USAID
FROM THE AMERICAN PEOPLE

USAID Enterprise Architecture Volume 3
FY2013 Target Architecture

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Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

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Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

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Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

1 EXECUTIVE SUMMARY

USAID's Target Enterprise Architecture identifies the Agency's business challenges, then describes how those challenges will be met with innovation, improved business processes, a focus on performance, and improved delivery of information services.

In this document you will see:

- ✓ A three-year vision for improving the Agency's performance, innovation, and impact
- ✓ The Target Enterprise Architecture, which guides change management initiatives and IT investment decision-making
- ✓ A "how to" guide for fine-tuning the Target Architecture over the next three years

USAID needs faster, more responsive program management and evaluation, increased collaboration with other donors, and an expanded relationship with development partners and the private sector. Innovative technologies present new ways for the Agency to share information, manage work, and engage partners using social collaboration tools, mobile devices, and cloud computing.

The Target Architecture takes a holistic approach to solving problems and aligns technology investments to USAID's seven strategic priorities:

Procurement Reform

Talent Management

Rebuilding Policy Capacity

Strengthening Monitoring and Evaluation

Rebuilding Budget Management

Innovation

Science and Technology

The Target Architecture uses the following four cross-cutting objectives to meet the Agency's strategic priorities:

- **Information on Demand:** Assure that all users of Agency information (including Agency staff, partners, and stakeholders) get timely, useful, and accurate information, through a secure, accessible, and reliable infrastructure
- **Innovation and Process Efficiency:** Improve Agency impact and efficiency with a focus on innovation, process performance, knowledge management, and accountability
- **Workforce Development:** Assure that USAID mission needs are met with a diverse, highly qualified workforce whose performance is supported through professional development, incentive alignment, accountability, and high quality workforce services
- **Effective and Efficient IT Service Delivery:** Assure that USAID's OCIO provides high quality information services to all users, and with greater stakeholder satisfaction

Through a rigorous and repeated process of refining the Target Architecture to support the most critical areas of the business, USAID will keep its IT investments aligned, save money, and improve service delivery.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

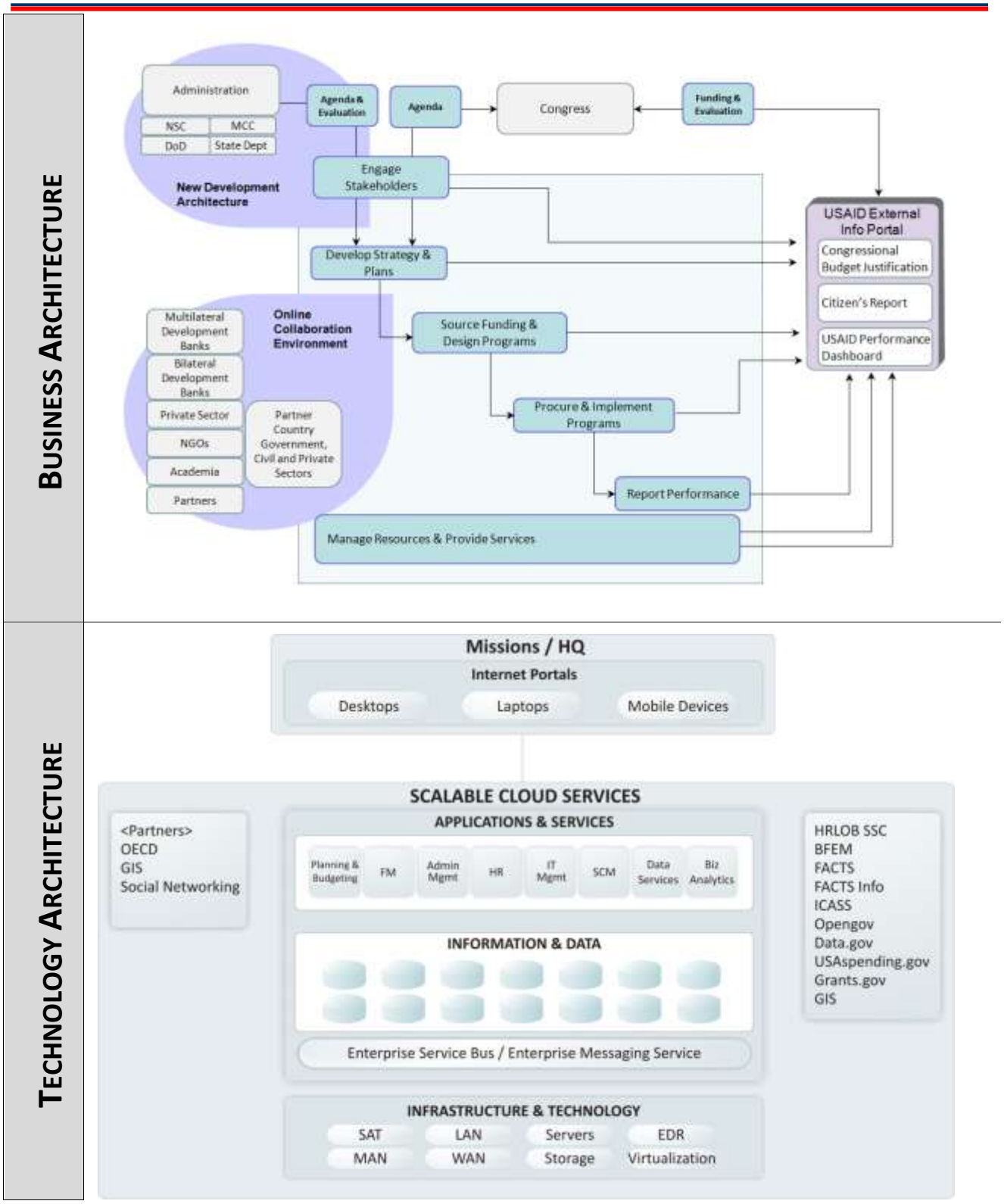


FIGURE 1: USAID FY2013 TARGET ENTERPRISE ARCHITECTURE

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

2 USAID ENTERPRISE ARCHITECTURE PROGRAM STRUCTURE

In order to organize and communicate its architecture, the Agency is following an established framework that uses a set of connected reference models that support an Agency-wide perspective in identifying opportunities for improving business processes, information technology, and opportunities for collaboration within and across the Agency and its Missions. When combined, the reference models create a framework, similar to the blueprints for a house, that describes the important elements of the Agency in a common and consistent way, and shows how they work together to support the Agency's mission. Through the use of this common framework, IT portfolios can be better managed and leveraged across the Agency and federal government. The framework is made up of the architectural "layers", described in diagrams that show these key elements and the relationships between them. The result is a comprehensive blueprint that is based on the Federal Enterprise Architecture (FEA) Reference Models[1].

Figure 2: USAID EA Program Management Structure, describes USAID's framework for documenting important elements of the USAID Enterprise Architecture. The USAID EA largely follows FEA guidance, but has been refined to reflect USAID priorities and terminology.

This volume of the EA Program Management documentation presents the target, or future state, of the Agency Enterprise Architecture. The approach to designing the Target EA clearly shows the relationship between Agency goals, the capabilities that the Agency needs to improve or introduce to achieve those goals, and the parts of the Target EA that have been designed to provide those capabilities. This transparency is intended to support communicating the Target EA, as well as making investment decisions and implementing the Target EA.

The Target Architecture was designed through a number of data calls and working sessions with key stakeholders and representatives from the business and technology organizations across USAID, followed by analysis of the key Agency strategic drivers, the identification of critical capability gaps that the Target Architecture must fill, and a design effort resulting in recommendations for new operational capabilities and information technology services. Following FEA guidance and EA best practices, the Target EA includes all five layers of the enterprise – Strategy & Performance, Organization & Business, Services & Applications, Information & Data, and Technology & Infrastructure.

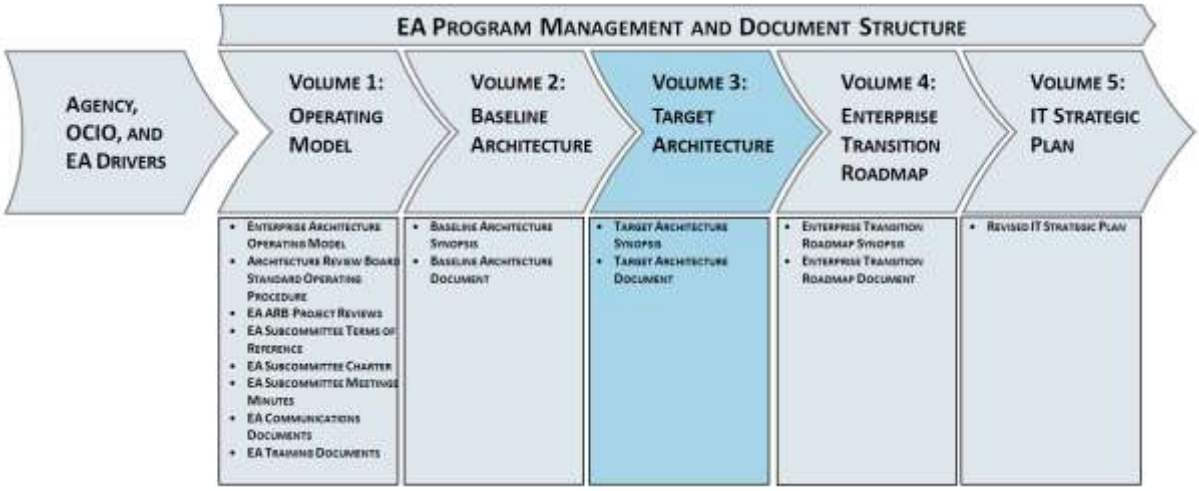


FIGURE 2: USAID EA PROGRAM MANAGEMENT STRUCTURE

[1] http://www.whitehouse.gov/omb/assets/fea_docs/FEA_CRM_v23_Final_Oct_2007_Revised.pdf

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

3 USAID TARGET ARCHITECTURE ENVIRONMENT, PRINCIPLES, GOALS, SCOPE, AND STAKEHOLDERS

The Agency's Target EA goals, scope, stakeholders, and context each present challenges and opportunities. Leadership is absolutely critical to a successful Target EA – it must be **adopted** by senior management as representing their vision of how the Agency operates; **invested** in, over a period of years, in order to be achieved; effectively **managed**, with trade-offs explicitly identified and adjudicated, and **monitored and evaluated** for both financial management and organizational impact.

