Department of Health & Human Services
Centers for Medicare & Medicaid Services
Office of Information Services

CMS IT Strategic Plan 2007

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Executive Summary

CMS Information technology (IT) resources are an indispensable tool in delivering services to Medicare, Medicaid, and State Children's Health Insurance Program beneficiaries. The increasingly rapid pace of change in CMS' programs and technological advances, and CMS' obligation to be fiscally responsible demand that CMS implement sound management practices for IT investments.

The *CMS Information Technology (IT) Strategic Plan* documents the IT Mission, Vision, Goals, and Objectives that will enable the agency to meet business objectives defined in the *CMS Strategic Action Plan for 2006-2009*, dated October 16, 2006 and HHS Strategic Information Resource Management (IRM) Goals as defined in the *DRAFT HHS IRM Strategic Plan for 2007-2012*, dated February 27, 2007. The approach to IT planning in this document aligns and integrates with HHS IRM strategic goals and additional HHS expectations for Operating Division (OPDIV)-level IT planning.

CMS' Mission: To ensure effective, up-to-date health care coverage and to promote quality care for beneficiaries.

CMS' IT Mission: To provide and support secure IT that enables the efficiency and effectiveness of CMS programs and the health care system, advancing quality and safe health care.

CMS' IT Vision: To be the recognized leader in providing effective, secure and innovative IT to enable high-value, high-quality, personalized health care.

CMS' IT Goals:

Goal 1: Maintain continuity of operations as programs change.

Goal 2: Enable innovation and collaboration through a flexible, reliable, and robust infrastructure responsive to changing business needs.

Goal 3: Provide leadership in the development and implementation of National health care standards and architecture to promote interoperability across the health care enterprise.

Goal 4: Provide a secure and trusted IT environment.

Goal 5: Ensure that beneficiaries, providers, business partners, and employees have ready and appropriate access to timely, high-quality data.

Goal 6: Build and sustain a culture that embodies an enterprise-wide view of IT and achieve excellence in IT management practices.

Goal 7: Ensure that stakeholders in the health IT and provider community are well-informed about the CMS environment and CMS initiatives.

Each of these IT goals is augmented in this plan with a set of objectives that will be met by a combination of investments, initiatives, and integrated IT governance improvements. Key initiatives include:

- Infrastructure Improvements:
  - Enterprise Data Centers (EDCs)
  - Wide Area Network (WAN) Replacement
  - Identity and Access Control
  - Homeland Security Presidential Directive (HSPD)-12
  - Internet Protocol Version 6 (IPv6)
- Data Improvements
  - Integrated Data Repository (IDR)
  - Data Governance
  - Data Integration
- Application Improvements
  - Medicare Fee-for-Service (FFS) Modernization
  - Medicare Advantage and Prescription Drug Benefit Systems
  - International Classification of Diseases (ICD)-10
  - Medicaid Modernization

In addition, CMS' IT Governance policies and procedures are undergoing changes consistent with department direction and community best practices. These changes include integration among Capital Planning and Investment Control, various IT decision authorities, and the Enterprise Architecture program through the CMS Investment Lifecycle.

Finally, some future trends are identified including the department's Service Oriented Architecture (SOA) approach, Business Area (Segment) development, and the Health Care Administration Business Area (Segment) development activity.

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CMS Information technology (IT) resources are an indispensable tool in delivering services to Medicare, Medicaid, and State Children's Health Insurance Program beneficiaries. The increasingly rapid pace of change in CMS' programs and technological advances, and CMS' obligation to be fiscally responsible demand that CMS implement sound management practices for IT investments.

The *CMS Information Technology (IT) Strategic Plan* documents the IT Mission, Vision, Goals, and Objectives that will enable the agency to meet business objectives defined in the *CMS Strategic Action Plan for 2006-2009*, dated October 6, 2006 and the HHS Strategic IRM objectives as defined in the *DRAFT HHS IRM Strategic Plan for 2007-2012,* dated February 27, 2007. *T*he approach to IT planning in this document aligns and integrates with HHS IRM strategic goals and additional HHS expectations for OPDIV-level IT planning.

1.1   *Purpose*

This plan is written to communicate strategic direction for CMS IT. The plan explicitly includes business and IT strategic direction from HHS and CMS.

The audience for this plan includes:

- CMS and HHS executive leadership, business owners, and staff involved in business and IT planning and governance activities.

- Contractors who participate in CMS business and IT development.

- CMS Business Partners, i.e., corporations or organizations that contract with CMS to process or support the processing of Medicare fee-for-service claims who interact with CMS business and IT staff.

1.2   *Scope*

This plan addresses goals, objectives, initiatives, and future trends for 2007-2010. As priorities change, accomplishments accrue and both internal and external drivers change, the plan will be updated.

1.3   *Document Organization*

Section 2 contains descriptions of the key environmental forces and drivers impacting CMS at this time. Internal forces include the aging systems and infrastructure; external forces include HHS IRM goals and objectives as well as other legislative and federal drivers.

Section 3 describes the CMS strategic direction.

Section 4 outlines key initiatives in the infrastructure, data, and applications areas.

Section 5 describes the evolving integrated IT governance framework.

Section 6 identifies trends that will impact CMS IT and become significant drivers in the future.

2   CMS Mission and Environmental Analysis

CMS administers health care for over 90 million people with approximately 650 billion taxpayer dollars per year. The mission is critical; its scale makes CMS the largest source of health care financing in the country[1]. The Agency's primary Medicare-related mission is to ensure that beneficiaries' medical claims are processed and paid timely and correctly. In the Medicaid Program and State Children's Health Insurance Program (SCHIP), CMS oversees and facilitates the States and Territories in their delivery of health care to the poor, the disabled, and to children whose families are ineligible for Medicaid.

Medicare processes more than one billion institutional and physician claims a year. CMS also has significant program oversight responsibilities for Medicare, including management of health insurance claims processing contractors, 600 Medicare Advantage and Part D providers, program safeguard activities, and health care quality improvement initiatives.

2.1   *CMS Mission, Vision, and Objectives*

CMS updated its strategic plan with the publication of the *Strategic Action Plan for 2006 – 2009, Achieving A Transformed And Modernized Health Care System For The 21st Century.* This document updates CMS' mission and vision to reflect the changing nature of our role in the nation's health care system. It also organizes all of our major undertakings around five key objectives.

CMS' Mission

To ensure effective, up-to-date health care coverage and to promote quality care for beneficiaries.

CMS' Vision

To achieve a transformed and modernized health care system

CMS' Five Key Objectives

1. **Skilled, Committed, and Highly-Motivated Workforce**
2. **Accurate and Predictable Payments**
3. **High-Value Health Care**
4. **Confident, Informed Consumers**
5. **Collaborative Partnerships**

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[1] Centers for Medicare & Medicaid Services, Office of the Assistant Secretary for Planning and Evaluation, Health Care System Chart Book, January 2007, http://www.cms.gov/thechartseries. In 2004, CMS paid 33% of national health spending through Medicare (16.4%) and Medicaid (15.6%).

Each of these agency strategic objectives embodies numerous implications for the IT needed to support the business objectives. Some of these implications are identified below:

- Skilled, Committed, and Highly-Motivated Workforce

    o IT provides tools and training to workers to enable them to perform mission functions.

    o IT calls for a more highly skilled workforce in IT specialties.

- Accurate and Predictable Payments

    o Effective program integrity activities for both Medicare and Medicaid require reliable data sources, well-integrated data, tools to mine data, and communication and collaboration with states and ICD-10 upgrade-related IT activities will improve claims data and associated business analysis,

    o IT necessitates the implementation of effective internal controls to maintain the confidentiality, integrity and availability of CMS information and information systems.

- High-Value Health Care

    o Data center consolidation and data management improvements will improve the quality and availability of health care information and enable better web-based access to services and information for providers, beneficiaries, and contractors. Integrating help desk and call centers and improving their access to information also improves health care value. Pay for performance initiatives that focus directly on improving quality at the point of delivery require reliable reporting mechanisms and accurate evaluation services provided by IT.

