Building the Smart Hospital Agenda

A comprehensive approach for Hospitals executives to develop their Smart Hospital Strategy and Implementation program

Arthur D Little

Content

Authors:

Vikas Kharbanda
Principal Healthcare,
Middle East
kharbanda.vikas@adlittle.com

Nils Bohlin
Global Practice Leader Healthcare,
Nordics
bohlin.nils@adlittle.com

Ulrica Sehlstedt
Partner, Healthcare,
Nordics
sehlstedt.ulrica@adlittle.com

Johan Treutiger
Principal. Strategy & Organization,
Nordics
treutiger.johan@adlittle.com

Executive Summary

A number of factors have been contributing to a rapid change in care delivery models world-wide. Increasing cost of care, need to improve access to care, inherent complexity in treatment options and increasing involvement of patients in the care delivery cycles – all of these factors have fostered an environment where hospitals or other care delivery institutions have started shifting focus from treating episodes to managing overall health of patients, while focusing on overall value of care rather than efficiency. In this context more and more hospitals have invested heavily in ICT capabilities in different areas of management and operations. This burgeoning deployment of ICT capabilities in hospitals has evolved into the concept of Smart Hospitals with the objective of achieving better clinical outcomes, efficiency in supply chain and enhancement of the patient experience.

Discussions with several healthcare executives yield a common question – how can a care delivery institution build its own vision of a Smart Hospital? What does it encompass and how can it be used to fundamentally redefine the way the hospital operates? Is there a commonly understood and universally accepted blueprint of a Smart Hospital?

Based on its work with several leading healthcare institutions across the globe, Arthur D. Little has developed a framework that can be used by hospitals in developing and explaining their vision of a Smart Hospital. The framework details out four key areas of focus within the hospitals management and operations that should be considered by all hospitals when developing their own Smart Hospital Agenda:

1. Patient Services and Interfaces
2. Care processes and orchestration
3. Logistics and Support Services
4. Organization and Capability Design

In developing their vision of a Smart Hospital across these four domains, hospitals need to identify the impact on their Med Tech Infrastructure, Facility Design, IT Infrastructure & Operations and the overall Information Management approach. Only when a hospital focuses on all of these domains, can it truly identify and detail a vision that will allow it to become smart.

Implementing this Smart Hospital vision will also require hospitals to fundamentally rethink several key capabilities internally. First would be the concept of how it defines its enterprise architecture approach, which allows it to think through the clinical and non-clinical operations concurrently with the technology capabilities. Second, it needs to build capabilities for partnering with service and technology providers instead of simply procuring ICT capabilities. Thirdly, it has to adopt the fundamentals of a learning organization allowing it to adapt and enhance its own capabilities continuously.

1. Setting the Context

The world over, a number of factors are rapidly driving a new paradigm in healthcare delivery.

Cost of healthcare delivery and need to improve access to care: Global costs of healthcare delivery continue to rise, with the healthcare industry accounting for almost 10% of the global GDP. In the context of such high expenditures and an aging population (driven by a decline in population growth rate but increased life expectancy), there is a fast-growing economic imperative for rethinking how care is delivered.

Complexity of care: With rapid advancements in treatment options, diagnostic capabilities and biotechnology, the model of care itself is changing rapidly. The industry is experiencing a radical shift in care pathways, utilizing multidisciplinary care approaches and fostering a model towards a continuum of care for the patient.

Increased patient involvement: Growth of chronic diseases continues to push much higher involvement of the patient in the treatment cycle, thereby improving the quality of care through better knowledge sharing, personalizing care and improving accessibility of treatment.