3.1 TARGET ARCHITECTURE ENVIRONMENT

USAID has a broad and complex mission, from providing emergency relief, including reconstruction and transition efforts, to implementing long-term sustainable development programs. Throughout its history, the Agency has been acknowledged as a world-class development and relief organization capable of delivering services in the world's poorest countries. USAID has accomplished this while placing most strategic, tactical, and funding decision authority in the field in order to provide maximum flexibility and responsiveness to local needs. This distributed model of operations, decision making, and IT planning and management has historically limited the role and impact of enterprise architecture at the Agency. The increasing role of whole-of-government initiatives is now influencing technology implementations and decisions across all Federal agencies.

3.1.1 USAID STRATEGIC ENVIRONMENT

The USAID strategic environment is extremely complex, encompassing all of the key challenges facing the developing world, all international organizations and activities focused on addressing these challenges, and all US government entities and activities related to international affairs. The strategic challenge of the Agency is to define how it will pursue its mission to provide humanitarian relief and support the economic development of countries in need.

USAID currently shares a joint strategic plan with the Department of State ("Strategic Plan – FY2007 to FY2012, Department of State and USAID") which uses the F Framework to develop strategic goals and performance measures. This framework is embedded in the Agency's budget formulation process, through the FACTS and FACTS-Info systems, and provides a view into the alignment between the Agency's mission budget requests and the six Objective Areas of the F Framework. USAID's mission and field activities align primarily with the "Governing Justly and Democratically", "Investing in People", "Economic Development", and "Humanitarian Assistance" Objectives, while its operational activities are generally associated with the "Program Development and Administration" Objective. The F Framework is a useful construct for measuring the overall impact and interaction between diplomacy, development, and humanitarian assistance.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

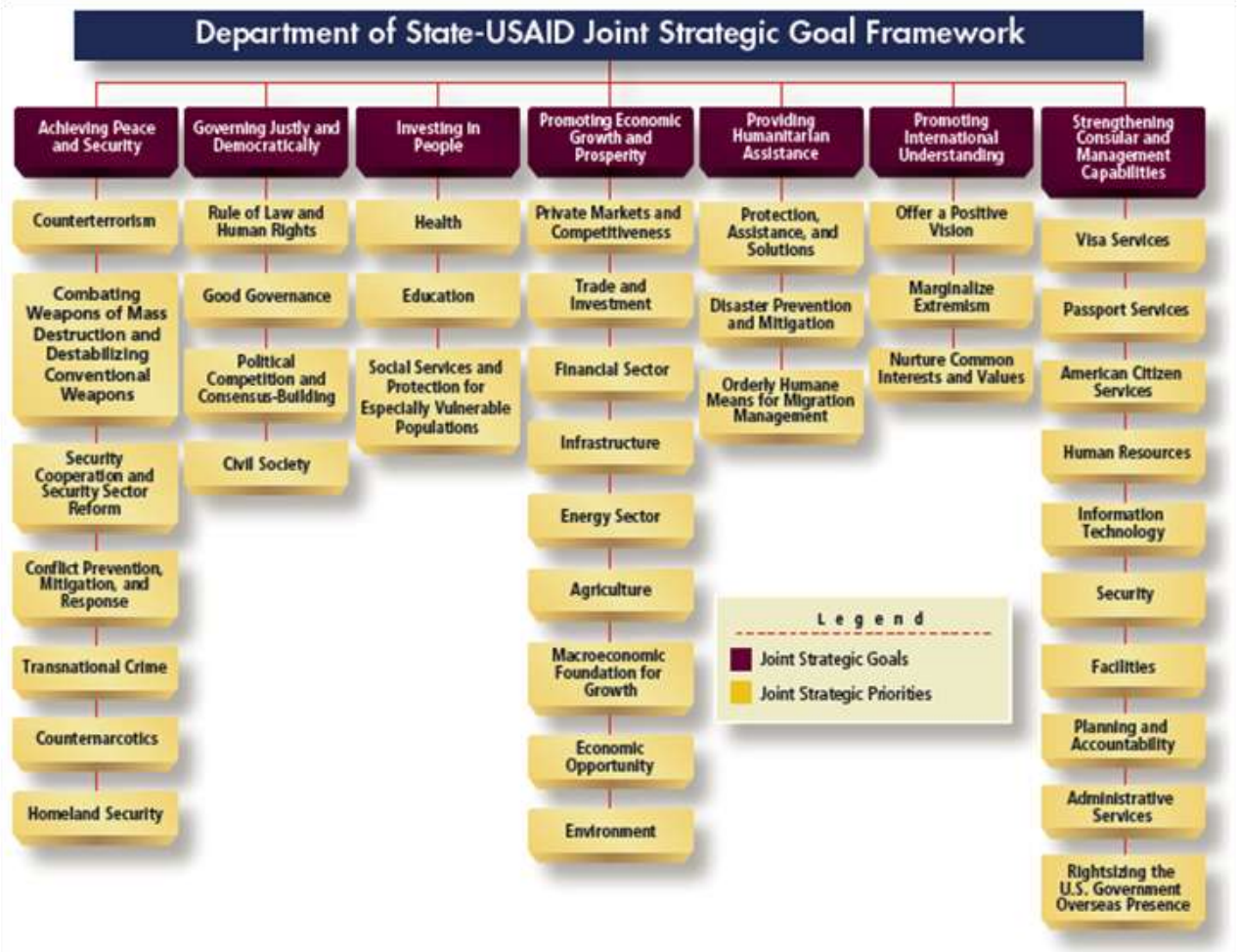


FIGURE 3: THE F FRAMEWORK STANDARD PROGRAM STRUCTURE

In May of 2009, the Agency's Business Transformation Executive Committee (BTEC) reviewed, "Rebuilding USAID", a statement of the Agency's strategy to achieve the goals of the Development Leadership Initiative (DLI). As a means to rebuilding the Agency's leadership in international development, DLI establishes the goal of doubling the number of Foreign Service Officers in the field, from the level in FY 2009, to be completed by FY 2012. "Rebuilding USAID" describes four strategic objectives to meet this goal, and to ensure the ability of these new development professionals to effectively support the Agency mission in the field.

1. **Sharing Knowledge:** Improving the ways in which lessons learned, operational information, and successful innovations are made available across the Agency
2. **Doing Business Differently:** Increasing the flexibility and adaptability of the Agency in operations, policies, and approaches
3. **Building a Professional Workforce:** Supporting the professional development of Agency staff through all phases of their career
4. **Creating Space for Development:** Improving and extending the physical environment used by Agency personnel in delivering development and humanitarian aid

The current strategic environment is also strongly influenced by technology. The Agency operates in an information-based community – in which the ability to execute the Agency's mission and ensure

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

financial security and economic vitality are dependent upon secure, timely access to accurate and trusted information. The ability to manage the Agency's information resources underpins all aspects of strategic performance and success.

New technologies with the potential to transform the delivery of development and humanitarian aid, services, capabilities, and interactivity are continually influencing the future of the Agency's strategy and operating model as well as the role of the OCIO. This dynamic technological environment presents continuing opportunities for USAID to better serve its customers and the nation.

The OCIO is focused on understanding the nature of this ever changing environment and harnessing the combined expertise that exists across the federal government to evaluate and implement new technologies. In addition, to meet and respond to the needs of the Agency, the OCIO is dedicated to being a strategic partner to the USAID Bureaus and Missions, the IT service provider of choice to the USAID community, and a good steward of the Agency resources.

3.1.2 CURRENT OPERATIONAL INITIATIVES

To help meet the complex challenges facing the Agency — achieving food security, addressing climate change, mitigating the impact of the global economic crisis, preventing health pandemics and stabilizing fragile states—USAID will continue to need resources for rebuilding its organizational capacity and assisting partner countries. USAID will become increasingly proactive in creating development solutions by increasing staff with technical and management expertise, along with modern IT systems and streamlined business processes.

The Agency will work more effectively to build capacity in developing nations, increasing its collaboration with host governments and other international agencies and partners by placing more officers in the field. USAID is implementing a plan, the Development Leadership Initiative (DLI) to double its Foreign Service personnel by 2012. The DLI is recruiting, hiring, and training a diverse staff that will fulfill the Agency's need for enhanced technical and development management capacity. To maximize the value of its expanded workforce, USAID is streamlining business processes, modernizing IT systems, and strengthening strategic planning, policy analysis, and program oversight capacity.

3.1.3 REGULATORY AND COMPLIANCE DRIVERS

A broad array of compliance guidelines generated by federal oversight agencies, OMB in particular, as well as legislated regulation, influence USAID management, operations, and information services.

Open Government Directive – On December 9, 2009, OMB announced the "Open Government" Directive, which directs federal agencies to develop a data quality plan (with a due date of April 14, 2010) outlining how the agency will ensure the reliability of data provided to stakeholders. USAID has prepared an initial draft of this plan, and is in the process of its implementation.

Government Performance and Results Act of 1993 – The Government Performance and Results Act established requirements for augmenting project management throughout the Federal Government. Under the Act, agencies must develop five-year strategic plans including strategic goals for all mission functions; prepare annual performance plans, including performance goals; and prepare annual performance reports that assess the agency's achievement of performance goals.

Paperwork Reduction Act of 1995 – The Paperwork Reduction Act requires federal agencies to reduce the total amount of paperwork generated by the public for Federal Government purposes as well as ensure the quality and integrity of information used by the Federal Government.

Clinger-Cohen Act of 1996 - The Clinger-Cohen Act established the requirement for an agency EA – "The Chief Information Officer of an executive agency shall be responsible for developing, maintaining,

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

and facilitating the implementation of a sound and integrated information technology architecture for the executive agency."

