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Knowledge driven Health – Microsoft vision for future health care

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Abstract: Today's healthcare systems are facing huge challenges related to the aging of population, availability of resources, development and availability of new technology and individual empowerment. A Microsoft Healthcare belief is that people are the key to success, whether success is measured by healthy patients or a healthy bottom line, that knowledge is a strong enabler of transformation of healthcare delivery, that IT is an agent of change and last, but equally important, Health IT needs to be available to many, not just some. The article will provide some arguments about heath IT contribution and Microsoft vision regarding the future of delivery of health care.

Key words: Medical Informatics; eHealth; Information and Communication Technology; Evidence Based Management; Quality Management, Personal Heath Record, Information Systems, Knowledge, Decision Support Systems, workflow management, prevention, early diagnostic, treatment.

1. Introduction

In every area of the Health ecosystem, organizations that develop deliver and pay for Health products and services are increasingly challenged to provide better and safer care to more patients in less time and at a lower cost. Every area of Health is facing tough challenges, and addressing them is no easy task in a working environment that is overloaded with disconnected information and fragmented with disparate technology systems - especially while also balancing the diverse demands of government services and regulators, health payers, researchers, providers, patients, and consumers.

In the past, solving these issues with technology has been expensive and overwhelming. The technology solutions available weren't affordable and they regularly took too long to implement and, then, didn't meet user needs. Moreover, they often required extensive training to learn to use—something time-challenged health professionals couldn't afford to do.

We believe it is time for a different approach.

At Microsoft, we are working on IT solutions for every area of health. We understand that Health is not just about Hospitals – it is about all the care, services and products delivered to people by the many organizations throughout the entire Health ecosystem, including Providers, Payers, Health and Social Service agencies, Life Science organizations and consumers.

Our innovative technology and partner solutions range from streamlining the way patient orders are recorded in hospitals, to enabling Health Payers to compete in a consumer-focused market, to helping pharmaceutical companies gain greater returns on their R&D investments and to helping consumers take charge of their care by keeping

track of all their health information. The core of the new approach is the knowledge driven health.

2. Principles:

Microsoft vision is articulated around several principles:

- It's about People

Microsoft understands that people are the key to success, whether success is measured by healthy patients or a healthy bottom line. Microsoft puts the need to provide software that helps the people who deliver and receive health services at the top of the list. We believe that the benefits of health IT investments have to be felt personally, by making jobs and lives easier and safer. We also know that the users of systems need to be involved in the initial design and ongoing evolution of the systems they are being asked to use. That is why we promote the use of software tools that are simple and familiar, and perhaps even fun to use. If individuals feel the benefits of health IT, then the systemic potential of the systems will also be realized. But first, above all things, it is about people.

- We focus on knowledge.

People make decisions based on knowledge, not just data. That is why our solutions don't just bring data together, they provide the information, facts and awareness of changes needed for knowledge-based decisions. In an industry often plagued by data overload, healthcare professionals need all pertinent information to be tailored and a keystroke away for the decisions they need to make to help their patients and improve their organization.

- IT is an Agent of change.

Advanced software solutions that connect a wide range of medical technologies and data into a seamless whole will provide a complete picture of health. But that isn't the ultimate end goal. Rather, those advance software solutions will enable a change to an information-centered approach to medicine that can shift the priorities of Health from treatment and cure to prevention and life-long wellness. It has the power to put individuals as the center of the Health system, empowered with the pertinent information needed to control their own well-being. And an information-centered Health system offers the opportunity for a rich marketplace of resources and services that will increase efficiencies and cut costs across the spectrum of care.

And last, but equally important,

- Health IT needs to be available to many, not just some

For too long, the solutions implemented to help solve some of the most significant issues in the Health ecosystem have been so complex and expensive that only the richest can afford to implement them, and then it can take years to realize the benefits. That is why Microsoft is dedicated to offering our economical, easy-to-implement-and-use, off-the-shelf technology to our health customers and partners so they can develop solutions that quickly and directly benefit everyone. We believe there is value to be gleaned to provide a better ROI and faster, easier implementation. Because although the Health industry has specific needs, it also has a lot of needs that have already been solved in other industries.

The challenges of Health will take a long time to fix, and there is a long list of technology companies, large and small, that have been in and out of the health

solutions world. This does not help patients trust and belief that money spent on health IT is money well spent. At Microsoft, we have taken a long term view and made investments that are consistent with that view. And based on our past successes in other industries, we believe there is no company with a better track record of solving long-term and difficult problems.