Figure 1: Health spending, annual average growth rate, %
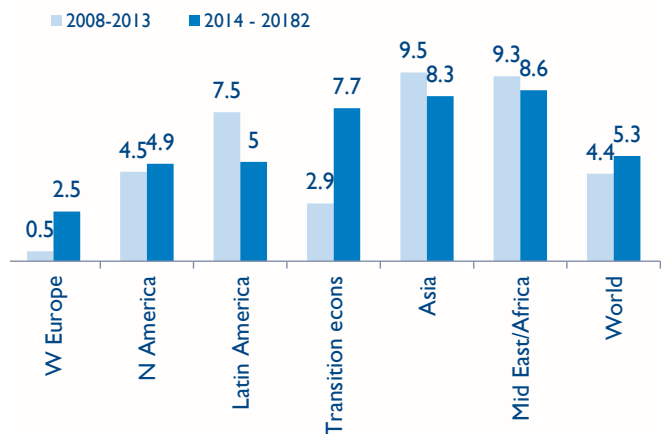
In the context of these transformative trends, the focus on digitalization in the healthcare sector has been increasing at a rapid pace. Investments in digitalization of the healthcare sector are expected to experience a year-on-year growth rate of more than 20%. A number of factors are driving this increase.

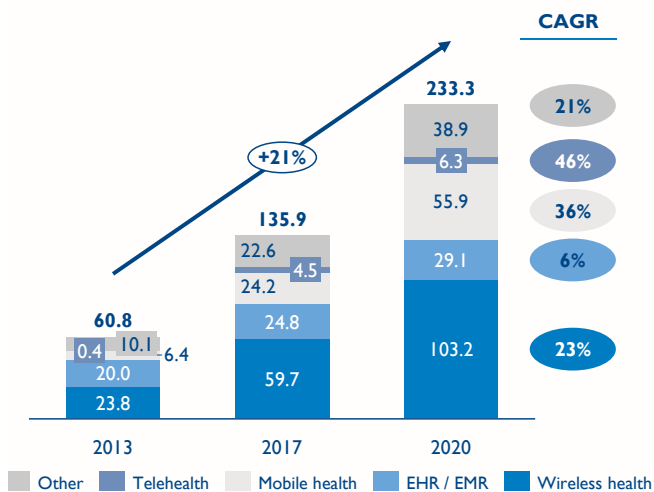Figure 2: Digital Health market 2013 – 2020 (bn. USD)

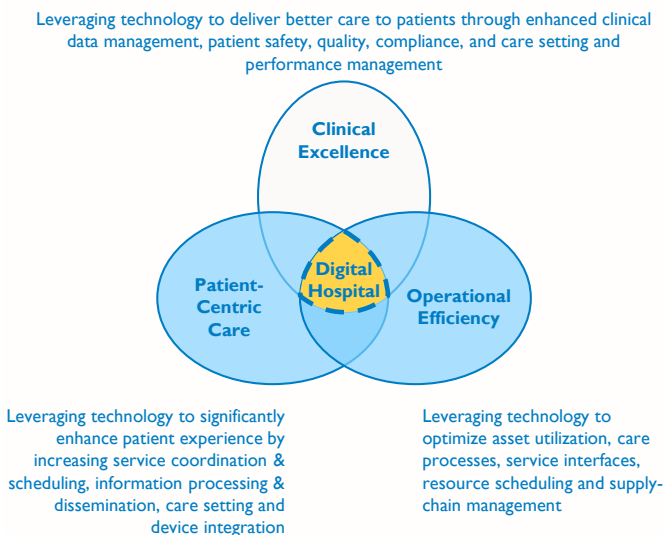Figure 3: Key Technologies driving Digital Health

2. The emergence of the smart-hospital concept

In the midst of this transformative wave, the last decade has seen hospitals shifting their care-delivery models. Care pathways have shifted towards multidisciplinary and team-based approaches. From simply treating patients, hospitals have started focusing more on managing the overall health of the patients and looking at the continuum of care, rather than simply focusing on episodic treatments. Financing models themselves have shifted towards value-based care instead of simply driving efficiency.

The impact of these changes is significant – in both the design and operations of the hospitals – and has the potential to impact clinical outcomes and patient-safety metrics significantly. And as with all transformative trends, these areas of change have created opportunities for the adoption of technology as one of the core enablers.