Memorandum M-97-16 "Information Technology Architectures" **–** Memorandum M-97-16 established "minimum criteria for an agency's information technology architecture (ITA) required in the Clinger-Cohen Act of 1996."

OMB Circular A-11 – A-11 provides guidance on the preparation, submission, and execution of the President's Budget. It specifically defines reporting requirements for agency EA investment.

OMB Circular A-123 – A-123 provides guidance to Federal managers on improving the accountability and effectiveness of Federal programs and operations by establishing, assessing, correcting, and reporting on internal control. The Circular defines management's responsibilities related to internal control and the process for assessing internal control effectiveness and emphasizes the need for integrated and coordinated internal control assessments that synchronize all internal control-related activities.

OMB Circular A-130 – A-130 provides guidance on the components which comprise an EA (e.g., baseline architecture, target architecture).

3.2 TARGET ARCHITECTURE GOALS

The Agency's Target EA design process develops a comprehensive, high fidelity enterprise architecture design that provides a clear and compelling vision for the evolution of USAID's operating and information services environment, and ensures that this vision remains consistently aligned with the Agency's most important strategic imperatives.

The Target EA's goals include:

- Presenting a clear and compelling vision for the desired future state of the Agency's business operations and IT environment
- Demonstrating the ability to support the Agency's strategic goals
- Providing a sufficiently detailed description to guide Agency change management and IT investment initiatives

3.3 TARGET ARCHITECTURE PRINCIPLES

A few key principles have guided the design of this Target Architecture:

- Design for Adaptability: the design uses the idea of "components" and "services" that can be rearranged to support new systems
- Design for Security: each layer, and particular components within layers, have security features that combine to provide "security in depth" while minimizing their impact on overall system performance and usability
- Design for Simplicity: each element of the design is as simple as possible, no complexity is added that does not perform a required function
- Design for Re-Use: the same "component" and "service" design principle mentioned above also supports re-use of these elements by external users and consumers
- Design for Integration: each layer of the architecture is designed to make connections, both in the layer itself, and between layers, easier to create and use

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

3.4 TARGET ARCHITECTURE SCOPE

The EA Target Architecture spans all levels of the Agency, including the formation of its overall strategy, its organization and operation, and all aspects of its information services environment. USAID is a globally distributed organization, with a presence in 83 developing countries. The planning, operations, and management of these distributed locations have widely varying degrees of sophistication and physical and information services infrastructure. The Target EA acknowledges and addresses these constraints and identifies capabilities that accommodate them. The Target Architecture, once initially defined, is revisited each time the Agency strategic plan is updated to ensure that it continues to accurately reflect the operational and information capabilities needed for the Agency to achieve its strategic goals. This collaborative process of updating the Target Architecture is a critical element of USAID's IT modernization and provides a bridge between USAID's strategic vision for business and IT modernization and tactical IT operations.

3.5 TARGET ARCHITECTURE STAKEHOLDERS

The stakeholders for the Target Architecture include the Administration and its key components responsible for security and international relations (the National Security Council, Department of State, Department of Defense, Millennium Challenge Corporation) and Congress. These bodies have a significant impact on Agency strategy, priorities, and funding. Agency senior business leadership and IT management will both have primary responsibility for implementation the Target EA. In addition, the Agency EA Team will utilize the methodology to provide guidance and governance to development teams as they build out the required components. Lastly, Project Managers responsible for Capital Planning and Investment Control (CPIC) investments may use the results of this methodology as a reference for understanding the necessary points of integration among EA and CPIC procedures.

Table 1: Target Architecture Stakeholders, Roles, and Uses provides further details for the intended audiences and uses of this document:

STAKEHOLDERS	ROLE AND USE OF TARGET ENTERPRISE ARCHITECTURE
ADMINISTRATION, NSC, DOS, DOD, MCC, CONGRESS	**Role:** Participate in Strategy & Performance layer **Use:** Provide guidance and input to Agency strategy and review performance
AGENCY SENIOR BUSINESS AND IT LEADERSHIP	**Role:** Review and approve Target EA; approve investments to achieve Target Enterprise Architecture **Use:** Clarify and provide context to change management initiatives that the business executes and the IT investments that the OCIO manages
BUSINESS AND IT MANAGEMENT	**Role:** Inform and review Target Enterprise Architecture **Use:** Inform and guide the implementation of change management initiatives and IT system development
USAID STAFF AND PARTNERS	**Role:** Inform Target Enterprise Architecture design and use it to fulfill the Agency's mission **Use:** Use Target Enterprise Architecture's capabilities to perform their operational functions
GOVERNANCE, CAPITAL PLANNING, AND EA TEAM	**Role:** Receive and manage the Target Enterprise Architecture **Use:** Ensure that the Target Enterprise Architecture is followed in planning, selecting, developing, and deploying change management and IT systems initiatives

TABLE 1: TARGET ARCHITECTURE STAKEHOLDERS, ROLES, AND USES

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

4 USAID TARGET ENTERPRISE ARCHITECTURE DESIGN METHODOLOGY

The USAID EA target architecture development methodology is a four step process that enables the Agency's Enterprise Architecture, including its business processes and the delivery of information technology services, to be continuously aligned with the Agency's most critical strategic goals. This continuous alignment is the result of two features of the methodology: 1) it directly incorporates an assessment of the Agency's performance against its strategic goals, and, 2) it is repeated on an annual basis, informing change management initiatives across the Agency and throughout the Agency's IT environment.

Figure 4 illustrates the key steps in this methodology, which are:

1. **Strategic Performance Assessment:** Identify the Agency's key strategic goals and assess its performance against each; the result is an identification of the Agency's strategic challenges
2. **EA Strategic Business Driver Analysis:** identify the key business problems, at each of the five layers of the enterprise, that currently inhibit the Agency's strategic performance; the result is a set of problem statements that comprehensively describe the strategic challenges facing the agency
3. **EA Capability Mapping:** for each business problem, at each layer of the enterprise, define the capability(ies) needed to overcome the challenge; the result is a set of capabilities that, if successfully demonstrated by the Agency, would improve the Agency's strategic performance
4. **Target EA Design:** at each layer of the enterprise, design the new elements needed to provide the missing capabilities; the result is the Target Enterprise Architecture

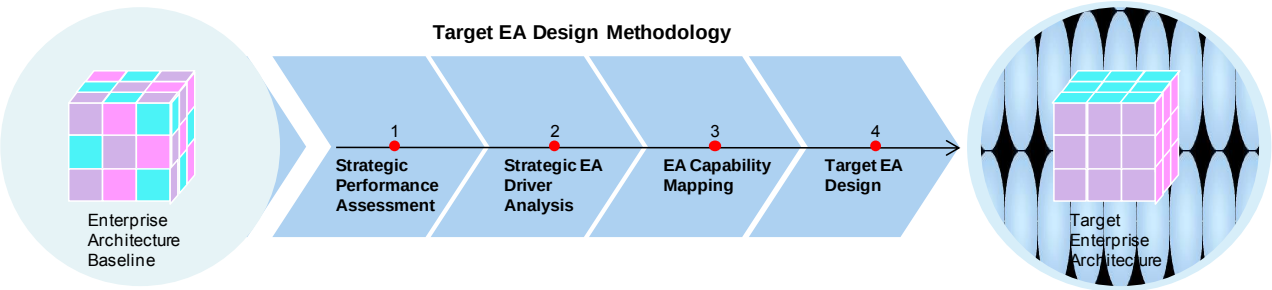


FIGURE 4: TARGET EA DESIGN METHODOLOGY

The individual steps of the methodology are explained in detail in the following sections 4.1 through 4.4.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

4.1 STRATEGIC PERFORMANCE ASSESSMENT

The USAID approach to Target EA design begins with the Agency's Strategic Plan, and assesses the performance of the Agency against its strategic goals. To the extent that quantifiable metrics have been identified for the strategic goals, sufficient data are gathered to numerically assess performance. In the case of qualitative strategic goals, sufficient data are collected, through interviews and working sessions with informed staff, to develop performance levels indicators (e.g., a 1 - "low performance" to a 5 - "high performance" scale).

In the event that the Strategic Plan is revised to add new goals which have not been explicitly pursued by the Agency over the past year (which may be expected as the result of the QDDR, PSD7 and other inter-Agency initiatives), this performance assessment is critical. All data and analysis used by the Agency's strategic planning process which derived the new strategic goals should be utilized in determining its current performance. Additional data are collected as necessary from appropriate organizations throughout the Agency, to determine the current performance level against these new goals.

The next step is to identify the current expectations of USAID senior management for the strategic direction of the Agency over the timeframe of interest (generally three to five years). This includes expectations that have changed since the previous cycle - for example, any change in the Administration's direction, changes in legislation or regulatory guidance that affect Agency operations, changes in global economic conditions, or changes in the geopolitical sphere that affect Agency strategy. If possible, these expectations are expressed in terms of performance metrics for the current strategic goals.

The Agency's strategic goals are then prioritized based on strategic expectations and the current performance of the Agency. The gaps that are discovered in the process of prioritizing the strategic goals are used in the next steps to identify needed changes to the Agency's enterprise architecture.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

4.2 STRATEGIC ENTERPRISE ARCHITECTURE DRIVER ANALYSIS

With the Agency's strategic goals prioritized, the enterprise architecture layers are used to identify specific performance failures that, if addressed, will ensure the Agency's ability to improve its performance against its strategic goals.

ENTERPRISE ARCHITECTURE LAYER	COMPONENTS OF THE LAYER
STRATEGY & PERFORMANCE	External factors and management decisions that combine to determine the Agency's strategic direction, goals, and measurement
ORGANIZATION & BUSINESS	The organizations, functions, and processes that perform all operations of the Agency
SERVICE & APPLICATION	Information Technology services and applications used by any part of the Agency
INFORMATION & DATA	All aspects of information and data used or generated by the Agency, including structured and unstructured data, repositories, definitions, and rules for generating reports
INFRASTRUCTURE & TECHNOLOGY	Physical devices and operating systems that provide the information and services to the Agency

TABLE 2: ENTERPRISE ARCHITECTURE STACK

An important aspect of this step is to characterize the performance issues at each layer of the enterprise architecture, in business terms, as a problem statement. Since the enterprise architecture decomposition links the Agency's strategic needs to the identification of new enterprise capabilities, these problem statements allow the Agency's management to express their needs, and communicate the direction and goals of change management initiatives to their operational units.

