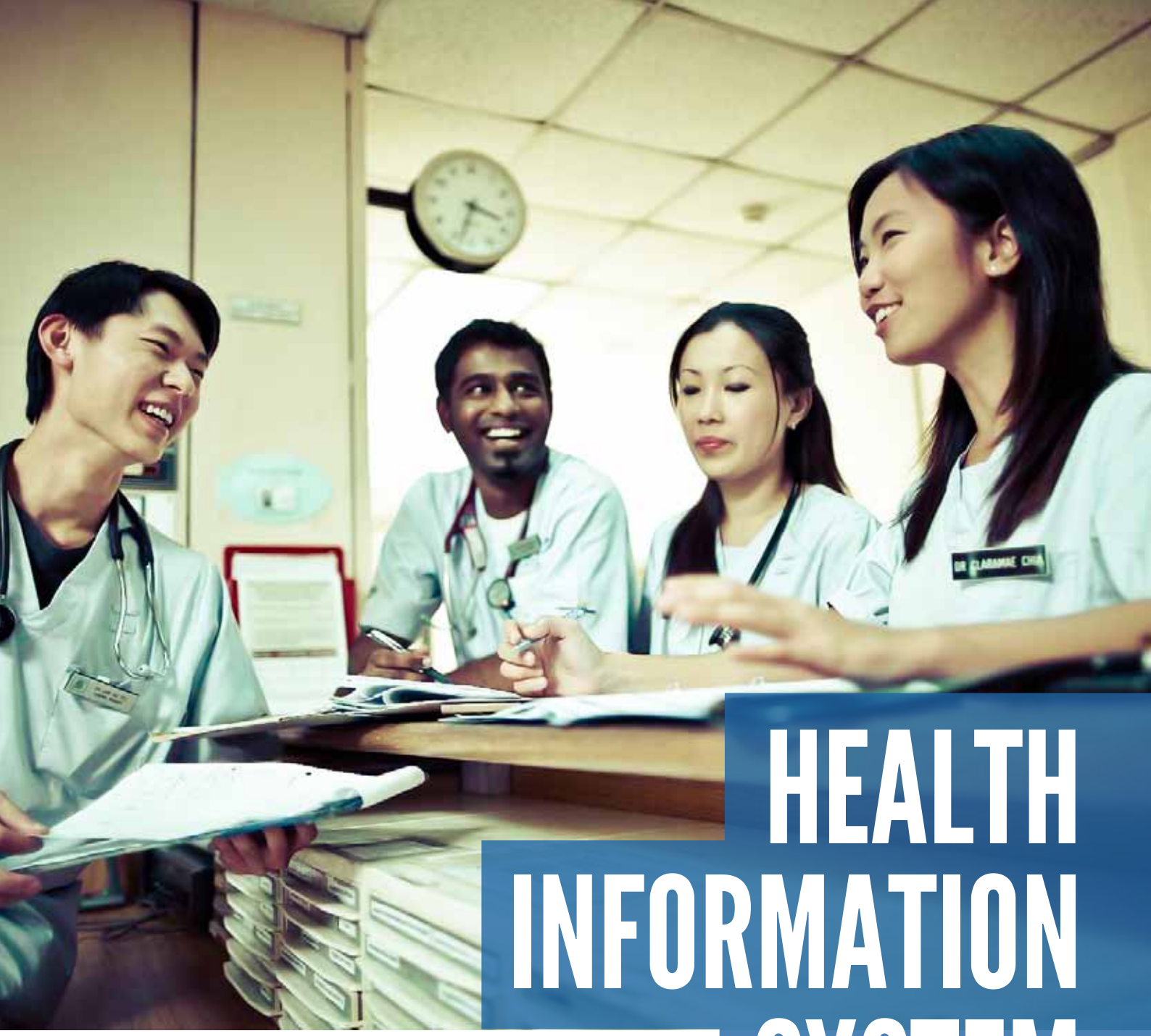


HEALTH INFORMATION SYSTEM

Adaption, Implementation & Penetration in Southeast Asia

solidiance

MARCH 2013

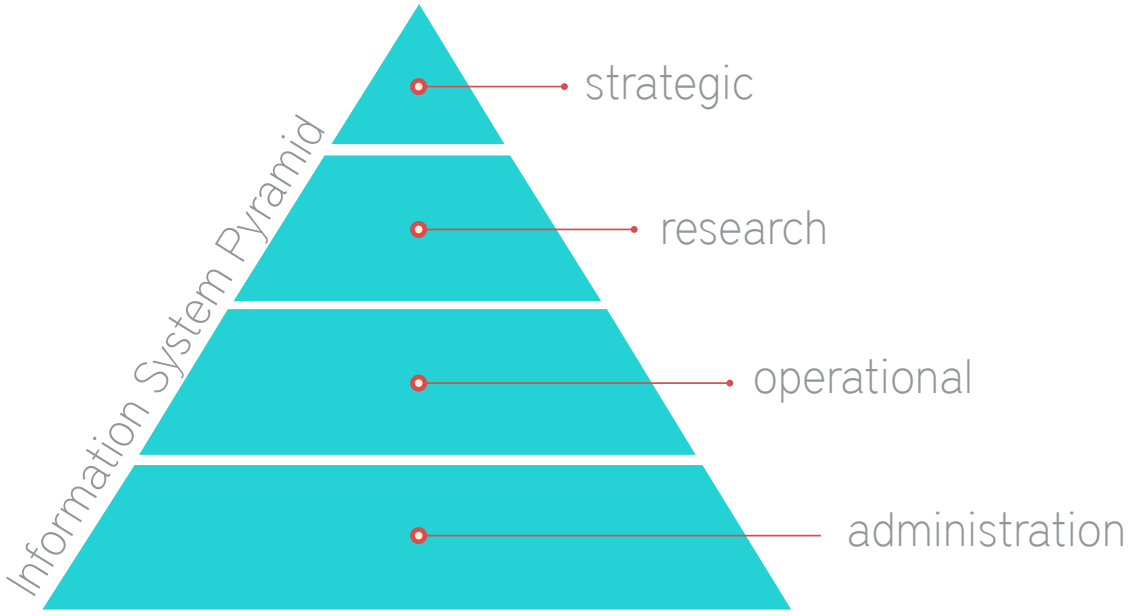
ABSTRACT

Health Information Systems (HIS) is an exciting field of technology that is intended to improve healthcare services. Like every other technology, HIS also comes in with challenges and concerns. This white paper aims to address these issues and also to give an overview on how HIS brings value for health organizations, health institutions, governments and patients. After taking a global perspective, this paper focuses on Southeast Asian market and analyzes where different countries in the region stand in regards to HIS implementation, adaption and penetration. This will be substantiated with case studies from Singapore and India.

INTRODUCTION

What is HIS?