Figure 4: Digital hospital as a concept is a key enabler in driving clinical excellence, patient-centric care and operational efficiency

Leveraging technology to deliver better care to patients through enhanced clinical data management, patient safety, quality, compliance, and care setting and performance management

Leveraging technology to significantly enhance patient experience by increasing service coordination & scheduling, information processing & dissemination, care setting and device integration

Leveraging technology to optimize asset utilization, care processes, service interfaces, resource scheduling and supply-chain management

Over the last decade, hospitals globally have been making significant investments toward adopting ICT capabilities in different areas of operations and management. From the implementation of electronic medical records and patient data management to more complex systems integrating telemedicine systems, the focus has been on automation of existing operations and driving efficiency.

However, with increasing maturity in technology adoption, most healthcare executives are realizing that building a smart hospital

is about fundamentally rethinking the hospital capabilities and adopting an integrated approach to design, management and operation of the facility.

The objective of the smart-hospital vision is to build a facility that uniquely balances three key aspects – excellence in clinical outcome, efficiency in the supply chain and enhancement of the patient experience. Conventional healthcare delivery models have often been based on a belief that ideal health-service delivery requires finding an optimal balance between the three. However, more recently, healthcare institutions around the world have started to drive these three elements, conventionally considered contradictory to each other, simultaneously. There is growing experience and illustrations among hospitals in different markets that show how all three dimensions of patient experience, clinical outcome and supply-chain efficiencies can be driven concurrently and, in many ways, complement each other.

The smart-hospital concept is coming of age as more and more healthcare institutions start to enhance capabilities in an integrated fashion across these three dimensions of service-delivery excellence.

St. Olav, A leading teaching hospital in Norway, applied this concept in the development and implementation of its new campus in 2010. The patient's perspective took center stage in the development of the new facility, and strong ICT integration gave the hospital several unique capabilities that even enabled campus-style construction, with 11 interconnected buildings rather than one mammoth structure. Rather than designing the hospital with patients moving from department to department, the hospital designed its infrastructure to co-locate a diagnostic, treatment and research facility with strong data and information management systems. The hospitals also adopted several key technology innovations by allowing patients significant information access during the treatment, thereby involving them more in their treatment. Digital consoles in patient rooms act as calling devices for nurses, tools for communication with doctors, and even sources of medical information related to the patient's disease and treatment. As it is a research institution with the university, staff carry mobile devices that serve their dual responsibilities – as clinicians and researchers. Not only did this provide better information management for clinical excellence, but it also created a stronger sense of participation, ownership and being valued.

Arthur D Little

3. Why is the conceptualization of a smart hospital more complex than it sounds?

There are several reasons adopting a digitalization strategy in hospitals is more complex than it appears at first. From discussions with several healthcare executives, it is clear that hospitals which adopt digitalization approaches with the aim of building smart hospitals typically go through three stages of evolution.
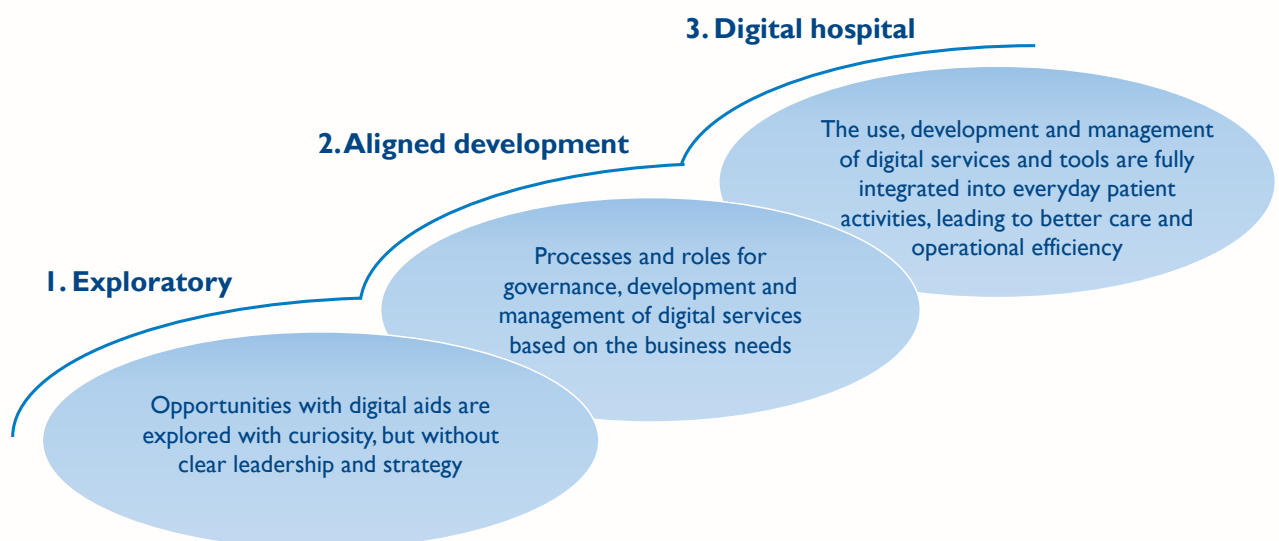
Building a smart hospital means fully integrating technology and digital capabilities into day-to-day functioning. Processes are designed to leverage technology-led efficiencies; patient-service interfaces leverage digital tools; and "people capabilities" are even built for the hospital staff to manage and operate these digitalized services.

