitals that can take advantage of this wave to bring in better planning, more efficiency and differentiated service.

WHAT WILL BE THE ROLE OF IT VENDORS?

IT vendors will play a significant role in the entire IoT ecosystem. The humongous data that would be generated by the machines would need to be managed, analyzed and used by end users. This would be possible only
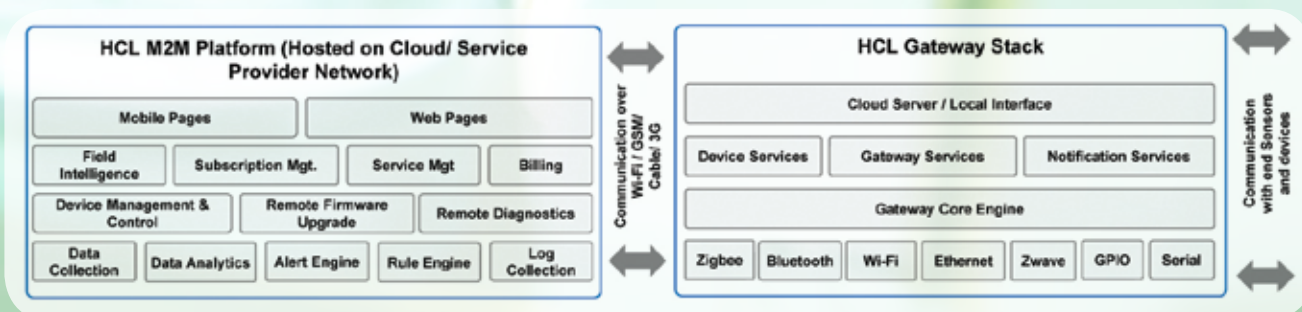
HIGH-LEVEL ARCHITECTURE

Figure 2: HCL's M2M platform architecture

with the help of intelligent applications that have to be built on top of the machine communication layers. New business models can be enabled with an entirely new set of applications for both the industry and end users or consumers. Application development in this area is still in its nascent stage, but there is potential for an exponential rise. The fragmented landscape of the current standards translates to more opportunities before consolidation takes place. IT vendors/system integrators or application developers can provide multileveled service. They can start with the application development on top of the machine data layer or the Cloud API, or provide the application development platform with API management, or they can start right from providing the Cloud platform to delivering the final applications.

Approach

M2M is a multidisciplinary ecosystem, and there can be no single best way of doing things. There are several approaches to harness and leverage the power of M2M communications. Several point solutions right from the realm of device connectivity to data analysis and visualization can come together to provide innovative business solutions. Alternately, there can be integrated platforms offered by several vendors that can offer better bases to build robust applications quickly.

EXAMPLE OF A PLATFORM & THE COMPNAY APROACH?

Platform Approach

One such company providing M2M platform is HCL. HCL has invested in a framework that provides an integrated approach for standardizing data collection across medical devices, managing the data securely and provisioning for several services.

At a high level, the major components of such a system with its activities, devices, infrastructure and supporting services are presented below.

HCL's M2M platform offers common shared services to the application layers. The integrated approach brings the required tools and platforms together. All the necessary features like data storage, real-time event collection and correlation, API management and analytics will be exposed as services to the higher order applications. The platform is based on SOA principles and delivers containerized capabilities/services to internal and external integration points. Key facets of the platform are as follows:

- Offered as a completely managed Cloud-based solution
- Comes with most of the utilities and components that are configurable or customizable, significantly reducing the time to market and the cost
- Has unique capabilities to aggregate and harmonize data to industry standards such as BRIDG, enables the customers with a wider usage of the information and sharing across departments.
- Can be further co-developed/customized with partners

Major components of the framework also follow the plug-and-play mechanism to make the integration much

> **Technologically, there are still certain gaps that need to be bridged to complement the emerging ecosystem.**

easier. It offers several secure APIs, which allow integration with third-party applications. HCL's M2M Gateway, AEGIS, extends the reach of an M2M service provider into device networks in healthcare provider settings or patients' homes. The platform provides for options like real-time data processing and analysis of large volumes of data. It contains a big data-based data syndication and analytics engine, which helps drive the continuous analysis of myriad sets of data from different sources/feeds. The platform also contains a Mobile App Kit that enables application development in multiple mobile devices/operating systems.

IMPEDIMENTS AND CHALLENGES ON THE ROAD AHEAD
At present, medical device adoption of M2M communication is very low as the technology is relatively new and immature. For better adoption, the following challenges need to be addressed:

Fragmented Technology Landscape
Technologically, there are still certain gaps that need to be bridged to complement the emerging ecosystem. No one standard exists for data interoperability. The presence of disparate standards for data is a major roadblock. Even

if we look at only wireless connectivity, there are plenty of network protocols like ZigBee, Z-Wave, INSTEON and En-Ocean, each optimized for a specific purpose, but is not interoperable. However, more standards are ensuring optimum and energy-efficient network topologies, which might increase the efficiency of connected devices in the future while at the same time keeping a check on energy consumption. An ideal M2M data communication environment would be agnostic to the underlying technology and should be plug and play. We definitely have a long way to go before we get to that point.

