Texas Health and Human Service Commission

Texas Medicaid Management Information System (TMMIS)

Cost Benefit Analysis (CBA) Version 3.2

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1. Executive Overview

Medicaid Management Information Systems (MMIS) have evolved with the Medicaid program and technology over time. The original MMIS like most enterprise applications were monolithic systems that were closed, difficult to enhance and maintain, most likely did not integrate well with other systems, and were costly to operate. However, the MMIS market is beginning to change. With some help from the Center for Medicare and Medicaid Services (CMS) and its Medicaid Information Technology Architecture (MITA) initiative, MMIS vendors and states are pursuing solutions that provide greater business and technical capabilities.

The current Texas Medicaid Management Information System (TMMIS), like most MMIS around the country, was pieced together over several years with several different contractors. Multiple development platforms and architectures were used. Functionality and data structures were fragmented and duplicated. Somewhat uncommon and relatively expensive development tools were chosen. All of these things have combined to make the TMMIS difficult to enhance and maintain and relatively costly to operate.

The TMMIS was certified over 5 years ago when many newer technological ideas like Service-Oriented Architecture and web services were still in their infancy. Products like web-based portals, business rules engines, and workflow processors were still not widely used. Today these ideas and products are considered essential to developing large enterprise applications, including MMIS.

The MITA initiative was created to guide states and vendors to the next generation of MMIS. The MITA 2.0 Framework provides both a guide for what future MMIS should look like and tools for measuring progress. It will continue to play an important part in the technological choices made by Medicaid enterprises for the foreseeable future.

This document evaluates two possible alternatives for HHSC to take in the TMMIS replacement effort, a Phased Replacement and a Bought (Transfer or Buy) option.

The Phased Replacement approach has the following characteristics:

- A Phased Replacement will replace the entire TMMIS or necessary components with a new system over a longer time period in smaller less risky increments.
- A Phased Replacement gives HHSC greater control over the end product.
- A Phased Replacement requires HHSC to develop the new TMMIS, and maintain and enhance parts of the old system at the same time, retiring applications in the old system when possible.
- The total cost of a Phased Replacement over all phases may be greater than with the Bought option, but there will be fewer funds at risk in each phase.
- A Phased Replacement could take advantage of the work already being done to move applications to the TMHP Portal. Continuing on this path could lower the total future maintenance and operations costs from 15% to 40% due to a consolidated system.

The Bought (Transfer or Buy) option has the following characteristics:

- A Bought system will replace the entire TMMIS at one time with an MMIS that is transferred from another state or provided by a vendor in the Medicaid software industry.
- A Bought system will give HHSC less control over the end product and most likely require the State to make compromises between functionality and costs.
- A Bought system may ultimately cost less than a Phased Replacement.
- A Bought system will put a larger amount of funds at risk at one time, but that risk may be reduced by the solution to transfer a certified MMIS from another state.

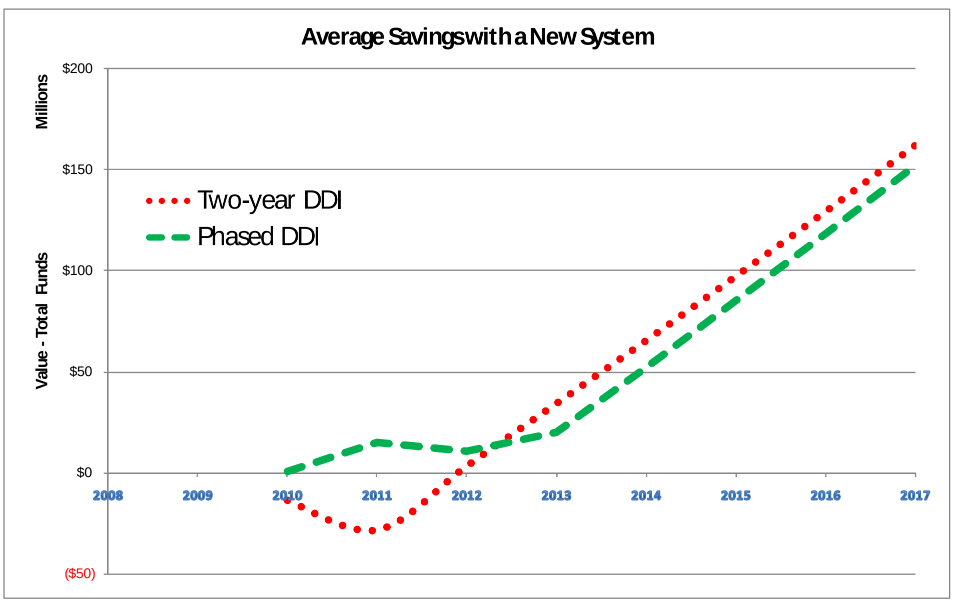
- A Bought system may not be able to take advantage of the work currently being done in the TMHP Portal and the Provider Management and Enrollment applications.
- A Bought system could result in lower maintenance and operations cost depending on the degree of centralization that exists or is modified into the system.

Financially, three alternatives were estimated from 2010 to 2017:

- Baseline - keep the current system as it is with minimal necessary design, development and implementation (DDI) in 2010 ($62.5M) and maintenance exactly like it is done today ($1,017M total by 2017). This option is used to standardize the ability to compare the two main alternatives already identified.
- Phased Approach – a purchased system is phased in over four years starting DDI in 2010 (average $91.3M) and replacing the current system 25% per year for four years with maintenance (averaging $857.6M total until 2017).
- Bought System - a purchased system implemented in two years starting in 2010 (average $91.3M), dropping the old system and new system maintenance starting in 2012 ($843.5M). Note: This analysis is based on a two year implementation although it is anticipated that a full implementation may require three or even four years to complete.

To compare the phased and bought approaches, they were both independently subtracted from the baseline "as is" alternative to obtain a standard measure of savings due to reduced maintenance and operations. Total savings due to a new system, regardless of implementation approach, can then be compared together, as seen in the chart below. The phased approach does not generate as much savings as a two-year DDI, but it allows HHSC to start saving in year one. The Two-year DDI initially costs more than the existing system and doesn't provide a return on investment until almost 2012, but by 2017 this alternative yields about $10M more in savings.

Figure 1.1 - Average Expected Total Savings and Year of Return on Investment of a New System Implementation vs. Staying "As Is"



Both options are financially feasible and ultimately better than if HSSC were to continue with the current system as it is today. Therefore strategic vision and organizational identity should ultimately decide the final alternative.

Since MITA has become a significant consideration in MMIS development and procurement, it is important to keep it in mind when developing a strategy or making system related decisions. Below are a few tips on how HHSC can ensure that TMMIS aligns with MITA in the future:

- Periodically perform a MITA review and assessment. As the MITA capability matrices become well defined this task should become easier and provide a clearer measure on HHSC's progress.
- Consider the guidelines and standards specified by MITA when making decisions about new systems. Compare the characteristics of any proposed solution against the business and technical capabilities prescribed in the MITA framework. The least costly solution may not always be the best solution if it violates the state architecture standards or MITA architecture guidelines.
- Consider restructuring organizations and reengineering business processes to more closely align with MITA. MITA alignment and maturation can only occur if business units are willing to change the way they do business. MITA prescribes an environment of continual improvement and increasing capabilities from both a business and technical standpoint. Compliance will ultimately require modifying the way business is currently conducted, which may in turn require organizational changes to promote efficiency.
- Engage other communities (e.g. providers and state-approved business partners) in the Medicaid Enterprise to ensure everyone is working towards the common goals. Every stakeholder in the Medicaid Enterprise needs to understand how CMS sees the future of the Medicaid program. It is in everyone's interest to improve the capabilities and efficiency of administering the program and providing services.
- Consider joint development efforts with external entities. Like HHSC many organizations that interact with the agency are developing new technological solutions. Working together may help to create better more efficient solutions.
- Create MITA experts in the organization. Understanding all that MITA entails is no easy task. Not everyone has time to read and understand hundreds of pages of documentation on enterprise architecture. Creating MITA experts in HHSC that can inform and instruct others within the agency can be helpful when making business and technical decisions.

Define a Strategic Vision and Organizational Identity

One of the stated objectives for this replacement effort is to develop a long-term strategic vision for HHSC systems. This is a worthwhile objective and one aspect of the process should be an evaluation or identification of its organizational identity. Essentially, HHSC should ask itself "What kind of organization are we when it comes to systems development?"

- Do we see systems development as an unfortunate event that must occur periodically or a continual effort to improve our capabilities?
- Do we like to have complete control over system functionality or are we willing to compromise?
- Are we willing to pick only solutions that fit into our existing framework in order to keep operating cost down or are we more concerned with the immediate development costs?
- Are we comfortable with big implementations or do we like smaller incremental changes?

Answering these types of questions could make defining a strategic vision and making decisions regarding proposed alternatives much easier given the cost/benefit of both options is relatively close.

2. Current Technical Environment and Systems Evaluation

How did we get here?

As with any large organization that "grew-up" during the computer age, information systems in the Texas Medicaid program have grown and evolved over time. Government mandates, technological trends, organizational structure, past decisions and natural system evolution all contribute to the current technological environment. The MITA 2.0 Framework describes the evolution of MMIS as the Medicaid program changed:

> *Historically the MMIS was intended primarily as a financial and accounting system for paying provider claims accurately and promptly. However, as Medicaid has grown more complex, the number and the complexity of MMIS's needed to support the Medicaid enterprise have increased. When Medicaid functions (e.g., managed care, clinical support, data analysis, fraud management, non-emergency transportation coordination, and prior authorization) became automated, they were usually added as separate systems, cobbled together with the MMIS, or, in some cases, hard-coded into the MMIS. These special purpose "best-of-breed" systems might require as many as a dozen different servers and user support systems (e.g., separate applications and call centers for provider services, recipient services, enrollment broker, pharmacy benefit management, clinical help desk support, data warehouse support, desktop support, non-emergency transportation (NET) support, fraud hotline, and prior authorization support). Each platform might have unique and often proprietary architecture, data standards, update cycles, and workflow requirements. As a result, these systems exchanged information with difficulty, at best.*

Large enterprise applications that do not integrate well are often referred to as "monolithic" systems. Generally, a monolithic system is one that is large, complex, centralized, and self-contained. These characteristics are often associated with mainframe-based legacy systems, but they may also apply to newer client/server or web-based applications. Because each monolith usually has its own data store, the same data is often duplicated across systems. Integration between systems is most often accomplished through an interface, a batch program that attempts to synchronize data between the two systems. Interfaces are a poor form of integration, and true integration with other systems may be difficult or impossible.

The failure of monolithic systems to integrate well has been a major issue for CIO's and executives for some time. They have begun to understand that applications rarely exist in a vacuum. They are more like pieces of a jigsaw puzzle. Each piece is interconnected and dependent on the other pieces. It is only when you put them all together that you see the whole picture.

In addition, monolithic systems generally have poor modularity that limits reusability. The functionality provided in a specific application was created only for that application's use, not for general use, and thus programs that provide the same service are often duplicated throughout the system. Because of the duplication and fragmentation of data and services, the deployment, maintenance, and enhancement of monolithic systems is often difficult and costly.

Although MITA is attempting to change the paradigm, most installed MMIS have the characteristics of monolithic systems. For the most part, vendors that provide software solutions to Medicaid enterprises continue to design and build solutions each of which is a world unto itself. They do not design their systems as if it were only a piece in the puzzle. They design it as if it were the entire puzzle. Modularity is not necessary; integration is an afterthought.

The table below lists and explains some of the common problems with this approach.