4.3 ENTERPRISE ARCHITECTURE CAPABILITY MAPPING

Beginning with the problem statements from the Strategic Driver Analysis, the next step identifies the new capabilities needed at each layer of the Enterprise Architecture to address these challenges and, thereby, improve performance against the Agency goals. The Agency EA uses the following definition of a "capability":

"the level of knowledge, skills, and process abilities available within each workforce competency of the organization to build its products or deliver its services" [2]

So a capability can be something as simple as Mcdonald's delivering hot, crispy french fries every time they're ordered, or as complex as Federal Express' supply chain delivering packages on time, anywhere around the world.

Similarly, the Technology Architecture demonstrates both "capabilities" and "services", where "capabilities" are limited to technologies that support the "process abilities" in the definition above, and "services" are defined as:

[2] Philips, M. & Konrad, M. (2009). *CMMI Update*. Software Engineering Institute, Carnegie Mellon University.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

"An IT Service is based on the use of Information Technology and supports the Customer's Business Processes. An IT Service is made up from a combination of people, Processes and Technology"[3]

Examples of an IT service include "single sign on" (the service for many USAID desktop applications, which allows users to enter their username and password once, and then use any of the applications they have been granted rights to), and the automatic synchronization between BlackBerry mobile phones and users' Outlook contacts, notes, addresses, and email.

This approach identifies new and unique capabilities for each of the business issues identified. At the "Strategy & Performance" layer, these new capabilities will take the form of improved outreach and communication mechanisms with stakeholders, and improvements in the Agency's formulation of strategy. The "Organization & Business" layer capabilities will be improvements in organizational structure and processes, and cultural changes required for the broad adoption of new behaviors.

Because of the broad applicability of many IT services, capabilities at the "Application & Services" layer are new or improved technology services, and are often repeated for different business issues. This repetition is a helpful indicator of how much "re-use" the Agency can expect for the given service. "Data & Information" capabilities are represented by new or improved data components and standards (with services that enable new interactions being provided at the "Application & Services" layer.) New capabilities identified at the "Technology & Infrastructure" layer take the form of new standards, devices, and performance levels.

The result of this step is a collection of identified capabilities, aligned to the strategic goals they support, which, if deployed, would effectively enable the Agency to meet its strategic goals over the strategic planning timeframe. The details of timing and sequencing, which will determine when and in what order the components of the Agency EA are transitioned to the Target Architecture, are the subject of the Enterprise Transition Plan, which is developed and refined during the development of Volume 4 of the Agency EA Program Management Documentation.

4.4 TARGET ENTERPRISE ARCHITECTURE DESIGN

The Target Enterprise Architecture is designed by identifying the collection of business capabilities and information technology services that, when deployed together, will enable the Agency to more effectively pursue its strategic goals. By using the EA "stack" (see Table 2: Enterprise Architecture Stack), the analysis identifies specific functional capabilities at the Strategy & Performance and Organization & Business layers that address the current organizational and operational challenges. The Target EA is then designed to include new frameworks, organizations, processes, and cultural changes that are necessary to provide these new capabilities and enable the Agency to execute its strategy. These two levels are combined to form the "Target Business Architecture."

The analysis further identifies technical capabilities that are needed to support the new processes, including new "Applications & Services," "Information & Data," and "Technology & Infrastructure" elements. These three layers are grouped in the "Target Technology Architecture," and are developed by combining best practices in system design with appropriate industry-standard technologies. The Target Technology Architecture is defined at the level of technologies and standards, and does not specify vendors or solution design.

[3] Kand k (2007). *ITIL V3 Glossary v3.1.24*. Office of Government Commerce.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

5 STRATEGIC PERFORMANCE ASSESSMENT

5.1 USAID STRATEGIC PERFORMANCE ASSESSMENT: PRIORITIZING USAID'S STRATEGIC GOALS

USAID's current Strategic environment is in a state of uncertainty, as multiple cross-Agency initiatives are under way to redefine the role of international development in pursuing the Administration's agenda[4], including the Quadrennial Diplomacy and Development Review (QDDR), Presidential Study Directive 7 (PSD 7), and OMB's High Priority Performance Goal (HPPG) guidance

5.1.1 QUADRENNIAL DIPLOMACY AND DEVELOPMENT REVIEW (QDDR),

The US Secretary of State announced the QDDR on July 10, 2009 to examine the "contemporary and anticipated challenges and opportunities, consider the impact we want to have, assess existing capabilities to respond, and identify needed changes with respect to institutional capacities, how we are organized and do business, and available resources and authorities."[5] The broad purpose of the QDDR is to provide strategic guidance for strengthening institutional capabilities and effectuating corresponding organizational changes required for U.S. civilian foreign affairs agencies to meet 21st century challenges.

The QDDR is led by the Deputy Secretary of State for Management and Resources and is co-chaired by the USAID Administrator (or Acting Administrator) and State's Director of Policy Planning. The QDDR leadership team includes senior representation from State, USAID and MCC, and is engaged with Congress, Cabinet agencies, and seeking input from non-government experts. Findings and recommendations of the QDDR will contribute to an interagency process aimed at developing a whole-of-government approach. The final report will be presented to the President and Congress and be made available to the public.

The QDDR will provide the short-, medium-, and long-term blueprint for US diplomatic and development efforts. The goal is to use this process to guide the government and in effect, USAID, to an agile, responsive, and effective institution of diplomacy and development, including how to transition from approaches no longer commensurate with current challenges. It will offer guidance on how to develop policies; how to allocate resources; how to deploy staff; and how to exercise authorities.

5.1.2 PRESIDENTIAL STUDY DIRECTIVE ON GLOBAL ENGAGEMENT ("PSD-7")

President Obama issued the Presidential Study Directive on Global Engagement ("PSD-7") on August 13, 2009, which is a "whole-of-government" review of U.S. global development policy. It establishes an Inter-Agency Development Policy Study Committee (IDPSC) to conduct an interagency review of development policy over a 120 day period. White House leadership of the exercise is important given the convening power necessary to secure high-level participation by the more than two dozen government entities currently responsible for portions of U.S. development policy.

The IDPSC will operate under the leadership of the National Security Advisor and the Assistant to the President for Economic Policy. At present, 15 agencies are identified as members, along with a number of entities within the Executive Office of the President and the Office of the Vice President.

[4] See, "USAID EA Baseline, EA Program Volume 1", April 2010

[5] http://www.usaid.gov/qddr.html

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

5.1.3 HIGH PRIORITY PERFORMANCE GOAL (HPPG)

OMB Memorandum M-09-20 was released on June 11, 2009 and provides guidance on the FY11 Budget and Performance Plan process. A specific request is made in that document for each federal Agency to "identify a limited a [sic] number of high-priority goals and begin to define the strategies and means to achieve them." The goals provided to OMB following this guidance will represent a third expression of Agency strategic goals.

5.2 USAID'S ENTERPRISE ARCHITECTURE STRATEGIC GOALS AND OBJECTIVES

Upon review of these various influences on Agency strategy, and acknowledging that the current inter-Agency initiatives will have a significant effect on both the formulation and expression of Agency strategy, this Target Architecture design uses a set of strategic drivers identified during the course of data gathering and analysis of Target Architecture requirements. Four goals consistently recurred as the EA team gathered data, interviewed Agency and OCIO managers, and reviewed strategic plans, investment plans, and system documentation. Regardless of the specific strategic goals being pursued by the Agency, the following four needs repeatedly arose:

EA STRATEGIC GOAL	DESCRIPTION
INFORMATION ON DEMAND	Provide worldwide access to timely, standardized, and relevant data, information, and systems
INNOVATION AND PROCESS EFFICIENCY	Improve information and knowledge services to deliver quality and efficiency by employing innovative methodologies, processes, and tools
WORKFORCE DEVELOPMENT	Enable and equip a workforce that is highly motivated, customer service oriented, diverse, and focused on common strategic and tactical goals
EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY	Provide world class information management services to end users, with greater customer satisfaction at lower costs

FIGURE 5: USAID EA STRATEGIC GOALS

The EA Program will review this analysis, and potentially revise the Target Architecture, when the findings and recommendations of the inter-Agency initiatives are published and adopted by USAID. If, as expected, a new strategic framework is developed and new strategic goals defined, the EA Program will repeat this Target Architecture design methodology, using the new framework and goals, and update this volume of the EA Program Documentation. As the Target EA design process is planned to be repeated on an annual basis, the need to revisit this analysis in six to nine months is not a drastic exception to the planned process.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

6 STRATEGIC ENTERPRISE ARCHITECTURE DRIVER ANALYSIS

With the Agency's EA strategic goals established, the enterprise architecture "stack" (defined as the combined layers of the enterprise architecture seen in Table 2: Enterprise Architecture Stack) is used to identify specific performance failures that, if addressed, will improve the Agency's performance against its strategic goals.

By locating these performance failures within the different layers of the EA stack, they are "decomposed", or described in more detail, with information relevant to that layer of the enterprise architecture. Since this decomposition illustrates the connection between the Agency's strategic needs and the enterprise architecture layers, these problem statements allow the Agency's management to express their needs, validate the change management initiatives and investments needed to address them, and communicate the overall EA transformation strategy and its value to their operational units.