- Confident, Informed Consumers

    o IT enables information delivery to and on behalf of consumers. Initiatives include personal health records, e-prescribing, call center integration, research and demonstrations (such as health support pilots) to improve health outcomes require IT to support data collection and measurement and analysis. Various sets of comparative information for consumers such as Hospital Compare and Nursing Home Compare rely on IT for quality data measurement and analysis.

    o IT requires effective information security and privacy programs to maintain the public's confidence in CMS' ability to protect their entrusted most confidential information.

- Collaborative Partnerships

o IT provides information, delivery mechanisms, and standards development to enable CMS to communicate, share information, and interact with government and non-government organizations in advancing health care goals.

CMS is transitioning from an Agency that pays claims to one that is instrumental in improving health care for all Americans. Our vision is a health care system that is fully in step with medical care in the 21st century. This means care that is safe, affordable and is right for every patient, every time. CMS will use its influence in the health care arena to promote disease management and preventive care to improve beneficiary health. We will also use the wealth of our health care information to influence policy decisions that improve public health.

2.2 *Internal Forces*

The Office of Information Services (OIS) serves as the focal point for the responsibilities of the CMS' Chief Information Officer in planning, organizing, and coordinating the activities required to maintain an agency-wide Information Resources Management (IRM) program. OIS ensures the effective management of the Agency's information technology, and information systems and resources.

OIS has reinvigorated its strategic vision and commitment to its implementation.

The vision:

"One set of matrixed teams — transforming the delivery of health benefits through efficient implementation and operation of effective IT solutions; continuously accountable to business owners throughout CMS; and fostering supportive partnerships with CMS stakeholders and vendors"

Applying this vision across the various product line responsibilities within OIS, the Chief Information Officer (CIO) has established the following goals for OIS:

- **Enterprise Architecture:**

    o Ensure business analysis reviews are routinely done for all IT projects and "As Is" and "To-Be" business process models are developed for IT investments.

    o Identify and document business risks throughout the project life cycle, and work to ensure that all risks are acceptable or are mitigated.

- **Investment Management**: Clearly articulate a 5-year plan including milestones for all significant IT investments.

- **Operationalizing Mature IT Governance, Security and Privacy:**

- o Establish standards and procedures for ensuring compliance are in place and incident response procedures established and exercised.

- o A mature CMS IT governance environment is established by working with business owners to make decisions that align with enterprise architecture principles and IT technology standards.

- o Incorporate a risk-based approach to manage information security throughout the system's life cycle, i.e., investment, development, operations and disposal.

- o Establish mechanisms for anticipating change and ensuring that we are planning systems that can and will accommodate and be flexible to adapt to change.

- **Data Management and Access:** Ensure data is managed through its life cycle as an enterprise asset, establishing access means for all data users/stakeholders.

- **System Development and Maintenance:** Establish and adhere to predictable & repeatable processes throughout agency. Form OIS Integrated Project Teams to support all significant development efforts.

- **Infrastructure Operations:** Establish processes for transition to production operations. Clearly articulate responsibilities for monitoring and return-to-service.

- **Business Operations:** OIS will build productive relationships with our customers by:

  - o Establishing clear processes and plans for stakeholder communications and support are established and monitored and routine reporting back to business owners is in place.

  - o Providing guidance and a "big picture" understanding of business to help business owners make decisions that align with enterprise architecture and IT technology standards;

  - o Ensuring that IT Project Roles are understood throughout OIS and CMS;

  - o Appling IT oversight and disciplines to business functions and common enterprise services (e.g., eligibility, enrollment, customer service, etc.).

2.2.1 CMS' IT Workforce

The IT workforce at CMS is undergoing a significant and rapid change from the historical operations-centered focus to a management, planning, and oversight focus. Among the business and environmental factors driving this change are the increasing size

and complexity of the CMS-related information systems and the rate of change of both CMS' business requirements and technology.

The legacy IT workforce was configured to perform IT operations, particularly maintenance; and not staffed to perform planning, management, and oversight of secure IT solutions, investments, and resources. CMS' IT functions are now substantially outsourced and IT staff must be redirected toward managing the activities that they once performed. Expertise must be retained in technology disciplines to be able to assess the appropriateness and feasibility of recommendations. Successfully accomplishing this migration requires that CMS continues to develop and re-deploy current technical staff away from operational tasks and into planning and oversight assignments. The agency must also hire new staff with the necessary knowledge and competencies to perform and support essential, inherently governmental functions.

2.2.2 Aging Systems and Technology

CMS is a data-centric organization. CMS performs many functions in the complex Medicare, Medicaid, and SCHIP program environment, including: claims processing, beneficiary education and communication, program integrity, policy analysis, and decision-making. These activities require a robust IT infrastructure to support transaction processing (enrollment and payment) against central data warehouses, the associated data quality and maintenance, data analysis, and information dissemination.

The legacy data environment, which supports the CMS business operations, is a fragmented, redundant, and difficult-to-access collection of non-relational data files. These systems met the Agency's needs at the time they were implemented. Since then, system modifications necessitated by numerous and ongoing changes in legislation, business processes, and technology have rendered data structures un-scalable, and unsuited for new or modified applications. Data redundancies are abundant and business applications and systems cannot effectively cross database boundaries, yielding a "stovepipe" environment. The current systems will not satisfy technical and data management requirements for the future. Current processes are poorly documented, making modifications to the existing applications difficult and expensive. A shortage of skilled programmers and compatible commercial off-the-shelf tools has made it increasingly difficult and costly to support our legacy databases.

While there have been pockets of redesign activities, significant deficiencies must be addressed to make processing more efficient, reliable, and adaptable, and able to meet the continually increasing workload demands being placed on CMS technical solutions.

2.3 External Forces

2.3.1 HHS Externals

The HHS IRM Strategic Plan identifies numerous external forces that influence the department's IT strategy. By definition, OPDIVs inherit these same forces, which include presidential initiatives and directives, legislation, National Institute of Standards and Technology Information Security guidance, Office of Management and Budget (OMB)

directives and guidance, and various IT-related Government Accountability Office and Office of Inspector General reports

2.3.2 HHS Forces and Initiatives

In addition to the goals, objectives and performance measures defined by the HHS IRM Strategic Plan, the department has identified the following key initiatives (many of these are now being addressed within CMS activities; others are identified as future trends in Section 6):

1. E-Gov Initiatives – delivering information to employees, consumers, and business partners via Internet, Intranet, and standards-based web services.

2. Federal Transition Framework Initiatives – defining 18 cross-agency initiatives including Federal Health Architecture, IPv6, HSPD-12, Financial Management, Grants Management, and Human Resources.

3. HHS Enterprise Architecture (EA) Program – developing the segment architecture, institutionalizing EA methods, processes, and governance.

4. IRM Security – encompassing the Secure One HHS initiative.

5. Optimization of IRM shared infrastructure – to integrate and share common standards-based infrastructure (for example, the HHS Identity initiative).

6. IT Investment Management (ITIM) and Performance Management – to integrate performance management with the CPIC and strategic planning processes and achieve ITIM Stage 3 by summer of 2007.

7. Federated SOA infrastructure – to deliver business agility, reuse existing systems, and achieve integration and interoperability to reduce development costs.

8. Health IT -- to support the Office of the National Coordinator (ONC) on activities including electronic health records, a national health information network, and HIT standards.

9. Communications and Collaboration – to maximize value from the IRM infrastructure, secure it, and enable efficient interactions among personnel.

2.3.3 CMS' IT Stakeholders

CMS' IT stakeholders include beneficiaries, providers, plans, states, Quality Improvement Organizations (QIOs), Medicare Administrative Contractors, Carriers, Fiscal Intermediaries (FIs), health care researchers, other federal partners such as Social Security Administration , Railroad Retirement Board, Office of Personnel Management as well as other OPDIVs within HHS, and the many contractors that help CMS to develop, maintain, and operate its technical solutions. Constant improvements in technology and increasing complexity in stakeholders' environments raise business expectations of CMS, putting ever increasing pressure on CMS IT and its workforce.