Building a smart hospital is more than simply bringing together connected devices on a high-speed networking infrastructure. It is about rethinking the care processes, management systems and even physical facilities to drive a new way of delivering care.

Ng Teng Fong Hospital in Singapore adopted several unique, patient-centric attributes in its design – physical infrastructure, workflows and use of technology – to establish a patient-friendly, healing environment. The hospital is among the first to combine A&E, registration and triage to reduce waiting times before treatment. Furthermore, the queue number provided to the patient at the time of arrival is the registration number for the patient's whole treatment, which eliminates the need to be booked in for subsequent diagnostic or consultation steps, thereby significantly reducing the waiting time. Enabling these concepts through smart introduction of ICT capabilities has resulted in the hospital achieving several accolades for patient experience and community engagement.

With equipment suppliers, system integrators and emerging digital solution providers offering several different technologies, which have found gradual adoption in hospitals around the world, there is an increasing demand among healthcare executives – *"Is there a commonly understood and universally accepted blueprint of a smart hospital?"*

Figure 5: A hospital needs to have a clear strategy and roadmap for developing in three stages for digitalization

3. Digital hospital

The use, development and management of digital services and tools are fully integrated into everyday patient activities, leading to better care and operational efficiency

2. Aligned development

Processes and roles for governance, development and management of digital services based on the business needs

1. Exploratory

Opportunities with digital aids are explored with curiosity, but without clear leadership and strategy

4. The smart-hospital framework

In helping healthcare executives answer this question, ADL has developed a common framework for articulating the smart-hospital concept.

This framework starts with the fundamental objective that every healthcare-delivery institution strives to achieve "excellence in healthcare delivery." This excellence can be addressed in three different dimensions – excellence in clinical outcomes, enhanced patient centricity, and efficiency in operations. Four key domains can then be examined in a systematic fashion to understand how each of these domains is adopting technology solutions for enhancing the three aspirations. Developing this blueprint systematically will also help the hospital set very clear directions for the core investments: medical and technology investments, physical facility design and infrastructure, IT systems and operations, and overall information management.

Patient Services and Interfaces: In designing smart hospitals, there needs to be a complete rethink of how patients use different services in the hospital. From digitalizing the appointment in the outpatient section to developing digitalized patient rooms which support audio-video communication systems for virtual, off-schedule interactions between patients and doctors, this can have significant impact on overall patient services. Digital infrastructure and content management in the patient's room could provide them with information related to their condition, procedure, medication and treatment – thereby improving the patient's own participation in their care. Kiosks placed in the outpatient section to support information dissemination, patient registration and billing systems can not only reduce waiting times for a better patient experience, but also minimize space consideration in the design of waiting areas and enhance space utilization for more medical services.