The result of this step is a more detailed analysis of the operational causes of performance failures (by having defined problem statements for each layer of the enterprise architecture stack). Figure 6: USAID EA Strategic Goals – Problem Statements Illustrates the results of the analysis performed in this step:

EA STRATEGIC GOAL	PROBLEM STATEMENT
INFORMATION ON DEMAND	The lack of a single, coherent strategic framework and language inhibits developing a shared understanding and expectations of USAID's strategy and plans with stakeholders and partners, also inhibits information sharing and analysis
INNOVATION AND PROCESS EFFICIENCY	The lack of process collaboration and automation impairs accountability and staff mobility, inhibits innovation, process improvement, performance management, and reporting
WORKFORCE DEVELOPMENT	Current workforce processes and systems do not sufficiently address mission needs, ensure staff development and appropriate utilization, or support staff - level performance management
EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY	While IT services are generally available and responsive, systems are not easily extensible or scalable; performance management and user satisfaction metrics are not available to be integrated into IT management decision-making

FIGURE 6: USAID EA STRATEGIC GOALS – PROBLEM STATEMENTS

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

6.1 STRATEGIC ENTERPRISE ARCHITECTURE DRIVERS – BUSINESS ARCHITECTURE PROBLEM STATEMENTS

6.1.1 INFORMATION ON DEMAND

The lack of a single, coherent strategic framework and common language among stakeholders of the Agency's mission inhibits the stakeholders' ability to develop a shared understanding and set of expectations for the Agency's strategy, operations, performance, and impact. This lack of a framework also inhibits the sharing of information and analysis among stakeholders.

6.1.2 INNOVATION AND PROCESS EFFICIENCY

The lack of process standardization and automation impairs accountability and staff mobility, inhibits innovation, process improvement, performance management, and reporting.

6.1.3 WORKFORCE DEVELOPMENT

Current workforce processes and systems do not sufficiently address mission needs, ensure staff development and appropriate utilization, or support staff-level performance management.

6.1.4 EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY

While IT services are generally available and responsive, systems are not easily extensible or scalable. Performance management and user satisfaction metrics are not available to be integrated into IT management decision-making.

6.2 STRATEGIC ENTERPRISE ARCHITECTURE DRIVERS – OBJECTIVES

Figure 7: EA Strategic Goal Objectives describes the set of objectives determined for each EA Strategic Goal. These objectives are the "pieces of the puzzle" needed to achieve their respective goals. Meeting these objectives will mean their goals have been achieved. Numeric targets will be developed for these objectives, and change management initiatives and IT systems investments will be aligned to them. By measuring each initiative's fulfillment of these objectives, the Agency's will measure its progress toward implementing its Target Enterprise Architecture.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

EA STRATEGIC GOAL	OBJECTIVES	DESCRIPTION
INFORMATION ON DEMAND	Characterization	Data are described in sufficient detail to allow their accurate use in analysis or reporting
	Context	Data have descriptive information indicating the process, place, person, etc. that collected the data
	Standardization	Capturing data in standard terms, units, timeframes, and storing in standard data structures
	Discovery	Mechanism to specify, search for, locate, and retrieve data of interest
	Delivery	Services to provide data to end users, applications, and information services
	Analysis/Creation	Tools and applications to allow users to create data of interest, including analysis and collection
INNOVATION AND PROCESS EFFICIENCY	Measurement	Performance measurement is enabled by integrating metrics into automated process models
	Automation	Business process data, decisions, and work products are automatically captured by applications
	Collaboration	Staff actively collaborate on business processes, performance, and execution
	Management	Processes models are developed, maintained, refined, and reused when successful
	Simulation	New process designs are evaluated for performance, workload and cost before implementation
	Training	Process training is enhanced with process models, performance measures, and simulation tools
WORKFORCE DEVELOPMENT	Staff Alignment	Competencies, workforce level, and succession planning ensure staff alignment to strategic goals
	Staff Mobility	Staff readiness is improved by rationalizing workforce recruitment, incentives, and strategy
	Diverse Workplace	A diverse workforce is enabled by leadership commitment, recruiting, development, and tools
	High Performance	Support and reward workforce performance with training, development, initiatives, and systems
	HR Services	Align staffing to mission needs by improving HR processes and technology
EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY	Availability	IT services are available as appropriate by class of service
	Responsiveness	Applications and services respond as users expect, and within appropriate timeframes
	Extensibility	Applications and services can easily be modified to deliver new functionality
	Scalability	The number of users of applications and services can increase without degradation of service
	Performance Mgt	Availability, responsiveness, and security of applications and services are monitored and reported
	Stakeholder Engmt	Stakeholders are engaged to ensure their goals and needs inform IT service delivery

FIGURE 7: EA STRATEGIC GOAL OBJECTIVES

6.2.1 ENTERPRISE ARCHITECTURE STRATEGIC GOAL #1: INFORMATION ON DEMAND

"Information on Demand" is the goal that all USAID staff, regardless of location around the world, can locate and collect the information they need to operate effectively. This goal also indirectly enables the Agency to become more transparent to stakeholders and partners. Achieving this goal requires meeting the following objectives for information generated and collected by the Agency:

- **Characterization:** Raw data is rarely useful for anyone other than the person who collected it – the data must be described in order to be used by others, and this descriptive information must be stored along with the raw data in a way to allow the users to identify it, and to allow automated systems (such as reporting systems, applications, or websites) to accurately represent, integrate, and modify it. This characterizing information is generally referred to as "metadata" - additional information that is stored along with the data. For instance, the metadata of an email includes all of the information that describes the email (e.g., author, addressees, when it was sent) but not the content of the email itself. In the case of email, the MS Exchange application automatically generates and manages this metadata. Information characterization will require that this type of metadata management, and its use, be defined and managed for selected enterprise data.
- **Context:** Because the accurate representation, understanding, and analysis of USAID data depends greatly on the specific way in which the data is generated, a particularly important class of characterizing data is the information that describes the operational context within which data are collected or generated. Information such as: what process was being followed, by whom, in what organization, in what physical location, and using what method(s), can all be critical to the organization's ability to properly use its data. The standard metadata

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

characterization method described in the above bullet can be used to capture context information.

- **Standardization:** The Agency collects and generates data throughout its operations, across all regions, programs, and functions. For this data to be useful, it must be standardized to the extent feasible and convertible otherwise, so that all data from across the Agency can be meaningfully combined, compared, and analyzed. From the users' perspective, this will require a common "dictionary" be used. Within information systems, units and representation methods must be standardized.
- **Discovery:** Whether the user is using a specific application and is trying to find information developed and managed by that application, or the user is searching for specific information, regardless of the application that generated it, the information needs to be stored in a manner that allows search tools (such as a website's "search" function, or a Google appliance) to accurately and efficiently locate it and inform the user.
- **Delivery:** For both systems and users, information is useful only to the extent that it is delivered. Information security requires that only users gain access to information only as authorized, and that this access be appropriately secured, from source (database, entry device, mobile device) to endpoint (delivery platform, application, website, or externally facing web service).
- **Analysis / Creation:** A rich set of data analysis tools should be broadly available across the Agency to allow users more interaction with the data available. These tools should be flexible enough to support any analytic needs of the Agency, whether domain – specific (e.g., supporting analysis of health-related topics), cross-domain, or application – specific (e.g., supporting analysis of GLAAS data). With the data standardized, characterized, discoverable, and delivered, these tools would greatly improve the Agency's ability to analyze and communicate its impact and operations.

6.2.2 ENTERPRISE ARCHITECTURE STRATEGIC GOAL #2: INNOVATION AND PROCESS EFFICIENCY

"Process Innovation and Efficiency" is the goal that the Agency's business processes will be measured, managed, and improved on, and that innovation be promoted and supported through tools, training, and incentives. In order to realize this goal, the Agency should meet the following process innovation objectives:

- **Measurement:** In order to identify those areas most in need of improvement, and to compare the cost of process improvement initiatives with their anticipated benefits, the Agency must have the ability to measure its process performance. Information services such as business process automation and management can be designed and deployed to automatically capture much of the information needed to measure process performance. Because these systems are executing the business process by electronically distributing data, forms, and process information, they can automatically record performance data, such as how long a given process step takes, how many staff members were involved, and how many times the process was executed in a given timeframe. Appropriately constructed performance measures can then be collected, aggregated, and reported. This objective utilizes many of the elements of the "Information on Demand" goal above, deriving specific value to the Agency in the form of performance improvement and identifying opportunities for innovation.
- **Automation:** Process automation tools provide staff with the information, forms, and data they need to execute their business processes. By enacting a documented business process, these

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

systems act both as a control (ensuring that the same process is executed each time) and as a supporting tool (by providing each user the information they need at each step in the process).

- **Collaboration:** Whether at the detailed level of a specific technique, or at the more abstract level of a mission support process, the Agency's ability to identify success is critical. Innovation happens through active and continuous collaboration among process participants. Using online collaboration tools, new approaches and ideas can be tried out by anyone in the Agency with the interest and motivation to do so (subject to policy guidance). This approach will also enable process standardization across the Agency, selected and implemented by the field, rather than being "imposed" by management. Standardization allows more effective resource management (including financial, personnel, and information), because the process requirements are more generally known and predictable. There are certainly limits to the degree of standardization achievable across the Agency. However, the benefits mentioned here will be realized most effectively as process innovations become standardized, rather than continuing to rely on ad hoc or informal processes.
- **Management:** In addition to the policy definitions provided by the Automated Directives System and documentation, the specific processes that the Agency uses to enact those policies should be identified and documented. This documentation should be updated and kept current, so that it acts as a continuous source of information allowing the Agency to measure its performance, improve its operations, and plan and deploy both new business processes and the information systems to support them. The technical solutions that enable this management practice are generally described as "Business Process Management", and they often include the ability to capture business process designs, maintain and communicate these designs, integrate them into training materials, and provide them to application development teams as part of the application requirements definition process.
- **Simulation:** With business process models captured in the ability to simulate process designs, and forecast their performance, cost, and interaction, can dramatically improve an organization's ability to innovate and deploy new processes.
- **Training:** An additional benefit of managing and measuring the Agency's business processes is that new hires and transferred staff can be trained on new processes with accurate, detailed process documentation, including the process flows and their current performance levels. An additional benefit of process standardization is that new staff, or staff new to a process, will have a much lower "learning curve", as the processes they have been using to date will be more similar to the process at their new assignment.