In the healthcare industry, Information Systems play a role of extreme importance in terms of support to decision making, optimization of resources and improvement of processes. The objective of Health Information Systems (HIS) is to generate information that supports and improves decision making along all levels in the health organizations, from administration [i.e. billing, payroll] to the strategic management of the entire organization.



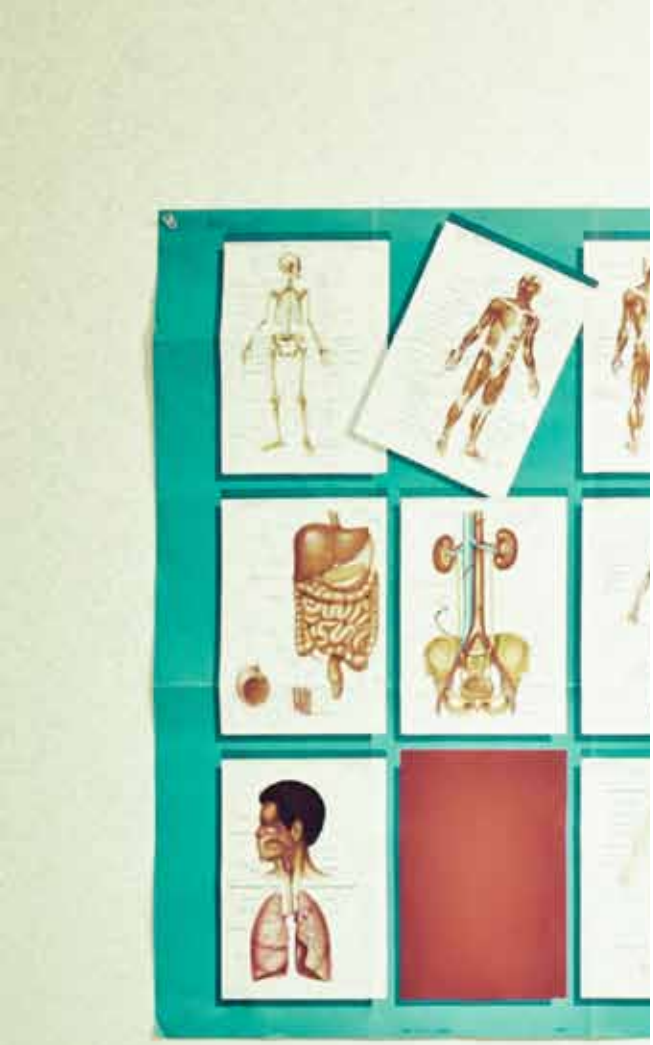
Types of HIS

HIS refers to a broad group of several and different information systems developed within the healthcare sector. They are different in the types of data treated, and in the way they store and display information. Here are a few types of HIS:

1. Subject-based systems

The most common type of HIS is the Electronic Health Record (EHR), which can be considered as the "electronic patient paper chart". The EHR is a subject-based system that captures and stores information based on a patient's name or medical record number.

The Master Patient Index (MPI) is another subject-based system. It lists all the patients who have ever been treated in a hospital or clinic.



2. Task-based systems

Task-based systems are those that capture and report information about specific healthcare related tasks i.e. laboratory, diagnostic imaging or medication management system.

3. Administrative healthcare systems

Administrative healthcare systems extract information from medical systems and use it to manage daily operations, such as scheduling appointments and billing insurance carriers or patients for the services provided.

4. Internet access care systems

EHR gives providers and patients easy access to timely health information. Using specific secure internet portal system, patients can access their medical records, update their demographic information, schedule an appointment or communicate directly with the physician. Internet access systems are most effective for patients with chronic conditions, such as diabetes, or those who have had organ transplants.

Care access portals also allow physicians to remotely monitor patients with chronic conditions. Data is transmitted via a secure portal system to the patient's electronic medical record or to a physician's mobile device so that the patient's condition can be monitored in real time.

New technologies in healthcare systems

One of the newest and fastest growing technologies in HIS is the mobile healthcare systems. These systems are a linear evolution of internet access care systems. Another new aspect to HIS is the cloud computing technology. This presents a new challenge for health information systems as the advantages of such a technology are already known [availability and timing of information, ease of access], but the critical aspect of the application of such a system in the healthcare industry is security. Health-related information is particularly sensitive, and the privacy and confidentiality issues are the primary concerns.

"Any technology sets a relationship between human beings and the environment, both physical and human. No technology can be seen as merely instrumental. This is especially relevant when dealing with large automatic information systems developed to contribute to the management and integration of large organizations, such as hospitals."

- International Medical Informatics Association

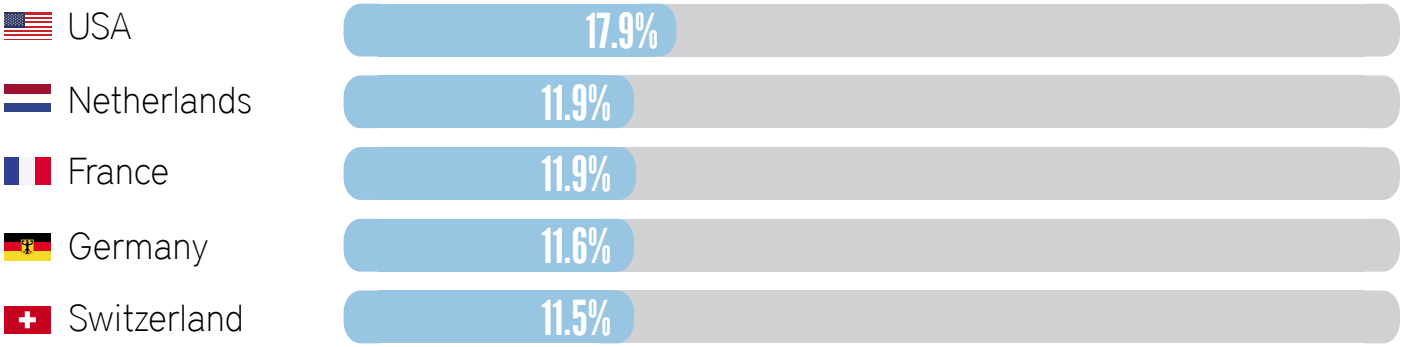
HOW HAS HIS DEVELOPED?

The first HIS was developed in the beginning of last century as a paper-based system. Since then, it has experienced several changes and passed key milestones to reach its current position.