2.3.4 CMS Specific Legislation

In addition to legislation cited in the HHS IT Strategic Plan (E-Government, Clinger-Cohen, Federal Information Security Management Act (FISMA), Government and Performance and Results Act (GPRA), Paperwork Reduction Act (PRA), and Health Insurance Portability and Accountability Act (HIPAA), there are additional specific pieces of legislation that directly affect CMS in particular:

- Improper Payments Information Act of 2002 (IPIA) identified specific payment error rate reductions for Medicare, Medicaid, and SCHIP.

- Medicare Prescription Drug Improvement and Modernization Act of 2003 (MMA) – introduced the Part D benefit and numerous changes in Part A, B, and C as well as Medicaid.

- Deficit Reduction Act of 2005 (DRA) DRA.

- Tax Relief and Health Care Act of 2006 (TRHCA).

2.3.5 Baby Boomers

The Medicare beneficiary population is expected to increase from approximately 43 million in 2005 to a projected 54 million by 2015. Two major reasons for this increase are the aging of the baby boomers and increased longevity. Due to the increased population from the baby-boom generation, there will be a significant increase in the number of Medicare eligible beneficiaries starting around 2011, shifting the age distribution of the population to the 65-and-over age group.

Increased longevity contributes to this phenomenon in two ways. First, more people will attain the Medicare eligibility age of 65. Those reaching the Medicare eligibility age in 2003 were born in 1938, when average life expectancy was 63.5 years. In comparison, the average person born in 2003 is expected to live 77.1 years. In addition, individuals' duration of eligibility will increase. Persons reaching 65 years of age in 2000 are expected to live 4 years, or 28.7 percent, longer than did persons reaching 65 years of age in 1950.

Starting in 2011, the baby boomers will begin entering the Medicare program, causing a major shift to the young-elderly age groups. Then around 2031, there will be a shift toward the groups aged 85 and older. This shift is important because, on average, these age groups have different per capita costs. As the Medicare population increases and the distribution shifts to older age groups, there will be corresponding increases in aggregate Medicare expenditures. As the population increases, there will also be corresponding increases in demand for effective and efficient IT caused by increases in claims volume and rising expectations due to an increasingly technically literate beneficiary population.

2.3.6 **E-Health**

E-health, health care practice supported by electronic processes and communication supported by interoperable health information technology (HIT), is central to improving the quality and cost of health care. The HHS Secretary has identified use of HIT as critical to modernizing the Medicare and Medicaid programs, transforming the health care system, and advancing medical research. The Secretary has committed that "HHS will do its part by adopting standards and data-sharing processes for Internet-based applications that will help federal programs like Medicaid and Medicare support the use of digital and interoperable health records that are privacy-protected and secure."

Three initiatives in particular focus on access to personalized, electronic information. Electronic Health Records (EHR) will allow providers to manage all aspects of patient care electronically. The Personal Health Record (PHR) is related to the provider-based electronic health record and will provide a complete summary of an individual's health and medical history, with information gathered from many sources, including self entries. E-prescribing will allow physicians to send accurate and understandable prescriptions electronically to pharmacies, reducing the potential errors for new prescriptions, refills, changes to, and cancellations of a prescription.

There are both technical and policy issues involved in determining the appropriate e-Health role for CMS. The agency is actively engaged in determining the feasibility of using Medicare claims data to populate PHRs to enable Medicare beneficiaries to track their health care. MMA mandates the use of e-prescribing based on national standards in the Medicare Part D prescription drug benefit by 2009. On November 7, 2005, CMS published e-prescribing foundation standards that became effective on January 1, 2006. The MMA mandated a report to Congress be issued in April 2007, and that the results of pilots will help inform the Secretary's future e-prescribing standards adoption.

2.3.7 **Rising Health Care Costs**

Total health care spending in the United States has been growing faster than the economy for many years, and the trend is projected to continue. Growth in health care spending has outstripped economic growth regardless of the source of its funding. Expenditures from Medicare, Medicaid, and private-sector health insurance have all risen faster than the gross domestic product (GDP). The cost of the Medicare program has been driven by increased enrollment, growth in spending per beneficiary, and the use of new medical technology. Advances in medicine and technology have generally raised costs rather than lowered them.

For CMS to become a more acute manager of the trust fund, the agency must move away from simply being a payment agency and towards leadership in health care quality and technical solutions that contain administrative, as well as health care costs. From an IT perspective, CMS needs to provide tools to mine its data to illuminate trends which may provide the impetus for changes in health care policy.

2.4   Key Themes and Challenges

Throughout CMS's implementation of the IT Strategic Plan, there will be recurring themes and challenges.

Main Themes:

- Supporting business performance and increasing the emphasis on quality and oversight to improve health outcomes and reduce administrative costs.

- Improving IT capacity and performance to support consolidation across the agency and the department that will help meet the needs and expectations of a growing Medicare population.

- Increasing integration and interoperability among technical solutions to improve business performance.

- Enhancing IT governance to ensure that objectives are met.

- Increasing participation in E-Gov, the federal transition framework, and other initiatives that enable cooperation, resource sharing, and improved services for citizens.

Major Challenges:

- Replacing a fragile, aging infrastructure.

- Planning and executing major infrastructure upgrades simultaneous with application and data management modernization initiatives and accommodating new business needs originating from legislative and other mandates.

- Supporting improved access to services and information while implementing stronger security and privacy enforcement.

3   IT Strategic Direction

CMS' IT Investment Review Board (ITIRB) ensures that CMS business drivers guide the Agency's IT operations and development. The ITIRB is responsible for strategic direction of the Agency's IT capital planning and investment control. The Board provides advice and recommendations regarding expenditure of appropriated IT capital investment funds; provides high-level oversight of the Agency's IT portfolio; monitors the work of change control processes throughout the Agency and provides strategic direction about priorities when necessary; and resolves IT-related concerns by CMS business owners. ITIRB ensures that IT resources are efficiently deployed to meet short-, medium-, and long-term business demands.

The ITIRB established the Agency's IT Mission and IT Vision in 2006 and confirmed them 2007. In addition, CMS also developed high-level goals and objectives by which the Agency will meet the IT Mission and IT Vision. Each IT objective is supported by one or more major IT or a key agency initiative. The major IT investments are approved annually by the ITIRB and documented in CMS' OMB Exhibit 300s. Although the goals on the surface appear to be the responsibility of OIS, they all must be carried out in partnership with components through out the Agency.

The following outlines the current strategic framework.

3.1   CMS IT Mission, Vision, Goals, and Objectives

CMS' IT Mission

To provide and support secure information technology that enables the efficiency and effectiveness of CMS programs and the health care system, advancing quality and safe health care.

CMS' IT Vision

To be the recognized leader in providing effective, secure and innovative IT to enable high-value, high-quality, personalized health care.

IT Strategic Goal #1: *Maintain continuity of operations as programs change.*

Objectives:
1. Ensure funding and staffing are available to support steady state activities.

2. Provide technologies and training that enable CMS employees to perform their work effectively, efficiently, and collaboratively.

3. Develop viable and executable contingency plans for continuity of operations (COOP) in the event that normal operations are disrupted.

4. Establish formal change management practices that facilitate change in all aspects of the Agency (e.g., process reengineering, organizational realignment, and incorporation of new technologies).

IT Strategic Goal #2: *Enable innovation and collaboration through a flexible, reliable, and robust infrastructure responsive to changing business needs.*

Objectives:
1. Transform today's inflexible legacy systems, structures and processes into an agile enterprise that can support rapid business changes.

2. Ensure that interfaces and information flows are standardized and that technology supports enhanced connectivity and interoperability across the Agency.

3. Establish a consolidated infrastructure to achieve communication and interoperability among operating divisions, beneficiaries, providers, and other health care stakeholders.

4. Support HHS and PMA E-Gov initiatives through the integration of business processes, applications, and data systems.

5. Support those HHS and PMA E-Gov initiatives that represent value-added improvements to operations that do not damage the ability of the Agency to execute its mission in the short or long term.

