

TESTIMONY OF

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BEFORE THE

UNITED STATES HOUSE OF REPRESENTATIVES

COMMITTEE ON VETERAN'S AFFAIRS

HEARING ON

THE STATUS OF SEAMLESS TRANSITION BETWEEN
THE U.S. DEPARTMENTS OF DEFENSE (DOD)
AND VETERANS AFFAIRS (VA)

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Chairman Buyer, ranking member Evans, members of the Committee, I want to thank you for inviting me to participate in this important hearing. I am honored to have the opportunity to share with you thoughts on the potential for evolution of information technology in the health care system. Since the VA and DOD scale is so vast, the design and implementation of their systems will resonate in how the entire health system in our country evolves. I hope that my comments will give you some idea of how one major hospital system is tackling the problem today.

Mr. Chairman, my name is Dr Peter A Dysert. Currently I am the Chief Medical Information Officer for the Baylor Health Care System, a \$2.7 billion dollar multi-hospital system serving the North Texas area. Baylor is a 102 year old, faith-based institution, with strong ties to the Baptist General Convention of Texas.

Last year, we provided more than \$256 million in Community Benefits, at cost and not including bad debt. Baylor Health Care System is the corporate sponsor of 17 non-profit hospitals. Our flagship —Baylor University Medical Center (BUMC) is located in downtown Dallas. BUMC is a 1,000 bed teaching hospital, with a Level I trauma ED.

I have been in a technology leadership role since the mid 1980s and currently serve as the co-chair of a 140 million dollar clinical transformation effort which will convert the delivery of care in Baylor facilities from paper to computer. The project also includes providing an electronic medical record in physician offices across our system. We see our investment in clinical transformation as the next great innovation in delivering quality health care.

What I hope to provide you with today is a lens with which to view your current and future technology investments that support health care. I will begin my testimony with some observations and then finish with a review of our strategy.

As you are aware, companies are entering the field of building the technology systems with varying degrees of service. Here are some of the reasons why:

Observations

- 1) Computer application (program) design-
 - a. Work flow support- most of the existing systems do a very poor job of supporting workflow (the way care is actually delivered). The computer program screens are mostly data entry in design, the functions they support represent clerk activities and require the user to sit and document work they've already done. This approach has a negative impact to the providers of care by eroding their productivity and efficiency. To nurses and doctors, these clerk type activities are not a value added function and it is not why they chose their professions. It is the major focus of legitimate resistance to the adoption of computers for patient care.
 - b. Mobility- in the hospital setting, most care providers are mobile. The majority of current systems do not support mobility except via the use of wireless laptops displaying the same types of screens I described above.
 - c. Data capture-one of the biggest opportunities for improving care and eliminating errors could be achieved if the computer systems automated data capture as a natural by product of doing the work. Technologies that could provide such a benefit are bar code, proximity recognition, biometrics, and voice recognition or natural language processing.
 - d. Information types-Most commercially available systems for health care are designed principally to handle structured data. The realities are that a complete record must also accommodate, free text (unstructured data), sound, and image files. One of the historic challenges in computerizing the current processes of care is represented by this set of issues. The component of the current record known as the physician progress notes section has remained an Achilles heal for vendors. The reason is their applications attempt to force physicians to convert their "analog" cognitive thought processes and observations into a binary decision tree of predefined, structured observations.
 - e. Human User interface design-the web browser has become the gold standard for the human user interface. It has proven to be very reliable,

platform agnostic, and require little to no user training. Traditional and many current product offerings have proprietary user interfaces and require a lot of training. In addition when changes are made to these proprietary applications, it typically requires a lot of work and training to support as well as a lot of effort to load the new applications on the user's computer. The web browser is the best version of a zero administrative client there is.

2) Computer systems architecture-

- a. Design-a global architecture design based on standards is required for the support of a reliable electronic health record. Most, if not all systems offered today are built on proprietary designs and in many cases outdated programming languages. As a result, these systems require expensive interface development in order for them to support the exchange of information with other systems. Interfacing as a means of exchanging data should be only one way of providing access to information contained in other systems. In my opinion, most people forget that simply making the information available to the user via a web browser without integrating the data at a systems or application level is in most cases is an acceptable solution. It can be accomplished in a lost less time and at a considerable savings in terms of cost.

The above observations are the reason the Baylor Health Care System has chosen a different approach for its electronic medical record. While we have solutions for most of these issues we are still in search of solutions for others.

The Baylor Approach

In 1997, members of Baylor Information Services (BIS) began meeting to explore the idea of using the Internet, a relatively new phenomenon in hospitals, as a medium for disseminating clinical patient information from the hospital where it resided in poorly interfaced main-frame host systems, to attending physicians and their office staff to

facilitate completion of the patient's office chart at their various Baylor-affiliated physician practices. Because of the ubiquity of the Web, it was thought that development of a browser-based Portal could be less expensive than that of an equivalent client-server product, and could be partially developed in-house by Baylor Internet programmers. This Portal would be cost effective to maintain because the only software required on the end-user's side would be a web browser, Internet access and a standard PC.