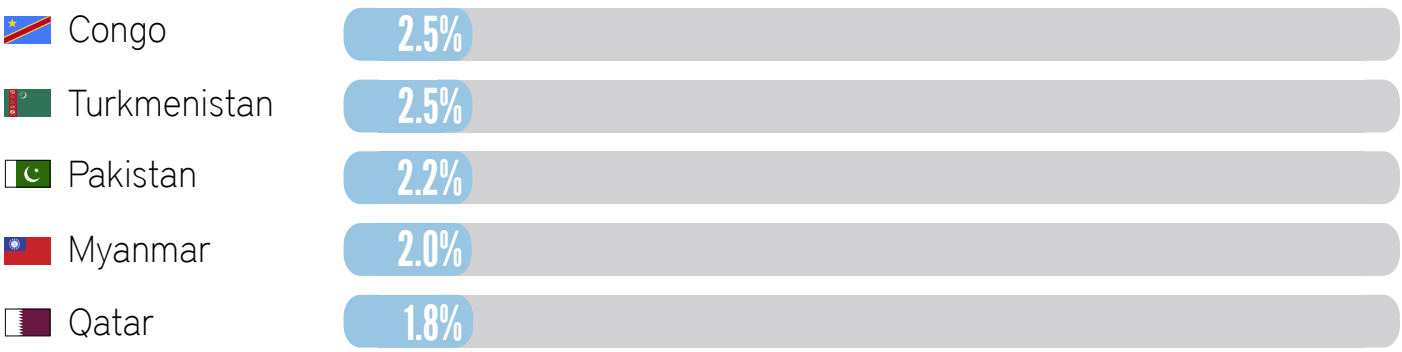
Key Decades in HIS Development	
1910	Beginning of Patient Data Collection
1940	First Hospital Accreditations in US
1960-1969	First Electronic Information Systems for Patient Admission, Patient Discharge and Billing
1969	Debate on "Patient Chart Models"
1980	First Ward Patient Chart
1990	Shared Patient Charts
2000	Evolution of Information System concept to sustain care's continuity

HIS is an important cost factor for organizations. It is estimated that on average 10% of the Gross Domestic Product of developed countries is devoted to healthcare and approximately 5% of it is dedicated to HIS.

Top 5 countries for Healthcare Expenditure [% of GDP 2011]

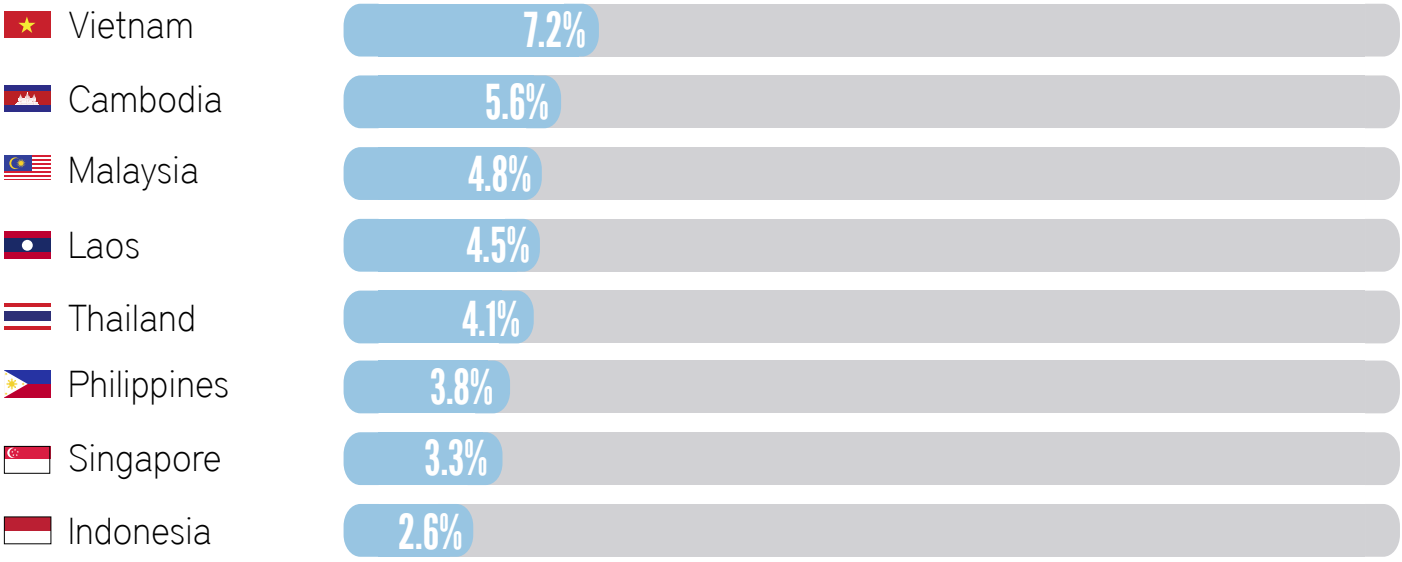


Bottom 5 countries for Healthcare Expenditure [% of GDP 2011]



Healthcare expenditures in SEA are below from that of the developed world. Expenditure on HIS is even more alarming as countries like Vietnam, Indonesia and Philippines are spending less than 0.5% of their healthcare expenditure on HIS.

SEA Countries' Expenditure on Healthcare [% of GDP 2011]



Source: Healthcare Informatics

WHAT DO WE GET FROM HIS?

"Dynamic data, retrospective data, predicted data. Those three are making up clinical medical decision support: that means you're using the information provided by information devices, then mix it with other information, data and algorithms - medical decision support is a result of all these different combinations of data, then translated into information and then the caregiver, the manager, takes into action."

- Bert Reese, Senior Vice President and CIO Sentara Healthcare

1. Value Add for Organizations

Efficiency of the Organization

Evidence show that health organizations achieve a reduction of its error rates and its "wasted time" with standardization of processes, both administrative and medical, due to better information flow and storage. Necessary conditions to achieve this goal are:

- Correct implementation of the system within the organization and
- Adequate management of the information system

Furthermore, the data collected is useful for research purposes: several health organizations carry on research activities in parallel with the provision of care services.

Financial Impact

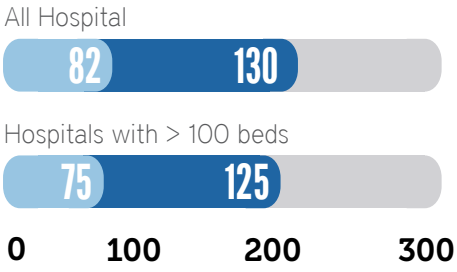
The reduction of error rates and the overall increase in the organization's efficiency has a significant positive financial impact, e.g. HIS manages the inventory level in the most efficient way, reducing cost due to backlog or surplus.

Estimated financial benefits from adverse drug event prevention in the US health system using HIS:

Through a computerized physician order entry system, HIS allows physicians to get warnings about adverse reactions from other drugs that patients might be using. If all hospitals would develop such a system, around 200,000 adverse drug events could be eliminated each year, for an annual cost savings of about $1 billion. Most of the savings would be generated by hospitals with more than 100 beds. Patients aged 65 or older would account for the majority of avoided adverse drug events.