Table 2.1 - Common Problems with Today's Enterprise Application Environment

Common Problems with Today's Enterprise Application Environment	
Multiple Platforms and Architectures	Applications are not built on a single platform and do not share a common architecture. Applications reside on multiple hardware platforms and have various software architectures.
Application Specific Product Requirements	Applications require particular products in order to run. This characteristic often forces organizations to purchase or use additional and unnecessary products. (The most common culprit in this category is applications developed to run only on a particular database management system.)
Redundant, Incompatible and Non-Integrated Data Structures	Applications have redundant and sometimes incompatible data structures. Sometimes integration is not as simple as converting a code in one system to different value in another system. In fact, that would be the exception not the rule. These differences are often underestimated when evaluating potential products or designing new systems and most often is the reason products cannot be optimally integrated.
Redundant Services	Every system has redundant business and utility services. The same business functionality is duplicated across systems, as well as services like security, reporting, logging etc.
Closed Systems	Applications do not have an open architecture. It would be easier to integrate applications and take advantage of existing services if the systems had an open architecture. An open architecture is one in which components or services can be accessed by external applications
Multiple User Interfaces	Each system has its own unique user interface forcing people to learn multiple paradigms for completing work.

These problems combine to drive up development, maintenance, integration, administration and training costs. Organizations pay for it in both the actual cost of products and the reduction in productivity of developers, administrators, and end users. This environment has produced the following effects:

Table 2.2 - Effects of Problems in Today's Enterprise Application Environment

Effects of Problems in Today's Enterprise Application Environment	
More Costly Products	Products cost more to build, purchase or implement because each product and system has redundant services and data structures.
Difficult Integrations	Systems are difficult to integrate due to multiple platforms, products, services, incompatible data structures and closed architectures.
Complex Operations	Systems are overly complex and difficult to operate. No one can have a comprehensive understanding of all the data, interrelations, and operations required to run and integrate all the systems.
Excessive Administration	Systems require excessive administration because each platform, database, and application requires specialized skills to administer.
Reduced Productivity	People have to spend more time training in order to be effective workers. If adequate training is not provided, workers take longer to perform work or solve system problems. Often, outside consultants must be employed to make up for inadequately skilled staff.
Reduced Sophistication	Each system or product provides redundant services that have various levels of quality and sophistication. However, since services are specific to the product or system, a high quality service cannot easily be transferred and used with another product or system of lower quality or sophistication.

This environment has driven up the total cost of ownership for enterprise applications, including MMIS. The truth is that everyone is at fault for creating this environment. Software development companies and system integrators are at fault for not attempting to work together to produce better more compatible products. They know what is possible yet they fail to change. Software buyers, including state Medicaid agencies, are at fault for not insisting on better solutions before they make a purchase. They often feel they have no choice but to buy what is available.

Inevitably, the MMIS marketplace is also seeing an increase in the cost of implementing and operating new solutions. Along with aforementioned problems, the fact that new MMIS typically have more technologically advanced requirements than past systems is driving up the costs. Likewise, significantly increased technological expectations of the States, driven mainly by MITA, new architectural paradigms and overall technology improvements in the IT industry are all increasing procurement and operational costs. Because of this environment, Medicaid organizations must take a more strategic view when making software decisions.

TMMIS Systems and Components

The TMMIS is a typical enterprise system in that is a conglomeration of custom applications and commercial software that has been modified and enhanced over time. Below is a brief chronology of some of the significant events during the current TMMIS lifecycle:

Table 2.3 - TMMIS Major Event Chronology

Date	Event
1997	Texas Department of Health receives federal approval for the development of a new TMMIS to replace legacy system.
August 2001	The core processing components of the TMMIS (Compass21, Vision21, LTC/CMS, and Medically Needy Program) are implemented.
June 2002	The TMMIS is certified by CMS.
January 2003	Fiscal agent contract for TMMIS is awarded to ACS (Texas Medicaid and Healthcare Partnership).
October 2003	Claims EDI is implemented
January 2004	ACS takes over TMMIS operations.
January 2004	Case Trakker is implemented.
January 2004	TMHP begins implementing applications in the TMHP Portal environment
September 2006	Encounter with EDI is implemented.
Present	Project to build new Provider Management and Enrollment applications in the TMHP Portal environment is underway.

The TMMIS is a large complex enterprise application consisting of many systems and subsystems. The hierarchical component list below is a logical representation of the major software applications within the TMMIS. It does not attempt to list all the software components, such as all the subsystems within the TMMIS. It is included here to help identify all the applications that make up the TMMIS.

0 Texas Medicaid Enterprise Systems (Components Root)
1 Texas Medicaid Management Information System (System)
1.1 Compass21 (System)
1.1.1 Phoenix (User Interface)
1.1.2 Provider Support Windows Application (PSWIN) (User Interface)
1.1.3 Authorization MUTT (User Interface)
1.1.4 OON-Pricing (User Interface)
1.1.7 TMHP Portal (Subsystem)
1.1.7.1 Submitter Management (Subsystem)
1.1.7.2 HAL (Subsystem)
1.1.7.3 Firebird (Subsystem)
1.1.7.4 Care Forms (Subsystem)
1.1.7.5 Prior Authorization Workflow (Subsystem)
1.1.7.6 TexMedConnect (Subsystem)
1.1.8 COLD (Subsystem)
1.2 CMS (System)
1.3 Medically Needy Program (System)
1.3.1 Medically Needy User Interface (User Interface)

1.4 Encounter (System)
1.4.1 EDI (Subsystem)
1.4.1.1 EDI User Interface (User Interface)
1.4.2 Encounter Data Warehouse (Subsystem)
1.4.3 Encounter User Interface (User Interface)
1.5 Vision21 (System)
1.8 TDHConnect (System)
1.9 Tex Med Central (System)
1.10 Expedited Plan Code and Benefit Plan Management System (System)
1.10.1 Expedited Plan Code User Interface (User Interface)
1.11 Ancillary Applications (System)
1.11.3 Case Trakker (System)
1.11.3.1 Case Trakker User Interface (User Interface)
1.11.3.2 Case Trakker Warehouse (Subsystem)
1.11.4 Member/Provider Management (System)
1.12 System Interfaces (System)
1.12.1 Care Forms Interfaces (Subsystem)
1.12.2 Ancillary Application Interfaces (Subsystem)
1.12.3 Vision21 Interfaces (Subsystem)
1.12.4 Compass21 Interfaces (Subsystem)
1.12.5 CMS Interfaces (Subsystem)
1.12.6 Medically Needy Interfaces (Subsystem)
1.12.7 Encounter Interfaces (Subsystem)

The diagrams on the next two pages come from the Current State Reference Architecture. The first diagram is a functional view of the software applications listed above and the second diagram is a technical view of the applications.