IT Strategic Goal #3: *Provide leadership in the development and implementation of National heath care standards and architecture to promote interoperability across the health care enterprise.*

Objectives:
1. Establish and evolve towards a target enterprise architecture that will improve efficiency, standardization, reliability, and availability of comprehensive health information.

2. Support the adoption of uniform data, coding, and vocabulary standards for the electronic exchange of clinical health information across the federal health care enterprise.

3. Support American Health Information Community (AHIC), ONC, and the health care community in the development of the National Health Information Network of interoperable systems that is capable of providing "anywhere and anytime" health care information and decision support.

IT Strategic Goal #4: *Provide a secure and trusted IT environment.*

Objectives:
1. Facilitate information exchange, with privacy and security protections and controls, to enable health care providers to share relevant patient information and for public health professionals to identify emerging public health threats.

2. Establish a single agency-wide identity management (e-authentication) strategy to protect IT assets from unauthorized access or misuse and to enable access to applications for providers, beneficiaries, researchers, and other stakeholders.

3. Ensure that IT security is incorporated into the project lifecycle.

4. Strengthen data privacy, confidentiality, integrity, and availability through established security controls.

IT Strategic Goal #5: *Ensure that beneficiaries, providers, business partners, and employees have ready and appropriate access to timely, high-quality data.*

Objectives:
1. Leverage web services to deliver information and conduct business with customers and stakeholders in a quick and reliable manner.

2. Ensure the availability and dissemination of information in preparation of, or in response to, local and national emergencies or other significant business disruptions.

3. Move from a claims-centric IT environment to an integrated data environment that provides multiple perspectives of Medicare and Medicaid data.

4. Develop an overall data architecture that supports evidence-based medicine to allow better decision making by customers and key stakeholders.

5. Continue to develop quality and efficiency measures to promote higher quality care.

IT Strategic Goal #6: *Build and sustain a culture that embodies an enterprise-wide view of CMS IT and achieve excellence in IT management practices.*

Objectives:
1. Institutionalize a formal Enterprise Architecture program through the development of business process modeling for IT investments to enable the unification and simplification of similar IT business processes and services within and across operating divisions.

2. Institutionalize a formal IT governance program that ensures IT decisions are based on sound enterprise architecture and CPIC principles.

3. Conduct enterprise architecture reviews of new and ongoing investments to reveal opportunities to consolidate systems, re-use applications and components, and avoid funding redundant projects.

4. Maximize the value of technology investments through enterprise-wide procurement and licensing vehicles.

5. Through the establishment of a data governance program, develop clear and consistent principles for the collection, protection, use, and sharing of data assets in support of CMS' strategic objectives.

IT Strategic Goal #7: *Ensure that stakeholders in the health IT and provider community are well-informed about the CMS environment and CMS initiatives.*

Objectives:

1. Invite interested parties to learn about the CMS IT environment and technical standards periodically.

2. Deliver presentations at national health IT meetings to inform the broader Health IT community about CMS operations.

3. Make appearances with business owners to describe the IT aspects of business operational changes that are relevant to selected communities (e.g. DME suppliers, providers, pharmacy associations).

4 Key CMS IT Initiatives

CMS has a number of ongoing IT initiatives that will help the agency adapt and evolve to meet the challenges imposed by department and agency business goals. These initiatives support three major themes: infrastructure, data, and application modernization. Needed improvements in each of these areas, described below, will consolidate capabilities, increase capacity, and improve the environment for future investments.

4.1 Infrastructure Initiatives

4.1.1 Data Center Consolidation

CMS' IT infrastructure is being consolidated and upgraded to reduce operating costs, enhance our ability to manage it, improve capacity and performance, and ensure its availability in the event of disasters. Data Center consolidation under way will reduce the number of data centers from 15 Medicare Data Centers (MDC) plus the 2 HIGLAS data centers and the Quality Net Data Center to 3 Enterprise Data Centers (EDC) plus the Baltimore Data Center (BDC). EDCs will house CMS business operations, ensure continuity of operations, and enable workload balancing among contractors. The BDC will serve as CMS' integration, test, and evaluation center for new applications prior to implementation within the EDCs. Data Center consolidation will benefit CMS by:

- Positioning CMS to respond to increases in claims volume by giving the Agency control and flexibility in the operation of the EDCs

- Capturing savings from economies of scale in claims processing

- Improving our ability to implement program changes in a timely manner through standardization of technology, policies, and procedures

- Enhancing CMS ability to serve beneficiaries and providers through the support of Web based services

- Improving access to quality data for help desks and call centers

- Enabling better control over security and privacy

4.1.2 Communications Infrastructure Replacement

The Medicare Data Contractor Network (MDCN) is an extremely large wide area network that connects CMS with its business partners, internal agency components, and other federal/state agencies. Currently managed by AT&T, the MDCN is essential infrastructure for the operation of CMS programs. A complex environment that is difficult to manage effectively, the MDCN offers limited technological solutions for securing protected health information data, and has become exceedingly costly to manage.

A new WAN strategy and technical solution is required to simplify the management of the CMS private WAN, provide better reliability and security, and replace costly outmoded technologies. By reducing the complexity of the network and restructuring the

cost burden with business partners, the Agency will be able to re-invest savings in WAN encryption technologies, improve staff productivity, and provide for a robust infrastructure for the future IPv6 and convergence of voice, video, and data.

4.1.3 Identity and Access Management

In support of the President's Management Agenda Expand E-Government (E-Gov) initiative, HHS E-Gov objectives, and CMS' strategic objective of collaborative partnerships, CMS is developing an enterprise service to enable secure access to information and applications. The service, "Individuals Authorized Access to CMS Computer Systems" (IACS), will support secure application access for authorized users including Medicare and Medicaid beneficiaries, contractors, employees, state agencies, and trusted partners. The IACS Service will accomplish this in part by creating a single, cost-effective, enterprise service to support identity management and authentication for CMS applications. Moving user identification and authentication functions from the application to the enterprise level eliminates the inefficiencies of administering user identities within each application.

4.1.4 Homeland Security Presidential Directive 12 (HSPD-12)

On August 27, 2004, the President issued HSPD-12 calling for a mandatory, government-wide standard for secure and reliable forms of identification issued by the federal government to its employees and employees of federal contractors. The primary goals of HSPD-12 are to enhance security against potential terrorist threats and prevent unauthorized access (to government facilities and IT resources). The initiative also intends to increase Government efficiency through standardization while protecting the personal privacy of individuals. More specifically, HSPD 12 sets forth mandatory guidelines and timelines for the implementation of a Federal standard for secure and reliable forms of identification that are:

- issued on sound criteria for verifying an individual employee's identity;
- strongly resistant to identity fraud, tampering, counterfeiting and terrorist exploitation;
- issued only by providers whose reliability have been officially accredited, and;
- can be rapidly authenticated electronically.

In response to this CMS is working with the Department's HHS Identity workgroup to develop a Personal Identity Verification (PIV) system that supports a common smart card-based platform for employee and contractor identity authentication. Smart cards have been chosen as the vehicle to carry the physical and digital components that will form the user's PIV credentials and grant access to multiple types of physical and logical access environments.

Once the program is in place and the initiative is fully implemented, all US Federal employees and contractors will have been issued credentials that securely identify who they are through standardized means. This will enable access to Federal facilities to be securely controlled via physical or electronic verification regardless of the Government

organization to which Federal employees and contractors report. The same form of identification will also be used to identify the user in order to grant him/her logical access to the networks and other electronic resources controlled by the US Federal Government across departments and agencies.

4.1.5 Internet Protocol Version 6 (IPv6)

In August of 2005, the Office of Management Budget issued Memorandum 05-22, establishing the goal of transitioning all Federal government agency network backbones to the next generation of the IPv6, by June 30, 2008. Internet Protocol is the "language" and set of rules computers use to transmit data over the Internet.