Disparate Device Data Formats

There are a host of instruments and devices that need to communicate with each other and their number keeps increasing day by day. Several devices like CT scans, X-ray machines, ECG monitors, wearable medical devices and pacemakers have their own formats and file extensions for the output. Images like DICOM files that are heavy due to their high-image resolution might need to be integrated with lightweight applications, which require building several custom interfaces. It is a fact that there is no common standard of data exchange, which only multiplies the number of interfaces for each of the protocols; thus bringing in a lot of complexity and cost.

Security and Compliance

Data collected from the medical devices can be extremely sensitive and needs to be protected from unauthorized access. Several data security standards and policies like HIPPA should be adhered to, but in contrast, the ever-evolving and changing technology landscape makes it very difficult to comply with them. Also, government regulations are not comprehensive and are evolving with the technology, which only makes for a larger gray area.

### Scalability and Cost Constraints

Different types of data are generated by medical devices. The data comes in several types, for-

It is clear by now that the healthcare segment is set to ride on the technology wave enabled by connected devices that can seamlessly share data with each other.

mats and sizes and so the storage needs differ. Some medical devices generate high-resolution images for which there would be a particular storage architecture. Some may warrant high network and data availability and synchronous operations for which the storage architecture may differ; for others, a low network availability might suffice. Hence, storage architecture could differ with devices. However, with all the devices in connection and all their data accumulating at the backend, it would be challenging to make devices nimble and provide for flexible storage systems and architectures for the backend while ensuring optimum cost and performance.

CONCLUSION

It is clear by now that the healthcare segment is set to ride on the technology wave enabled by connected
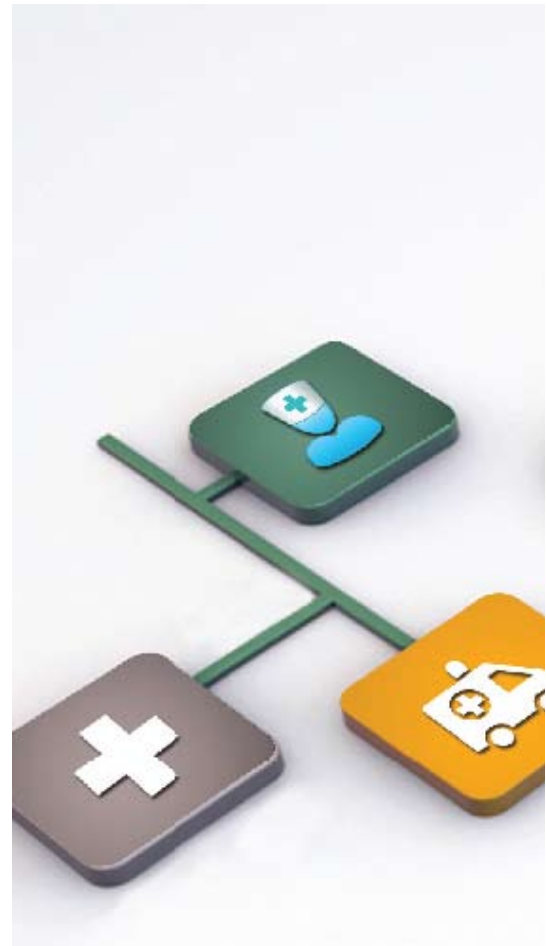
devices that can seamlessly share data with each other. Medical device companies should brace themselves to catch up with this wave. It would be a multidisciplinary ecosystem and stakeholders will be many. The new streams of data that can be generated hold incisive insights and drive the future of medical device maintenance, patient care, manufacturing processes, lean supply chains and much more. The possibilities are limited only by imagination. IT vendors and system integrators are going to be the key enablers of an empowered ecosystem with a maze of data streams. Boundaries between hospitals, clinics and homes will become blurred, and care will get more personalized and customized. The ever-increasing range of sensors, decreasing cost of data hosting, innova-

tions in network technologies, emerging frameworks on big data, data analysis and visualization will come together for an exciting and new breed of medical devices and services.

HCL LIFE SCIENCES & HEALTHCARE

HCL is a leading provider of Life Sciences and Healthcare Business and Technology services. HCL are the chosen service provider for enabling new growth drivers for our clients, providing them with industry leading best practices, taking care of their compliance needs and ensuring gold standard process cycle times. HCL clientele includes seven of the top ten global pharmaceutical companies, seven of the top ten medical devices companies, six of the top ten health plans, three of the top five CRO's and two of the top three data providers. Equipped with certified technology experts and domain specialists, HCL offers services in critical areas of the life sciences and healthcare eco system such as drug discovery, clinical development, drug safety, regulatory compliance, manufacturing and plant automation, commercial, Healthcare analytics, Population Health Management [PHM], mHealth, member experience management [MEM], fraud, waste and abuse management [FWA].

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HCL

Transforming in-home care through mobile innovation

Canadian healthcare provider Saint Elizabeth used mobile innovation to provide a powerful and secure mobility solution for in-home care. With Samsung devices and KNOX Workspace security they were able to offers their workers a powerful tool for improving patient care while maintaining patient privacy.

HEALTHCARE CHALLENGE

Healthcare workers face a unique set of challenges when providing care designed to help patients live independently in their homes.

To help healthcare organizations like Saint Elizabeth increase efficiency and improve the quality of care, mobility solutions must meet these requirements:
- Be easy to use and maintain.
- Protect patient information.
- Support a myriad of health and productivity applications.

BENEFITS

With Samsung devices and KNOX Workspace security, Saint Elizabeth offers its workers a powerful tool for improving patient care while maintaining patient privacy.