6.2.3 ENTERPRISE ARCHITECTURE STRATEGIC GOAL #3: WORKFORCE DEVELOPMENT

The USAID Human Capital Strategic Plan FY2009- FY2013 identifies the following five strategic Human Resource objectives, each of which will be implemented through a combination of process improvement, information systems, and change management initiatives[6]:

- **Staff Alignment:** USAID will more effectively use competency management, workforce planning, and succession strategies to align staff with Agency priorities. Assigning, retaining, and developing talent to match USAID's changing needs requires workforce planning that is both focused and flexible.

[6] The following definitions are taken from, "USAID Human Capital Strategic Plan, FY2009-2013"

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

- **Staff Mobility:** Highly qualified FS and CS personnel must be hired, retained, trained, and easily deployed to provide support quickly in areas of highest need. USAID will create a 21st Century workforce by ensuring employees are qualified not just for the current position occupied, but for the future job roles.
- **Diverse Workplace:** USAID will sustain a diverse workforce by monitoring and continually strengthening equal employment opportunity and diversity-enhancing policies and programs, while being in full compliance with EEO statutes, regulations, policies, and other written instructions.
- **Improved Performance:** USAID will use training and development, career development initiatives, and performance management to ensure high performance while fostering a culture of continuous learning.
- **Human Resource Services:** Providing first rate OHR services and tools entails strengthening and sustaining OHR capacity, as well as increasing use of technology and automated systems in order to ensure efficiency and alignment with USAID's overall mission requirements.

The same practices and tools described above for the "Innovation and Process Efficiency" goal would be used to support the process improvements (for staff alignment, mobility, and performance) needed to execute the HCSP. Processes would be modeled, measured, and automated with the same enterprise standard tools, innovations would be identified through the same collaboration tools, and simulation and training would benefit from the use of enterprise standard technologies and methods.

6.2.4 ENTERPRISE ARCHITECTURE STRATEGIC GOAL #4: EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY

"Effective and Efficient IT Service Delivery" encompasses all of the systems, processes, and management required to deliver information services to Agency staff, including the following objectives:

- **Affordability:** While information technology can help the Agency innovate, its costs can be significant. Effective IT investment management does not mean reducing investment in IT, but does mean making sure that the Agency receives the benefits (both quantified and qualitative) it expects from its IT investments.
- **Responsiveness:** Responsiveness includes both the speed at which the system responds to user requests, as well as the system's overall "ease of use". Compared to information system design ten years ago, the current generation of users has grown up with applications designed to be used over the internet or on cell phones, and expects their "user experience" to be no more complex than those devices allow. Both speed and an intuitive, "no training required" interface, are pre-requisites for modern information systems.
- **Extensibility:** In order to continue to meet the needs of the Agency's mission and evolving operational needs, information systems must continuously evolve themselves, broadening their ability to capture, process, and present new types of information to users. In order to control costs, decrease system deployment times, and decrease training requirements, existing systems must be easily extensible to these new uses.
- **Scalability:** Even as current information systems incorporate new functionality, they must scale up to meet the needs of a growing user base, without significant new costs in either application modification or supporting infrastructure.
- **Performance Management:** The OCIO's performance across many dimensions (including the dimensions being described in this section) will determine its value as a strategic partner to the

Agency. Performance Management also allows the Agency's ability to make sure that it is receiving the benefit it expects from its IT investments. In the absence of clear, objective performance metrics, the OCIO organization will not be able to quantitatively improve its operations, or effectively manage its staff and infrastructure.

- **Stakeholder Engagement:** Stakeholder satisfaction is a key to the success of any IT organization. To a certain extent, the challenge is communications – stakeholder goals and expectations need to be understood by the IT organization, and stakeholders need to understand the opportunities and constraints IT presents. Stakeholder engagement takes many forms - user groups, training, involvement in beta and prototype systems, online resources, and the help desk. USAID will put in place a consistent, repeated process of measuring stakeholder satisfaction and incorporating feedback into the management decision making in the OCIO.

Similarly to the "Workforce Development" goal, this goal would apply the "Innovation and Process Efficiency" tools, methods, and practices, in this case, to the information services organization.

6.3 STRATEGIC ENTERPRISE ARCHITECTURE DRIVERS – TECHNOLOGY ARCHITECTURE GAPS

At the Technology level (which includes Applications & Services, Information & Data, and Technology & Infrastructure), the architectural drivers are the same objectives as those described for the business level, but take the form of information services. Rather than being behaviors of people, they are behaviors of systems. The drivers are missing or incomplete services – services that have not yet been developed, or that have been deployed on an application-specific basis. In either case, the current architecture has "gaps" in the services it provides the enterprise. These gaps indicate missing services needed to support the business requirements, as identified in Section 6.1 above.

Figure 8: USAID EA Strategic Goals - Technology Drivers is a high-level description of the current technology gaps at USAID. In reading the figure, the term "App Specific" indicates that, for the service listed on the left (for instance, "Characterization", the first service under the "Information on Demand" goal) the service at that layer of the current EA does exist, but has been developed and deployed to support only one specific application at a time, and isn't able to be shared by other systems. Similarly, where "None" appears, it means that service has not yet been deployed at USAID. The third way gaps are described in Figure 9 is "Varies", which means that the service is used by some, but not all, systems. Where Figure 8 does not include a label, that means there isn't an obvious, unique service needed at that layer in the architecture. For instance, there is no unique "Infrastructure & Technology" requirement to support "Characterization".

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

EA STRATEGIC GOAL	OBJECTIVES	CAPABILITY		
		Applications & Services	Information & Data	Infrastructure & Technology
INFORMATION ON DEMAND	Characterization	App specific	App specific	
	Context	App specific		
	Standardization	None	None	
	Discovery	App specific	None	
	Delivery	App specific		App specific
	Analysis/Creation	App specific	None	App specific
INNOVATION AND PROCESS EFFICIENCY	Measurement	None	None	
	Automation	None		
	Collaboration	Varies	None	
	Management	None		
	Simulation	None	None	
	Training	App specific		
EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY	Availability	Varies	Varies	Varies
	Responsiveness	Varies	Varies	Varies
	Extensibility	App specific	App specific	App specific
	Scalability	App specific	App specific	App specific
	Performance Mgt	Varies	Varies	Varies
	Stakeholder Engmt	Varies	Varies	Varies
WORKFORCE DEVELOPMENT	Drivers are reflected in Organization & Business Target Model			

FIGURE 8: USAID EA STRATEGIC GOALS - TECHNOLOGY DRIVERS

6.3.1 INFORMATION ON DEMAND

The core focus of Information on Demand is to provide broad access to information that supports decision making across the Agency. Consumers of enterprise information (internal and external) are assured of global access to timely, normalized, and relevant data. The data is contained, controlled, and presented in information and knowledge systems through an integrated and modern infrastructure that facilitates access to all consumer end-points.

The Agency currently has numerous "cuff", or local, function-specific systems that are widely distributed among Missions. In addition to these cuff systems, Missions and Bureaus use a core set of centralized but non-integrated enterprise systems The Agency currently lacks an Enterprise-wide data model and data management strategy. This leads to difficulty using Agency data and presents a challenge to the OCIO to effectively address business needs and management of information and knowledge across USAID.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

6.3.2 INNOVATION AND PROCESS EFFICIENCY

Innovation and processes efficiencies are discovered and pursued throughout USAID, but without the benefit of an overall coordinating or reporting function. Without such a function, the Agency is almost certainly not achieving the full benefit of its innovation efforts, and is unable to report current benefits to its stakeholders. This is due, in part, to a lack of enterprise-wide standards and services that measure process performance, encourage collaboration, and provide re-use of successful process models. In addition, the lack of governance, standardization, and automation impairs accountability and staff mobility, inhibits innovation, process improvement, performance management, and reporting.

These services will also support USAID's compliance with recent directives released by the Office of Management and Budget (OMB) that require agencies to develop services that allow for the reporting of innovation and process efficiencies.

6.3.3 WORKFORCE DEVELOPMENT

The drivers that guide the Technology Architecture to support workforce development are described above in Section 6.1.3. Unique technology services or components required for the Target Architecture to address those business drivers may be identified as a result of executing the Agency's Human Capital Strategic Plan (for example, the need for a new software application or information service targeted at human resources needs may be discovered), and will be added to the Target Technology Architecture at that time.

6.3.4 EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY

Effective and Efficient IT Service Delivery means providing the highest quality information management services to OCIO customers, within resource and policy constraints.

While USAID IT services are generally available and responsive, systems are not easily extensible or scalable. Performance management and stakeholder input are not consistently integrated into enterprise IT management and investment decision-making, which reduces the Agency's ability to achieve the full benefit of its IT investments. Additionally, data and technology standards have been only partially implemented, which has hindered communication, aggregation, and interoperability across headquarters and field systems.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

7 ENTERPRISE ARCHITECTURE CAPABILITY MAPPING

Beginning with the problem statements and objectives identified in the previous step, the next step is to describe how the objectives are to be combined to achieve the capabilities needed at each layer of the Enterprise Architecture to improve performance against the Agency goals. Because of the broad applicability of many IT services, they are often repeated for different business goals. This repetition is a helpful indicator of how much "re-use" the Agency can expect for the given system or service.

The result of this step is a collection of identified capabilities, aligned to the EA Strategic Goals they support, which, if deployed, would be sufficient to ensure the Agency's ability to meet its strategic goals over the strategic planning timeframe. The details of timing and sequencing, which will determine when and in what order the strategic goals will see improvement, are the subject of the Enterprise Segmentation and Transition Roadmap, which is developed and refined during the next phase of the EA Operating Model (see Figure 2: USAID EA Program Management Structure).