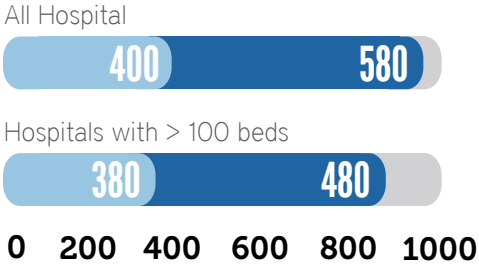
Adverse Drug Event Prevented

(thousands/year)



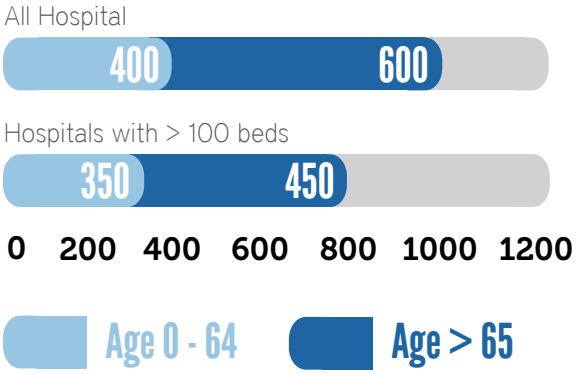
Bed-Day Saved

(thousands/year)



Dollar Saved

(thousands/year)



Source: Rand Health

2. Value Add for Patients

The standardization and simplification of the processes via HIS make the health services easier and more accessible from the patient's point of view.
Furthermore, the cost saved through an efficient management of information system would reflect from patients' point of view either in a cheaper service or in an improved service at the same expense level.
Progress in the field of HIS is directly correlated with better quality and efficiency of care.

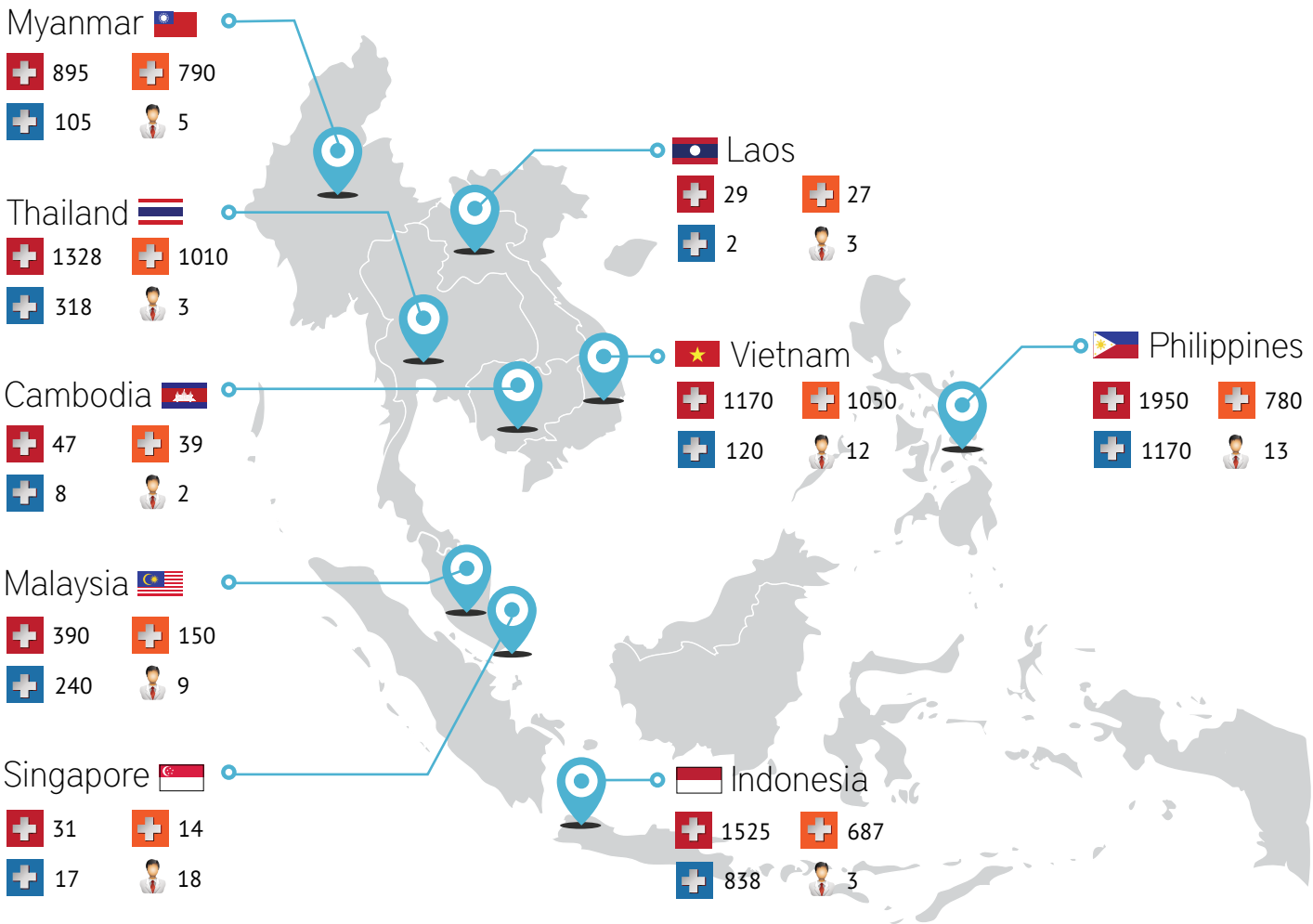
3. Value Add for Governments

Information systems play a key role in health systems at national level. Harmonizing and integrating the information system that each health organization develops would make it possible to have a clear and broad view of the major health indicators for the entire national population. Moreover, it is also possible for the government to monitor trends or threats that the national health system is facing, which is why it is operating in an order to improve the national health system.

The integration of such systems, both from private and public health organization, would strongly support governments in policy-making.
However, the integration of HIS is not easy to achieve, due to the unwillingness of health organizations to share their information.

SOUTHEAST ASIAN MARKET

In order to understand HIS market in Southeast Asia, a close look is required on the healthcare service providers. Let's analyze healthcare infrastructures across different countries in the region along with the level of service provided and human resources at their disposal.