Care Processes & Orchestration: With increased proliferation of wearables, sensors and communication devices, the way the patients interact with providers can be fundamentally shifted. Not only can some of the care processes be shifted out of the hospital setting, but the multi-specialty, team-based care model can be facilitated across a network of hospitals. Video-streaming capabilities from surgical rooms can provide live feeds for

Figure 6: Developing such a delivery approach hinges on an integrated planning and design framework that inte the strategy, operations and infrastructure planning
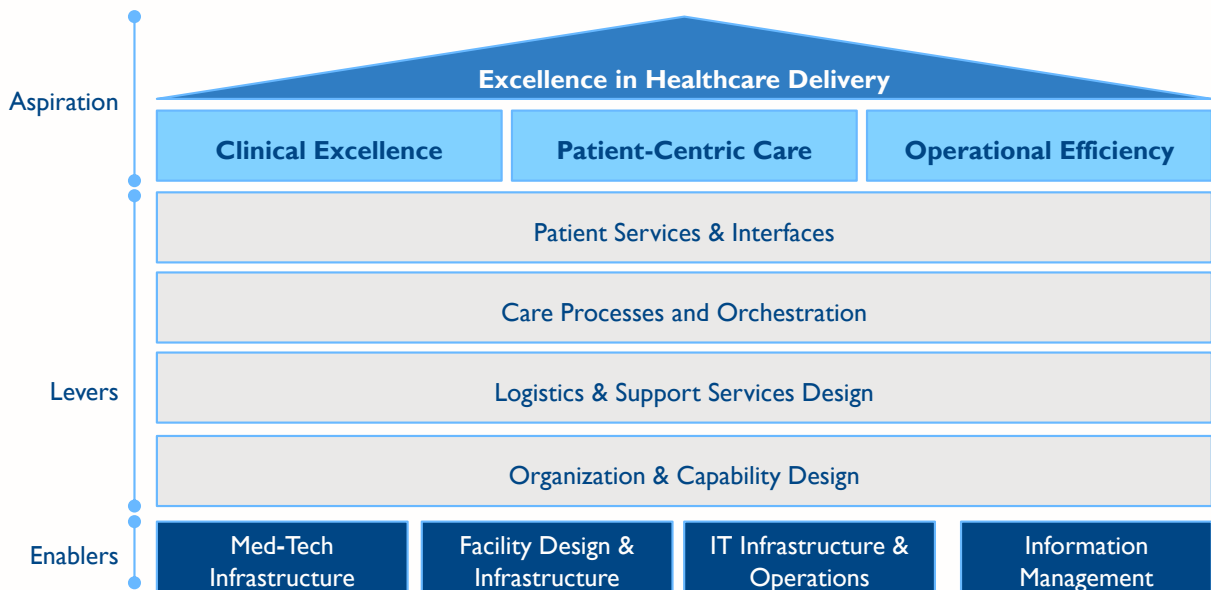
training purposes, as well as give the clinician access to external expertise. Integration of patient data and live feed from sensors in the patient room displayed across a digital device with the doctors can enable doctors to do "virtual" rounds to patients' rooms and improve the frequency of interaction between patients and doctors. Such data transfers can also impact processes and staffing requirements in nursing stations.

Karolinska University Hospital (Karolinska) is located in Stockholm, Sweden. Karolinska has been consistently ranked among the top medical institutions globally, and is considered one of the front-runners in digital-health innovation. Karolinska has developed and tried out a concept in which Parkinson's patients follow treatment programs from their homes. The concept has been implemented and is used in daily work. During video consultations the patient is asked to perform specific exercises, and the neurologist is able to monitor the movements and tremors via HD. This enables the neurologist to diagnose the status of the patient and, if necessary, recommend a change in the medicine dosage remotely.

Logistics & Support-Services Design: Extending the technology infrastructure to minimize wastage of consumables, and using advanced RFID and Wireless LAN technology to identify and report location and utilization of medical and non-medical resources in the hospital could help hospitals achieve significant reduction in capex and opex. Reduction in downtime of critical facilities, synchronization with patients' treatment schedules and even inventory management across single- or multi-site hospital operations could have significant efficiency impact on hospital operations. Optimizing the movement of clinical and non-clinical equipment throughout the hospital would not only enhance overall efficiency, but also ensure access to well-maintained equipment.