The existing protocol supporting the internet today - Internet Protocol Version 4 (IPv4) - provides the world with only 4 billion IP addresses, inherently limiting the number of devices that can be given a unique, globally routable location on the Internet. IPv6 provides the world with an almost unlimited number of available IP addresses, and significantly enhances mobility features.

Implementing IPv6 represents a strategic opportunity for agencies to provide improved services with greater efficiency. Some of the benefits of transitioning to an IPv6 infrastructure include:

- Providing the opportunity to network-enable new types of agency assets, such as remote sensors, handheld computing devices, industrial machinery, mobile phones, and other devices with individual and unique IP addresses. This will allow the elimination of network address translation and enable direct end-to-end connectivity between IP-enabled devices and systems.

- Creating more robust mechanisms for prioritizing data traffic. These provide a more reliable infrastructure for bandwidth-intensive applications such as streaming video, voice over IP, near-real-time collaboration and others.

- Allowing devices to automatically configure themselves and join networks without requiring centralized servers to manage them. Mobility support built into IPv6 will enable devices to remain connected even while roaming across great physical distances and multiple networks. These capabilities will enable flexible, decentralized, "plug and play" networking that will decrease administrative requirements and provide continuous connectivity.

- Incorporating (and requiring) end-to-end security for all IP traffic directly within the network layer, simplifying and strengthening network security.

In support of this goal, CMS is required to meet a number of interim milestones, including completion of two inventories of IP devices and technologies, completion of an IPv6 transition impact analysis, and development of an IPv6 transition plan. CMS also is required to submit a completed IPv6 transition plan, as well as a progress report on the inventory and impact analysis, as part of their EA assessment.

4.2 Data Initiatives

Ready access to consistent, accurate, and complete data is key to the agency strategic goals of high-value health care and accurate and predictable payments. High-quality, accessible data is also critical to achieving other goals including confident, informed consumers and enabling collaborative partnerships. The data modernization initiative underway is designed to transition the agency from its current collection of redundant, costly-to-maintain data stores to a single, efficient, authoritative data source for both Medicare and Medicaid data.

4.2.1 The Integrated Data Repository (IDR)

The Integrated Data Repository (IDR) will:

- Consolidate the many current data stores, reducing both maintenance and new development costs.

- Work with IACS and applications to provide secure access to CMS data through portals and views designed to accommodate different user communities (such as providers, plans, beneficiaries, call center staff, researchers, and other CMS stakeholders) with different information needs.

- Simplify operations by enabling both data management and analytics in controlled environments. In particular, simplifying claims processing via faster access to better-quality data.

- Enable service-oriented solutions to improve the agency's ability to respond to new business needs and changes in national priorities.

4.2.2 Data Governance

Centralized data governance must be put in place to guide and control IDR development and evolution. Objectives for a data governance council include:

- A decision-making process for the Data Governance Council to assist with determining the Agency's priorities for resources and data management through the data lifecycle.

- An ongoing communication plan to keep the Agency and our business partners aware of, and involved in the governance of data through the data lifecycle.

- Approve overarching processes and policies associated with managing data through the data lifecycle that will be enforced at the Baltimore Data Center (BDC) and at the Enterprise Data Centers (EDCs).

- A data mart strategy that defines the methodologies for establishing domain (analytical) and business-specific (eligibility, enrollment, etc.) data marts, as well as the processes for determining when to use each type of mart and for populating the data marts using appropriate data structures will be operational and enforced at the BDC and at the EDCs.

- A data archiving strategy will be developed and approved through the Agency's Data Governance Council. This strategy will lay out the policies and processes associated with retaining access to data as it ages.

4.2.3 Data Integration

A data strategy that offers a wide range of integrated data-sharing capabilities will help the Agency secure its role as the lead federal agency in healthcare. The promise of improved data integration and greater reuse and sharing of high quality, authoritative data will help CMS improve its delivery of healthcare to the nation.

CMS' data modernization strategy calls for improved data quality and data synchronization of CMS' operational systems by consolidating these data systems around the concept that authoritative data is stored and managed in one place and reused by many.

The decision support systems will be fed by authoritative data generated or captured in the operational environment. The data in the decision support environment will be stored in the database in a manner that serves as a historic audit trail for key transactions such as for a Medicare claim that moves from one process to another in the claim's lifecycle.

Both operational and decision support data will be segregated into highly tuned infrastructure.

Modern data warehousing techniques will be used to add value to raw transaction data by adding Business Intelligence features such as data integration, identity management of Medicare beneficiaries and Medicaid recipients, linking Part D drug event data to other claims data, creating episodes of care, linking all claims for a provider, creating cohorts for research, etc.

Powerful database technology will support most end user reporting and analytic needs through virtual data marts. Virtual data marts reuse the underlying granular data that is physically stored only once in a decision support system such as the IDR. Virtual data marts are more cost effective, more secure, and more easily adaptable to new requirements.

4.3 Application Initiatives

4.3.1 Fee-for-Service Application Modernization

CMS is undertaking a long-range initiative to architect and redesign Medicare FFS applications. This initiative will infuse Medicare FFS Program operations with HIT and to leverage enterprise standards and security services to reengineer Medicare FFS claims processing operations (which include the four major applications that currently process and pay Medicare FFS claims: contractor front-end and back-end systems, the "shared systems," and the Common Working File). The current FFS environment must be modernized to accommodate a rapidly growing volume of transactions, changing payment systems and benefits, improved fraud, waste and abuse detection and prevention

and other initiatives such as pay for performance, e-health, contracting reform, provisions of MMA, and a new financial management system.

CMS intends to redesign the FFS claims processing systems within the EDC environment. The EDC platform will support deployment and hosting of applications within a secure, web-based, CMS-controlled environment. The initiative will construct an integrated project portfolio that supports a business-driven FFS Architecture. Current activities falling within the integrated project portfolio include: FFS Architecture design; consolidation and standardization of front-end processing; survey of back-end systems functions; business rule capture for Common Working File (CWF) processing; definition of development efforts to build major subsystems and services; and development of a transition strategy for incremental deployment and business owner-driven near-term improvements. FFS application modernization has the following goals:

- Realize Program Administrative Cost Savings

- Improve Electronic Claims Processing

- Extend E-Gov Capabilities

- Increase Responsiveness to Changes in Population and Program Direction

4.3.2 Medicare Advantage and Prescription Drug Benefit

Medicare Advantage and Prescription Drug (MA-PD) applications include a suite of systems, many of which supported managed care prior to the advent of the prescription Drug Benefit. To meet critical legislative milestones in the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA), CMS leveraged existing processes and modules of existing systems, databases, and applications for rapid deployment of the new benefit. It is now necessary to stabilize these applications, standardize communications and formats for internal and external systems, and optimize processing and operations of these systems to accommodate the rapidly growing volume of transactions, changes to the enrollment and payment systems, and ongoing business adjustments.

Specific MA-PD initiatives include:

- Stabilizing MMA applications by redesigning software modules to improve maintainability and allow for increased transaction volumes; improving data synchronization processes to ensure current enrollment information; and developing a data archiving strategy to reduce production data volumes.

- Standardizing communications among systems by redesigning and optimizing the current Notifications architecture to ensure predictability and flexibility in communications between the existing MMA systems and other CMS legacy systems including Enrollment Data Base and CWF. The initiative will also improve the communication between the OIS operational and warehouse databases, the dissemination of data from these databases, and the presentation of data to end-users.

- Optimizing MMA operations by consolidating operations where possible, streamlining end-of-year processing, and improving measurement processes to identify further improvements.

4.3.3 International Classification of Diseases 10 (ICD-10)

The ICD classifies diseases and other health problems recorded on many types of health and vital records including death certificates and hospital records. Developed 30 years ago, the ICD is designed to promote international comparability in the collection, processing, classification, and presentation of health information and has become the international standard diagnostic classification for all general epidemiological and many health management purposes. It enables the storage and retrieval of diagnostic information for clinical and epidemiological purposes.