# of Hospitals

Public Hospitals

Private Hospitals

# of physician per 10,000 population

all numbers for year 2011

Patient Base in South East Asia

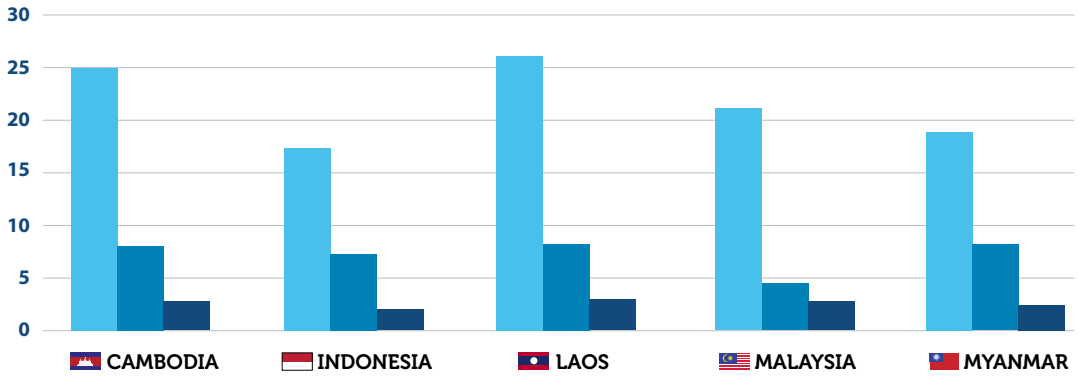
It is important to scan the patient base to have an overview of the number and characteristics of the population receiving healthcare and how these factors increase the need of an integrated HIS.

Largest population is of Indonesia but it has one of the lowest physician density per 10,000 population, also the public healthcare infrastructure is below par as only 45% of the total hospitals are government funded. Health insurance penetration in Indonesia is low as well.

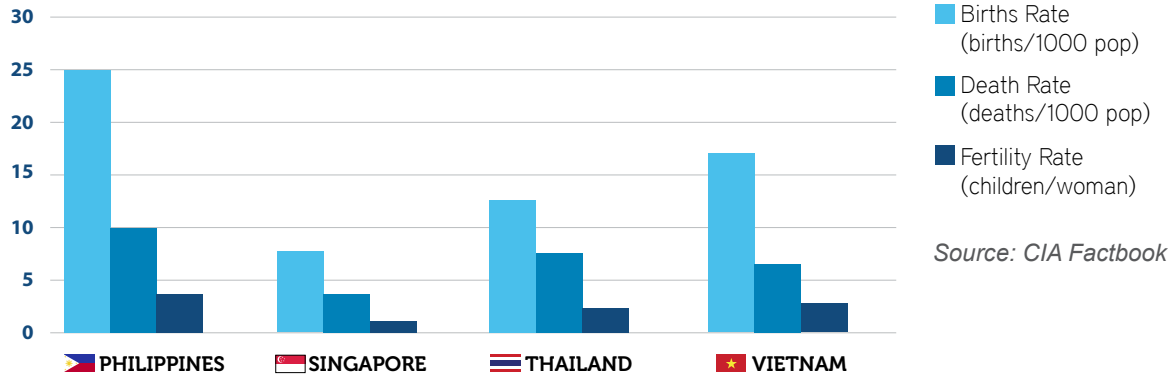
Thailand is an interesting country here as its physician density per 10,000 population is also amongst the lowest in the region. However, with increased government spending on healthcare (over 4% of GDP in 2011 as ~75% of hospitals are public facilities) and robust private sector expenditure, Thailand is fast becoming a healthcare hub of the region.

Countries	Population (2011)	Life Expectancy	Population Growth Rate
Cambodia	14.9 million	63.04 years	1.68%
Indonesia	248.2 million	71.62 years	1.04%
Laos	6.6 million	62.77 years	1.65%
Malaysia	29.1 million	74.04 years	1.54%
Myanmar	54.5 million	65.20 years	1.05%
Philippines	103.7 million	71.94 years	1.87%
Singapore	5.3 million	83.75 years	1.99%
Thailand	67.1 million	73.83 years	0.54%
Vietnam	91.5 million	72.41 years	1.05%

Source: CIA Factbook



Other indicators [birth rate, death rate and fertility rate] are also taken into consideration to outline a picture of healthcare in Southeast Asia.



Source: CIA Factbook

Medical Tourism – A catalyst for HIS adoption?

Medical tourism is an important phenomenon that has to be taken into consideration when analyzing the Southeast Asian healthcare patient base. Medical tourists are people who cross international borders for the exclusive purpose of receiving healthcare services. This is a rising trend in the region due to:

- Rise of healthcare costs in developed countries,
- Cross-border medical trainings and the consequent increase in healthcare quality in developing countries, and
- Increased ease of air travel (budget airlines)

Medical Tourism is globally a USD $20 billion industry with a total of more than 5 million patients a year. It is growing at a year-on year rate of 30-35%. Along with East European and South American countries, Asian countries represent major destinations for medical tourism: it is estimated that India, Singapore, Thailand and Malaysia account for almost 90% of the total medical tourism in Asia.

Singapore - In 2011, medical tourism receipts contributed USD 792 million, up from USD 628 million in 2009. Medical tourism's contribution to Singapore's economy is growing at a CAGR of 8% for the last 3 years and is expected to grow by 12% over next 5 years. An interesting statistic here is that Indonesians contributed to almost 50% of medical tourism receipts in Singapore in 2011. Singapore adds 200 – 250 new doctors each year from local universities in its quest to becoming a medical tourism destination of choice globally.

Medical Tourism Receipts (Singapore)	2009	2010	2011
	USD 628 million	USD 692 million	USD 792 million

Malaysia – It is the fasted growing medical tourism market in Southeast Asia. Medical tourism receipts have grown at CAGR of 33% in the last 3 years. Major contribution comes from Indonesians and Arabs, Malacca and Kuala Lumpur being the popular areas. More hospitals are now providing translation services in Bahasa Indonesia, Arabic and Japanese.

Medical Tourism Receipts (Malaysia)	2009	2010	2011
	USD 92 million	USD 125 million	USD 164 million

Thailand – The most popular destination for medical tourists in Asia, accounted for over 40% of the medical tourists in Southeast Asia in 2011. Japanese and Americans are the top contributors to medical tourism receipts in Thailand.

Medical Tourism Receipts (Thailand)	2009	2010	2011
	USD 2.6 billion	USD 2.8 billion	USD 3.2 billion

The medical tourism represents a great opportunity for Southeast Asian countries in terms of income. Along with reducing costs and increasing quality of healthcare, an integrated HIS may prove to be a differentiator to increase attractiveness of the region as a medical tourism destination.

HEALTHCARE PROVIDERS OUTLINE

"Central Thailand and Bangkok region's private hospitals are at a stage where HIS adoption seems like a logical next step. These hospitals are already contributing to the bulk of medical tourism for the country and having HIS would definitely enhance their credibility."

- Praneet Mehrotra, Principal for Healthcare at Solidiance Asia Pacific

"Today we have 600,000 Indonesian patients who go abroad for treatment spending billions of USD, for the simple reason we don't have enough physicians and we don't have enough hospitals. There is a gap and the gap is growing bigger and bigger as the population grows. All this shows that Indonesia lacks a healthcare system."

- Mochtar Radi, chairman of Lippo Group

It is important to look at HIS from a healthcare provider's perspective in Southeast Asia.