At the time, Baylor was spending in excess of \$225,000 per year supporting a relationship with a vendor that had first automated Baylor's document delivery process. The vendor, working with hospital clients across the country, had created a way to capture patient information from main-frames by using virtual print queues and modems. In this process, the company would send the files out by modem to their off-site hub, and then relay the text files to physician offices. This extremely simple system was expensive to maintain because it required PC software on the Baylor network to process the files from the mainframes and client software in the physician offices.

In contrast, BIS began contemplating a Web system allowing for the ability to "grab" the patient files from the mainframes and send them out over the Internet to the physician practice Web browser. BIS' biggest concerns were how to parse the files themselves in order to determine which doctors were named in them, and how to send them securely over the Internet to the appropriate physician offices. BIS staff was confident it could be done, but lacked the knowledge to ensure strong security and confidentiality of data.

What followed was a three year design and implementation period where Baylor engaged a succession of software application vendors. The goal was to challenge these vendors to provide a Web-based solution that would fit Baylor's needs. At this time, Baylor worked with numerous vendors to confirm the concept and document the framework for building a solution.

From the beginning, the Baylor Portal team approached design of Portal features and functionality as a partnership with our physician user community. The Portal team has always sought input from key members of Baylor's medical staff. From the medicine and the surgery sides of the house, doctors have never been shy about sharing their hopes, concerns, or complaints for the Physician Portal. By going out to the physician's offices

and talking to their office staff, the Baylor Portal design team was able to get a holistic understanding of what the everyday patient information flow problems are for physician practices. In turn, they were able to design useful Web tools for physician practices and begin to solve long-standing problems regarding how information flows from the hospital to the physician practices.

Features & Functions

Highlights

All secure access protocols have been developed with key HIPAA, legal, and HIMD personnel.

Electronic Signature represents that biggest time savings tool on the current myBaylorEMR Portal.

The Portal Search functionality has been identified as the most popular way for physicians and staff to locate and review patient information.

Baylor Health Care System's chart scanning initiative coupled with the myBaylorEMR Portal is allowing Baylor to move to a completely paperless legal medical record.

Secure Access: Physician users are required to be active staff at a Baylor hospital and sign a confidentiality agreement at the time of credentialing in order to get their Portal account information. The confidentiality agreement refers to language in the medical staff by-laws concerning consequences of misusing patient information. The confidentiality agreement also references "agents acting on their behalf," which implies that the physician is liable for patient information abuse by their office staff. Physicians are expected to initiate electronic requests office staff Portal accounts, so that a clear audit trail exists showing that the physician proxied his/her access to the office staff. There are different levels of access based on the user's defined role in the Portal. For example, physicians are able to see their own patients, as well as other patients by request, while office staff can only see their physician's patients. Hospital employee users can see currently admitted patients for their facility. All usage is logged and a nightly audit report is emailed to Medical Records and HIPAA department personnel. These access

procedures were originally developed with oversight from Baylor's HIPAA, legal and Medical Records departments.

Electronic Signature: This Web application gives the physician the ability to view, edit and sign dictated reports as well as scanned orders. This saves the physician a trip to the Medical Records department to sign the paper chart.

Census: The Physician Portal dynamically creates a list of the physician's current patients in the hospital, sorted by nursing unit. When the physician pulls it up he or she can click on the patient's name to see all the current documentation for that patient including lab results, pathology results, medical imaging interpretations, cath lab procedure transcriptions and all dictated reports from Medical Records.

Search: Physicians, their office staff, and approved hospital employees can look up patients based on their access level.

Clinical Document Viewer: This feature enables the physician or office staff user to view and retrieve patient documents from the hospital in the chronological order they are sent out, with most recent first. The user can manage the list of documents like an e-mail inbox. This application is most popular with office staff users responsible for maintaining their practice's office chart.

New Clinical Documents: This feature is part of the Portal's latest release; it shows the doctors a list of their patients against a grid of columns labeled Lab, Pathology, Radiology and Transcription. Hyperlinked numbers in those columns indicate how many documents the physician has not yet looked at. Clicking on the number creates a PDF file showing the documents indicated.

Scanned Chart feature: Baylor has an enterprise-wide strategy to electronically scan all paper charts once the chart has been closed, allowing the scanned chart to become the legal medical record as the paper version is destroyed. Baylor is using the Physician Portal as the primary means to access the scanned charts. When a treating physician wants to see a patient's chart from their last admission, all he or she has to do is look it up on the Portal.