3. Microsoft future vision:

The main elements of the Microsoft future vision captures the essence of current health industry trends, including the rising tide of citizen empowerment in healthcare, the availability of information everywhere and cost containment.

3.1. Citizen empowerment:

The future of healthcare will be based on active participation of individuals to the management of their health status. Health information, Health education and remote monitoring are the key elements of this vision. Collaboration with health professionals for the interpretation of various physiological functions and fine tuning of the physical exercise and behavioral factors are made possible by today technology. Virtual Visits with General Practitioners or case managers would allow prevention, precocious intervention and early diagnostic of disease and possible enrollment in clinical studies.

3.2. Support to Health Professionals

A range of light weight intelligent devices will allow Health Professionals to better manage the whole care workflow of their patients. They will be receive in real time important information regarding the status of their patients, receive alerts concerning the treatment and plan the future steps being inform about the latest medical guidelines relevant to their patient. The tools will help manage and track patient medications in the hospital setting as well as locate needed equipment to conduct his patient visits.

3.3. Evidence based management

The challenges regarding increasing cost of healthcare could be tackled by evidence supported information about the available resources, performance of health professionals and compliance to medical guidelines (care pathways). This information gathered and managed by the health professionals could pave the way to a new generation of quality management techniques based on evidence.

3.4. Knowledge driven healthcare

The essence of how information technology will truly help transform Health to better connect people and data, facilitate improved collaboration, and better inform everyone involved with the best knowledge at hand, in the timeliest manner while eliminating geographic barriers is what the Microsoft vision for Knowledge Driven Health is all about.

Microsoft Knowledge Driven Health encompasses solutions, technologies, products, and services from Microsoft and its partners that connect people to systems and data, improving collaboration and informed decision making to facilitate knowledge-driven delivery of care, services, and products.

It equips people who work in the healthcare ecosystem with intuitive tools so they can provide safer, higher-quality care, services, and products to more patients and citizens in the most time- and cost-efficient manner. Microsoft's contemporary and flexible technology solutions allow organizations to not only streamline, but transform processes. They leverage existing IT investments and make previously disconnected systems and information within and across organizations easily accessible, so people can collaborate across the healthcare ecosystem to share and analyze information and turn it into knowledge-driven action for improved operational, and personal and public health outcomes.

4. Impact

Once implemented, the Knowledge Driven Health vision can have a significant impact across the spectrum of Health organizations:

- Providers[1] have the information they need when they need it, so they can take knowledge-driven action for improved patient, clinical, and business outcomes. Using innovative approaches and easy-to-use, flexible technology tools, healthcare professionals are able to provide safer, higher-quality, more accessible care that is patient-centric, evidence-based and time- and cost-efficient. And because Knowledge Driven Health solutions are economical and quick to implement, the benefits of increased caregiver and patient satisfaction and better business performance are quickly realized.
- Health Payers[2] can transform health plans from transaction-based enterprises into highly collaborative, knowledge-driven organizations that enable consumers, providers, and employers to make informed choices that improve personal health, the quality and affordability of care, the customer experience, and their bottom lines. A faster time to market for new innovative products and services and an expanded capacity to handle more complex customer interactions with fewer staff are other positive outcomes from improved technology in this area.
- Life sciences organizations[3] can facilitate seamless collaboration between industry professionals, customers, and business partners, which can lead to breakthroughs in research and product innovation, business performance, and supply chain optimization.
- And Public Health[4] organizations can connect their people and systems, improving collaboration for more informed decision making. This allows organizations to more efficiently provide services to a broader population,

[1] See http://www.microsoft.com/industry/healthcare/healthplans/default.mspx
[2] See http://www.microsoft.com/industry/healthcare/healthplans/default.mspx
[3] See http://www.microsoft.com/industry/healthcare/lifesciences/default.mspx
[4] See http://www.microsoft.com/industry/healthcare/lifesciences/default.mspx

help protect and promote better health, and enhance citizen health status and social services outcomes while managing the cost of service delivery.

5. Infrastructure:

Microsoft Knowledge Driven Health starts with the principle that a system of successful, high-quality healthcare is built on an integrated infrastructure. In an environment in which a hospital, health payer, or other health-associated organization may have as many as 200 separate, disconnected systems for creating and storing information, the underlying objective is to create a standards-based technology framework by which people can easily access and navigate the information stored inside.