More efficient, effective healthcare

The Samsung devices and a range of apps help Saint Elizabeth healthcare workers connect the circle of care. Staff can schedule appointments, plan and navigate travel routes more efficiently, and electronically record

BUSINESS ISSUE

Every day, Saint Elizabeth provides in-home health care to more than 18,000 people across Canada. Its vast network of 8,000 nurses, personal support workers, and rehabilitation therapists complete more than six million visits annually. To continue its business focus on quality, productivity and efficiency, the health care provider sought a mobile technology solution.

SOLUTION

Saint Elizabeth needed a technology solution to help its vast network of remote workers stay connected, access information quickly, and deliver a world-class level of health care. Working with Samsung, Saint Elizabeth selected three types of devices to empower their dedicated staff. Devices included 5,000 GALAXY Tab S LTE-connected tablets and 500 GALAXY S5 and Note 4 mobile devices optimized for on-the-go performance.

Each device includes KNOX Workspace to ensure security. Patient data is protected behind two factor authentication. Since KNOX Workspace also includes integration with Enterprise Mobility Management (EMM) solutions for configuring the management and security settings of Samsung devices, Saint Elizabeth can use SOTI Inc., a Samsung EMM partner, to manage, control, and monitor the devices.

RESULTS

The success of the pilot project has led to a national rollout of the Samsung tablet based mobile solution. As part of its transition from paper to electronic record management, Saint Elizabeth can now deliver an even higher level of care to the people who depend daily on in-home services, while ensuring patient data stays protected.

patient data from a single device.

Protects patient privacy

KNOX Workspace protects workers' personal information in a separate container from patient data and applications. KNOX Workspace applications and data cannot be accessed or shared with any applications outside of the Workspace.

Saint Elizabeth can specify that health workers input a password and one additional identifier to ensure authorized personnel are accessing patient data.

Easy to use and maintain

Staff can get up and running quickly, since Samsung GALAXY Tab S, S5, and Note 4 devices are intuitive to use. Features like Multi Window, Ultra Power Saving Mode, and SideSync 3.0 make it easier for healthcare workers to stay productive and spend more time on patient care. Since KNOX Workspace supports MDM/EMM solutions, Saint Elizabeth can also centrally manage security and remotely troubleshoot any issues.

IT can be confident that company data is secure, while remote employees can use the device for personal apps and data.

ENTERPRISE-READY SECURITY

The KNOX-hardened Android platform protects your infrastructure with multi-level, hardware-to-application security via Trusted Boot and ARM TrustZone-based Integrity Measurement Architecture (TIMA). This keeps devices safe from hacking, viruses, and unauthorized access.

SAMSUNG KNOX WORKSPACE

KNOX Workspace is a manageable, on-device mobile security solution. By keeping enterprise and personal data separate with enhanced technology, the Workspace is secure enough to run on government-grade networks.

Separation of professional and personal data.

IT can be confident that company data is secure and manageable, while remote employees can still use the device for personal apps and data. Healthcare workers can switch between the password-protected KNOX Workspace and personal apps with a tap of a button.

Secure applications. Only secure, tested apps make it onto the KNOX Workspace. A full collection of ready-to-use apps are preloaded, including Contacts, Calendar, Phone, Browser, Camera, and Email.

Two-factor authentication.

Organizations have a variety of options—including swipe patterns, security PINs, and passwords--to
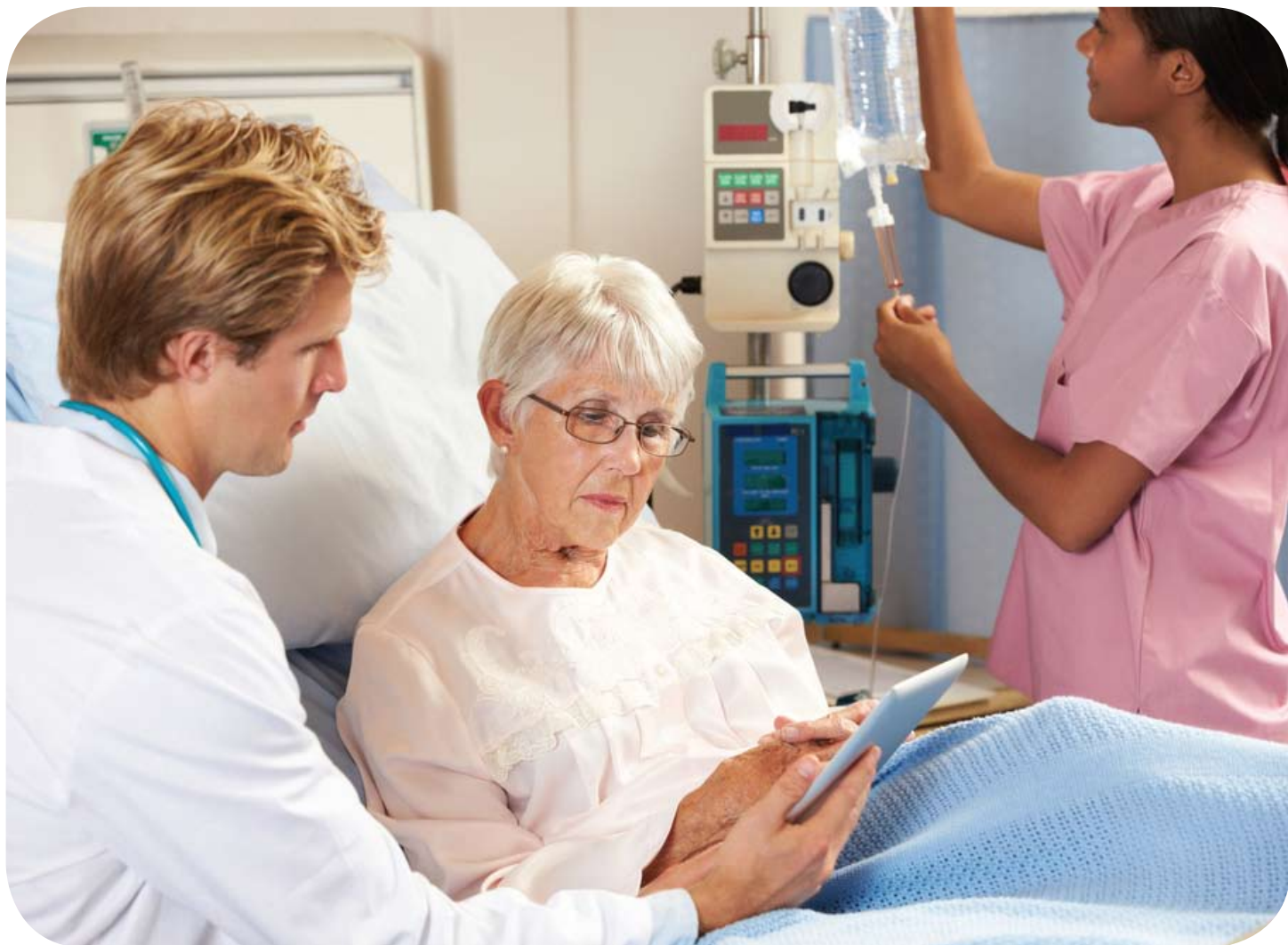
authenticate employee identity and further protect patient data in the KNOX container.