Integrated PACSWeb access: As a result of working with Baylor's PACS vendor, the Portal development staff has been able to incorporate access to medical images seamlessly into the Physician Portal's patient visit screens.

Surgery Schedule Viewer and Case Monitor: A real-time surgery schedule viewer is available to surgeons, anesthesiologists and their respective office staffs.

Technical Architecture

Architecture Facts

Database agnostic, supporting all ODBC compliant data stores

Role based access methods leverage Microsoft Active Directory for Authorization.

Redundant load balanced server farm is utilized for high availability

N-Tier application design provides physical machine boundaries for added security/reliability

Highlights

Module reuse improves productivity when application functionality needs to be consistent across product boundaries

Microsoft Windows Server Systems and other Best of Breed technology solutions help maintain support costs

The myBaylorEMR Physician Portal developed at Baylor Health Care System was written using open industry standard protocols such as HTML, ODBC, HTTPS, XML, WSDL, SOAP, Web Services and product APIs where available. Cross vendor interoperability is achieved primarily through the use of Web Services when needed for myBaylorEMR integration. Interoperability definitions demand that the functionality of a web service interface behave consistently across:

Application boundaries, such as Lab systems and ADT systems

Application Platforms, such as Microsoft IIS, Apache Web Server, etc

Programming languages, such as .NET, C++, Java

Hardware platforms, such as mainframes and PCs

Database Platforms, such as Oracle, SQL Server, Informix, etc

Software Development Platform

The myBaylorEMR Physician Portal core engine is written entirely in .NET using the C# language. Microsoft IIS 6.0 web servers are used to deliver content to the browser.

Microsoft Windows Server 2003 serves as the operating system for all server based infrastructure. The Microsoft BizTalk Server platform is used to facilitate data capture from legacy HIS systems.

Client Architecture

The myBaylorEMR Physician Portal is a secure web based application that is delivered to clients internal and external to the Baylor network. In an effort to be browser agnostic, no ActiveX controls were developed as part of the core services delivered via the Web. This architecture allows Baylor to deliver clinical patient information securely over the Web to affiliated physicians, allowing this information to be accessed anywhere and anytime.

The availability of the myBaylorEMR Physician Portal allows Baylor to continue the vision of being the best place to give and receive safe, quality, compassionate healthcare.

Component Based Design Architecture

All applications developed for the myBaylorEMR Physician Portal are .NET modules. The design goal when creating this framework was to allow certain applications to span multiple products. For instance, there is a Surgery Schedule module that needs to be used by Physicians, as well as many other administrative non-clinical staff. Since non-clinical administrative staff has no access to the myBaylorEMR site, these modules were developed once, but are exposed multiple times via the portal framework to the corporate Intranet in the same role-based manner as is used on myBaylorEMR.

The modules developed on Baylor's Portal Framework must inherit from certain technical business object classes in order to compile correctly. These inherited classes ensure that HIPAA logging, Authentication, Authorization, UI Styles and Environment

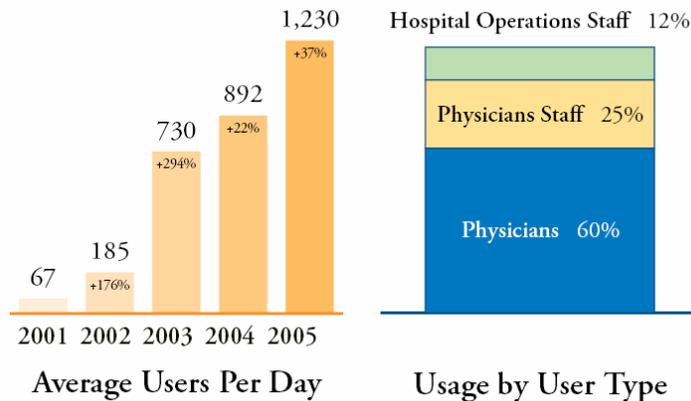
Settings are all consistent to produce the effective and secure user experience that staff has grown to expect.

Infrastructure Architecture & Design Approach

The myBaylorEMR Physician Portal systems architecture was developed using the Microsoft Windows Server System suite of products. This enabled the use of industry standard x86 server technology platforms as well as a standards based network and IP management solution from Cisco and f5 Inc. By utilizing this core set of technology, significant cost savings were realized while maintaining and achieving very high performance and high availability in the deployment model. Baylor’s choice of these core technology vendors further enhanced this platform choice by bringing value added services and support to the deployment. By utilizing de facto and best of breed solutions available today, BIS is empowered to rapidly deliver performance, reliability, and scalability while maintaining acquisition and support costs relative to the established business model and design philosophy.