Microsoft defines this framework with our Connected Health Framework – Architecture and Design Blueprint. It is a set of vendor-agnostic best practices and guidelines for building electronic health solutions based on a service-oriented architecture (SOA) and industry standards. The Architecture and Design Blueprint provides health organizations with an approach to developing information networks with common business and technical design definitions. The framework is organized in 3 layers:

Health Solutions

Knowledge Driven Health solutions enable health providers to build connected, security-enhanced and highly interoperable ehealth solutions that span people, processes and systems. These solutions help to reduce complexity and increase organizational agility, deliver intuitive and productive user experiences, and amplify the impact of healthcare professionals and patients.

Shared Services

The second layer of the framework, Shared Services, includes solutions that allow healthcare organizations to standardize, streamline, and better coordinate common services for increased operational efficiencies. By aggregating technology resources, shared services solutions help manage both content and relationships among health professionals and patients, enabling health organizations to fundamentally improve the effectiveness of information sharing, healthcare delivery, and processes.

Connected Health Platform

To deliver an optimized Connected Health Platform, it is necessary to have a proven and robust infrastructure and the 3rd layer of the framework addresses just that. Microsoft's infrastructure provides a security-enhanced, scalable, and interoperable foundation for seamless, organization-wide capabilities.

6. Successful implementations and results:

Eastern Health is the second largest healthcare provider in the State of Victoria, Australia. They provide public healthcare services to a population of 800,000 people across an area of 2,800 square kilometers. With more than 7,000 staff working in five hospitals, Eastern Health relied on e-mail and voice mail to contact its practitioners.

Although they already used e-mail messaging and telephony services extensively, it was not providing effective communications across all levels at all times. The organization already had BlackBerry devices and Palm Treo Smartphones deployed for

mobile messaging in clinical, radiological, and administrative areas, but needed to better support their mobile practitioners. Eastern Health wanted an integrated messaging solution to streamline collaboration and cut operating costs.

Using Microsoft Exchange Server 2007 with Unified Messaging in conjunction with Microsoft Office Communications Server 2007, Eastern Health has created a unified communications environment that offers extended capabilities and improves patient outreach. The new system provides a one-stop gateway for collaboration that is scalable for future expansion, cost-effective, and helps improve patient care. Now, e-mail, voice mail, and faxes are delivered to users' inboxes, and users can access that information from familiar clients such as the Microsoft Office Outlook 2007 messaging and collaboration client, or from a telephone using Microsoft Office Outlook Voice Access. With Office Communications Server 2007, users can send instant messages and see the availability of other employees through presence awareness which is linked to the presence status they set in their Outlook calendar or Office Communicator.

The Eastern Health project clearly demonstrates a solution that focuses on People making both its staff and patients' lives much easier and safer[5].

Another example of successful implementation, of a solution for health professional's collaboration is the Washington Hospital Center, the largest private hospital in the Washington, DC, who faced the common challenge of controlling hospital-acquired infections. Relying on multiple databases and systems, infection-control clinicians struggled to access the complete information needed to trace where infected patients had been in the hospital, to minimize their exposure to other patients, and to satisfy governmental reporting requirements. The hospital implemented a solution based on Microsoft Amalga™, the Unified Intelligence System, initially developed at Washington Hospital Center and acquired by Microsoft in 2006.

Microsoft© Amalga™, the new version of the product formerly known as Azyxxi, allows hospital enterprises to take advantage of the data sitting in clinical, financial and administrative silos. Without replacing current systems it offers an innovative way to capture, consolidate, store, access and instantly present data in meaningful ways for leading edge institutions. The system helps users to correlate information from multiple systems and gather valuable intelligence that can help support patient care, organizational quality objectives and operational efficiency. With its flexible data capture, storage and presentation capabilities, Amalga quickly delivers rich, role-based, customizable views and allows users to adapt the system to their workflow and preferences. With Amalga, the infection-control department now has minimized infection exposure, fewer costly patient transfers, comprehensive device tracking, up to 3 days faster reporting and up to 3 hours saved weekly in MRSA compliance reporting.[6]

Another example is Bumrungrad International Hospital that treats more than 1.2 million patients from 190 countries each year. They use Microsoft Amalga Hospital Information System to efficiently manage clinical workflow, billing, regulatory compliance, and medical records. Microsoft Amalga HIS is a state-of-the-art, fully Integrated Hospital Information System complete with picture archiving, patient and

[5] See : http://www.dimensiondata.com/NR/rdonlyres/E54E1B77-359B-4C33-A63F-D68F72761DC5/8494/EasternHealth20071.pdf

[6] See : http://www.microsoft.com/industry/publicsector/partnersolutionmarketplace/CaseStudyDetail.aspx?casestudyid=4000001100

bed management, laboratory, pharmacy, radiology, pathology, financial accounting, materials management and human resource systems.