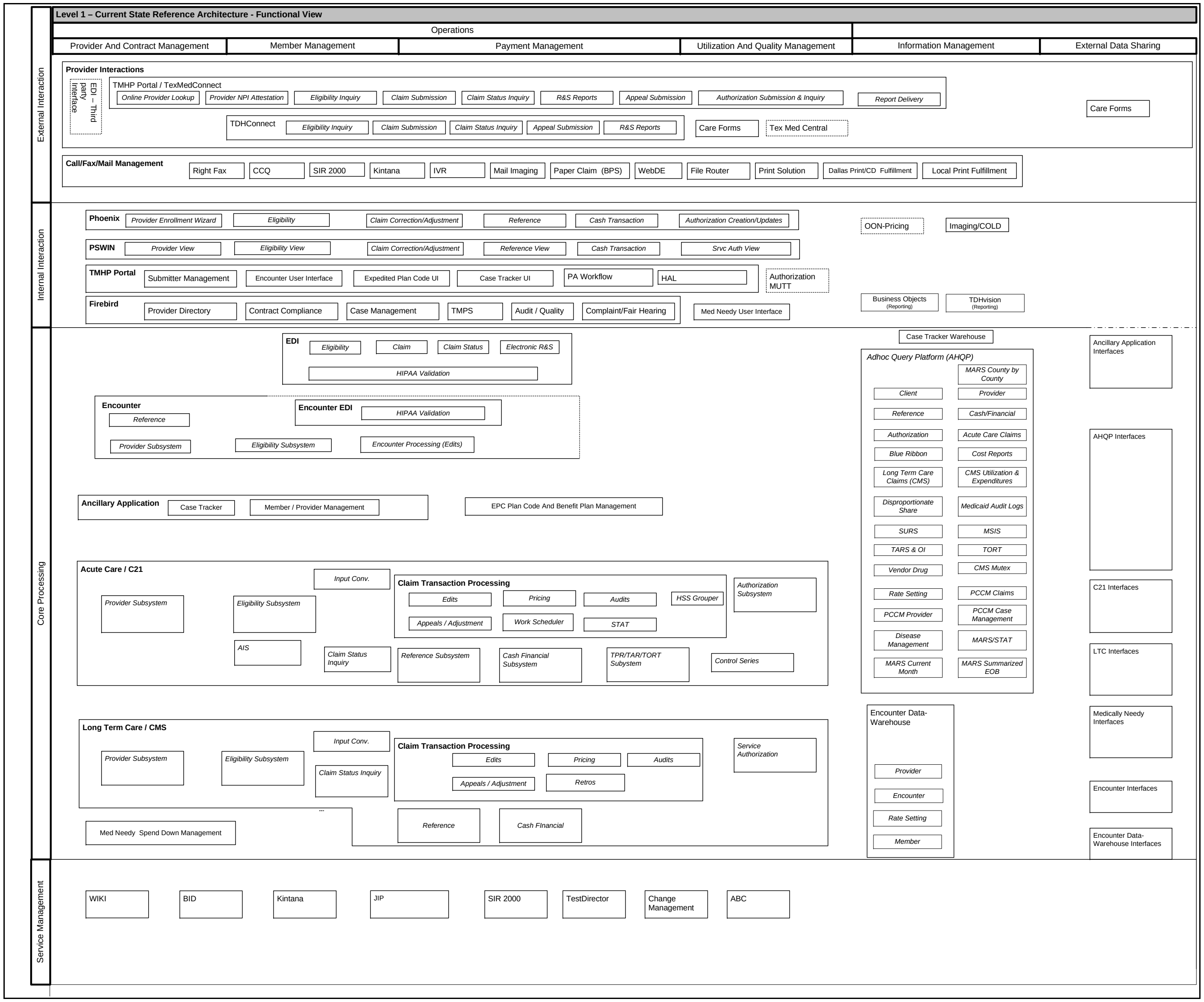


Figure 2.1 - Current State Reference Architecture / Functional View

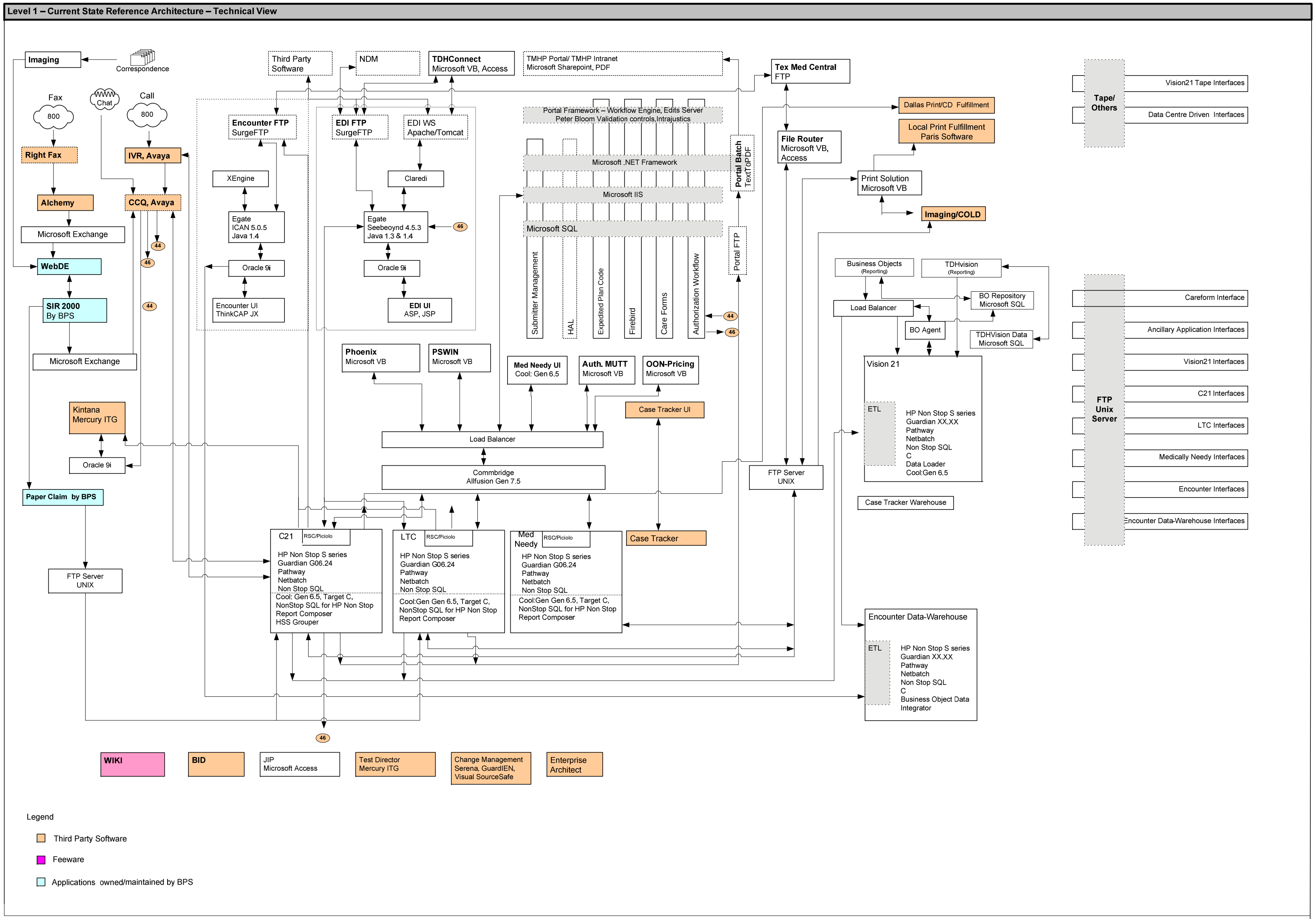


Figure 2.2 - Current State Reference Architecture / Technical View

The table below lists some of the applications and identifies the development and operating environment for each application.

Table 2.4 - Application Development and Operating Environments

Systems/Components	Operating System	Database System	Programming System
Compass21 Long-Term Care Medically Needy Program Expedited Plan Code and Benefit Plan Management System	NonStop Kernal	NonStop SQL/MP	Cool:Gen (COBOL) C
Vision21 Encounter Data-Warehouse Case Trakker Warehouse	NonStop Kernal Windows Server	NonStop SQL/MP Microsoft SQL Server	Cool:Gen (COBOL) C Business Objects
Phoenix PSWIN	Windows	NonStop SQL/MP	Visual Basic
Encounter/EDI	Unix	Oracle	Java
OON-Pricing	Windows	Microsoft Access	Visual Basic
Authorizations MUTT	Windows		Visual Basic
TMHP Portal Submitter Management HAL Expedited Plan Code UI Firebird Authorization Workflow	Windows Server	Microsoft SQL Server	Microsoft SharePoint Microsoft Visual Studio .NET
Case Trakker	Windows		
System Interfaces Care Forms Interfaces Ancillary Application Interfaces Vision21 Interfaces Compass21 Interfaces CMS Interfaces Medically Needy Interfaces Encounter Interfaces	Unix		

Work-In-Progress

A major new development effort is underway to move the Provider Management and Enrollment functions out of Compass21 and into new applications being developed to run through the TMHP Portal. In a TMHP presentation (Provider Enrollment on the Portal, Solution Architecture, Version 1.1 August 27, 2007) the following solution goals were identified.

<u>Solution Goals</u>

1. Migrate provider management out of Compass21
   1.1. Move Provider Enrollment function from Phoenix/Kintana/C21 to Portal
   1.2. Move PCCM Credentialing function from Case Trakker/Kintana to Portal
   1.3. Move the Provider Information Change (PIC) Form on the Portal
2. Automate manual processes for improved operational efficiencies
   2.1. Allow providers to complete forms online rather than submit paper forms
   2.2. Build data validation into online forms to reduce data errors and suspended transactions
   2.3. Automate the provider verification process through an online record matching service
   2.4. Automate letter generation for provider enrollment and credentialing
   2.5. Implement workflow to coordinate enrollment, credentialing, OIG criminal background checks
   2.6. Implement barcodes to further automate document imaging and routing
3. Align new components with MITA
4. Implement new Technical Architecture components
   4.1. Update .Net Application Architecture to use latest technologies
   4.2. Increase the maturity of the SOA development model

4.3. Provide clearer future-state direction for the architecture

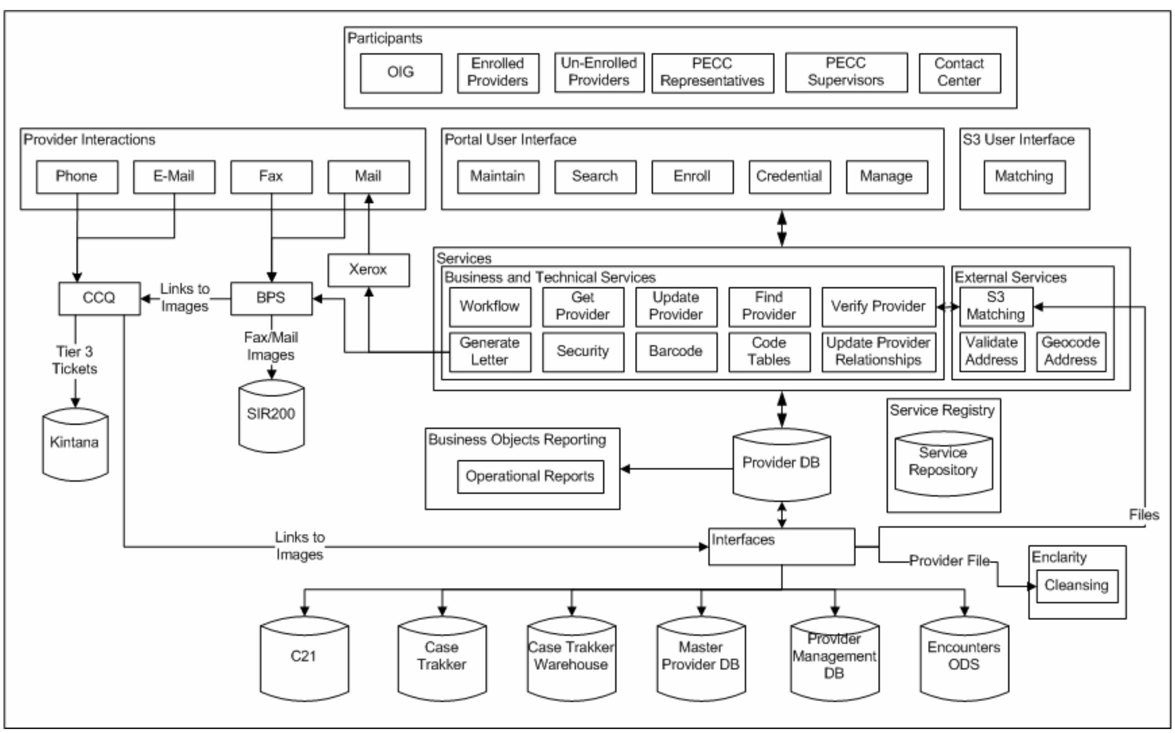
The same presentation later identified the following architecture requirements.

Architecture Requirements

1. Achieve mission-critical system availability (23x7) for external functionality and normal availability (7am to 7pm) for internal functionality
2. Evolve SOA capabilities and maturity
   2.1. Use and contribute to Service Repository
   2.2. Incorporate external, value-added web services
   2.3. Ensure separation between presentation, business, and technical services
   2.4. Strive for reusable services, not just reusable source code
   2.5. Allow for future implementations of an Enterprise Service Bus (ESB)
3. Make progress on the .NET architecture roadmap
   3.1. Use and contribute to the .NET architecture component inventory
   3.2. Implement and follow the new .NET development standards and framework
4. Support new technologies

The Provider Management and Enrollment development effort is included in this document to demonstrate how the TMMIS is continuing to evolve and how it is naturally evolving towards an architecture that more closely aligns with the MITA vision that is discussed later in this assessment. The diagram below shows the proposed architecture for the new Provider Enrollment application.

Figure 2.3 - Provider Enrollment Architecture on the Portal



Benefits of the Current Environment and Systems

The current TMMIS has its benefits, most importantly that it is certified and the HHSC is able to use it to conduct its everyday business. From a technological point of view, the TMMIS has the following benefits:

- Hewlett Packard NonStop servers provide a powerful and reliable environment that is able to process a high volume of claims.
- The system utilizes a Relational Database Management System.
- The system provides a Windows based GUI for most applications.
- The system provides an ad hoc report and query facility.
- Some applications are being moved to the web-based TMHP Portal environment.
- The system has some applications (e.g. EDI/Encounters, TMHP Portal applications) that allow interaction with external entities such as providers.
- Table-Driven updates for benefit plans.

Shortcomings of the Current Environment and Systems

Based on interviews with HHSC staff, the high maintenance costs of the current TMMIS along with major enhancements that need to be made in the near future are the major catalyst's for considering other alternatives. This section will focus on larger "macro" factors affecting the current system instead of smaller application specific problems. It is these larger issues which drive up maintenance costs and may be a barrier to future enhancements.

Within the current TMMIS, examples of each of the common problems with enterprise applications identified in Table 2.1 can be found. Some of the problems and specifically how they impact the TMMIS are discussed below.

<u>Multiple Platforms and Architectures</u>
The data in Table 2.4 shows that the current TMMIS is built on multiple platforms and architectures. That table identifies three different operating systems - NonStop Kernal, Windows, and UNIX. It identifies three different database management systems - NonStop SQL/MP, Microsoft SQL Server, and Oracle. It also identifies three different programming environments – Cool:Gen (COBOL) and C in the NonStop environment, Microsoft Visual Studio .NET and Visual Basic in the Windows environment, and Java being used with Oracle in the Encounter system. In addition, there is the newer TMHP Portal environment that uses the latest Microsoft products including Microsoft SharePoint Portal. There may well be additional operating systems, databases, and programming systems that are not listed here, but are used in the current TMMIS. The point is that there are many.

Why does having multiple platforms and architectures matter? How does it impact costs? Almost everyone is familiar with a Texas company called Southwest Airlines. In order to hold down certain costs, Southwest Airlines only uses one type of airplane, the Boeing 737.

> *Over time, Southwest has added improved 737 variants but has stayed within the Boeing 737 family to hold down operating costs. Because this technique simplified training, maintenance, and ground operations, it revolutionized the industry's approach to building aircraft fleets. (http://en.wikipedia.org/wiki/Southwest_Airlines)*

The same principle applies to developing and maintaining enterprise systems. Today's operating systems, database management systems, and programming systems are each complex systems within themselves. Having products that duplicate the same functionality drives up costs because it takes more people with a greater range of skills or specialized skills to maintain them. In addition, it creates complexities and barriers to integration that otherwise would not exist.

Just because HHSC uses a fiscal agent does not mean that the agency is immune from the costs of these shortcomings. The fiscal agent simply charges more for its services to make up for the technological shortcomings. The inflationary effects may be less obvious, but the agency is still paying for them through higher implementation, enhancement and operating costs, as well as the decreased productivity of its own staff.

