



White Paper

Gearing up to Healthcare Agility

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Why Agile?

By meaning, agile is a development approach that speeds release and control costs by minimizing overhead, guarantees closer fit to business needs through stronger association, and decreases menace through swift releases of precious and utilizable business functionality. Purposely a break from the “heavy-weight,” process-intensive methodologies used earlier, agile gets its name from its flexibility and compliance to react to change all over the development cycle. Thus, agile because:

- ∞ ***It’s a set of values and practices for engineering better software.*** Re-energizing the way software is projected, built and tested; agile practices are extremely attractive to developers. These practices are faster, economical and less dicey than conventional, colossal development methodologies.
- ∞ ***A group of “light” methodologies.*** Agile principles and practices are the foundation for many other methodologies. Examples include: Scrum, XP (Extreme Programming) and Crystal.
- ∞ ***Proven in practice.*** Although new relative to the other major categories of methodologies, agile practices have been in use since 2000 and have a long track record of successful project delivery. Agile success stories are widely published, touted by analysts and presented at conferences.

Agility is not just about responding to change efficiently and with speed -- it is also about sensing that change.

-- “Achieving Agility: The Data Center Is the Foundation” by Gartner

- ∞ ***Growing in use within enterprise IT.*** Use of agile methods has grown steadily since their inception. Agile adoption began in software development companies and has since expanded throughout government and industry sectors.
- ∞ ***Here to stay.*** Methodologies and gargantuan development practices come and go. Agile’s causal set of guidelines, however, will influence IT practices and fabricate positive business value for many years into the future. These belief, combined with agile’s flexibility and receptiveness to change, will enable agile methods to evolve to handle new needs and technologies.

What is Healthcare Agility?

Health organizations require agile IT that keeps swiftness with the increasing rate of change in the healthcare paradigm.

Gartner predicts agility elements will become measured critical success factors for the majority of large data centers by 2010.

Why is agility so critical to healthcare IT? Consumerism and government regulations are evolving. Globalization and “medical tourism” are growing. Business models are ever changing. This new competitive environment has healthcare CIOs responding to market drivers and focusing on consumer needs and expectations.

A report by Gartner says “enterprises that attempt to define and improve agility without

clearly understanding IT's role will fail to exploit IT's transformational ability to engineer and measure the steps necessary to develop agility."

So IT agility is a prerequisite to business agility. And healthcare IT organizations that move towards change and agility proactively accomplish better competitive position and contribute greater value to the over all society.

Current Problems

Outdated Information systems (IS) contribute the source of many of the problems in the Health care industry. Health care is one of the most transaction sensitive and intensive industries, given all the encounters between patients, providers, insurers, pharmacies and merchants. Yet compared to other industries, health care has historically underinvested in IS – and it shows. The transactions between parties in health care take place not so much electronically as through a mixture of phone, paper, fax, and EDI media. The result is that much information is never captured, is captured incorrectly, is captured wastefully, or is difficult to recover and use. Moreover, the industry relies heavily on legacy systems that cannot communicate with one another, not only between organizations but often within the same organization.

Healthcare providers, in an endeavor to provide better, cost-effective care, are increasingly turning to IT-enabled business rules and strategies. This increased level of investment is being driven by the need to:

- Improve the quality, cost-effectiveness, and competence of the offered services
- Increase patient satisfaction

- Reduction in medical errors and promotion of patient safety

The implementation of digital health records is leading to increased availability of detailed, ample, and patient-specific clinical information in knowledge format. This, in turn, will cover the way for the next wave of IT applications. But investment in electronic medical record (EMR) and related clinical applications, which are designed to automate workflows and organize patient clinical data, while critical to lay the foundation for these improvements, is, in and of itself, inadequate to achieve these goals. The next wave of IT investment will build on this foundation, and a key module of this next wave will be the business intelligence (BI) applications that combine data from clinical, financial, and other applications. This is essential to provide the insights hospitals need to ensure that substantial operational, financial, and clinical benefits from their EMR investments are realized.