Organization & Capability Design: In order to ensure full leverage of digital capabilities in the hospital setting, there needs to be adequate focus on the way the organization structure and people capabilities are designed. In a hospital, where the care and support processes are fundamentally thought through differently, the capabilities of the clinician and non-clinical staff to support this new model of operations in terms of management systems, governance and technology competency need to be ensured.

Working across all four domains diligently and systematically can unearth clear strategies and approaches for hospitals to build their digitalization roadmaps and fully integrate them into their design and operations.

5. What drives success in designing the smart-hospital strategy?

Based on experiences of developing the smart-hospital blueprint across different facilities, there is a common understanding of what drives success in developing this agenda.

Observing and learning from the success and failures of several institutions building their smart-hospital agendas, it is clear that there are **four** fundamental guiding principles that hospitals need to adopt in order to carry out this exercise successfully.

Organizational commitment to the smart-hospital agenda:
Institutions that have approached the "smartization" drive with the idea of throwing more IT at the ambition have typically achieved less than organizations that have approached the agenda with a more concerted organizational imperative. This is more about creating a role that leads the "SMART" agenda for the hospital – a role that goes beyond just managing technology, but rather drives how technology enables the functioning, outcome and patient experience. This role is not just a virtual function within the organization delivered by a committee, but a necessary a role anchored in the organizational structure, with the mandate of achieving the smart-hospital vision. The role has a position at the executive table among the senior management, and allocated budget and clear targets linked not only to cost containment, but to revenue and patient experience as well.

Rethinking the enterprise-architecture approach:
Conventional technology strategies focused on automation, and the mechanics of building such strategies, need to be rethought. With a fast-developing portfolio of innovative technologies that will have a fundamental impact on the hospital's services and operations, a smart hospital's technology blueprint and the conventional approaches to building these need to adapt rapidly. This is where adopting an enterprise-architecture (EA) approach and ensuring that all elements of the EA are well aligned to the innovation agenda are critical. Most importantly, adopting a

ADL was recently involved in the development and implementation of a digitalization strategy with a leading hospital in Europe, in which much of the concepts and theory in this article came to life.

As a starting point, the hospital in question was recognized for its use of IT in its care activities. Compared to other organizations, it was relatively mature in its IT usage, with certain successful initiatives, e.g., within e-health. However, initiatives were done in an ad hoc manner, lacking both an outspoken and clear digitalization strategy and synchronized processes. In addition, investments were done, but without a clear link to the overall hospital vision. These challenges are not unique. The hospital was, like many other organizations today, evidently at an exploratory stage, and asked ADL to support it in preparing itself and creating the capabilities required to develop and enter the next stage of its digitalization journey.

In the first phase of the case, a systematic situation analysis, in addition to interviews with leading organizations around the world, sought to lay the foundation for the strategy development. During the situation analysis, all ongoing digitalization projects were mapped. This mapping revealed several exciting projects; however, in some areas up to 30 different projects addressed similar topics – without overarching coordination. In the second phase, the strategy was developed according to the smart-hospital concept, which, in all three dimensions, supports the hospital's overall vision in a natural way.

Taking a systematic approach, ADL developed, in close collaboration with the client, a strategy that included: prioritized processes that supported steering, development and management of the hospital's digitalization; an organizational structure and associated roles; client-specific guiding principles and a decision framework to ensure that investment decisions were in line with the vision of the hospital; and a roadmap including both projects and future IT systems. Both the decision framework and the roadmap were based upon the concept of the smart hospital, deconstructed into categories of digitalization. This enabled an intuitive and easy clustering and overview over the digitalization efforts and gaps.

The digital strategy development initiated important dialogues and created momentum for change within the hospital. The digital strategy was decided with broad consensus, and the implementation included communication and involvement of all 8,000 employees as an important step to digital development. All in all, the client received a strategy that was compiled into a very concise and to-the-point document, as it should be read and understood by everyone within the organization. With the strategy and its components, the hospital now has the prerequisites to develop into the next stage of its digital evolution journey.