Duplicated Data and Redundant Services

The Functional View of the Current State Reference Architecture in Figure 2.2 shows how the TMMIS physically separates and duplicates data and services. Compass21 and the Long Term Care system have many of the same subsystems, but each has its own database and program code. Using Provider as an example, there are at least four different applications in which there is a Provider subsystem:

1. Compass21
2. Long Term Care
3. Encounter
4. Case Trakker (Not shown in diagram)

In addition, new Provider Management and Enrollment applications are being developed in the TMHP Portal environment. Because each application uses it own data store, interfaces between systems have to be built to keep the data synchronized. Database or programming changes that may be applicable in more than one application have to be made several times. Testing, database administration, and other support services have to be performed several times. Provider was used here as an example, but the same redundancy can be found other sub-systems such as Eligibility, Claims, Reference, Financials, Prior Authorizations, etc.

Redundancy not only occurs in the business functionality, but in other common software services as well. Common application features like security, error handling, data access, reporting and configuration are repeated in each physically separate system.

Technology Choices and Inefficiencies

It seems that some previous technological choices are creating relatively high maintenance costs over time. COOL:Gen is an expensive development environment and its cost appears to be a major factor in why it is being phased out of the IT market.

> *Since many business enterprises can no longer afford expensive enterprise development environments, COOL:GEN's expensive maintenance and support costs are causing it to be phased out. Most companies are looking to replace parts or all of the COBOL based applications with Java and J2EE. In some cases, modernization of the COBOL applications, refactoring the code to a three tier model along with replacement of the COOL:GEN libraries is an attractive, low-cost alternative. RPC middleware is often used in conjunction with Service Oriented Architectures to enable the modernized software to consume or provide web services. This modernization process and integration with SOA avoids the costly maintenance and support of the COOL:GEN libraries.*
> *http://www.ecubesystems.com/coolgen.htm*

> *Legacy IT assets can include large-scale applications developed with a 4GL like COOL:Gen (also Advantage™ Gen)*. The proprietary COOL:Gen COBOL generator is ineffective at lowering maintenance costs - these large applications have become overly complicated and resource-intensive. The generated code requires a COOL:Gen runtime, and must be maintained within the COOL:Gen environment. In addition, COOL:Gen programmers have also become increasingly difficult to find.*
> *http://www.bphx.com/COOLGen_Migration.cfm*

During the original development of C21, COOL:GEN was selected as the development environment for the NSK (NonStop Kernal). However, COOL:Gen is relatively costly compared to other current development environments. The most recent version COOL:Gen environment, CA:Fusion, does allow for programs to be developed in JAVA or .NET, however it remains an expensive overhead to the system that should be replaced. Additionally, code generators are less necessary in newer infrastructures than they were in the older COBOL oriented systems.

In addition, HHSC paid 5.5 million for CO-MAND, the application that supports COLD and imaging, during the transition in 2003. Current annual maintenance costs are approximately $800,000 and are included in the contract extension through August 2009. This is another area where the high maintenance cost of existing software warrants the consideration of lower cost alternatives.

A technical inefficiency that can prove costly is the use of thick or rich client applications without the ability to systematically or automatically update the software when new computers are deployed or enhancements are made. There are techniques for doing this systematically, however it appears they are not currently being used.

In summary, the construction of the current TMMIS with multiple platforms and architectures, duplicated and fragmented data and services, and inefficient and costly technologies prohibits maintaining the status quo through the next procurement cycle. This fact is supported by the creation the TMHP Portal and the project to build new Provider Management and Enrollment applications. That project advocates a solution to address some of the existing shortcomings of the current environment, for example:

- A Service-Oriented Architecture with multiple tiers and reusable business and utility services
- A web portal and web-based user interfaces
- A workflow engine
- Consolidation of Provider related business functionality and data updates
- Use of a more common, less expensive development environment

The fact that this project is proceeding in this direction is no coincidence. This is the direction that the software development industry is going. Enterprise applications whether they are built or bought will continue to move in this direction for years. This is the same direction the MITA proposes. It is simply the modern way of developing enterprise applications.

3. MITA

What is MITA?

The best place to get a definition MITA is probably from the most current documentation released by CMS, the MITA 2.0 Framework. The overview in that document describes MITA in the following way:

> *MITA is both an initiative and a framework. As an initiative, MITA is a plan to promote improvements in the Medicaid enterprise and the systems that support it through collaboration between CMS and the States. As a framework, MITA is a blueprint consisting of models, guidelines, and principles to be used by States as they implement enterprise solutions.*

One of the many interesting aspects of the MITA documentation is that it recognizes that Medicaid is more than just a state's Medicaid agency. The Medicaid Enterprise consists of all the government agencies (Federal, State, County, etc.), health care providers, service providers, consultants, etc. that are involved in assisting states in administering and delivering the program to beneficiaries. Inherent in this view, is the realization that MMIS exist to do more than just pay claims or manage providers, they also exist to provide accountability, improve program performance, and ultimately to improve the health outcomes for beneficiaries to the greatest extent possible.

The MITA 2.0 Framework describes the Medicaid enterprise in the following way:

> *The MITA initiative focuses on the Medicaid enterprise. The Medicaid enterprise is defined in the MITA context as three spheres of influence: (1) the domain of State Medicaid operations in which Federal matching funds apply; (2) the interfaces and bridges between the State Medicaid agency and Medicaid stakeholders, including providers, beneficiaries, other State and local agencies, other payers, and CMS and other Federal agencies; and (3) the sphere of influence that touches, or is touched by, MITA (e.g., national and Federal initiatives, including the Office of the National Coordinator for Health IT [ONC], standards development organizations [SDOs], and other Federal agencies such as the Department of Homeland Security [DHS]).*

The MITA 2.0 Framework is an extensive document based on modern enterprise architecture principles. Because of the size and level of detail in the framework document, this assessment will only attempt to highlight some of its more important technological aspects. It is important to note that the framework talks in terms of a technological transformation that will take place in Medicaid over many years, most likely in several phases. Therefore, it is unlikely that solutions implemented in the very near future will meet all of the outlined goals.

Given these parameters, it is possible to discuss the most important high-level technological goals CMS has for current and future MMIS. Since this document is a technical assessment, it will only discuss MITA in terms of how it can be used to evaluate current systems and how it may effect future technology related decisions. The table below highlights some of the characteristics of the application architecture of systems that comply with the MITA vision.

Table 3.1 - MITA Goals for Future MMIS Application Architecture

Application Architecture – Applications should be:	
Interoperable	Interoperability is the ability of systems to communicate directly. This does not mean creating a batch interface between two systems, but rather the ability of two systems to communicate directly using standardized data formats and communication protocols.
Accessible	Accessibility is the ability of people to readily access a system to get data and complete work. This not only means that a system must be available, but that it should be available to a person for getting data and performing work. For example, if a person performs most of their work in the field they should be able to access the system remotely on a variety of media (e.g. Web, PDA, Voice Response Systems, etc.)
Adaptable	Adaptability is the ability to change how a system works without modifying core components such as program code and data structures. System processes become more data-driven through the use of such things as rules engines, workflow engines, and configuration files.
Extensible	Extensibility is the ability to add new features to a system by reusing common components and services to perform new tasks.. It is also the ability to add new components or services that easily integrate with the existing components and services.
Private	Privacy is the ability of the system to keep personal data from non-authorized exposure.
Secure	Security is the ability of the system to ensure system access is only granted to authorized people or processes.
Service-Oriented	Service Orientation or a Service-Oriented Architecture (SOA) is a software design strategy in which software components provide services that can be consumed by applications or other services. This approach differs from older design strategies that tended to be more process-oriented.
Integrated	Integration is the ability of systems to work together to complete business processes and share data. Integration is more than having “interfaces” that trade data in a batch process. Solutions should be integrated within agencies, across agencies, and across business partners within the Medicaid Enterprise.

As stated in the Table 4.1, the MITA 2.0 Framework prescribes the use of a Service-Oriented Architecture. Because this is such an important aspect of MITA and modern software development techniques a definition of SOA and its advantages is provided below.

> *Service Oriented Architecture (SOA) is an architectural style that guides all aspects of creating and using business processes, packaged as services, throughout their lifecycle, as well as defining and provisioning the IT infrastructure that allows different applications to exchange data and participate in business processes regardless of the operating systems or programming languages underlying those applications. SOA represents a model in which functionality is decomposed into small, distinct units (services), which can be distributed over a network and can be combined together and reused to create business applications. These services communicate with each other by passing data from one service to another, or by coordinating an activity between one or more services. It is often seen as an evolution of distributed computing and modular programming. http://en.wikipedia.org/wiki/Service-oriented_architecture*

Data architecture is another major aspect of the MITA vision. The table below highlights some of the characteristics of the data architecture of systems that comply with the MITA vision.

Table 3.2 - MITA Goals for Future MMIS Data Architecture

Data Architecture – Data should be:	
Consistent	Data consistency means that the same data element has the same value across the system most, if not all of the time. MITA Framework 2.0 states that consistency means: • The number of copies of a data element is minimized • Multiple copies, if they are necessary, are synchronized in a timely manner • The official data of record is always available
Usable	Usability refers to the need for data to be accurate and pertinent to the situation.
Timely	Timeliness refers to the need for data to be as current as possible.
Accurate	Accuracy refers to the need for data to be correct and complete.
Accessible	Accessibility is the ability of people to readily access the data for inquiry or modification.
Normalized	Normalization is a data modeling term that refers to rules for structuring and managing data. MITA states that normalized data: • Minimizes duplication • Ensures the precise capture of business logic • Prevents the loss of information • Aids in data model management

MITA also falls in line with several of the goals and strategies of the President's E-Government Initiative and the Federal Enterprise Architecture. These goals include the following items:

- Improving productivity growth through IT reform investments
- Controlling IT costs and achieving economies-of-scale
- Reducing redundancy in systems and services
- Improving access to information using web-based services
- Improving security for data and applications
- Improving the effectiveness of the government's IT workforce
- Improving the interoperability of processes and systems

There is a great deal of talk in the Medicaid industry about "MITA Compliance". States want to make sure they comply with MITA and vendors say they have compliant solutions. The truth of the matter is that at this point no one knows what "MITA Compliance" means. The measuring stick that CMS has provided in the framework is the MITA Maturity Model (MMM) and the associated Business Process Model (BPM), Business Capability Matrix (BCM), and Technical Capability Matrix (TCM). The models and matrices recognize that organizations and systems will be transforming over a long period of time, the framework states:

> *Over the next 10+ years, CMS foresees that maturing business capabilities can transform the Medicaid enterprise and that transformation will be a constant. Even as State Medicaid enterprises evolve, there are always increased functionality and better performance outcomes just around the corner. States do not have to achieve the higher levels of capability all at once for all business processes. The MITA Framework encourages growth and transformation by showing the benefits of improving State operations and provides tools to help States achieve that transformation.*
>
> *The MITA team has developed a first draft of business capabilities (see Part I Appendix D). CMS is asking States to collaborate with the MITA team to refine the capability statements and qualities and reach a consensus regarding the fairness, applicability, reasonability, and measurability of the capabilities. The BCM is to be used as a leveling tool to measure State performance in achieving higher levels of maturity.*
>
> *CMS intends States to use the BCM to perform a self-assessment to establish their current maturity level for each business process and select higher levels for future improvements. CMS encourages States to develop a strategic plan for continuous*

> *improvement, targeting Level 3 now and Levels 4 and 5 later. See Part I Chapter 6, State Self-Assessment, for more detail on this process.*

Since the capability matrices identify the characteristics of organizations and systems at various levels of maturity, if someone were to claim that their organization or system was MITA compliant the first question to ask would be "At what maturity level?" Implying general compliance demonstrates some lack of understanding of the MITA Framework. As a rule, for the time being an organization should see themselves in compliance as long as they are actively seeking to improve their business and technical capabilities using the MITA framework as both a decision making guide for moving forward and a tool for measuring progress.