The ICD is updated periodically to incorporate changes in the medical field so that it can accurately describe the diagnoses and inpatient procedures of care delivered today. The current, Ninth Revision (ICD-9) is obsolete and is unable to meet current health care data needs or support the transition to an interoperable health data exchange in the US. ICD-10 represents the broadest scope of any previous ICD revision to date; it is more comprehensive and specific than current standards and extends well beyond the traditional causes of death and hospital admission.

Upgrading to ICD-10 will meet HIPAA mandates to use nationally standardized code sets and CMS is positioned to take a lead role in implementing ICD-10 nationwide. This includes replacing the ICD-9 Clinical Modification (CM) code set with ICD-10 CM for diagnoses, and ICD-10 Product Service Codes (PSC) for inpatient hospital procedures. This investment requires CMS to change, test, and validate internal and external systems needed to accept and use ICD-10 billing codes. The conversion will have a major impact on CMS' coverage and reimbursement activities: the more detailed codes will help CMS improve the accuracy of coverage and reimbursement, quality measurements of patient care and safety, fraud and abuse detection, and data quality for research.

4.3.4 Medicaid Modernization

The need for more uniform, timely and standards based Medicaid data has led to a major modernization push for Medicaid. The Medicaid Information Technology Architecture (MITA) effort managed by the Center for Medicaid and State Operations (CMSO) is an important acknowledgement that the nation is ready to modernize the Medicaid data architectures to support vital national interests.

CMSO has responsibility for helping all of the states develop the IT systems needed to capture and manage Medicaid data.

In addition, there are complementary Medicaid IT modernization efforts taking place at the state level. The National Governors Association (NGA) Center for Best Practices has announced the creation of the State Alliance for E-Health. This initiative is designed to improve the nation's health care system through the formation of three subcommittees comprised of state representatives to work on E-Health issues related to privacy and

security, medical licensure and certification, and the development of interoperable IT infrastructure and coding. These subcommittees will make recommendations on E-Health to the NGA that will increase the efficiency and effectiveness of the health information technology initiatives they develop.

To support programs that meet the needs of their highly diverse populations, the fifty states and the District of Columbia have built highly individualized claims processing systems commonly referred to as Medicaid Management Information Systems (MMISs). These MMISs are developed within broad national guidelines established by Federal statutes, regulations, and policies. Each state establishes its own eligibility standards; determines the type, amount, duration, and scope of services; sets the rate of payment for services; and administers its own program. A person who is eligible for Medicaid in one state may not be eligible in another state, and the services provided by one state may differ considerably in amount, duration, or scope from services provided in a similar or neighboring state. In addition, state legislatures may change Medicaid eligibility and/or services during the year.

As previously noted, MMISs were built primarily for claims processing and limited information retrieval purposes. They have served as the workhorse for each state over the past thirty years but have been found to be increasingly inflexible with regard to reflecting changing federal and state requirements. In addition, they are costly to develop and operate. A new MMIS today typically cost over $50 million, even when based on upgrading from an older MMIS platform. CMSO contributes significant funding for MMISs upgrades.

MMIS do not easily share information across system platforms; this makes it hard for a State to share data between its own departments, much less across State boundaries to another State. Many MMIS have hard-wired workarounds in order to support managed care, disease management and decision support. Separate, uninterested systems make it difficult to develop comprehensive views of Medicaid client needs and services. This impedes a States' ability to administer holistic, client-centric Medicaid programs.

State Medicaid programs and systems vary considerably in the types of information collected, the way the data is categorized and the computer platforms used. Consequently, CMS requests that States extract certain data items from their MMIS' and submit them to CMS in a standardized format. Even though a standard format is used to send data to CMS, data definitions and other state-specific policy interpretations have resulted in non-standard data submitted to CMS such that comparisons across states have been both difficult to undertake and slow to achieve. MITA's modernization, in partnership with the States, established a target data architecture that is HIT standards compliant.

MMIS data is forwarded to CMS on a quarterly basis and loaded into the CMS central Medicare data repository called the Medicaid Statistical Information System (MSIS), which is the primary Medicaid analytic database at CMS. Since each State's MMIS feeds the MSIS, many of the data integrity problems found in MMIS flow into MSIS. MSIS is a set of standardized Medicaid eligibility and claims data that State Medicaid

agencies submit to CMS (from MMIS) as a result of the Balanced Budget Act (BBA) of 1997. The BBA of 1997 mandated that all states participate in MSIS beginning in 1999. Requiring States to send data to CMS was a major advance in the maturing of the MSIS. Prior to this, each State's participation was voluntary. MSIS raw data does not lend itself to user friendly data analysis. CMSO has developed modern Data Marts that sit on top of the MSIS database to provide summarized, user friendly views of the data. Because of the variations in state data, it takes a considerable amount of time to normalize the data as best as possible in the data marts; often the development of the data marts takes more than a year to place into production due to the complexity of the data normalization involved.

To summarize, CMSO indirectly guides the development of each State' MMIS through its funding and directly manages the MSIS data stores. These two major systems are tightly coupled and any improvement in MMIS data architectures and quality will flow to the MSIS. The underlying systems were developed to meet the needs of the state-specific policy parameters rather than to address common concerns on a national basis. Consequently, the MMIS systems are often not positioned to support the more demanding needs of an empowered consumer and fast emerging E-Health paradigm. It is in CMS' overall interest to assist states in their transformation of their MMIS' from the transaction-based systems of the past to the standards-based, patient-centric, enterprise-wide service oriented architectures of the future through adoption of the MITA framework.

5 Governance

Governance encompasses the policies, roles and responsibilities, processes, approval procedures, and other mechanisms to ensure that information resources support the business needs of the agency. Governance goes beyond IT because the analysis to define business strategies occurs before IT is considered as an option. The initiatives previously described will be executed in accordance with recently updated policies. Additional processes and procedures are under development to implement these policies.

5.1 Enterprise Architecture

The CMS EA program is developing and evolving a repository of architectural descriptions that document and inter-relate strategic goals, performance objectives, legislative drivers, business processes, data, applications, and technical solutions. Information captured records and integrates institutional knowledge in the repository to provide decision support to CPIC and IT Governance activities. Alignment to the Federal Enterprise Architecture (FEA) and well-established integration with the HHS EA anchors the CMS EA in context.

In the most basic sense, strategic planning and performance management can be thought of as consisting of 3 elements: planning strategy, aligning resources, and carrying out/operating the plan. From an EA perspective, this fundamental perspective is captured in the "Architect, Invest, Implement" diagram below.
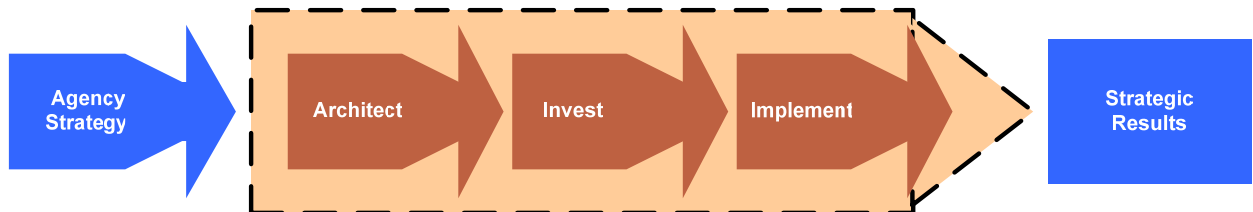
Figure 1 – Architect, Invest, Implement Concept

A Federal Agency carries out its strategy and achieves results by using EA as a tool to govern planning, investing, and implementation.

The CMS EA vision is of an information asset that:

- Provides a detailed inventory and linkage of all IT assets through the population of the nine layers HHS Framework: strategy, investment, business, data, application, technology, workforce, facilities, and security. Effective configuration management program ensures timely updates to all layers.

- Provides timely management reports and analyses on newly proposed investments.

- Allows key CMS decision makers to view the current enterprise to analyze the cost-benefit of a proposed IT investment and promotes business process reengineering.

- Enables reuse/leveraging/consolidation/conservation of existing IT resources.

- Enables development of robust transition strategies from the current as-is business processes to future desired states by establishing target architecture models and other artifacts.