"campus" approach to EA, in which cross-functional teams are co-located, constantly reviewing the technology footprint, and scanning internal and external applications for technology, are necessary. The mandate for this function would be not just to review and refine the technology blueprint, but to orchestrate the evaluation, adoption and integration of technology in the hospital's operations.

Partnering, not just procuring: Large hospitals, like any other large enterprise, have well-developed procurement functions well versed in driving cost efficiencies. With a fast-maturing landscape of innovative technology providers, the concept of procurement needs to evolve to one of partnering. This includes a shift in the processes, mindset and capabilities of the procurement organization. This does not mean doing away with the existing efficiency of the procurement function, but rather adding capabilities that allow it to create risk-shared, innovative approaches for adapting to and adopting a new breed of service providers that are rapidly adding new and innovative capabilities to the portfolio of health technologies.

Creating a learning organization: The last and most important facet often shared by health institutions that have successfully

managed the "smart" agenda is the constant investment in educating and enhancing the capabilities of its people. Creating the management systems, performance systems and more importantly, the culture that motivates the staff within the hospital to constantly upskill their capabilities, is critical, particularly in areas around deployment of new-technology-enabled ways of working. This is not new to healthcare systems, in which continuing professional development has been a clear requirement of the clinical staff – smart hospitals need to expand the system to go beyond and apply the same up-skilling mandate and systems to the non-clinical part of the organization as well.

With the growing need to rethink the cost-efficiency of care-delivery systems while adapting to a fast-changing landscape of medical science, the adoption of the smart agenda will very soon be no longer be just an ambition – but the new norm.

Contacts

If you would like more information or to arrange an informal discussion on the issues raised here and how they affect your business, please contact:

Austria
Wilhelm Lerner
lerner.wilhelm@adlittle.com

Italy
Fabrizio Arena
arena.fabrizio@adlittle.com

Nordic
Ulrica Sehlstedt
sehlstedt.ulrica@adlittle.com

Belgium
Marc Herlant
herlant.marc@adlittle.com

Japan
Satoshi Ohara
ohara.satoshi@adlittle.com

Singapore
Vikas Kharbanda
kharbanda.vikas@adlittle.com

China
Russell Pell
pell.russell@adlittle.com

Korea
Kevin Lee
lee.kevin@adlittle.com

Switzerland
Wilhelm Lerner
lerner.wilhelm@adlittle.com

Czech Republic
Marcel Hominda
hominda.marcel@adlittle.com

Latin America
Guillem Casahuga
casahuga.guillem@adlittle.com

Spain
David Borras
fborras.david@adlittle.com

France
François Deneux
deneux.francois@adlittle.com

Levant Region
Vikas Kharbanda
kharbana.vikas@adlittle.com

Turkey
Coskun Baban
baban.coskun@adlittle.com

Germany
Wilhelm Lerner
lerner.wilhelm@adlittle.com

Middle East
Vikas Kharbanda
kharbana.vikas@adlittle.com

UK
Richard Eagar
eagar.richard@adlittle.com

India
Vikas Kharbanda
kharbanda.vikas@adlittle.com

The Netherlands
Martijn Eikelenboom
eikelenboom.martijn@adlittle.com

USA
Mitch Beaumont
beaumont.mitch@adlittle.com

Arthur D. Little

Arthur D. Little has been at the forefront of innovation since 1886. We are an acknowledged thought leader in linking strategy, innovation and transformation in technology-intensive and converging industries. We navigate our clients through changing business ecosystems to uncover new growth opportunities. We enable our clients to build innovation capabilities and transform their organization.

Our consultants have strong practical industry experience combined with excellent knowledge of key trends and dynamics. Arthur D. Little is present in the most important business centers around the world. We are proud to serve most of the Fortune 1000 companies, in addition to other leading firms and public sector organizations.

For further information please visit **www.adl.com**

www.adl.com/SmartHospital