Since automating patient data and medical images, implementing filmless radiology, and transforming its workflow with Amalga HIS, Bumrungrad has decreased the cost of care, at a time when global healthcare costs are soaring. Gross profit margins increased to 33%, a significant increase from the low 20s in 1997, and they realized a 40 % growth in total number of patients. The hospital has not increased its IS or back-office staff and was able to eliminate its old medical records unit, and convert its 10,000 square feet to a kid-friendly, revenue-generating pediatric clinic[7].

Interesting example is the one of Hospital de São Sebastião near Porto, Portugal. They wanted to implement a unified technology environment to serve the needs of patients rather than depend on isolated systems for each healthcare professional and department within the hospital. So, their 11-person in-house IT group built a patient record and management system using Microsoft commodity products for one-tenth of the cost of traditional commercial systems and had users relying on the system only six months after the original idea was conceived.

First deployed in the emergency department, their Medtrix EPR solution was developed as a Web-based application using Microsoft® Visual Studio® .NET 2003 and the Microsoft .NET Framework. The application provides physicians an integrated view of all clinical information relating to patients, starting with hospital admissions. The workflow of patients has been improved according to the hospital personnel, as well as the waiting time. The delay between prescription and administration of drugs is sensible reduced due to the voice recognition feature, automatic transfer of prescription to the nurses and pharmacy[8].

Let's take a look at Asklepios, the largest private hospital group in Germany with holdings in the US. They wanted to provide streamlined processes and rapid access to patient data, with standardised IT infrastructures to efficiently manage all of its hospitals and facilities. Their goal was to optimize interactions between medical-technical equipment and facilities and create the conditions necessary for flexible, demand-orientated assignment of doctors and nurses.

To achieve this, Asklepios launched a large-scale project, known as OneIT, to standardize its computing environment on the Microsoft platform and enhance its delivery of medical services. With uniform data services, a single Active Directory domain, and a stable high-speed network, all barriers to information sharing between hospitals have been removed. The scale of the project was unprecedented in the history of the Germany healthcare industry. Due to meticulous preparation, the migration of hospitals with 300 to 600 computers was managed in just one week. The number of servers in the architecture was reduced from 120 to 20, resulting in a substantial increase in availability.

The results of the conversion phase are well evidenced. A study based on a total cost of ownership (TCO) model—carried out by Asklepios, Microsoft, and Intel®—showed that the OneIT standardization project not only simplifies administration and increases security, but also delivers cost savings per client of almost one third. Availability of IT services has been substantially increased, while waiting times and

[7] See http://www.microsoft.com/casestudies/casestudy.aspx?casestudyid=4000001796
[8] See http://www.microsoft.com/casestudies/casestudy.aspx?casestudyid=49389

downtime have dropped. In addition, users can log on to any computer, increasing their ability to work effectively from any location.[9]

HealthVault Personal Health Record (PHR) is one example of successful attempt to empower individuals to manage their own health. This secure Web Personal Health Record allows healthy individuals and patients to store their medical data making it accessible with their consent to the health professional of their choice. Moreover, following multiple alliances with the medical devices industry, a wide range of individual measurements such as weight, blood pressure, pulse, ECG, blood sugar level and others can be collected in HealthVault. Agreements between a number health institutions and Microsoft allowed the patients affiliated to these institutions to have their medical data transferred in HealthVault[10].

Many of the aspects related to the increased quality and efficiency of care will need thorough scientific validation but as a first remark we must point out the large interest of many individuals around the world that HealthVault faces today.

7. Conclusion:

As a company, Microsoft is driven by the desire to improve lives through technology. Good health is central to quality of life. That is why Microsoft is so committed to finding solutions to help transform the Health ecosystem and improve people's health and lives around the world. Microsoft would like to help health professionals, organizations and funding authorities to deliver better Health care more efficiently and cost effectively.

[9] See http://www.microsoft.com/casestudies/casestudy.aspx?casestudyid=201211
[10] See http://healthvault.com/