Impact of outdated Healthcare Systems

- Communication about patient-specific care to patients and among care givers is nominal.
- Collective data and information for improvements in financial management, time efficiency, and quality improvement are needed.
- Knowledge-based information for enhanced decision making and improved patient results is deficient.
- Comparative data and information for quality contrast is less than nominal.

Healthcare Systems

Healthcare systems are extremely intricate. They operate in a mixed environment of public and private services, with a variety of business models that make the design, implementation and operation of integrated healthcare systems both complex and costly. Information technology for healthcare has developed around independent entities and functions that are not synchronized. Government agencies, hospitals, clinics, laboratories, doctors' offices and insurance companies have all invested in information technology to organize and accelerate work, yet each unit tends to implement its own processes and delivery channels. Patients, the end consumers of healthcare services, are required to deal with several departments that have no perceptible commonality in the way they work or materialize to the patient. Each takes its own approach to scheming information flow and access, such as keeping an individual's data confidential. Many of the solutions presently in use deal with complexity by restricting their scope; requiring use of rigid, pre-determined business processes and stressed to offer even minimal user-friendliness.

The consequence is a collection of isolated islands of automation, using disparate technical platforms and standards that make it extremely difficult to access the right information at the right time. Significant prior investments keep healthcare entities working within the restrictions of their legacy technologies. These limitations must be overcome for doctors, patients, administrators and others to embrace e-health solutions that have the potential to transform healthcare delivery. This lack of integration between services offered by multiple organizations, either public or private, is a reflection of the fact that these

organizations themselves are in most cases unable to efficiently and effectively integrate data within their own confines.

With the advancing ability for technology to work in flawless, integrated ways, healthcare and delivery entities are re-thinking the ways they use technology. Increasingly, they are looking for ways to make durable investments in solutions that help manage the colossal complexity of large-scale healthcare systems, help healthcare workers perform their jobs more effectively, and manage the sensitive and private data for each individual in the system in a way that improves service.

- Patient flow and the eradication of process delays
- Scheduling of and access to clinical resources (e.g., beds, operating rooms, imaging systems)
- Patient satisfaction
- Assessment and management of patient patterns
- Physician practice patterns, including conformity with clinical protocols that positively impact patient and fee outcomes
- Compliance with process and fulfilling standards mandated by accrediting entities (e.g., HIPAA for US)
- Span or Length of stay (LOS), hospital costs, revenue, and operating margins

The Value Proposition Business Intelligence

Today's commercial BI product offerings provide a rich set of capabilities. Their ability to extract data stored in a wide variety of different formats and resident on a wide variety of technology platforms is challenged only by the complexity of their data analysis, reporting, and visualization options.

The successful deployment of the most recent generation of BI tools can offer hospitals' clinical and executive leadership visibility into the operation of their enterprise that can allow them to achieve their strategic goals and make the most of the value they accumulate from their investments in both clinical and financial applications. These insights can help them realize improvements in:

- Excellence of care
- Patient safety and risk alleviation
- Staff performance and operating effectiveness

Major Objectives of a Healthcare System

- Improved revenue cycles
- More precise coding
- Diminution of revenue leakage
- Automated repetitive services (e.g., prescription refills)
- Paperless environment
- Superior accuracy and standardized documentation
- Ability to grow performance without adding staff
- Clinical decision support system at the point of the care
- Improved reporting

- Data management for pay for performance
- Data for constant quality improvement and total quality management
- Data management for promotion purposes
- Conversion of medical record space to clinical revenue-generating
- Reduction of blunders, improved patient safety
- Improved speed of documentation