MDM Integration.
KNOX Workspace easily integrates with MDM or EMM solutions, enabling IT to tailor security to the specific needs of the organization. More than 500 supported IT policies and 1,000 MDM APIs are available with KNOX Workspace.

ABOUT SAINT ELIZABETH
Saint Elizabeth is a national health care provider and social innovator with a powerful vision for the future. As a thriving not-for-profit organization fuel by social impact and a century of forward-thinking, Saint Elizabeth employs 8,000 people and visits 18,000 clients every day.

Whether it is nurturing the recovery of a single person or stimulating the thinking of an entire organization, Saint Elizabeth is firmly fixed on unleashing the power of people and communities.

> **IT can be confident that company data is secure, while remote employees can use the device for personal apps and data.**

To learn more, visit
www.saintelizabeth.com

ABOUT SAMSUNG ELECTRONICS CO., LTD.
Samsung Electronics Co., Ltd. is a global leader in technology, opening new possibilities for people everywhere. Through relentless innovation and discovery, we are transforming the worlds of TVs, smartphones, tablets, PCs, cameras, home appliances, printers, LTE systems, medical devices, semiconductors and LED solutions. We employ 286,000 people across 80 countries with annual sales of US $216.7 billion.
To discover more, please visit
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SAMSUNG

Innovation in visualisation saving patients to proceed to a formal ultrasound.

Pocket-size visualisation tool allows doctors to provide immediate bedside assessment and care at Ipswich Hospital which is a 341-bed teaching hospital situated at Ipswich, 40 kilometres west of Brisbane in Queensland, Australia. Ipswich Hospice is a six-bed facility located nearby.

> **Both the hospital's Palliative Care Unit and Ipswich Hospice provide quality palliative care for terminally ill patients and their families.**

The Palliative Care Unit at Ipswich Hospital and Ipswich Hospice manage patients in all phases of their terminal illness including symptom control, ongoing care options and end-of-life care.

Both Ipswich Hospice and hospital's Palliative Care Unit take patient referrals from any public or private hospital in Brisbane. An outreach scheme is also provided whereby health-care professionals look after terminally ill people in their home.

The healthcare team cares for patients ranging from teenagers to people in their late 90's and who have progressive, generally symptomatic disease, usually related to cancer. Staff have cared for patients with most types of cancer with the most common cases being cancer of the breast, lung, bowel and prostate. More than 80% of cancer cases seen are for advanced malignancy.

For these patients, the service provides pain relief and all management methods. Complications of a patient's underlying illness can include pleural effusion and ascites. A pleural effusion or collection of fluid in the space between the two linings of the lung, can lead to shortness of breath or difficulty breathing. While the accumulation of fluid in the abdominal cavity or ascites causes abdominal pain, discomfort and bloating. Shortness of breath can also occur if pressure builds on the patient's diaphragm.

To alleviate a patient's discomfort and pain caused by pleural effusion and ascites, medical staff use ultrasound to assess the cavity site prior to fluid drainage. Before the availability of Vscan, patients in the hospice or Palliative Care Unit were transferred to the hospital's X-ray department for formal ultrasound.