- Assists CMS in the strategic management of human capital by capturing knowledge of the agency's business functions and the investments, applications, data, and technology that support those functions.

5.2   Investment Management and Governance Policy

The CMS IT Investment Management and Governance Policy establishes the scope of the IT governance program for the agency and defines roles and responsibilities for many participants in investment management and governance. The policy document defines the following roles and their specific responsibilities for IT governance:

- IT Investment Review Board
- Executive Steering Committees
- Chief Information Officer
- Chief Technology Officer
- Chief Enterprise Architect
- Chief Information Security Officer
- IT Investment Management and Governance Support Staff
- Business Component Leadership
- Business Owners
- Project Managers
- System Developers/Maintainers

5.3   CMS Investment Lifecycle

In accordance with the department's Enterprise Performance Lifecycle (EPLC), CMS is refining its own investment lifecycle (ILC). The ILC integrates the Capital Planning and Investment Control (CPIC) processes with EA and systems development. By defining activities, work products, and participating roles and responsibilities, the ILC connects CPIC, EA, project management, and engineering to define the processes by which business needs are satisfied by investments, which are consistently managed from concept through development, operations and maintenance, and finally to disposition.

The HHS EPLC on which CMS' ILC is based is described visually below in Figure 2. The EPLC is the means by which IT requirements and solutions are identified, planned, implemented, and managed. EPLC aims to promote an effective, efficient process for developing and operating IT initiatives and investments by defining standard lifecycle phases and deliverables for program and investment managers to use in planning and executing investments, and by defining review and approval processes for providing effective oversight.

The EPLC framework identifies "critical partners" who ensure effective, efficient management of IT investments from an enterprise perspective. Critical partners include

EA, capital planning and investment control (CPIC), security, business/program management staff, and others.

The EPLC is based on industry best practices designed to improve the performance and minimize the risk of IT investments.
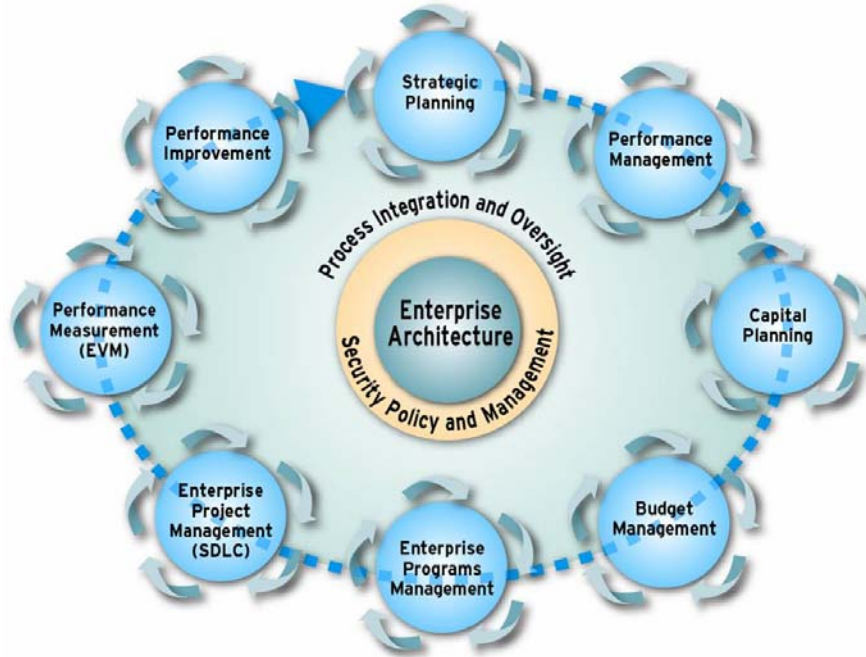

Figure 2 – EPLC Framework Overview

5.4   *E-Health Executive Steering Committee*

The E-Health Executive Steering Committee (EESC) provides executive leadership for e-health activities across the Agency, to ensure that CMS and HHS e-health priorities are identified, coordinated, and carried out. The group is responsible for establishing strategic goals and objectives that promote e-health priorities within CMS and the Department. They encourage partnering where appropriate, sponsor multi-component workgroups to focus on specific issues as needed and prevent duplication of efforts. These workgroups will report back to the EESC upon completion of their objective. The EESC also coordinates with AHIC, ONC and other relevant HHS bodies to ensure that the Agency's e-health efforts tie in with the larger e-health agenda of HHS and the AHIC.

The EESC is composed of the executive leadership of CMS components that have a direct and substantial stake in the Agency's e-health strategy and initiatives. The group is chaired by the Director of the Office of E-Health Standards and Services (OESS), who is accountable to the Chief Operating Officer (COO) for issues relating to e-health and is responsible for chairing and directing EESC meetings.

5.5   *Data Governance Council*

The newly formed Data Governance supports the management and protection of CMS data and sets the strategic vision for data use, integration, consolidation, quality, sharing, privacy, and security. This council will review current data governance practices and structure and propose options for change. It also will address the need to align decision-making across the spectrum of architecture and design, funding and prioritization, and mission accomplishment to optimize the use of CMS data assets. This council will provide clear and consistent, principles-based direction on the collection, protection, use, and sharing of data assets in support of CMS' strategic objectives. They will review the current data environment and defines issues, options, and recommendations for change and prioritize activities to be addressed.

6 Future Trends

6.1 HHS Approach to Service Oriented Architecture (SOA)

SOA initiatives are leading a revolution in enterprise business and IRM integration. Many companies and government agencies are moving toward SOA projects, from limited scale efforts, to large strategic SOA rollouts at the enterprise level with support from senior IT management and business executives. SOA enables a business service layer on top of applications, which facilitates emphasis on business function support rather than hardware and software.

The core business value of SOA is in delivering business agility. Industry best practices have demonstrated that the business benefit of SOA is in rapid service reconfiguration flexibility. This means that the business and technical architectures must be aligned, which is not the case in most organizations today. Expressing existing application architecture in SOA terms is not enough. Services must be business-oriented if they are to be understood and orchestrated by business people. SOA helps to streamline IT infrastructure, and helps to align IT investments with business goals, optimizing IT investments. The deployment of SOA in web service allows integration of business with current technologies.

SOA can be evolved based on existing systems and infrastructure rather than requiring a full-scale re-build. Organizations will achieve benefits from SOA by focusing their development effort around the creation of services using both new and existing components and technologies, combined with the component-based approach to software engineering and the enabling SOA infrastructure. The benefits of SOA include:

- Business agility: SOA facilitates business process improvement. It provides business users with an ideal environment for monitoring business operations. Process modeling is reflected in the business services. Process manipulation and the change of process flow can be achieved by the use of BPM (Business Process Modeling) tools integrated into the SOA infrastructure.

- Reuse and leverage existing assets: A business service can be constructed as an aggregation of existing components, using a suitable SOA infrastructure and made available to the enterprise. Legacy systems can be encapsulated and accessed via web service interfaces.

- Common infrastructure as commodity: SOA infrastructure is becoming a commodity that can be implemented by the use of commercial-off-the shelf (COTS) products. By enforcing standards, its development and deployment can be consistent across an enterprise. Existing components, newly-developed components, and components purchased from vendors can be consolidated within a well-defined SOA infrastructure.

- Reduced development cost: The reuse of existing service and components will reduce software development time and cost.

Beyond SOA, and to align with the HHS enterprise structure, HHS will explore a Federated SOA solution, and this Federated SOA approach will be tightly integrated with, and a subset of the HHS Enterprise Architecture. In combination, this approach can be viewed as an HHS Federated, Service Oriented Enterprise Architecture (SOEA). HHS will leverage SOA technologies for delivery of common services across the Department to support both enterprise IT initiatives as well as Mission Oriented IT investment (systems and applications) across the Department.