7.1 ENTERPRISE ARCHITECTURE CAPABILITY MAPPING – BUSINESS ARCHITECTURE DETAILS

At the level of Business Architecture, "capabilities" refer to the specific combination of objectives supporting the Agency's Strategic EA goals – including how they should use the resources that the Agency has to pursue its mission, including the **strategic framework** senior management uses to identify and prioritize its strategic goals, the **stakeholders** and decision-making **structures** that inform strategic planning, and all operational **policies, processes**, and cultural **behaviors**. USAID's Business Architecture will be aligned to the EA Strategic Goals by adopting a new strategic framework, expanding and improving engagement with stakeholders, adopting a culture of operational accountability, risk acceptance, and innovation, and by pursuing a broad, cross-Agency performance management and process improvement initiative.

Figure 9: USAID Target EA Business Capabilities indicates the capabilities needed to achieve USAID's new culture and operating environment.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

EA Strategic Goal	Objectives	Capability	
		Strategy & Performance	Organization & Business
Information on Demand	Characterization Context Standardization Discovery Delivery Analysis/Creation	A coherent strategic framework for Whole of Government programs is defined and implemented that sufficiently addresses country and sector – level issues; strategic goals are derived that adequately address USAID's mission	All organizations of USAID have a well-defined role in the strategic planning and engagement processes; management endorses and rewards the development of a common framework for generating, managing, and using Agency data and information
Innovation and Process Efficiency	Measurement Automation Collaboration Management Simulation Training	The Agency initiates and manages a comprehensive process improvement and automation initiative, focused on innovation and process management; change management efforts reward performance, collaboration, and risk taking	Each operating unit establishes a business process performance review, continuously identifying opportunities for improvement and collaboration with other USAID and external organizations
Workforce Development	Staff Alignment Staff Mobility Diverse Workplace High Performance HR Services	HR performance metrics and processes are aligned to USAID strategy and mission – specific plans and goals	HR processes are continuously reviewed to identify improvement and integration opportunities; performance and employee development management are integrated
Effective and Efficient IT Service Delivery	Availability Responsiveness Extensibility Scalability Performance Mgt Stakeholder Engmt	The IT Strategic Plan incorporates the EA Target Architecture and Transition Plan, demonstrating the roadmap to improved delivery of IT services; stakeholder goals and needs are integrated into IT decision making and operations	The IT Operating Plan incorporates the EA Transition Plan, and uses the Target Architecture to inform system design and deployment

FIGURE 9: USAID TARGET EA BUSINESS CAPABILITIES

7.1.1 INFORMATION ON DEMAND – BUSINESS CAPABILITIES

A coherent strategic framework for Whole of Government programs for international development and humanitarian aid will allow the Administration to determine its national security and international assistance goals, and to define the roles that the various agencies and departments will play in their pursuit.

This framework will also allow strategic goals to be derived that adequately address USAID's mission. As the lead US government agency for international development, USAID will be able to bring its unique knowledge of local conditions and sector-specific expertise to bear in support of key regions and issues. This expertise is located throughout the various organizations of USAID, whose role in inter-agency strategic planning and engagement processes will be documented and executed in the business process and performance management framework described below in Section 7.1.2.

Because of the diversity of locations, sectors, developmental progress, and disciplines within which USAID operates, the Agency faces a significant challenge in defining and using terms and data consistently. The Target Business Architecture calls for management at all levels of the Agency to endorse and reward the development of a common framework for generating, qualifying, managing, accessing, and reporting Agency data.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

7.1.2 INNOVATION AND PROCESS EFFICIENCY – BUSINESS CAPABILITIES

Innovation is defined for the purpose of this Target Business Architecture as "creativity applied with benefit". Creativity by itself is not sufficient, it has to be applied, and it has to benefit the Agency (or the Agency's partners). The benefit may be tangible (e.g., reduced cost, reduced time, increased production, or increased quality) or intangible (e.g., reduced managerial oversight, decreased complexity, or improved responsiveness). The Target Business Architecture provides an environment that promotes innovation by encouraging collaboration, process experimentation, and process analysis. By providing an environment in which new ideas can be "tried out" and tested with relative ease and low cost, innovations can be identified, improved on, and used throughout the Agency.

7.1.3 WORKFORCE DEVELOPMENT – BUSINESS CAPABILITIES

Human Resource management is a key focus of the Target Business Architecture. Aligning HR performance measurements and processes to USAID's strategy and mission is the primary purpose of the Agency's Human Capital Strategic Plan (HCSP), and the Target Business Architecture applies the data management, innovation, and process management capabilities described above to fulfilling that strategy. A successful implementation of the HCSP will result in HR processes being continuously reviewed to identify improvement and integration opportunities.

7.1.4 EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY – BUSINESS CAPABILITIES

The Agency relies on access to effective information services for nearly every aspect of its operation. The EA Target Architecture represents the EAS's "vision" of how these services will be developed and supplied. The OCIO strategy (the Information Technology Strategic Plan, ITSP) uses the Target Architecture as the desired "end state" of its investments, organizational changes, and operational improvements. The Target Architecture integrates the Agency's "stakeholder satisfaction" and feedback into OCIO decision making, so that investments and operations are informed by stakeholder goals and needs. The IT Operating Plan is a three year view of investments, projects, and deliverables that have been designed to implement the Target Enterprise Architecture.

7.2 ENTERPRISE ARCHITECTURE CAPABILITY MAPPING – TECHNOLOGY ARCHITECTURE DETAILS

The Target Technology Architecture specifies the capabilities needed to close the "gaps" identified in Section 6.2. The resulting collection of capabilities brings a number of proven, industry standard technologies to support the Agency's strategic performance.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

EA STRATEGIC GOAL	OBJECTIVES	CAPABILITY		
		Applications & Services	Information & Data	Infrastructure & Technology
INFORMATION ON DEMAND	Characterization	Metadata Tagging	Meta data	
	Context	Context Tagging		
	Standardization	Data Standards	Data Dictionary	
	Discovery	Enterprise Search	Enterprise Search	
	Delivery	Data Services		Data Mart
	Analysis/Creation	Analytics & BI	Ontology	Data Warehouse
INNOVATION AND PROCESS EFFICIENCY	Measurement	Process KPIs	Measurement	
	Automation	Workflow Service		
	Collaboration	Social Networking	Standardization	
	Management	Bus Process Mgmt		
	Simulation	Process Simulation	Scenario Date	
	Training	Process Training		
EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY	Availability	Web Delivery	Data Services	Cloud Hosting SLA
	Responsiveness	Bandwidth Mgt	Network	Cloud Hosting SLA
	Extensibility	SOA	Master Data Mgmt	SOA Infrastructure
	Scalability	Cloud Deployment	Cloud Deployment	SOA Infrastructure
	Performance Mgt	App Monitoring	Data Monitoring	Cloud Hosting SLA
	Stakeholder Engmt	Msmt & Reporting	Msmt & Reporting	Msmt & Reporting
WORKFORCE DEVELOPMENT	Capabilities are reflected in Organization & Business Target Model			

FIGURE 10: USAID TARGET EA TECHNOLOGY CAPABILITIES

7.2.1 INFORMATION ON DEMAND – TECHNOLOGY CAPABILITIES

The technology capabilities that enable "Information on Demand" are primarily related to effectively identifying, managing, and providing services to access agency data. These capabilities include:

Applications & Services

- **Metadata tagging and management:** an enterprise service to identify, manage, and apply metadata for core Agency data

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

- **Context tagging:** an enterprise service to identify specific metadata related to the process context in which data are generated, and the application of metadata services to this subset of Agency metadata
- **Data standards:** enterprise standards on how data are defined, represented, stored, accessed, and integrated
- **Enterprise search:** a service that looks across all Agency data stores, according to information security policy, to locate and provide data of interest to users
- **Data services:** enterprise services to represent, integrate, and report on Agency data
- **Business Intelligence and Analytics:** enterprise services that provide advanced analysis of Agency data (including statistical, visual, and simulation) and flexible means to identify, store, access, and present findings of such analysis

Information & Data

- **Metadata:** the identified and managed Agency metadata
- **Data dictionary:** the Agency's standard English language dictionary
- **Standard ontology:** the Agency's standard definition of relationships defined between members of its dictionary

Infrastructure & Technology

- **Data mart:** industry standards and infrastructure supporting the development, management, and use of key sets of operational data and analysis that are used for Agency reporting
- **Data warehouse:** industry standards and infrastructure supporting the development, management, and use of identified Agency data that is reused by multiple enterprise applications

7.2.2 INNOVATION AND PROCESS EFFICIENCY – TECHNOLOGY CAPABILITIES

The Technology Capabilities supporting Innovation and Process Efficiency allow for the definition, deployment, management, and measurement of Agency business processes within collaborative environments that foster innovation:

Applications & Services

- **Process KPIs:** Key Performance Indicators inform the Agency when a process is improving or deteriorating, according to critical dimensions
- **Workflow services:** an enterprise service that automatically sends messages, data, and process state information (e.g., what decisions have been made in the process, which task is currently being performed, which participants have performed their part of the process) to participants and managers of business processes
- **Process modeling:** an enterprise service that creates standardized representations of business processes, for use in workflow automation, performance management, and training
- **Business process management:** an enterprise service that manages business process models, often integrating the modeling, automation, and performance measurement functions
- **Process simulation:** an enterprise service that simulates the operation of business process models, predicting characteristics such as cycle time, cost, level of staff effort, process cost, production rates, and performance bottlenecks
- **Process training:** an enterprise service that uses process models, performance information, and simulation tools to support staff training

Information & Data

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

- **Measurement:** enterprise data representing process performance, including time series, and costing
- **Standardization:** enterprise standard process data, including terminology, policies, business rules, Agency benchmark process performance data, and standardized process designs
- **Scenario data:** enterprise data representing useful or distinct scenario data for use in benchmarking and process simulation

Infrastructure & Technology

- There are no unique Infrastructure & Technology requirements for Innovation and Process Efficiency

7.2.3 WORKFORCE DEVELOPMENT – TECHNOLOGY CAPABILITIES

Until detailed analysis is performed, the Agency's HCSP requirements can be addressed by the combination of the other Technology Capabilities described in this section.