Vscan is a pocket-size visualisation tool that can be carried by medical staff and used at the point-of-care. Roughly the size of a smart phone, it houses powerful ultrasound technology that can be used in any clinical, hospital or primary care setting. It offers image quality that until recently was only available with a console ultrasound. The Ipswich medical team initially acquired Vscan as part of their plans to expand its Outreach Service so that more people can be treated at home rather than being admitted as a hospital inpatient for acute events. In this way, if the patient can be effectively treated at home or in the hospice, avoiding the time and cost involved in a formal hospital admission, hospital resources are preserved for other cases.

According to Dr Judith McEniery, medical staff use the Vscan to undertake an immediate assessment of patients at the bedside, enabling the palliative care team to operate independently of the X-ray department although on some occasions, the treating physician has made the decision to use both.

"I have been able to satisfactorily identify the appropriate drainage site for pleural effusion and ascites in a number of patients on numerous occasions, saving patients from going to the X-ray department. According to our records, only about one in 10 still proceeds to a formal ultrasound," Dr McEniery said.

"I think it is reassuring for patients to know that the doctor can reassess them at the time of the drainage procedure. It's quick and easy and doesn't produce any discomfort for the patient whatsoever," she said.

"I've had some people who wish to see the image of what is causing their pain and their apprehension can be allayed by seeing the fluid inside their chest or abdominal cavity. We can then easily insert a needle and withdraw the fluid."

A condition such as ascites can impact a patient's quality of life. One patient with carcinoma of the breast, also developed metastatic involvement of the lungs and abdomen and over a few months, developed a problem with gross ascites. Prior to the condition developing, she had been able to move around but the large collection of fluid in her abdomen, caused pain and great discomfort and prevented her from getting out of bed.

By using Vscan at the patient's bedside, the procedure was undertaken quickly and easily without the patient having to be moved. After a fluid drainage, the patient was much more comfortable and able to move from bed to chair. She was also able to eat more easily because her abdomen was not so swollen and tense.

By using Vscan, the medical team can visualise what they feel and hear with traditional palpation or auscultation techniques. In addition to assessing fluid drainage sites, the medical team have also used Vscan to elucidate complicated situations such as finding undiagnosed hydronephrosis on one patient.

In another instance, the liver metastasis was clearer on the ultrasound than on CT. On other occasions, the medical team have used the Vscan to scan a patient's bladder when a bladder scanner was not available on the ward.

> **In another instance, the liver metastasis was clearer on the ultrasound than on CT. On other occasions, the medical team have used the Vscan to scan a patient's bladder when a bladder scanner was not available on the ward.**
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> "
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> It has become a nice adjuvant to my care
>
> DR MCENIERY

Typically, the medical team have used Vscan to minimise the number of additional procedures required by their patients. These have included chest X-rays for patients with recurrent pleural effusion or the need for a formal ultrasound in the management of ascites.

"It has become a nice adjuvant to my care," Dr McEniery said.

ABOUT HEALTHYMAGINATION

GE's "healthymagination" is about better health for more people. We've committed $6 billion to continuously develop innovations that help clinicians and healthcare providers deliver high-quality healthcare at lower cost to more people around the world.

Healthymagination applies GE's scale and innovation toward achieving sustainable health through our advanced technologies and research and development capabilities. Just as our ecomagination commitments guide us in taking on global environmental challenges, we are proud to invite the world to join us on this unprecedented journey. For more information about our healthymagination commitment, visit www.ge.com/healthymagination.

Express Patient Care through Speech-enabled reporting solution

For patients diagnosed with cancer, it can be difficult to learn that they have to wait for paperwork before they can begin treatment. To speed the lengthy reporting process that precedes treatment, Centre Oscar Lambret (COL), a French cancer hospital, implemented a speech-enabled reporting solution based on the Microsoft Speech Platform and Winscribe Text. COL has slashed report creation time from 21 days to 3 days and gives doctors an unprecedented mobility.

It takes a village

Treating cancer patients takes a village of specialists and hospital departments, and all the paperwork and bureaucracy can slow patient care. In Europe, the average time between first patient visit and treatment-start is 48 days —an interminably long time for the patient or family waiting anxiously for a diagnosis and treatment to begin.

At Centre Oscar Lambret (COL), a leading cancer care, education, and research center in Lille, France, the wait was not quite that long—an average of 30 days—but COL knew that patients deserved better.

The culprit was paperwork. Managing oncology patients is a complex, multidisciplinary process. At COL, various specialists run tests on a patient, then meet to discuss and create a treatment plan. However, after each test, a doctor created a report that was distributed to other team members, and doctors had to wait for colleagues' reports before they could weigh in with their own treatment plans. The time to create and distribute each report at COL averaged 21 days. "We needed to speed up report generation so we could speed up treatment," says Didier Cauchois, Chief Information Officer at Centre Oscar Lambret.

In 2005, Cauchois introduced Winscribe Digital Dictation, which provided a big productivity gain over writing reports by hand. But doctors and their assistants still had to transcribe, correct, and distribute the reports. Cauchois looked at speech recognition technology—which automatically transcribed dictated text— but the products available then were not mature enough.

Mobile speech-enabled workflow solution

In 2014, Centre Oscar Lambret embarked on a major initiative to digitize all patient files and become a paperless facility. This was the perfect time to revisit speech recognition.

Cauchois turned to Winscribe to look at its latest speech recognition offering, Winscribe Text. Winscribe Text is a Windows operating system-based program that provides not only speech recognition but end-to-end workflow, electronic signature, and documentation management tailored to the needs of healthcare organizations. The product's speech recognition capabilities are based on the Microsoft Speech engine that is part of Windows.