The Worth of Healthcare Transformation

Healthcare systems are extremely complicated both organizationally and technically. They lodge enormous amounts of medical information for healthcare professionals, keep records for enormous numbers of patients, and facilitate maintenance of records for long periods of time. Medical records are extremely sensitive and private information. Because of this scope, changes to healthcare systems are neither inexpensive nor unimportant. Despite the complexity, the most powerful driver for e-Health transformation is the potential to perk up public health. Technology has the potential to facilitate broader reach and improve quality and effectiveness of healthcare. Enhanced systems have the potential to reduce costs (e.g., reducing the number of unneeded or duplicate tests, dropping the number of hospital admissions, etc.) They can help handle imperative issues such as compliance in legal and regulatory matters. Information technology can transform access to information and services, encourage self-service, and reduce the costs associated with traditional delivery

involving paper tasks, data entry, and paper filing and reception services.

Evolving healthcare solutions need to contain the data, interactions and transactions for at least four types of customers: patients, healthcare professionals, healthcare providers and policy makers and legislators.

As e-Health matures, it has a probable to deliver rising benefits to the community. Starting with "presence" or basic public information utilization, e-Health can extend to be more interactive through limited online features such as information search. This phase is followed by transactional capabilities, such as making online appointments or filling prescriptions online. Ultimately, we can look forward to transformation of e-Health, where suitable services are shared and orchestrated with seamless integration and new services delivered broadly. Over time, as trust develops in the new systems, we foresee that the general public will take more advantage of services available online, which should diminish the cost and inconvenience of handling routine health problems in traditional ways such as doctor visits.

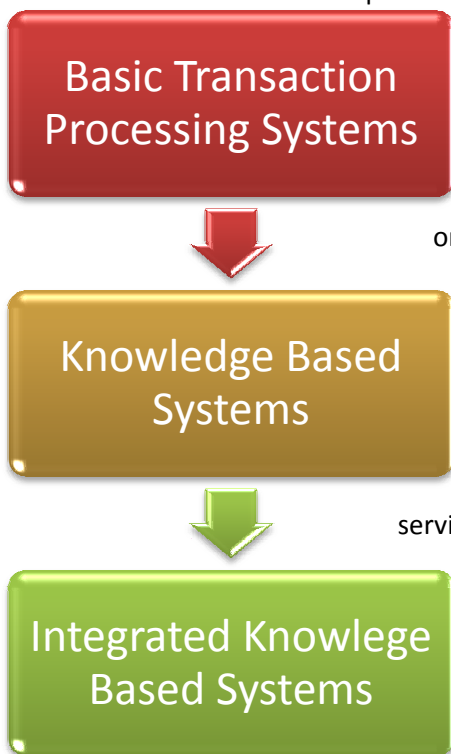
A Common Health Infrastructure

Patients, healthcare professionals, application developers, independent software providers, and government agencies all can derive major benefits from the creation of a common infrastructure. Prospective benefits include

accelerated time-to-use for new services; common reliable building blocks such as user identity management, authentication and authorization across services, and improved user experience.

A common infrastructure also has the potential for improved developer knowledge via

consistent interfaces and specifications to which they adhere – thus encouraging a broadening range of healthcare solution choices for all types of organizations. Organizations would benefit through applications that enable effective re-use of resources, standards-based interoperable solutions on a variety of platforms and _always-available'24 x 7 services.



Requirements for Connected e-Health Services

Key challenges – whether in emerging nations or developed countries – involve security, interoperability, privacy, legacy, and trust, the intangible quality required to draw a critical mass of data to into a broad e-Health system.