Where are we now?

While CMS and the MITA team made great progress when creating the 2.0 framework, the MITA framework itself is still a work in progress. The framework states:

> *An organization's business capability is its ability to execute a business process at a certain level of maturity as defined in the Business Capability Matrix (BCM). MITA derives business capabilities by applying the MMM to business processes as defined for the BPM. Each business process has as many as five levels of maturity.*
>
> *The business capability also uses MMM qualities, which describe how effectively the process is being executed (e.g., ease of use, timeliness, and accuracy). In the future, the MITA initiative plans to add conformance criteria to each business capability. Conformance criteria are used to determine whether the business process has achieved a specific level of maturity.*

This relates back to the compliance discussion in the earlier section, if conformance criteria are yet to be developed then how is anyone supposed to measure compliance?

The Technical Capability Matrix is even less mature than the Business Capability Matrix. The 2.0 frameworks states:

> *This version of the Framework only contains an initial draft of the TCM. It discusses the TCM and principles associated with the TCM. An incomplete TCM is provided. Specific technical capabilities and their associated Technical Services will be developed in a future version of the Framework. New technical areas and functions may also be identified as part of this process.*

The lack of completeness does not mean that the current framework is not useful. The current version of framework provides a very good idea of direction CMS would like Medicaid agencies and MMIS to go. It is slightly less clear on exactly what the Medicaid agency or MMIS of the future will look like, but it does recognize that there are many possible acceptable configurations. Its weakest point is that it has yet to provide concrete criteria on which to measure progress.

MMIS vendors are getting onboard. Vendors are currently modifying their systems based on the MITA principles and capabilities. In some ways, they are being forced to because states are including MITA based requirements in new RFP's. However, most vendors already saw the advantages of things like SOA and began to incorporate them into their solutions. However, since the MITA 2.0 Framework is relatively new, no MMIS has been implemented since it was released.

HHSC is already taking MITA into consideration in new development projects as is demonstrated in the solution goals outlined in Provider Management and Enrollment presentations.

4. Financial Alternatives Analysis Methodology

Financial alternatives are constructed such that each financial alternative can be compared to the other. This involves building alternatives that not only demonstrate performance of the Phased Approach and the Bought System approach, but standardizes both alternatives so that they are comparable and so that the State can see which alternative yields the most savings and which starts to show savings the quickest. To accomplish this, three alternatives were estimated from 2010 to 2017 for DDI and Maintenance Costs:

- **Baseline** - keep the current system as it is with minimal necessary DDI in 2010 and maintenance exactly like it is done today until 2017. This option is used to standardize the ability to compare the two main alternatives already identified.
- **Phased Approach** – a purchased system is phased in over four years starting DDI in 2010 and replacing the current system 25% per year for four years with maintenance being reduced by phase until 2013 and then projected to 2017.
- **Bought System -** a purchased system implemented in two years starting in 2010, dropping the old system, and estimating new system maintenance starting in 2012. Note: This analysis is based on a two year implementation although it is anticipated that full implementation would require three or even four years to complete.

Standardization is accomplished by subtracting each alternative from the baseline scenario to yield the difference between the recommended alternative such as the Phased Approach and the baseline "As Is" approach. This subtraction yields an overall cost or savings of the alternative over the baseline. If the result is negative, then the alternative costs more than the baseline, if positive, then the alternative is saving HHSC money over what it would otherwise be spending should HHSC continue with the current system as is.

Because there is significant variability in cost drivers for an MMIS in the market and because those will ultimately fluctuate the bottom line for HHSC, a Monte-Carlo technique is used to generate thousands of simulations for each pairing of an alternative with a baseline. This technique will allow this analysis to vary the variables that impact the bottom line for HHSC such as DDI cost drivers, expected reductions in maintenance costs, and the portion of DDI and Maintenance that receive a 50/50 federal match versus the optimal 90/10 or 75/25. By varying these inputs, the resulting estimated savings for each option will yield best-case and worst-case scenarios to provide an idea of financial risk for either alternative.

Baseline Construction

The baseline that is used to standardize the two recommended alternatives was constructed by taking historic data for Texas from the CMS 64.10 data submitted by the State to the Medicaid Budget and Expenditures System (MBES). It was then enhanced by detailed cost allocation data provided by HHSC. Baseline DDI characteristics were generated from the following assumptions:

- As noted in the TMMIS technical assessment, there are a number of proprietary components that are probable candidates for replacement.
- The DDI Cost covers license upgrades and other changes minimally necessary to continue operating their current MMIS until 2017. The fixed amount is $50M - $75M with a likely value of $62.5M.
- Maintenance will stay the same as historic maintenance and was projected to 2017
- MMIS DDI and Maintenance costs reported under private sector (work done by a fiscal agent) are used as they are the significant drivers of MMIS cost in Texas.
- In-house reported expenditures (those done by State staff) for MMIS DDI and Maintenance costs are not significant cost drivers behind the MMIS.

- The depreciated value of the current system is almost less than zero, and therefore the TMMIS would have to be given some enhancement to maintain functionality until 2017.

DDI in Texas since 2002 has amounted to almost $101M. Taking the double-declining balance depreciation for 5 years on each year of DDI indicates that most of the system has been depreciated. Continuing this analysis out to 2010 captures the idea that the system is still being used after it has gone beyond useful life in terms of maintainability and technology. This is another reason for using double-declining balance to capture the concept that IT systems rapidly go out of date due to new developments in the market. Extending this into a "negative depreciation" fully captures this concept. As can be seen in the following schedule, by 2010, DDI activities from 2002 to 2006 net to a negative value of $2.6 million, which can be considered virtually zero value is left in the TMMIS activities from 2002 to 2006.

Table 4.1 - Depreciation Analysis of TMMIS Historic DDI from 2002 to 2006

	2002	2003	2004	2005	2006	2007	2008	2009	2010
2002 Expenditures	$ 829,604	$ 497,762	$ 298,657	$ 179,194	$ 107,517	$ -	$ (107,517)	$ (179,194)	$ (298,657)
2003 Expenditures		15,530,406	9,318,243	5,590,946	3,354,568	2,012,741	-	(2,012,741)	(4,025,481)
2004 Expenditures			12,584,355	7,550,613	4,530,368	2,718,221	1,630,932	-	(1,630,932)
2005 Expenditures				10,916,771	6,550,063	3,930,038	2,358,023	1,414,814	-
2006 Expenditures					25,840,622	15,504,373	9,302,624	5,581,574	3,348,945
Total Value	$ 829,604	$ 16,028,168	$ 22,201,256	$ 24,237,525	$ 40,383,137	$ 24,165,372	$ 13,184,062	$ 4,804,453	$ (2,606,126)

HSSC spent as little as $75M in 2006 to as much as $143M in 2002 for a fiscal agent to maintain the TMMIS – otherwise called "private maintenance". Based on historic private maintenance, claims processed, and HHSC projections for clients, maintenance and operations done by the fiscal agent, maintenance costs were estimated to 2017 for a cumulative total from 2010 to 2017 of about $1 Billion. The expected cost for the baseline is as follows:

Table 4.2 - DDI and Maintenance Should HHSC Operate the TMMIS "As Is"

Phase	Mix	2010	2011	2012	2013	2014	2015	2016	2017	Total
DDI										62,500,000
DDI 90/10	94.27%	29,459,375	29,459,375	-	-	-	-	-	-	58,918,750
90% Federal		26,513,438	26,513,438	-	-	-	-	-	-	53,026,875
10% State		2,945,938	2,945,938	-	-	-	-	-	-	5,891,875
DDI 50/50	5.73%	1,790,625	1,790,625	-	-	-	-	-	-	3,581,250
50% Federal		895,313	895,313	-	-	-	-	-	-	1,790,625
50% State		895,313	895,313	-	-	-	-	-	-	1,790,625
Maintenance and Ops										1,017,513,203
M & O 75/25	65.40%	79,224,077	80,313,706	81,422,491	82,552,136	83,703,174	84,876,154	86,071,648	87,290,248	665,453,635
75% Federal		59,418,058	60,235,280	61,066,868	61,914,102	62,777,380	63,657,116	64,553,736	65,467,686	499,090,226
25% State		19,806,019	20,078,427	20,355,623	20,638,034	20,925,793	21,219,039	21,517,912	21,822,562	166,363,409
M & O 50/50	34.60%	41,913,655	42,490,126	43,076,731	43,674,372	44,283,331	44,903,898	45,536,377	46,181,079	352,059,568
50% Federal		20,956,828	21,245,063	21,538,365	21,837,186	22,141,665	22,451,949	22,768,188	23,090,540	176,029,784
50% State		20,956,828	21,245,063	21,538,365	21,837,186	22,141,665	22,451,949	22,768,188	23,090,540	176,029,784

Construction of the Alternatives

Alternative financial scenarios for the Phased Approach and the Bought Approach rely on the same overall estimate of DDI costs as well as the same assumption that maintenance will be reduced by a variable factor due to the new system. The same numbers are used for a new development and a transfer because there are no demonstrated systems working in other states today that meet the requirements for Service Oriented Architecture (SOA) and CMS MITA 2.0 framework. Therefore any transfer system would have to undergo significant updates to be equivalent to the same newly developed system because of the requirements for SOA and MITA

2.0. It is the expert opinion of SES and FourThought Group that such an undertaking would approximately cost the same as a new implementation.

New System Cost Estimation

A new system was estimated for Texas based on historical data of other states ranked similar in size to Texas and by inflating the latest MMIS bid prices on the market (Nebraska) to Texas's level of program activity. Combining both of these sources of price data yielded maximum, minimum, and average spending for various line costs necessary for a new or transferred system.

The following assumptions were used to build this financial alternative:

- MITA was referenced in the requirements and Nebraska bids had to be responsive to the latest published version of MITA.
- The best market price data is the last price to be offered by the market (Nebraska). Texas's Medicaid program is 10 to 11 times the size of the state of Nebraska and processes 4 to 5 times more claims.
- By consolidating several business processes that today exist across many systems into one system, maintenance costs could be reduced by 15% to 40%, depending on how implementation and maintenance is managed. Final scenario generation will allow fluctuation of this reduction in maintenance.

  *NOTE: This should decrease the **cost** of maintenance, however; market prices for maintenance by a fiscal agent **may not** reflect this reduction in cost. This is a question the state should require bidders to be aware of and address during the procurement process.*

- Currently, 5% of DDI is done at a 50% federal match rate. This scenario allows that proportion to fluctuate between 0% and 10% with uniform probability (all ranges are equally likely).
- Currently 35% of Maintenance is done at a 50% federal match rate. This will be allowed to fluctuate between 25% and 40% for scenario generation.

- Nebraska DDI estimates were scaled up to Texas based on the following assumptions:
  - Hardware and software licenses would have to be more to accommodate higher processing volume.
  - Organizational Change Management will be higher due to more employees.
  - Training will be higher, again due to more employees.
  - Provider Implementation Support due to more providers.
  - Implementation will be higher due to more hardware and software to configure.
  - Requirements Validation would be higher due to more programs in the mix.
  - Data Conversion would be somewhat higher, due to more data in Texas.
  - Acceptance Testing is expected to stay the same due to a fiscal agent doing most of the work with the system.
  - Certification is expected to stay the same as all states must pass the same minimum.