Southeast Asia – Health Infrastructure Overview

Within Southeast Asian countries there are major differences concerning medical infrastructure. It is not just about the capacity of hospitals but also technical level of equipments. We divide Southeast Asian countries into three tiers according to their "technological advancements".

- Singapore. Singapore has been the first Southeast Asian country to experience a real technology boom, especially in the healthcare sector. Having experienced such an early growth, Singapore's healthcare technology is at the level of the most advanced western countries.

- Malaysia and Thailand. These countries are experiencing a growing pace in healthcare since 2005. Both countries are investing heavily in the healthcare infrastructure and signs of improvements can now already be seen (Vajira Hospital and Bumrungrad Hospital in Thailand, or Malay Medical Centre and Pantai Hospital in Malaysia). Still, the overall level of Malaysian and Thai hospitals registers a high variance: from highly developed to underdeveloped infrastructures all over the country. Kuala Lumpur and Bangkok, for instance, face a complete different situation in terms of information and communication networks and healthcare organizations compared to other semi-urban and rural areas.

- Indonesia, Philippines, Vietnam, Cambodia and Laos are still in the naïve stage of health infrastructure development. HIS requires a good info-communication backbone and all these countries are still lagging from the likes of Singapore.

The medical tourism represents a great opportunity for Southeast Asian countries in terms of income. Beyond the reduction of costs and the increase of healthcare quality, an integrated HIS represents a key lever to increase their attractiveness as a medical tourism destination.

Skilled Personel

Even though the cross border training has experienced a great increase in the last two decades, Southeast Asian countries register a lower level of physician in comparison to major western countries. This particular aspect raises the importance of the role played by HIS. The optimization of resources, in terms of time and manpower, is fundamental to ensure the efficiency and quality in healthcare.

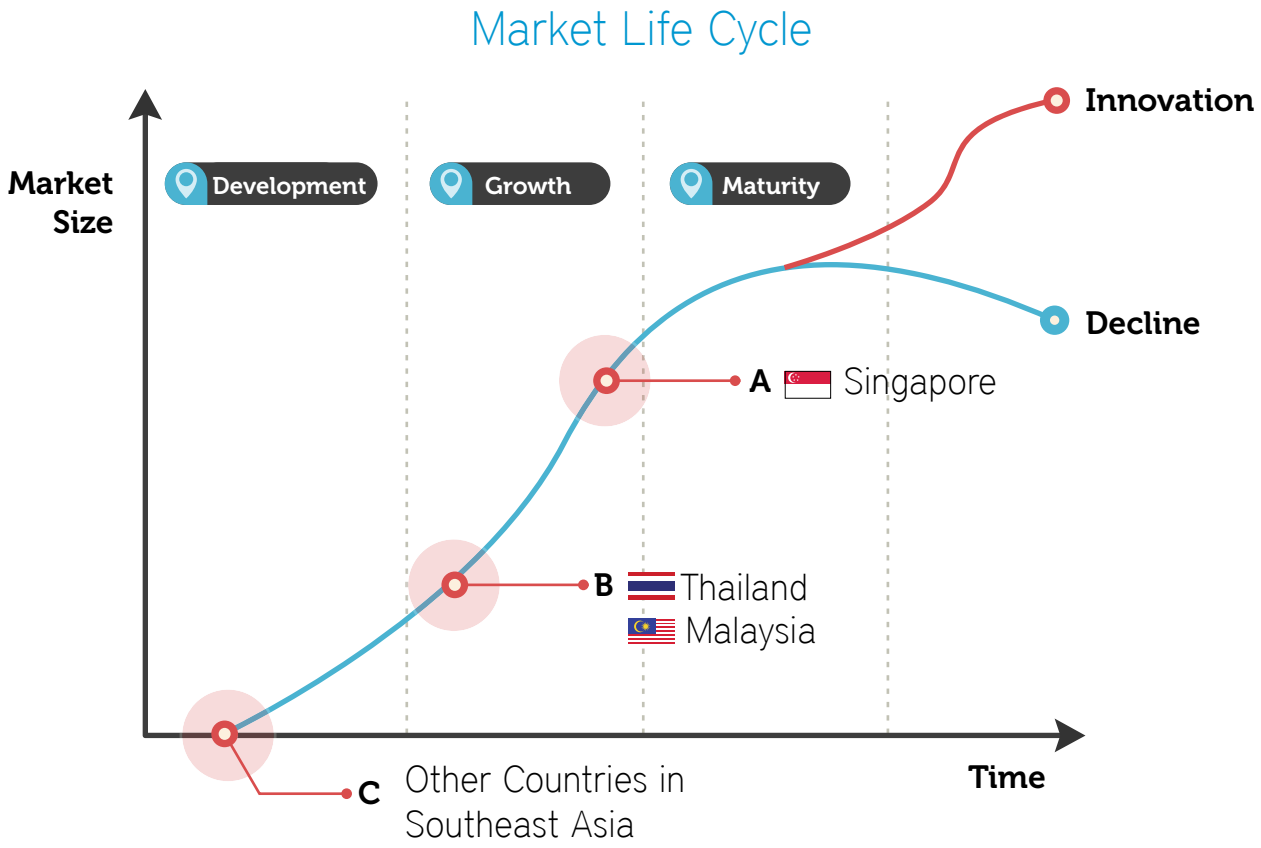
Countries	# of physician per 10,000 population
Cambodia	2
Indonesia	3
Laos	3
Malaysia	9
Myanmar	5
Philippines	13
Singapore	18
Thailand	3
Vietnam	12

Hospital Capacity

Concerning the healthcare infrastructures, hospital capacity is also below the level of western countries. There is a great need of better optimization of resources in Southeast Asia in order to effectively utilize the limited hospital capacity – HIS can be a good step towards achieving this goal.

WHERE IS SOUTHEAST ASIA IN HIS DEVELOPMENT?

There are three different infrastructure technological levels that gauge HIS maturity in a market. Since the technological progress registers different levels in the healthcare systems, consequently the HIS market is at different stages in Southeast Asia. Below is a chart of the typical market life cycle and how the three tier countries map on it.



A) Singapore

Singapore is a market at the end of its growth stage. It has reached an HIS penetration level almost comparable to the one in major western countries. The particular attention given to information and communication technology in Singapore enables HIS to grow and allows the country to become an innovation hub in Asia.

Most of the international HIS providers have their headquarters in Singapore. This is backed by government's focus on healthcare and local universities investing on medical R&D.

Here is a snapshot of HIS penetration in healthcare procedures in Singapore (2011), in comparison with major western countries. An important aspect to note is the higher use of HIS for 'clinical decision support system' in Singapore as compared to other countries, so it is the doctors that are making the most out of the HIS in Singapore. Administrative and nursing staff however is using HIS far less in Singapore as compared to the 4 European countries.