The version of Microsoft Speech that Winscribe Text uses was further advanced by Recognosco, which adapted the Microsoft technology for

> **In 2014, Centre Oscar Lambret embarked on a major initiative to digitize all patient files and become a paperless facility. This was the perfect time to revisit speech recognition.**

> **When the hospital's Windows-based medical applications become mobile, doctors will have patient files with them wherever they go**

use in complex, enterprise healthcare IT environments. Recognosco added features such as the ability to understand medical terminology, centralized management of profiles and vocabularies, built-in streaming capabilities, and failsafe and recovery features. To the Microsoft Speech and Recognosco foundation, Winscribe adds workflow, healthcare interoperability, and document management

capabilities geared to the needs of hospitals.

"We looked at other speech recognition solutions, but we were already a solid Windows shop and were very impressed with Microsoft Speech and the comprehensive workflow management capabilities in Winscribe Text," Cauchois says. "Because of our Windows foundation, Winscribe was able to integrate Winscribe Text into our existing health information system [HIS] so that doctors can automatically pull patient health data from the HIS and insert it into reports," Cauchois says.

COL is using Winscribe Text on hospital workstations but is evaluating ways to make the speech-enabled reporting solution even more accessible by testing it on the Microsoft Surface Pro 3. COL is considering the possibility of distributing Surface Pro 3 devices to all physicians and many administrative staff as their only computer. "Because we have switched to digital patient files, we want doctors to have access to those files wherever they are," Cauchois says. "We can have this kind of mobile productivity with

the Surface Pro 3, which is every bit as powerful as our workstations."

Faster report creation speeds patient care

With its new speech-enabled document management solution, COL has cut the time-consuming reporting process down to size. "With Winscribe Text based on Microsoft Speech, we've reduced report creation and distribution time from 21 days to 3 days," Cauchois says. "This reduces patient anxiety and speeds the start of treatment." Often, doctors can access reports within 24 hours.

After performing a patient test, a doctor selects the patient name in the HIS, opens the appropriate report template, and dictates the test results into Winscribe Text using a microphone attached to the Surface Pro 3. Winscribe Text automatically pulls patient health data from the HIS and inserts it into the report. Winscribe

> " With Winscribe Text based on Microsoft Speech, we've reduced report creation and distribution time from 21 days to 3 days
>
> **CAUCHOIS**

Text transcribes the doctor's speech into text, and the doctor reviews the text, makes any corrections, and electronically signs and distributes it to other members of the medical team. Any team member can also listen to the audio file, stored in the HIS, if he or she wishes.

Greater productivity, new mobile scenarios

Now that reports are no longer such a quagmire, busy doctors get more done every day. "Our doctors are much more productive and our workflow more transparent with Winscribe Text," Cauchois says. "When the solution is fully deployed, our doctors could save an hour or more a day, which they can use to extend time with patients or see more patients."

COL has to revise its HIS and other core medical applications for responsive design before staff can effectively use them on mobile computers, but that's coming . When the hospital's Windows-based medical applications become mobile, doctors will have patient files with them wherever they go. They will also be able to show X-rays and other images to patients at bedside and take photos with the camera built into the Surface Pro 3.

"Mobile computing will open up new efficiencies inside the hospital and out," Cauchois says. "Using Windows security features and Active Directory, we can fully secure patient data so that doctors can access patient files from home for the first time ever."

Reduced administrative work

A year ago, the COL radiology department had a backlog of 600 reports. Today, there are fewer than 30 reports in that pile. "We used to have eight people in radiology imagery reviewing and managing reports, and we've transferred two of those people to new jobs," Cauchois says. "Report management doesn't consume as many hospital resources as it used to."

One of the things these workers did was review dictated reports for accuracy. The Winscribe Text solution at COL boasts an average accuracy rate of 97.6 percent, which speeds or eliminates review work. The high speech-capture accuracy rate also helps with compliance requirements by tracking user and event activity and providing audit trails.

> " Our goal is to have all doctors using Winscribe Text on Surface Pro 3 devices by the end of 2016
>
> CAUCHOIS

"Our goal is to have all doctors using Winscribe Text on Surface Pro 3 devices by the end of 2016," Cauchois says. "It is one of the most exciting technologies we've ever used."

Improving quality of life by converting decades of date into valuable info.

Turning decades of research data into valuable medical insight making it more secure and accessible resulting in better medical care and health promotion to improve people's longevity and quality of life.

Medical research plays a vital role in developing preventive measures, treatments and cures that help improve quality of care and patient outcomes. However uncovering new insights from huge stores of unstructured research data can often be a daunting task – one that Kuakini Health System (Kuakini) has worked to overcome by taking advantage of sophisticated content management and data warehousing solutions.

The Hawaii-based organization had transform decades-worth of research paper files and medical specimens into a rich store of digital information, and is simplifying and accelerating access to this research data.

A newfound ability to easily and rapidly analyze research data will help advance important scientific stud-ies and support greater collaboration with other research centers. Kuakini broaden the scope of the platform to include clinical information, which holds great potential for improving the understanding of aging, longevity and human disease, and translating that knowledge into better medical care, health promotion and lifestyle.

THE NEED

Kuakini Health System struggled to extract insight from decades of paper-based research records – including unique longitudinal studies of Hawaii's ethnic Japanese population – potentially impeding future research.