The results if this estimation yielded a set of parameters that will be used in value analysis simulations for DDI line item costs and other cost modifiers. DDI line item cost parameters are characterized as follows:

Table 4.3 - DDI Line Item Cost Parameters

Line Item	Minimum	Average	Maximum
Purchased Hardware	$ 2,169,993	$ 4,790,027	$ 6,659,999
Purchased Software	5,783,394	12,586,159	15,073,079
Licensed Hardware and Software	3,120,217	7,098,025	9,337,185
Project Management	3,156,624	5,535,894	8,061,149
Requirements Validation	4,030,574	7,516,832	10,880,177
Organizational Change Management	2,477,025	3,436,844	4,030,574
System Design	3,777,212	11,087,346	15,286,995
System Development	8,061,149	15,060,217	20,041,386
Data Conversion	1,943,872	4,720,231	12,091,723
Acceptance Testing	2,008,081	4,020,368	6,545,293
Training	1,518,556	4,387,192	8,061,149
Provider Implementation Support	1,124,140	3,818,044	8,061,149
Implementation	2,123,327	2,921,545	4,030,574
Certification	754,133	4,325,859	8,061,149
Total New System DDI Costs		$ 91,304,581	

Other parameters that impact costs are maintenance savings and optimal use of DDI and Maintenance matching funds. The parameters are characterized in the following table.

Table 4.4 - Other Parameters that Affect Cost Scenario Generation

Parameter	Minimum	Average	Maximum
Portion of DDI at 50% Federal Match	0.00%	5.00%	10.00%
Portion of Maintenance at 50% Federal Match	25.00%	34.87%	45.00%
Expected Decrease in Maintenance	15.00%	25.83%	40.00%

Scenario Generation

Both the phased approach and the bought approach alternatives were analyzed for savings by subtracting the baseline "as is" at the mean values for the parameters presented above. Then, a random value from each parameter was selected and run through the same calculations and saved as a simulation observation. This random sampling was done 6000 times for each scenario and yielded risk adjusted estimates of the difference between each alternative and the baseline as savings for each option as well as statistical confidence for each savings estimate.

5. Evaluation Results

In considering alternatives, HHSC has numerous objectives:

- To reduce long-term development, maintenance and operational costs of the TMMIS
- To develop a long-term strategic vision for HHSC systems
- To align the TMMIS with Objectives, Goals, Principles and Capabilities defined in MITA
- To provide Texas with a system that can quickly and economically adapt to changes in policy, state and federal legislative changes, and mandated standards

There are also several constraints or limitations:

- The total cost of the selected alternative must be reasonable relative to other state's more recent MMIS acquisitions and it must project lower long-term operational costs for HHSC.
- Existing policy and operating procedures may be a barrier to implementing new technology and accommodating changes in business operations.
- The selected alternative must demonstrate how it will be well suited to incorporate new functionality and take advantage of rapid advances in technology.

Explanation of Alternatives

This document will be limited to a discussion of two alternatives. These two alternatives were decided upon after discussions with HHSC staff. Each alternative will be discussed in terms of viability, risk and cost. The two new alternatives are:

1. Phased Replacement
2. Bought (Buy or Transfer)

It is important to note that both of these alternatives are viable in the sense that it is possible to implement a new and significantly improved TMMIS using either approach. The more important question may be whether it is worthwhile to pursue a particular approach. Is the Texas Medicaid Enterprise going to get the most "bang for their buck" when it comes to a particular approach? Is it feasible to pursue a particular course of action given certain constraints and limitations? Is a particular approach more compatible with HHSC's strategic vision?

Option #1: Phased Replacement

With this approach, the existing TMMIS is replaced incrementally using the existing system as a guide. This approach means that some portions of the existing system remain functional until new components are developed to replace them. An example of this incremental replacement would be bringing up the new Provider subsystem and integrating that system with the existing Claims and Encounter subsystems. At a later date, the Claims and Encounter Systems would also be replaced.

Even assuming HHSC uses a vendor to build the system, such an approach would allow HHSC greater control of the architecture, design, and functionality the system provides. It would give HHSC the opportunity to ensure that both agency and MITA objectives were being met. It is logical to think that this approach would begin with building a technical architecture and environment and gradually moving various subsystems to that new environment.

(NOTE: HHSC has already established a new development platform in the TMHP Portal. That platform is based on Microsoft Windows, the .NET architecture, and uses IIS, SQL Server and

SharePoint Portal. This indicates that HHSC recognizes the advantages and sophistication of this environment and how it will help them to create robust applications that more easily align with the goals and objectives of MITA. Developing major applications such a Provider Management and Enrollment that have a SharePoint user interface requires is a significant investment of resources on both the part of HHSC and the fiscal agent. Not only in the actual dollar amount spent on the development, but in the training and support services that will be required. Strategically, it would make sense for HHSC to leverage that investment to the largest extent possible, and see the migration of the Provider applications as the first step in a longer re-engineering or replacement effort.)

Benefits

An iterative or phased approach has considerably less failure risk than the single-implementation model. A key facet of the incremental approach is that each project phase has a smaller scope requiring fewer people and therefore a geometrically decreased number of communication channels. Incremental projects tend to offer a number of benefits to the project team and the sponsoring organizations:

- A Phased Replacement should require fewer people from HHSC at any given time.
- A Phased Replacement should allow the project team to have a greater understanding of the scope of each phase.
- A Phased Replacement should require less elaborate management controls than a Bought system.
- A Phased Replacement should spread out cultural change over a longer period of time.
- A Phased Replacement should allow later modules to incorporate technology improvements that may not be initially available.
- A Phased Replacement should allow costs to be spread over a longer period of time.
- A Phased Replacement should reduce the overall risk by limiting risk to the current and subsequent phases. Successfully completed phases and the capital invested are no longer at risk.
- A Phased Replacement should allow HHSC to demonstrate previous successes and benefits when requesting funding for subsequent phases.
- A Phased Replacement should give HHSC complete control over the business and technical functionality delivered to the system users.
- A Phased Replacement should allow HHSC to align the TMMIS with MITA Maturity Level 2 or higher.
- A Phased Replacement will allow HHSC to recognize long-term cost savings by reducing the number of platforms and architectures, reducing data and system redundancy, and eliminating some technical inefficiency.
- A Phased Replacement should allow HHSC to recognize benefits and productivity increases more quickly because improvements will be implemented as they are ready as opposed to waiting until almost everything is complete.
- A Phased Replacement could implement a Service-Oriented Architecture.
- A Phased Replacement should allow HHSC to centralize user interfaces under a single web-based portal.
- A Phased Replacement could introduce productivity increasing tools such as a business rules engine and a workflow engine.
- A Phased Replacement could have a consolidated data store with a more standardized data model.
- A Phased Replacement could take full advantage of reusable business and utility services.
- A Phase Replacement system should be able to take advantage of the work currently being done in the TMHP Portal and the Provider Management and Enrollment applications.

Disadvantages

Perhaps the most significant disadvantage is that incremental projects have built-in duplication of effort and design inefficiencies. If the entire system is replaced at once, the initial design does not need to worry about the physical implementation of the existing system—it merely has to move data from that system to the new system. In an incremental project, however, parts of the existing system continue to function through earlier iterations and therefore some amount of the work is devoted to interfacing the new system to the old. The results of this work are generally only useful until the old system goes away, at which point they are discarded. Because of this duplication of effort, this approach may ultimately cost more than the Bought option. However, HHSC may also get the most value for its dollar.

Another disadvantage is the possibility of disillusionment by some stakeholders. Implementing a new MMIS requires a significant amount of attention and commitment by the stakeholders. The incremental approach can increase the timeline required for this attention and commitment, thereby leading some stakeholders to "run out of steam" as what they envisioned as a project begins to look more like a process. Since this disadvantage is political and managerial, it is arguably not as significant as other issues.

The major disadvantages of this approach are:

- A Phased Replacement recognizes that the HHSC may have to continue to live with some of the shortcomings of the current system for a longer period of time. Likewise, it may force HHSC to wait longer to recognize the full benefits and productivity increases from the replacement system.
- A Phased Replacement may cause some parts of the system to have to be modified several times. Each new application that is implemented may require both new and old applications to have to be revisited and modified. This would not be the case with the implementation of a completely new system all at once.
- A Phased Replacement may have a greater total cost than a Bought system.
- A Phased Replacement may result in the federal government covering a lower percentage of the total cost of the new system than with the other approach.
- A Phased Replacement may be more susceptible to stakeholder disillusionment.
- A Phased Replacement that uses the existing system as a guide may incorporate the weaknesses of the old design.

Financial Evaluation

The final analysis of the phased approach compares DDI and maintenance costs for phasing in a new system against the same costs when continuing with the current system "as is" with some modification. This alternative starts with a schedule of prorated DDI Costs. The following table shows how DDI is allocated across phases from 2010 to 2013 so that 25% of the total DDI is accomplished in each phase and 25% of the old system is retired in each phase.

Table 5.1 - Phased Approach to DDI Allocated Across 4 Phases for 4 Years from 2010 to 2013

[redacted]

Based on this allocation, maintenance savings are expected to start in 2011 at 25% of total savings available from the new system components for that phase. Maintenance savings continue to build to a fully realized savings in 2014 while a gradually decreasing portion of original system maintenance costs are still incurred until 2013. The following table shows maintenance with an average expected savings of 22.5% (22.5% is allowed to fluctuate later from 15% to 40% during scenario generation):

Table 5.2 - Estimated Maintenance for a New System via the Phased Approach

	2010	2011	2012	2013	2014	2015	2016	2017
Portion of New System Maintenance (decrease at an average of 22.5%)								550,611,428
Phase 1	-	23,793,242	24,121,724	24,456,386	24,797,385	25,144,885	25,499,055	25,860,070
Phase 2	-	-	24,121,724	24,456,386	24,797,385	25,144,885	25,499,055	25,860,070
Phase 3	-	-	-	24,456,386	24,797,385	25,144,885	25,499,055	25,860,070
Phase 4	-	-	-	-	24,797,385	25,144,885	25,499,055	25,860,070
Portion of Original System Maintenance								307,046,844
Phase 1	30,284,433	-	-	-	-	-	-	-
Phase 2	30,284,433	30,700,958	-	-	-	-	-	-
Phase 3	30,284,433	30,700,958	31,124,805	-	-	-	-	-
Phase 4	30,284,433	30,700,958	31,124,805	31,556,627	-	-	-	-
Total New System Maintenance								857,658,273
	121,137,732	115,896,117	110,493,059	104,925,785	99,189,541	100,579,540	101,996,219	103,440,279

Table 5.3 - Average DDI and Maintenance Costs for a Phased Approach to New System DDI