The top ten issues can be summarized as follows:

Ten Key Issues in Healthcare Systems

- How to create a patient's health record
- How to build a lifelong health history for a patient from information stored in multiple, diverse systems
- How to manage identity and authorities

How to identify a patient (or a healthcare professional) uniquely and reliably

- How to connect different systems on different platforms
- How to interconnect diverse systems and how to make them interoperate
- How to communicate with distant systems
- How to reuse legacy systems
- How to achieve flexibility and agility
- How to achieve performance and scalability

By aggregating these requirements, Microsoft' offers a vision for the evolution toward e-Health that consists of three core types of capabilities. They are:

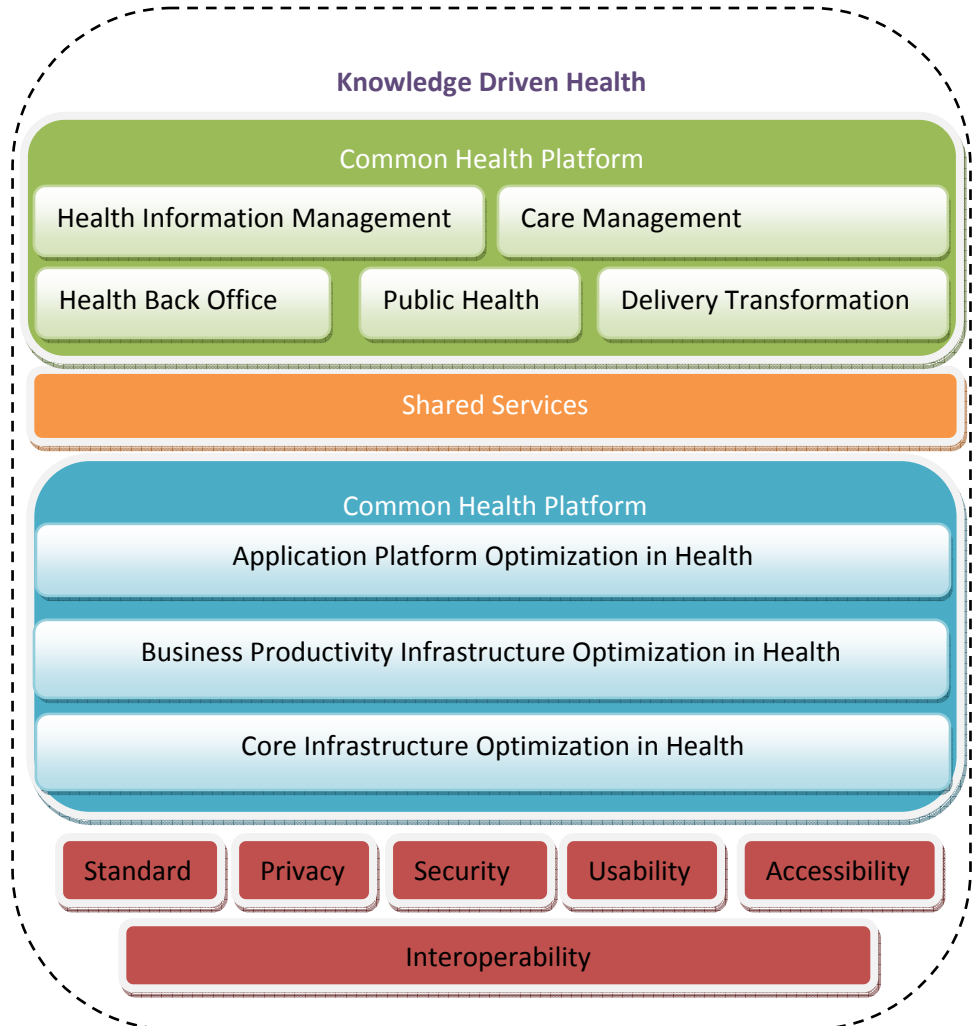
- **Connected systems** – software networks that span applications, devices, services, and healthcare organizations to help streamline processes, improve knowledge sharing and reduce costs. Connected systems rely on the use of open standards which enable interoperation of legacy and third-party applications.
- **Information-driven software** – new applications that radically improve the way healthcare workers find, organize and act on information, facilitating better cooperation and quality of care.
- **Collaborative environments** – rich interfaces and new experiences that help progress collaboration and discussion for healthcare works and patients using high-quality audio, video and natural language.