HIS Functionality	Singapore		US		England		Germany		France	
	1	2	1	2	1	2	1	2	1	1
Administrative (schedule, billing etc)	38%	38%	60%	62%	47%	25%	55%	60%	57%	57%
Patient's note after consultation	29%	53%	58%	59%	91%	16%	72%	76%	86%	47%
Electronic Alerts	29%	34%	35%	33%	84%	7%	24%	18%	38%	16%
Clinical decision support system	31%	23%	19%	22%	28%	13%	17%	18%	18%	18%
AVERAGE	**32%**	**37%**	**43%**	**44%**	**63%**	**15%**	**42%**	**43%**	**50%**	**35%**

Note: 1=Primary care; 2=Secondary care

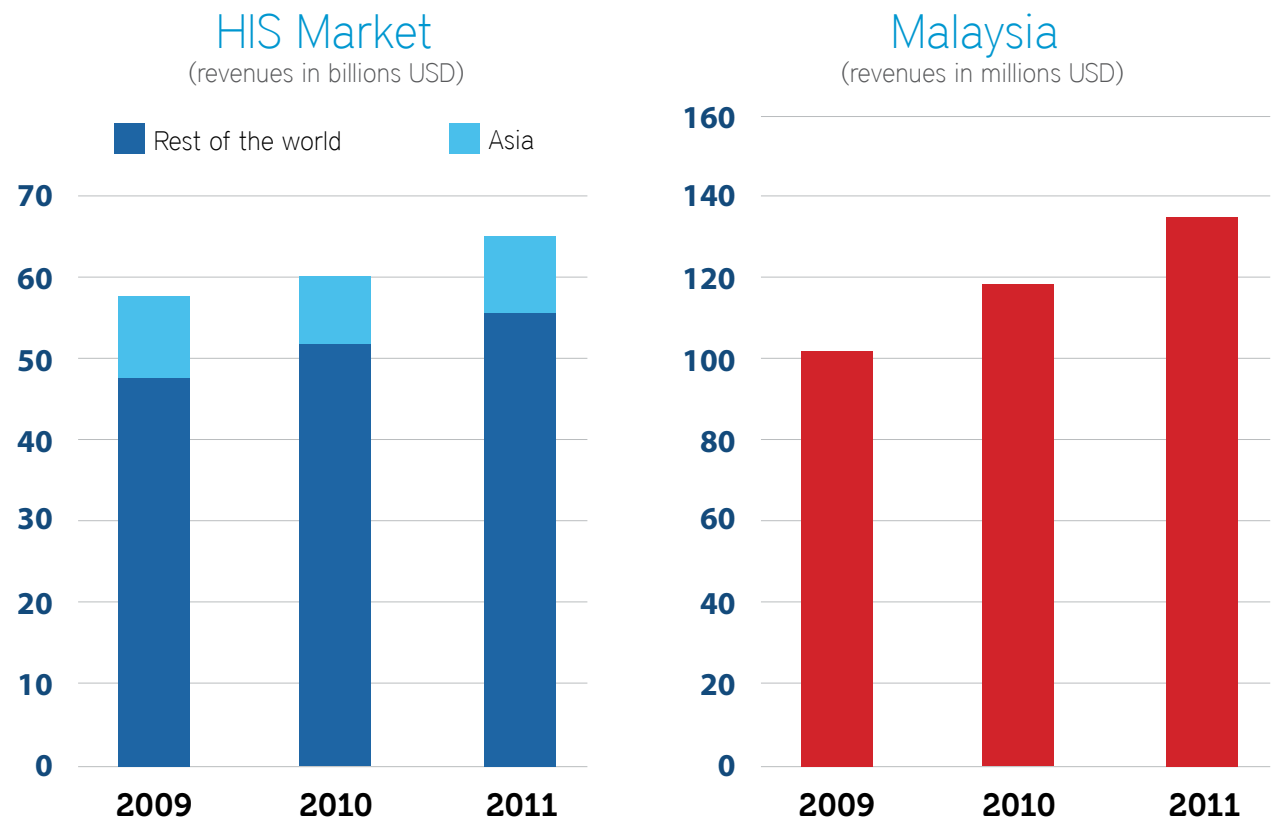
Source: : Accenture

"Having worked extensively in the healthcare field in Malaysia, we see both hospitals and governments are ready to adopt HIS. HIS providers should use this opportunity to penetrate and gain traction."

- Praneet Mehrotra, Principal for Healthcare at Solidiance Asia Pacific

B) Thailand and Malaysia

Thailand and Malaysia are about to face the growth phase in HIS market cycle. The economic growth in these countries is aiding the improvement of healthcare infrastructure and consequently increasing their HIS investment. Here is an example of Malaysian HIS market situation.



Source: Solidiance Analysis

Using HIS market data, Malaysia represents a small fraction of the Asian market. But if we focus on the Compounded Annual Growth Rate, we notice that Malaysia is experiencing 15% growth, higher than the average of the Asian region (13%), and even higher than the 7% registered by the Rest of the World.

C) Other Countries in Southeast Asia

For the remaining countries under consideration, the HIS market is at its very early stages. Most of the health infrastructures are not suitable for a proper HIS implementation. A lot of investment still has to be made in the healthcare industry before the HIS would start to penetrate and enter a growth phase.

To have an overview of the current status of HIS adoption and market in these countries, here is a quotation published in The Philippines Health System Review 2011:

"The current state of Health Information Systems closely reflects the larger health system. The national and local health information systems are poorly integrated and are very weakly governed. These negative conditions create information gaps at the national and local level. The lack of health information standards - which prevents any system from scaling at a faster rate or inter-operating with another system- is a key issue."

- Excerpt from The Philippnes Health System Review

MAJOR CHALLENGES IN HIS IMPLEMENTATION

In developing HIS major concerns have to be taken into consideration. These represent challenges for the HIS implementation and are fundamental for its sustainability in the long run.

Cost - The prime challenge to HIS adoption

Even though the market is competitive and there are several solutions available, still the cost associated with initial implementation of an HIS is very high for health organizations. In addition to purchasing (or internally developing) a system, it has to be taken into consideration the cost associated with training personnel to navigate, maintain and upgrade the new system. Consequently, certain kinds of hospitals, such as those in urban areas, teaching hospitals, and more profitable hospitals, are more likely to have HIS rather than smaller and less financially stable organizations.

Regulations – Second hurdle to achieve HIS effectiveness

The development of HIS challenges the traditional legal procedures in three ways:

- Privacy of individually identifiable health information,
- Quality and reliability of the data, and
- Tort-based liability

Effective regulations should strongly focus on protecting individual privacy, recognizing the status of health-related information as highly sensitive.