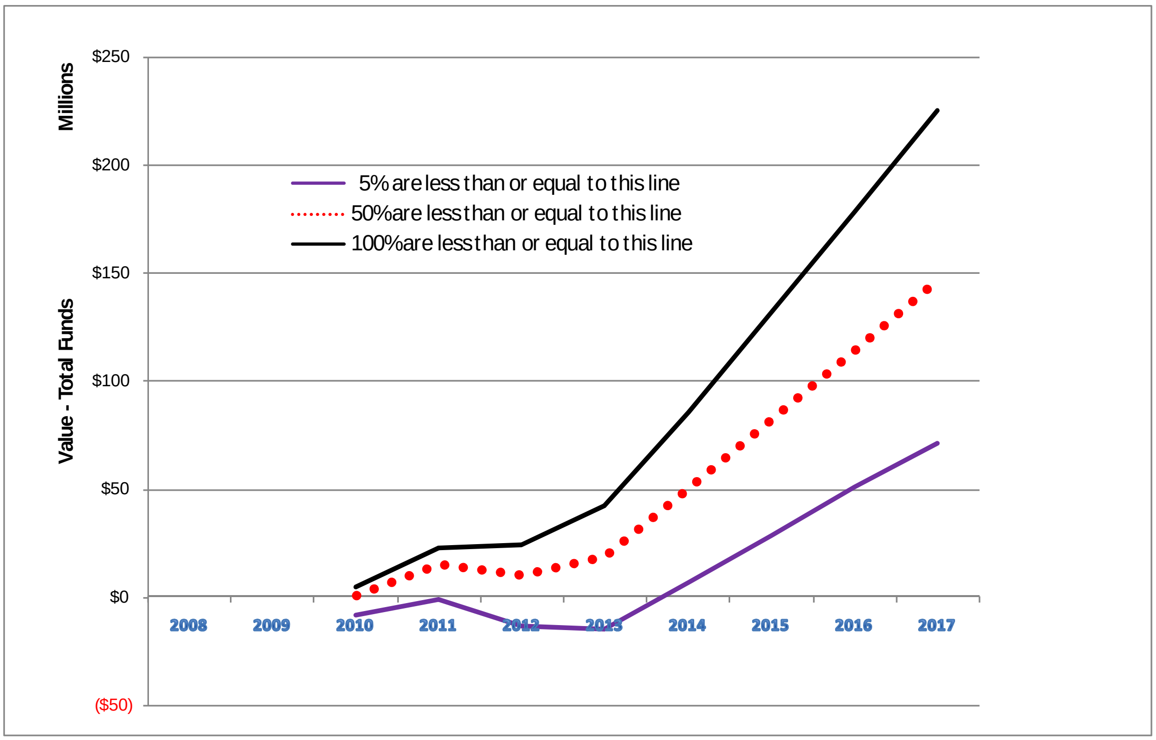
		Phased Approach								
Phase	Mix	2010	2011	2012	2013	2014	2015	2016	2017	Total
DDI										91,304,581
DDI 90/10	94.27%	29,049,580	23,670,028	19,366,386	13,986,835	-	-	-	-	86,072,829
90% Federal		26,144,622	21,303,025	17,429,748	12,588,151	-	-	-	-	77,465,546
10% State		2,904,958	2,367,003	1,936,639	1,398,683	-	-	-	-	8,607,283
DDI 50/50	5.73%	1,765,716	1,438,732	1,177,144	850,160	-	-	-	-	5,231,753
50% Federal		882,858	719,366	588,572	425,080	-	-	-	-	2,615,876
50% State		882,858	719,366	588,572	425,080	-	-	-	-	2,615,876
Maintenance and Ops										857,658,273
M & O 75/25	65.40%	79,224,077	75,796,060	72,262,461	68,621,463	64,869,960	65,779,019	66,705,527	67,649,942	560,908,510
75% Federal		59,418,058	56,847,045	54,196,846	51,466,098	48,652,470	49,334,265	50,029,145	50,737,457	420,681,383
25% State		19,806,019	18,949,015	18,065,615	17,155,366	16,217,490	16,444,755	16,676,382	16,912,486	140,227,128
M & O 50/50	34.60%	41,913,655	40,100,056	38,230,598	36,304,322	34,319,581	34,800,521	35,290,692	35,790,337	296,749,762
50% Federal		20,956,828	20,050,028	19,115,299	18,152,161	17,159,791	17,400,260	17,645,346	17,895,168	148,374,881
50% State		20,956,828	20,050,028	19,115,299	18,152,161	17,159,791	17,400,260	17,645,346	17,895,168	148,374,881

The final analysis functionally fills Table 5.2 **and**

Table 5.3 based on randomly sampled values from **Table 4.3** and Table 4.4 and then subtracts from the result. This is done 6000 times and the results saved for statistical analysis. The final result provides a probable range of costs and savings and a return on investment in years relative to continuing "as is".

Figure 5.1 below shows the possible range of savings and possible range of years until a return on investment for the phased approach of new system implementation versus continuing on with the current system "as is". The top line (100% line) shows the best case scenario of savings over time. The middle line (50% line) shows the middle and most likely scenario for savings with a new system phased in. The bottom line (5% line) shows the least likely scenario. If a very conservative approach is taken, then using the 5% line, a new phased in system is not expected to save the state money until early 2014 and by 2017, that savings will be about $70M. Being the extreme line, this scenario is not as likely as the middle scenario. The moderate estimate with the 50% line indicates that the state will be in a position of savings from the start and that savings by 2017 could be as much as $150M. The same can be said for the extremely optimistic line (100% line) that savings will exceed $200M. Both the extreme 100% and 5% lines are not very likely and the moderate line is more in line with what Texas should expect.

Figure 5.1 - Possible Savings in Total Costs and Years to Return on Investment Between A New System Using the Phased Approach vs. Continuing As Is



Risks

There is a "momentum of success" required for a project the size and complexity of a MMIS replacement to be successful and that momentum may be hindered by the time required for this option. Replacing an application such as a MMIS has significant implications for the entire enterprise. It is generally disruptive and creates some amount of resistance and animosity. The project team and sponsors must build enough momentum to overcome these difficulties and actually bring the new system live. Using an iterative approach can reduce the resistance and difficulties, but it can also reduce the momentum the team is able to build. It is often easier to build a significant amount of momentum in order to accomplish something difficult one time than it is to continually accomplish difficult tasks repeatedly. The iterations may in fact be easier, but the iterative approach may lead participants and users to believe the project is never-ending. This risk can be mitigated with an appropriate cultural change management program and strong leadership.

Building an MMIS, even with a phased approach, is a very complex task. HHSC and the contractor building the system would have to sustain great organizational discipline over a long period of time to achieve success. Without disciplined project, quality and software engineering management, it is highly likely that the implementation will not proceed according to plan, resulting in greater cost and longer schedule. Without a disciplined software engineering methodology, it is highly likely that the functional and technical design of the system will not meet the users' needs. This risk can be mitigated substantially by implementing the appropriate management programs, but such programs require experienced leadership and time to mature.

Building a MMIS also requires significant Medicaid expertise. In order to design a robust system that enables significant improvements in the Medicaid program, the design team should have a breadth of experience that goes beyond Texas's program and leverages best practices from other States and even other industries. The most significant risks are:

- A Phased Replacement may result in HHSC being unable to get funding for successive phases due to changes in the state's priorities, failures or cost overruns during a previous phase.
- A Phased Replacement does not guarantee that stakeholders will be willing to modify business processes or approve business or organizational changes that would result in the greatest long-term cost savings. Essentially, costs may be incurred, resulting in only small productivity gains and cost savings.
- A Phased Replacement may result in the stakeholders becoming disillusioned due to the long duration of the project.
- A Phased Replacement may not be successful if the contractor and HHSC cannot sustain the managerial and technical discipline required over the long duration of the project.

Option #2: Bought (Buy or Transfer)

In this option, the HHSC purchases a set of software applications that is marketed as providing the functionality necessary for a certifiable MMIS. This option is generally termed a transfer system because it is assumed the starting point for the new system is another state's MMIS, which is transferred in. Transferring a system is optional because HHSC could allow vendors to bring in a MMIS that has never been implemented in another state. This option will be referred to as the "Bought" option.

Many of the listed advantages say that a bought system "may" have a particular advantage. That word was chosen to signify that a purchased system will only have the stated characteristic if HHSC ensures so before the solution is purchased. These advantages are not inherent characteristics of any bought or transferred system.

Benefits

It is assumed that by transferring an existing MMIS, the timeline and risk associated with implementation are reduced more than with a completely new system. Specifying a transfer system increases the perceived advantage under the argument that if the MMIS is implemented, operational or certified in another state, it will more quickly be implemented, operational and certified in Texas. This does not mean that buying a system will have less overall risk than the Phased Replacement approach. It just means that starting with a system that has already been implemented in another location is probably less risky than starting with a system that has never been implemented anywhere.

Another possible advantage of this option is that an existing system may already include improved business rules and processes which can be taken advantage of by HHSC. By using an existing MMIS as an implemented model for Medicaid business process operations, HHSC can review each of its business processes against the model and choose to change those that are better implemented in the model than the current HHSC operations. Any necessary changes should be simplified if the existing system uses a business rules engine and a work flow engine.

This approach makes the assumption that by the time HHSC is ready to purchase a system, the market will contain one or more options to buy a system that has many of the architectural advantages identified. There are currently vendors working on developing such solutions, and the assumption is that these new systems will be available.

Finally, considering HHSC already uses a fiscal agent and intends to continue doing so, buying or transferring a solution offered by a prominent fiscal agent may lower the overall risk. It is assumed that the vendor's experience with its own system and in other implementations will significantly improve the chances of a successful implementation that meets the HHSC's requirements.

The advantages to this approach are:

- A Bought system should be able to be implemented more quickly than a Phased Replacement system.
- A Bought system may have business rules and processes modeled on another state that can be kept or modified as necessary.
- A Bought system may have a total cost that is less than the Phased Replacement cost.
- A Bought system may ensure that federal government covers 90% of the total cost.
- A Bought system may have a working implementation making it easier for HHSC staff to understand.
- A Bought system may allow HHSC to realize the full impact of the long-term cost savings more quickly.
- A Bought system may allow HHSC to align the TMMIS with the MITA Maturity Level 2 or higher.
- A Bought system that is transferred from another state may be less risky than implementing a completely new system.
- A Bought system may be built on a single development platform and technical architecture resulting in a system that is more consistent and less costly to maintain and operate.
- A Bought system may have a Service-Oriented Architecture.
- A Bought system may consolidate all user interfaces under a single web-based portal.
- A Bought system may take full advantage of modern productivity tools such as a business rules engine and workflow engine.
- A Bought system may have a consolidated data store and improved data model.
- A Bought system may take full advantage of reusable business and utility services.

Disadvantages

The most significant disadvantage to this approach is that the existing systems that are available for transfer were generally not architected or designed for significant change. In most cases, they represent a system that was architected to meet the needs of a particular state at a particular time. The same system may then have gone through one or two iterations of modifications to meet different state's needs.

Another disadvantage of this option is that transfer systems implement an older way of doing business. Given the implementation schedule for a MMIS, a transfer system that has been tested was at best proposed at least two years earlier. Furthermore, that proposal was in response to requirements that were probably developed three to six months earlier. The result is that a transfer system cannot, and does not, represent the last two years of changes in the healthcare, Medicaid or IT worlds. It is virtually guaranteed to be outdated.

A disadvantage to this approach that may be difficult for some people within HHSC to live with is the compromises the agency will have to make when it comes to specific design aspects of a bought system. Any purchased application, no matter how adaptable or extensible it is, has certain things about it that will be difficult or too costly to change. This situation may frustrate people considering the expense the agency will be incurring, but they will have to compromise in order to have success.

A final disadvantage of this option is that, contrary to the language in vendor proposals, the systems they propose may only partially exist. With very few exceptions, when vendors propose transfer systems, they cobble together pieces of systems that they have implemented in the past and typically combine them with enhancements that are currently being written or have not yet started. A stated goal of transfer systems is to reduce the risk associated with a new implementation by using a proven solution. Just how "proven" such systems are, however, is open to interpretation. If vendors must make significant changes to the system (which is likely given the age of the requirements a transfer system implements), and the system is not being transferred from a single installation, but from multiple installations, it is doubtful that what is being transferred is a true "system." Therefore, it in fact may not be less risky.

The disadvantages associated with this approach are:

- A Bought system may require more HHSC resources during implementation.
- A Bought system will not provide HHSC with complete control over the business and technical functionality delivered to the system users. Thus it may not meet 100% of the HHSC requirements.
- A Bought system may force HHSC to wait several years to recognize the benefits and productivity increases from the new system.
- A Bought system may implement technology that is already out-of-date.
- A Bought system would require a larger capital expenditure in a shorter period of time.
- A Bought system implementation may require more elaborate management controls.
- A Bought system may result in the need for swift cultural change within the agency.
- A Bought system may not be able to take advantage of the work currently being done in the TMHP Portal and the Provider Management and Enrollment applications.

Financial Evaluation

The final analysis of the bought approach compares DDI and maintenance costs for implementing a new system against the same costs when continuing with the current system "as is" with some modification. This alternative starts with a DDI in 2010 and 2011, retirement of the old system at the end of 2011, and then continuing operations and maintenance on the new system starting in 2012. Maintenance savings are expected to start in 2012 as well.