THE SOLUTION

Kuakini transformed paper files into digital content and

developed a data warehousing solution to enable more effective analysis, using solutions from the IBM® Watson™ Foundations portfolio.

THE BENEFIT

Researchers can quickly and easily access the information they need and analyze it for new insights, potentially leading to new research and potential breakthroughs that will improve medical care and health outcomes.

KEEPING VITAL RESEARCH WORK ON TRACK

Uniquely, Kuakini holds an extensive collection of epidemiological and clinical data contributed voluntarily by the Japanese-American community in Hawaii, including questionnaires, blood and tissue specimens, and brain tissue from autopsies. For decades, this data has helped to conduct numerous studies on cancer, heart disease, dementia, longevity and more.

Wilfred Higashi, Manager of Corporate Audit and Compliance at Kuakini Health System, states, "Kuakini has collected a huge amount of research data, with some of our oldest documents and specimens going back nearly 50 years. As these files were all paper-based, there was a risk of the documents deteriorating and becoming unusable due to frequent handling. We wanted to find a better way to preserve this data and ensure that it would be available to researchers for years to come."

In addition to maintaining the integrity of its research data, Kuakini wanted to make it easier for internal teams and researchers from external research centers to access and analyze this wealth of information. A fast, reliable way of sourcing and querying data would enable Kuakini to boost collaboration and accelerate the progress of research work, potentially helping scientists to make breakthroughs that improve the health status of the community.

FINDING THE RIGHT PARTNERS

Seeking to transform the way researchers used information, Kua-kini's President and CEO, Gary Kajiwara, spearheaded an initiative to digitize research data and make it more readily available for analysis by developing a robust data warehousing solution.

"We evaluated a number of offerings from different software vendors, but none of them fit our needs," remarks Wilfred Higashi. "It was only after meeting with IBM that we found a solution that really matched what we were looking for. IBM brought in healthcare industry consultants and software experts to lead an Industry Business Value Assessment, which helped map out our requirements and create a clear vision for a solution that met these needs."

Kuakini also engaged Sirius Computer Solutions, its long time service provider, to provide consulting services throughout the project, covering solution analysis, design and implementation activities.

Wilfred Higashi notes, "This was a big undertaking for Kuakini, and we wanted to ensure that it was done right. Sirius has played a key role in the project, from design to knowledge transfer, and we are still working closely with them today. Their expertise with IBM software has been really valuable, and we have been very satisfied with the level of service they have provided."

MOVING TO DIGITAL DATA

Kuakini began by working to digitize its huge volumes of unstructured research data, including paper questionnaires and medical records of the periodic exams and clinical data collected from research cohorts. The organization used IBM FileNet® Capture to transform the scanned images into useful digital content, which is housed in a central IBM FileNet Content Manager repository.

This solutions gave them a complete peace of mind, said Wilfred Higashi. "Moving from paper files to digitized content means that we no longer have to worry about the integrity or accessibility of our research data. We are confident that the information will be there when researchers need it in the years and decades to come."

"Having access to a secure, central data repository of digital information also saves our teams huge amounts of time and effort. Researchers no longer have to hunt down paper files; instead, they can quickly find the information they are looking for with just a few clicks of the mouse. As a result, they spend less time tracking down data and more time analyzing it, and this helps accelerate research work."

Moving from paper files to digitized content means that they no longer have to worry about the integrity or accessibility of their research data.

TURNING INFORMATION INTO INSIGHT

Having established a solid platform for capturing and managing the newly digitized content, Kuaki-

> **"** For Kuakini, having the right partners is crucial to guaranteeing project success. "We have a clear vision for what we want to achieve. Active support and involvement of key executives is crucial to keeping this project moving forward and turning our vision into reality,"

WILFRED HIGASHI
Manager of Corporate Audit and Compliance

Kuakini Health System

ni turned its attention to building the core warehousing solution that would enable researchers to analyze this rich data and extract new insights from it.

IBM InfoSphere® Warehouse acts as the foundation of Kuakini's research data warehouse. Powered by industry-leading IBM DB2® database software, the solution provides a reliable, high-performing environment for consolidating and analyzing both structured and unstructured data.

With easy access to relevant, categorized content, researchers can more readily unlock new insights from the organization's huge volumes of research information.

Wilfred Higashi comments: "Our old database system was fairly limited in scope, and it required us to treat each study as a separate dataset, limiting opportunities for collaboration across projects. The new data warehouse is enabling us to break down these barriers and integrate all our research data, so we can deliver the right information to any users who might need it. This opens up new possibilities for our research teams – now that they are no longer restricted in the kind of data they can access at one time, it is easier for researchers to query more information and potentially uncover new insights."

STRONG FOUNDATIONS

To support its new content management solutions and research data warehouse, Kuakini knew that it needed a robust infrastructure capable of delivering the high performance that researchers required to rapidly access and analyze large volumes of data.

The organization has implemented a rock-solid hardware architecture, built on IBM Power Systems™ and IBM System x® servers, connected to IBM System Storage® devices through a storage area network. The IBM infrastructure provides high levels of computing power and availability for Kuakini's content management

and analytics applications, helping keep vital research work on track.

IMPROVED COLLABORATION

To foster greater collaboration with researchers from other research centers, Kuakini has developed a secure portal through which authorized external users can access the organization's data. Making research data available to the wider scientific community will help the organization attract more researchers to identify new research initiatives and create new opportunities for joint research.