Description of the Knowledge Driven Framework Architecture and Design Blueprint

The Knowledge Driven Framework Architecture and Design Blueprint recommends an approach to addressing the requirements described above, while capitalizing on the benefits of e-Health transformation. It provides generic and scenario-specific recommendations for how to design, develop, deploy, execute and operate an architecturally sound application portfolio and interoperability infrastructure in a healthcare environment. Knowledge Driven Framework addresses two main subjects: faultless application integration and technical connectivity and interoperability. Seamless application integration is addressed in the Knowledge Driven Framework Business Framework. Connectivity and interoperability are addressed in the Knowledge Driven Technical Framework. Used together, they comprise a practical set of architecture and design guidelines for stable and agile healthcare solutions.

Service Oriented Approach

The current trend in application integration is to move away from tightly coupled monolithic systems and toward systems of loosely coupled, dynamically bound components, as in service oriented architectures. Looking at the long list of business requirements for a new generation of healthcare system and current application portfolios, Microsoft has identified service oriented architecture (SOA) as a practical approach. This is in response to the need to achieve integration on two major levels – application integration, in which systems and applications can talk to each other in mutually understandable terms (also identified in the industry as —Syntactic Interoperability)) and technical interoperability, in which systems can be interconnected in a protected and reliable manner. These two levels of integration would help healthcare systems to interoperate and collaborate at a much higher level, allowing applications such as decision support, patient and business intelligence (also identified as —Semantic Interoperability)). SOA has two separate but vital functions. From a business perspective, it is a way of making enhanced business capability and information available to consumers both inside and outside the enterprise in a controlled manner, particularly by supporting improved business processes. This is achieved by joining up systems at the application level and resolving issues of data



consistency and business interoperability. From a technical viewpoint, it is a design paradigm aimed at creating or enabling applications to interoperate across diverse technical and operational platforms. This is achieved at a technology level by observing detailed international standards and protocols, in particular those of Web services. Based on standards such as XML, SOAP and the Web services stack, an SOA provides a means of achieving the necessary agility and flexibility to support rapidly evolving business processes and changing business objectives and goals. Further, most of the building blocks in the SOA will exist in the form of legacy applications that can be

reengineered rather than discarded, giving access to their functionality and data.

Achieving interoperability through the Knowledge Driven Framework Technical Framework

The Knowledge Driven Framework Technical Framework describes the many issues involved in achieving successful healthcare-oriented interoperability at the infrastructure level – together with the tools, technologies and standards to connect systems. It recommends a supple, agile platform and a standards-based approach. And it builds on the principles and practices covered in the white paper "Government Interoperability – Enabling the Delivery of E-Services"⁵. Architectural challenges include the following:

- Multiplicity of platforms, locations, languages, capabilities and credentials
- Identity management
- Integration challenges
- Flexibility and agility Security
- Scalability, performance and availability
- Achieving the Common Hub

The Long-term Benefits of Knowledge Driven Health

The Knowledge Driven Framework to help government and healthcare organizations as a path to realizing Knowledge Driven Health. Applying Knowledge Driven Framework can be beneficial regardless of the particular technologies used. Combined with the Microsoft platform, it carries even more benefits, which may be summarized as follows:

Connected – Interoperable by design

Open architectures build on industry standards that facilitate the flow of health information and clinical knowledge seamlessly through the healthcare continuum and across agencies

- Leverage legacy application and infrastructure investment
- Collaborative – Familiar tools to automate the way you work
- Let clinicians be clinicians: improve adoption
- Enable delivery of health services in a standardized, replicable manner
- Better Economics – Driving down the cost of healthcare technology
- Create ROI faster than traditional investments
- An integrated platform that lowers TCO
- Local delivery model
- Scalable from single providers to country-wide programs
- Dependable – Proven and robust
- Applications that support 24x7x365 healthcare operations
- Financially stable
- Extensive partner ecosystem gives decision makers a choice.

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