Table 5.4 shows the average DDI and Maintenance for the bought approach with a 2-year DDI starting in 2010

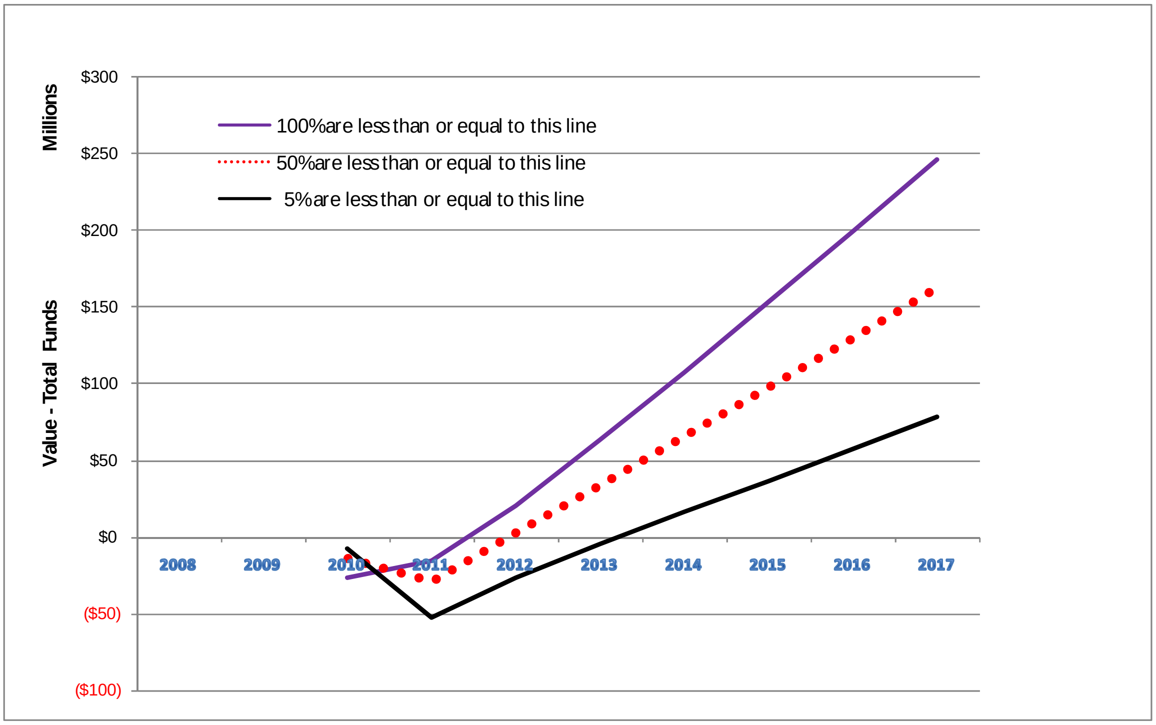
Table 5.4 - Average DDI and Maintenance Costs for a Bought System with Two-year DDI

		Bought Approach								
Phase	Mix	2010	2011	2012	2013	2014	2015	2016	2017	Total
DDI										91,304,581
DDI 90/10	94.27%	43,036,414	43,036,414	-	-	-	-	-	-	86,072,829
90% Federal		38,732,773	38,732,773	-	-	-	-	-	-	77,465,546
10% State		4,303,641	4,303,641	-	-	-	-	-	-	8,607,283
DDI 50/50	5.73%	2,615,876	2,615,876	-	-	-	-	-	-	5,231,753
50% Federal		1,307,938	1,307,938	-	-	-	-	-	-	2,615,876
50% State		1,307,938	1,307,938	-	-	-	-	-	-	2,615,876
Maintenance and Ops										843,459,585
M & O 75/25	65.40%	79,224,077	80,313,706	63,102,431	63,977,906	64,869,960	65,779,019	66,705,527	67,649,942	551,622,568
75% Federal		59,418,058	60,235,280	47,326,823	47,983,429	48,652,470	49,334,265	50,029,145	50,737,457	413,716,926
25% State		19,806,019	20,078,427	15,775,608	15,994,476	16,217,490	16,444,755	16,676,382	16,912,486	137,905,642
M & O 50/50	34.60%	41,913,655	42,490,126	33,384,466	33,847,638	34,319,581	34,800,521	35,290,692	35,790,337	291,837,016
50% Federal		20,956,828	21,245,063	16,692,233	16,923,819	17,159,791	17,400,260	17,645,346	17,895,168	145,918,508
50% State		20,956,828	21,245,063	16,692,233	16,923,819	17,159,791	17,400,260	17,645,346	17,895,168	145,918,508

The final analysis functionally fills
Table 5.4 based on randomly selected values from Table 4.3 and Table 4.4 and then subtracts from the result and does this 6000 times. The result provides probable range of savings values and a return on investment in years relative to continuing "as is".

Figure 5.2 below shows the possible range of savings and possible range of years until a return on investment for a bought system with a two-year implementation versus continuing on with the current system “as is”. Similar to the phased approach, the top line (100% line) shows the best case scenario of savings and years to return on investment. The middle line (50% line) shows the middle and most likely scenario for savings and the year the bought system breaks even with the “as is” scenario. The bottom line (5% line) shows the least likely scenario. If a very conservative approach is taken, then using the 5% line, bought system approach is not expected to save the state money until mid to late 2013, and savings will be about $75M by 2017. Being the extreme line, this scenario is not as likely as the middle scenario. The moderate estimate with the 50% line indicates that the state will start saving with the new system in early 2012 and ultimately save around $150M by 2017 versus continuing on “as is”. The same can be said for the extremely optimistic line (100% line) that the new system will break even by late 2011 and final savings by 2017 will exceed $200M. Both the extreme 100% and 5% lines are not very likely and the moderate line is more in line with what Texas should expect.

Figure 5.2 - Possible Savings and Years to Return on Investment Between A New System Using the Phased Approach vs. Continuing As Is



Risks

One risk is that HHSC will receive different functionality in the ultimate solution than they envisioned during the procurement phase. The purchase and modification of any packaged system involves more trade-offs than deploying a built system. It is not uncommon for users to sacrifice functionality in order to meet cost and schedule goals, particularly when a system as large and complex as a MMIS is purchased and modified. The application is so large that the users cannot truly understand how well any particular system will meet their needs during the procurement process. Once the project begins, it is a certainty that discrepancies will arise between actual functionality and what users perceived during procurement. In such situations, users often lose out because obtaining the desired functionality would be too expensive, take too long, or both.

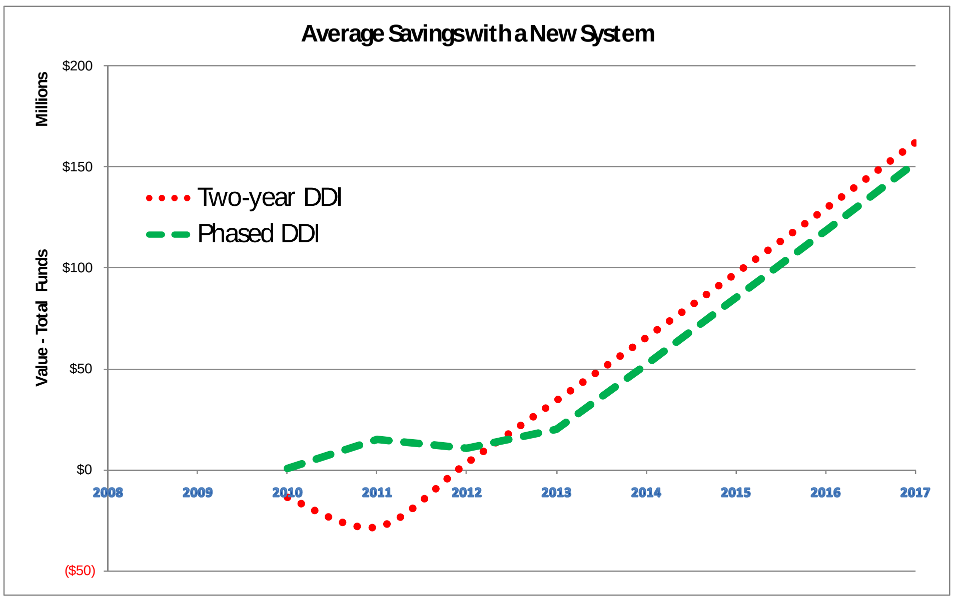
Implementing a MMIS also requires significant Medicaid, managerial and technical expertise. Simply using an existing product and a prominent vendor does not mitigate all the risk involved. A project may still fail. The most significant risks are:

- A Bought system approach may result in larger state loses if the project fails.
- A Bought system does not guarantee that stakeholders will be willing to modify business processes to optimally take advantage of the system design. Essentially, cost may be incurred, resulting in only small productivity gains.
- A Bought system may incorporate the weaknesses of the existing system into the new TMMIS.

Summary Comparison of Alternatives

To compare the phased and bought approaches, they were both independently subtracted from the baseline "as is" alternative to obtain a standard measure of savings due to reduced maintenance and operations. Total savings due to a new system, regardless of implementation approach, can then be compared together, as seen in the chart below. The phased approach does not generate as much savings as a two-year DDI, but it allows HHSC to start saving in year one. The Two-year DDI initially costs more than the existing system and doesn't provide a return on investment until almost 2012, but by 2017 this alternative yields about $10M more in savings.

Figure 5.3 - Average Expected Savings of New System Implementation vs. Staying "As Is"



Both options are financially feasible and ultimately better than if HSSC were to continue with the current system as it is today. Therefore strategic vision and organizational identity should ultimately decide the final alternative.

6. Recommendations

How can we ensure that our systems align with MITA in the future?

Since MITA has become a significant consideration in MMIS development and procurement, it is important to keep it in mind when developing a strategy or making system related decisions. Below are a few tips on how HHSC can ensure that TMMIS aligns with MITA in the future:

- Periodically perform a MITA review and assessment. As the MITA capability matrices become well defined this task should become easier and provide a clearer measure on HHSC's progress.
- Consider the guidelines and standards specified by MITA when making decisions about new systems. Compare the characteristics of any proposed solution against the business and technical capabilities prescribed in the MITA framework. The least costly solution may not always be the best solution if it violates the state architecture standards or MITA architecture guidelines.
- Consider restructuring organizations and reengineering business processes to more closely align with MITA. MITA alignment and maturation can only occur if business units are willing to change the way they do business. MITA prescribes an environment of continual improvement and increasing capabilities from both a business and technical standpoint. Compliance will ultimately require modifying the way business is currently conducted, which may in turn require organizational changes to promote efficiency.
- Engage other communities in the Medicaid Enterprise to ensure everyone is working towards the common goals. Every stakeholder in the Medicaid Enterprise needs to understand how CMS sees the future of the Medicaid program. It is in everyone's interest to improve the capabilities and efficiency of administering the program and providing services.
- Consider joint development efforts with external entities. Like HHSC many organizations that interact with the agency are developing new technological solutions. Working together may help to create better more efficient solutions.
- Create MITA experts in the organization. Understanding all that MITA entails is no easy task. Not everyone has time to read and understand hundreds of pages of documentation on enterprise architecture. Creating MITA experts in HHSC that can inform and instruct others within the agency can be helpful when making business and technical decisions.

Define a Strategic Vision and Organizational Identity

One of the stated objectives for this replacement effort is to develop a long-term strategic vision for HHSC systems. This is a worthwhile objective and one aspect of the process should be an evaluation or identification of its organizational identity. Essentially, HHSC should ask itself "What kind of organization are we when it comes to systems development?"

- Do we see systems development as an unfortunate event that must occur periodically or a continual effort to improve our capabilities?
- Do we like to have complete control over system functionality or are we willing to compromise?
- Are we willing to pick only solutions that fit into our existing framework in order to keep operating cost down or are we more concerned with the immediate development costs?
- Are we comfortable with big implementations or do we like smaller incremental changes?

Answering these types of questions could make defining a strategic vision and making decisions regarding proposed alternatives much easier.