Metrics

Metrics Highlights



Usage Metrics

The average users per day values are reflective of increased physicians and staff adoption. To further compliment these statistics, BIS has tracked a downward trend of how long users are taking to complete their desired action on the site. In 2003 and 2004, on average a user would spend 13 minutes and 50 seconds on the site. In 2005 through

usability changes and enhanced functionality (in the Aug. 1 redesign of the site), the average visit length decreased to 10 minutes 36 seconds.

To further support the increased usability and adoption of the site, BIS has seen the number of pages used per visit increase over 100 percent, specifically in the viewing of clinical documents (to be detailed later). During 2003 and 2004, the average user viewed 10 pages per visit, in 2005 BIS has observed the average pages viewed rise greater than 22 pages per visit.

Physicians currently account for 60 percent of the total usage of the site, with 25 percent and 12 percent being from physician staff and hospital operations staff respectively.

Technical Measures

2003 page load time 7 seconds

2004 page load time 5 seconds

2005 page load time 2 seconds

During the MyBaylorEMR portal lifecycle, BIS has made yearly advances in the supporting infrastructure and technical components to increase performance. Leveraging faster server hardware, increasing the quality and performance of the code base and upgrading the network infrastructure has led to a 350 percent increase in site performance in a two year period.

Clinical Document Content

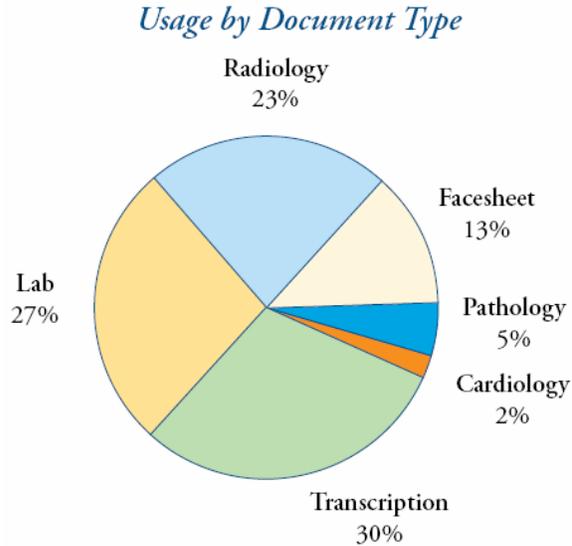
	<i>Average Clinical Documents Viewed Per Day</i>				
	2001	2002	2003	2004	2005
Average Views	87	603	2,876	4,035	5,303
% Change	--	692%	476%	143%	31%

To get a feel for usage as it relates to the total number of clinical results processed, there are on average for 2005, 14,270 clinical documents uploaded daily to the data repository. Based on these numbers, BIS has approximately 37 percent of the total available clinical documents being viewed daily through the myBaylorEMR portal, this is an increase from 35 percent in 2004.

Metrics (Continued)

Types of Documents Being Viewed

During 2005, the percentage breakdown of documents viewed by type is:



Supporting Information

myBaylorEMR Statistics Summary

	2001	2002	2003	2004	2005
Usage Metrics					
Users*	67	185	730	892	1,230
Pages Viewed**	-	-	10	10	22
Time on site**	-	-	13m 50s	13m 50s	10m 30s
Clinical Documents					
Documents viewed*	87	603	2,876	4,035	5,303
Document type:					
Transcription	-	-	-	-	30%
Lab	-	-	-	-	27%
Radiology	-	-	-	-	23%
Facesheet	-	-	-	-	13%
Pathology	-	-	-	-	5%
Cardiology	-	-	-	-	2%
Technical Measures					
Page load time*	-	-	7 sec	5 sec	2 sec

* Reporting averages per day ** Reporting averages per session

Metrics (Continued)

Growth & Adoption Summary

The myBaylorEMR Physician Portal has been a huge success at Baylor Health Care System. Strong Physician and Executive sponsorship of the portal vision, a need for enhanced access to clinical information and a corporate vision of being the best place to give and receive safe, quality, compassionate health care are all factors in this successful implementation of technology.

As the technical staff has grown at Baylor, staff has been able to introduce new features and functionality that continue to drive adoption. The technology choices selected, the strategic business partnerships with HIS vendors and the introduction of a Physician Workflow and A

Conclusion

Health care should follow the technology lead of all other major industries and customer service organizations around the world. The technological approach to the creation of an electronic medical record should be based on the internet family of solutions. These technology solutions are reliable, scalable, and user friendly.

In addition we should not forget that when it comes to providing access to patient information for the providers of care, that serving it up via a browser and letting them do the integration in their head is a much more cost effective and timely way than building discrete point to point interfaces. I read that recent experiences during Hurricane Katrina validated this approach.

Mr. Chairman thank you for allowing me to be apart of this important dialogue; the VA and DOD will set the standard for the development of information technology. We must insure that the design is as forward thinking as possible to serve the citizens of our great country.