Integration and Interoperability, and the use of a Federated, Service Oriented Enterprise Architecture Approach—Application and infrastructure integration and interoperability are consistent goals for any large, diverse, organization such as HHS. Technologies and strategies for information integration and interoperability continue to evolve, with the latest trend focusing on SOAs. While not new, SOAs traditionally focus on Web Services based applications, however, the architectures and the implementation for SOAs are not limited to this paradigm. Building on current OPDIV activities, as well as State and local activities to explore and implement SOA-based integration and interoperability objectives, HHS will leverage these investments and will establish an SOA-based approach to IT common service delivery and integration initiatives. This approach will provide guidance, governance, policy, and technical strategies for implementation of a Federated SOEA that will establish Service Provider/Service Consumer relationships across the Department. In addition, this approach will look to the OPDIVs to fulfill a role as Service Consumers as well as Service Owners and Providers in a truly federated approach. This recognizes and leverages in-place IT infrastructure, skills, and capabilities across our diverse organization. In this approach, the OCIO will focus on the Federated SOEA, and will provide guidance, policy, and support in the implementation of Department-wide SOA solutions.

6.2 HHS Business Areas (Segments)

The OMB FEA has defined "Health" as a federal line of business. The Health Care Administration (HCA) sub-function represents a coherent functional slice of the "Health" enterprise. OMB expects department-level agencies to develop segment architectures as a means to establishing achievable business improvements through investments that are aligned to the agency mission, as enforced through the CPIC process. HHS is looking to CMS to define the business architecture for HCA as nearly 80% of CMS' IT investments align to the HCA. HHS expects CMS to identify and leverage commonalities among business services and identify potential candidates for reuse across OPDIVS.

The HHS EA Program identified nine business areas corresponding to OMB's federal lines of business that will be pursued via detailed segment architecture development. The HHS Business Areas are:

1) Access to Care (mission oriented)
2) Health Care Administration (mission oriented)
3) Health Care Delivery Services (mission oriented)
4) Health Care Research and Practitioner Education (mission oriented)
5) Human Services (mission oriented)
6) Population Health Management and Consumer Safety (mission oriented)

7) Management of Government Resources (support oriented)
8) Planning and Oversight (support oriented)
9) Information Resources Management (support oriented)

Of the nine HHS business areas, six are mission-oriented and three are support-oriented. OpDivs within HHS will collaborate to build the segment architectures.

6.3 Health Care Administration Business Area (Segment)

The Department has assigned responsibility for initial development of its Health Care Administration (HCA) Segment to CMS, the Health Resources and Services Administration (HRSA), and Indian Health Services (IHS) with CMS leading the effort. The CMS EA program has created an initial decomposition of HCA in the context of CMS lines of business and will refine the structure as needed while using it to organize and guide EA development.
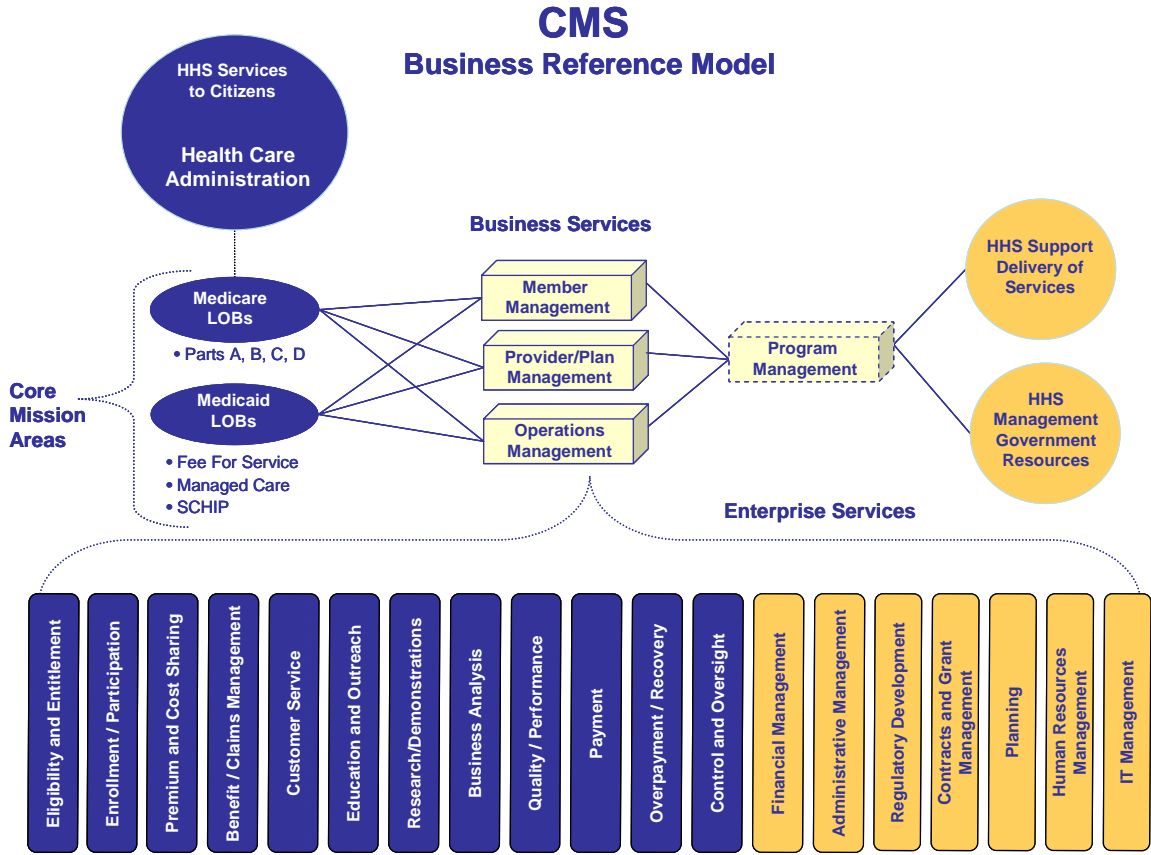
Figure 3 – The CMS Business Reference Model

In this model, the CMS lines of business are identified as core mission areas. Business services (Member, Provider/Plan, Operations, and Program Management) represent externally-visible services that can be used across the department. Enterprise services, shown along the bottom of the diagram represent services that can be shared across the Health Care Administration enterprise.

7 Acronym List

Term	Expansion
AHIC	American Health Information Community
BDC	Baltimore Data Center
CMS	Centers for Medicare & Medicaid Services
CMSO	Center for Medicaid and State Operations
COO	Chief Operating Officer
COOP	Continuity of Operations
CPIC	Capital Planning and Investment Control
CWF	Common Working File
DRA	Deficit Reduction Act of 2005
EA	Enterprise Architecture
EDB	Entitlement Data Base
EDC	Enterprise Data Center
EESC	E-Health Executive Steering Committee
EHR	Electronic Health Record
GAO	Government Accountability Office
HHS	Department of Health and Human Services
HIT	Health Information Technology
IACS	Individuals Authorized Access to CMS Computer Systems
IDR	Integrated Data Repository
ILC	Investment Lifecycle
IPv6	Internet Protocol Version 6
IRM	Information Resource Management

Term	Expansion
IT	Information Technology
ITIM	IT Investment Management
MAC	Medicare Administrative Contractor
MA-PD	Medicare Advantage and Prescription Drug
MDCN	Medicare Data Contractor Network
MITA	Medicaid IT Architecture
MMA	Medicare Prescription Drug, Improvement, and Modernization Act of 2003
MMIS	Medicaid Management Information Systems
MSIS	Medicaid Statistical Information System
NIST	National Institute of Standards & Technology
OESS	Office of E-Health Standards and Services
OIS	Office of Information Services
OIS	Office of Information Services
OMB	Office of Management and Budget
ONC	Office of the National Coordinator
OPDIV	Operating Division
OPM	Office of Personnel Management
PHR	Personal Health Record
QIO	Quality Improvement Organization
RRB	Railroad Retirement Board
SCHIP	State Children's Health Insurance Program
SOA	Service Oriented Architecture
SSA	Social Security Administration

Term	Expansion
TBD	To be determined
TRHCA	Tax Relief and Health Care Act of 2006
TRP	Technical Review Panel
WAN	Wide area network