Wilfred Higashi says: "Now that we have a robust platform for managing research data, and an easier, more reliable way of accessing and analyzing it, we can broaden our horizons in terms of research and collaboration. We will be able to promote our data to the global scientific community, which will invite valuable new insights on decades of data and increase Kuakini's prestige as a research institution."

Future enhancements will allow Kuakini to engage in real-time collaboration with researchers and study participants through virtual communities, wikis, blogs and more, creating

Moving from paper files to digitized content means that they no longer have to worry about the integrity or accessibility of their research data.

IBM Watson

an ideal environment for advancing joint research work.

FINDING THE KEYS TO A HEALTHIER AND LONGER LIFE

The flexibility of the new platform offers exciting opportunities to expand the scope of research and analysis work at Kuakini. The organization has plans to incorporate electronic clinical data into the data warehousing and analytics solution, and to merge this information with existing research data to find new connections between genetics, lifestyle, longevity and specific diseases. The insights gleaned from such analysis can be used to improve clinical practices and patient care, and to improve the health status of targeted populations.

Wilfred Higashi concludes: "If we can take our clinical data and tie it into existing research on healthy living, aging and genetics, it could have a huge impact on the quality of the treatment and care that we offer. With predictive analytics, for example, we could look at past practices and outcomes, and use that information to model treatment pathways that deliver the best outcomes for individual patients, helping them maintain a healthy lifestyle as they age.

"Kuakini's ultimate goal is to provide a higher level of care to our patients and to improve the welfare of the community as a whole. The IBM solutions give us the ability to uncover new insights from a wealth of data. This will go a long way in helping Kuakini's researchers to understand the factors that can affect human health and aging, and translating that knowledge into practical improvements in medical care and health promotion that can improve people's longevity and quality of life."

ABOUT KUAKINI HEALTH SYSTEM

Kuakini Health System is a non-profit healthcare organization based in Honolulu, Hawaii with four non-profit subsidiaries: Kuakini Medical Center, a 250-bed acute care hospital and emergency facility; Kuakini Geriatric Care, Inc., a long-term care facility, adult day program, and assisted living facility; Kuakini Foundation; and Kuakini Support Services, Inc. To find out more, please **visit: www.kuakini.org**

Company
Associated

Accenture is a global management consulting, technology services and outsourcing company, with more than 358,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world's most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenue of US$ 31.0 billion for the fiscal year ended Aug. 31, 2015. Its homepage is www.accenture.com

GE Healthcare provides transformational medical technologies and services that are shaping a new age of patience care. Our broad expertise in medical imaging and information technologies, medical diagnostics, patient monitoring system, drug discovery, biopharmaceutical manufacturing technologies, performance improvement and performance solutions services help our customers to deliver better care to more people around the world at a lower cost. In addition, we partner with healthcare leaders, striving to leverage the global policy change necessary to implement a successful shift to sustainable healthcare systems.

Our "healthymagination" vision for the future, invites the world to join us on our journey as we continuously develop innovations focused on reducing costs, increasing access and improving quality and efficiency around the world. Headquartered in the United Kingdom, GE healthcare is a $17 bullion unit of General Electric Company (NYSE:GE). Worldwide, GE healthcare employs more than 46,000 people committed to serving healthcare professionals and their patients in more than 100 countries. For more information about GE Healthcare, visit our website at www.gehealthcare.com

IBM is one of the world's largest providers of information technology (hardware, software and services) and business to business solutions. IBM's worldwide business model is built to help clients succeed in delivering business value by becoming more innovative, efficient and competitive through the use of business insight and information technology (IT) solutions.

IBM Deutschland GmbH is headquartered in Ehningen and is IBM's largest company in Europe.

The Siemens Healthcare Sector is one of the world's largest suppliers to the healthcare industry and a trendsetter in medical imaging, laboratory diagnostics, medical information technology and hearing aids. Siemens offers its customers products and solutions for the entire range of patient care from a single source - from prevention and early detection to diagnosis, and on to treatment and aftercare. By optimizing clinical workflows for the most common diseases, Siemens also makes healthcare faster, better and more cost-effective. Siemens Healthcare employs some 51,000 employees worldwide and operates around the world.

Company Associated

Microsoft

Microsoft Online Services – Microsoft Online Services are business class communication and collaboration solutions delivered as a subscription and hosted by Microsoft. With these offerings, Customers can cost-effectively access the most up-to-date technologies and immediately benefit from streamlined communications, simplified managements, and business-class reliability and security features.

SAJIX

iHelix – Transforming Healthcare

Sajix Incorporation is headquartered at Pleasanton, California with a Development Centre in Vishakhapatnam, India.

The mission of Sajix, which has its clients spread across six countries, is to provide best-in-class information technology products for the global healthcare industry and create the ultimate customer satisfaction by continuous improvement in everything we do. Our flagship product iHelix Hospital is an enterprise-wide solution developed on a Java platform that provides complete patient information across all points of care to allow healthcare providers to deliver the best care possible. Specifically designed for large medical clinics and long-term care facilities, and Public Health Systems, the iHelix Hospital solution is comprised of individual, but integrated modules - including an advanced electronic medical record (EMR) and a Patient Portal christened OMRVault.

Company List

Accenture
www.accenture.com

GE Healthcares
www.gehealthcare.com

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