Ethics – A small factor that can be addressed with well placed regulations

As HIS has the potential to improve quality and efficiency of the healthcare, it also raises important ethical issues such as: what are appropriate uses of HIS? Who should use information and how? How will this change patient-physician relationship?

This does not represent the problem itself, It is more a setting stage in which ethics need to sustain and track the HIS implementation and penetration. If ethics would have been left too far behind, there would be the risk for HIS of losing the touch with shared values and consequently for its development not being accepted in a long term perspective.

"Too much data, not enough actionable information" represents the second largest barrier to technology adoption in healthcare."

- Wolters Kluwer Health 2011 Point-of-Care Survey (USA)

CASE STUDY

Singapore iN2015

Singapore sees information and communication technology as key indicators for economy growth. In 2005 Singapore launched iN2015 [Intelligent Nation 2015], a 10-year plan aiming to:

- increase the competitiveness and efficiency of key economic sectors, and
- establish a fully-connected society

Through high investments in information and communication technology, supervised by the IDA Singapore (Infocomm Development Authority). Healthcare is one of the industries under the spotlight of iN2015.

GOAL

To accelerate sectorial transformation through an infocommunication-enabled personalised healthcare delivery system to achieve high quality care, service excellence, cost effectiveness and strong research support

STRATEGIC THRUSTS

- Enable integrated healthcare services
- Enable integration between healthcare and advances in biomedical sciences

STRATEGIES

- Health information exchange along the healthcare value chain
- Integrated processes and links across the healthcare value chain
- Integrate hospital and biomedical research data

OUTCOMES

- Well-integrated quality healthcare
- Cost effective healthcare services
- Greater ability of public to manage their health
- Strong clinical and health services research

For the Healthcare sector, the iN2015 is based on four pillar programmes:

Integrated Clinic Management System (CMS)

Launched in 2006, aims to encourage general practitioner clinics (GPs) to lever infocomm technology for clinical improvements. Information flow allows to plan treatments in coordination with other healthcare organisation along the health value chain. Capability to plug into the nation healthcare network to reach the vision One Singaporean, One Electronic Medical Record.

GP-IT Enablement

Launched in 2010 as subsequent step of GP-IT Adoption. It aims to support the GPs adoption of more sophisticated Information technology creating an IT-enabled foundation that links the National Electronic Health Record and other health database.

Healthcare Innovation

Launched in 2011 as a collaboration between IDA and Motorola Solutions Asia Pacific to incubate innovative enterprises active in mobile application for healthcare sector, and organise them in local healthcare clusters and later widespread within the region.

Healthcare Innovation

Funding support for skills development in healthcare. Development to increase knowledge in Health Informatics through programmes in School of Computing at NUS. Network with fellow professionals through Singapore Computer Society. Networking and exchange experiences with international colleagues at the annual Health Informatics Summit.

Sir Ganga Ram Hospital – A True Story

Sir Ganga Ram Hospital is a multi-specialized hospital in New Delhi, with a capacity of approximately 650 beds. In 2009 it had the need of replacing its obsolete information system. The management chooses to implement a new HIS:

- Web-based user interface, easy to learn and use
- Single and unified information environment for all the departments, enabling easy information flow and sharing, fast implementation, easy maintenance and low costs
- Reliable technology running high performance database.

The flexibility is a fundamental feature of the new HIS: being web-based, it is easy to use in different contexts, supporting the information flow and display based on the particular needs of each department.

Results

- Administrative Procedures

The new HIS enabled a massive optimization in administrative procedures. Sir Ganga Ram Hospital has more than 400,000 patient visits per year and it managed to reduce its patient processing time by 40%, increasing the patient throughput. The automated billing approximately saves 1.7 hours in a 4-hour registration shift.

- Inventory Management

The new unified information flow across all the departments allowed the hospital to achieve relevant savings in inventory management. With inventory information linked to patient billing, inventory levels change only when patient is billed, preventing inventory leaks and minimizing costs related to inventory management.

- Cost Control

The hospital is now able to have an overall picture of its cost structure knowing precisely where it has been losing money on medical package. The previous cost control was imprecise, but due to the HIS implementation the hospital is now able to define what is allowed in each package at the group, subgroup or item level, and set limits on the number or value of items.

- Pharmaceutical Substitution

The new HIS led to substantial cost savings through pharmaceutical substitution. Physicians often prescribed medicines out of stock, but for which a substitute is available. Previously, it would have been arranged for the prescribed medicine to be purchased externally at premium rates for delivery services to the patient. Now, the HIS automatically checks for medicine substitutes in stock.

CONCLUSION

In the light of the above discussion, it is safe to say that HIS benefits outweigh its difficult implementation and heavy cost concerns. Southeast Asia is a prime market for HIS providers to penetrate as infrastructure supporting HIS is improving at a fast pace. Thailand and Malaysia in particular present the biggest opportunity as governments are willing to spend funds, and hospitals are also open to adapting new solutions to help them get better organized. Indonesia, Philippines and Vietnam are also potential targets, though providers will have to act as catalysts to create awareness for HIS.

ANNEXURE

APAMI 2012

HIS is nowadays a subject of main concern particularly in Asia.

Asia Pacific Association for Medical Informatics (APAMI) is the regional member of International Medical Informatics Association (IMIA), and since its foundation, it has been very active to sustain and drive the information system progress in Asian healthcare sector. As of now, APAMI has 18 countries and regional members from Asia region.

In October 2012, Beijing hosted the triennial APAMI conference that normally attracts numerous experts to discuss and assess the innovations and progresses of medical informatics. The 2012 conference focused on trends of medical informatics and electronic health records on the progress of cloud computing and internet within the HIS.

SWOT Analysis for HIS implementation

STRENGTHS

- Efficient data processing and information management
- Support in decision making

WEAKNESSES

- Cost of implementation
- Time needed for training and integration within the organization

OPPORTUNITIES

- Increase of care service quality
- Achievement of financial advantages
- Support for research activity
- Support for government in policy-making

THREATS

- Security matter for information
- Level of accuracy of the system and of the data quality
- Accessibility of information

ABOUT US

What We Do

We help multinational clients understand the Asian market landscape by profiling industries and competition, sizing the markets, segmenting customers, analyzing distribution channels, determining the best locations, preparing investment feasibility studies, identifying suppliers, reviewing potential joint ventures or acquisitions, and delivering market entry and growth strategy in Asia.

What We Are Focusing On

Our expertise in the healthcare industry is based on the previous medical technology, hospital, patient monitoring, and life sciences experiences we have had. Our Asian market entry and growth strategy services provide the required insights and the necessary roadmap to capture a profitable market share in the region.

Additional Details

Solidiance has offices in China, India, Indonesia, Malaysia, Myanmar, Singapore, Thailand, and Vietnam. We are fast expanding and always on the lookout for exceptional people.

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Solidiance is a dedicated B2B marketing and growth strategy and consultancy firm focused on the Asia Pacific Region.

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