7.2.4 EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY – TECHNOLOGY CAPABILITIES

Applications & Services

- **Web delivery:** enterprise services that deliver applications' user interfaces and logic using internet standards such as HTTP, HTML, and TCP/IP
- **Bandwidth management:** enterprise services that proactively monitor and adjust bandwidth provisioning to meet user demand patterns
- **SOA:** Service Oriented Architecture – industry standards for computer application design and implementation that enforce software design that allows for applications to be developed by reusing existing components, and an application execution environment that enables the required messaging and interactions among these distributed components
- **Cloud Deployment:** an enterprise service that provides the five core elements of cloud computing[7]:
    - **On-demand self-service:** A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service's provider.
    - **Broad network access:** Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, laptops, and PDAs).
    - **Resource pooling:** The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include storage, processing, memory, network bandwidth, and virtual machines.
    - **Rapid elasticity:** Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in.

[7] Mell and Grance, "The NIST Definition of Cloud Computing version 15", NIST, October 2009

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.

- **Measured Service**: Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported providing transparency for both the provider and consumer of the utilized service.

- **Application Monitoring:** an enterprise service that proactively measures and reports application utilization, performance, and security status
- **Measurement & Reporting:** an enterprise service that provides user satisfaction measurement and reporting

Information & Data

- **Data services:** enterprise services specific to data discovery, management, qualification, integration, and transfer between systems
- **Network:** enterprise data related to the operational status and performance of the physical network, including all physical and logical components
- **Master Data Management:** the business management function specific to identifying and managing Enterprise Data sets
- **Cloud Deployment:** please see the NIST definition of cloud computing above
- **Data Monitoring:** enterprise services that continuously monitor the operational and security status of select data stores
- **Measurement and Reporting:** enterprise user satisfaction data, including trending and analysis performed

Infrastructure & Technology

- **Cloud Hosting SLA:** as a provided service, Cloud Hosting will be implemented by establishing and managing a Service Level Agreement with a select vendor to ensure the appropriate service levels of the cloud computing environment described above are provided to the Agency; the use of an SLA may not be limited to an external vendor, but may also be generated and provided in support of a “private cloud” deployment
- **SOA Infrastructure:** industry standards and infrastructure required to support the SOA described above
- **Measurement & Reporting:** industry standards and infrastructure required to support customer satisfaction measurement and reporting

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

8 TARGET ARCHITECTURE DESIGN: THE BUSINESS OF USAID

The Target Business Architecture provides the capabilities described in Section 7.1 above. The themes of transforming the Agency through innovation and integrating strategic and performance management are reflected in specific organizational elements. Cross-Agency initiatives to bring about organizational, operational, and cultural change will be required to transform the Agency. We have arrived at these recommendations by examining the detailed requirements of achieving the four Strategic EA Goals: the need for information, process innovation, improving the workforce, and improving information services.

8.1 TARGET STRATEGY & PERFORMANCE LAYER

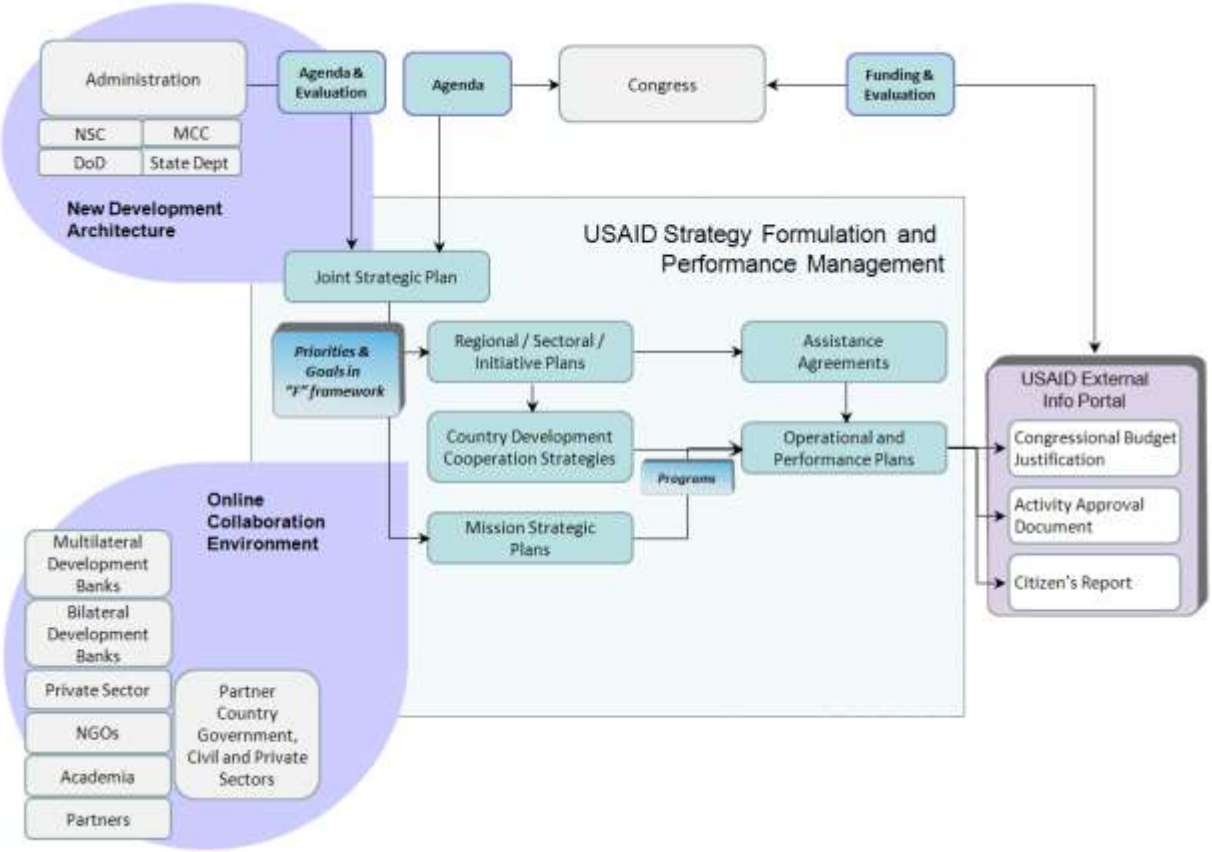


FIGURE 11: USAID'S TARGET STRATEGY & PERFORMANCE LAYER

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

8.1.1 TARGET STRATEGY & PERFORMANCE LAYER DETAILS

The Target Strategy & Performance layer addresses the Agency's interaction with and reliance on a number of external stakeholders, many of which possess significant influence on the Agency's strategic planning, financial resources, and operational direction. Given this operating environment, certain aspects of the Target Strategy & Performance layer are aspirations – goals that would serve the mission of the Agency, but whose achievement cannot be assured.

A New Development Architecture

The Agency is actively supporting the PSD-7 and QDDR processes, which have the potential to change the strategic framework within which the Agency interacts with other governmental agencies. The Agency should continue this support, with the following two goals:

1. Enhance and improve the Agency's status as the global leader in international development
2. Use its global leadership position to improve its negotiating posture and participation in cross-Agency initiatives

WHAT THE TARGET ARCHITECTURE MEANS TO ONE USER: STRATEGY & PERFORMANCE

An online community of local NGOs develops an idea for a workshop on press freedom in Southern Africa; through the Partner Portal, they set the conference agenda and logistics, they also distribute invitations and presentations; the conference is live-blogged by a number of attendees, allowing a variety of viewpoints to be heard; materials are reviewed and revised online as they are being presented; after the conference, all this information is stored online, in a fully searchable format; later a Program Officer in Angola discovers a potential partner for performing an assessment of the press freedom in that country, based on a paper presented at the conference.

The result of achieving these two goals will be to increase the Agency's influence on the evolution of the "International Aid Architecture", a phrase used recently by World Bank President Robert Zoellick[8]. This new architecture is an attempt to conceptualize the changing patterns of development aid (e.g., as more emerging economies such as China and India provide aid to developing economies – known as "South-South" development – the role of bilateral agencies such as USAID may change) and adapt to them.

However the Agency is able to influence the evolution of its strategic environment, the Target Business Architecture supports its strategic performance by describing transformational initiatives and information services that will enable innovative and measurable benefits to communities and individuals in need around the world.

Regional/Sector Plans

We recommend that Regional and Sector plans be made mandatory and be formally integrated with the Country Development Cooperation Strategy (CDCS) development process. The insight, knowledge, and expertise the Agency possesses in its sector and regional networks should be brought to benefit Mission planning.

Assistance Outcome Goals

Assistance Outcome (AO) goals should be integrated into CDCSs, so that a single document represents the Agency's goals in the country. This will clarify Mission planning and reporting, and enable an

[8] Robert Zoellick, "New Partnerships in Global Development Finance", Welcoming Moscow Conference Remarks, February 17, 2010

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

effective "cross check" between AOs and the longer term, more detailed goals developed in CDCSs. Because of the cross-Agency nature of the CDCSs, this will also allow additional Agencies to provide support to achieving AO goals, as appropriate.

Operating Plans

Operating Plans (OPs) should be extended to include performance measurement plans and the "results framework" currently developed separately in the AO plans. By incorporating these elements into the OPs, the Mission will have a single, definitive document that contains its planning for the year as well as its understanding of the country's development environment. The OP will be able to provide ongoing guidance throughout the year, as conditions change and plans are adjusted, by using the "results framework" as a model to explore alternative scenarios and approaches.

Online Partner Collaboration Environment

We recommend that a collaboration environment be established for Agency partners, to provide a permanent, online communication and networking site for sharing planning and results data, coordinating efforts, researching topics of interest, and determining the broad development community's perspective. As opposed to the Global Development Commons, this recommended site is intended to be driven by the community, rather than defined and implemented by USAID. New collaboration tools allow monitoring and control over the evolution of online collaboration sites, without the need to rigidly specify an operating model prior to launch.

Online Reporting Portal

We recommend an online data portal be established and regularly updated, to provide unclassified Agency budget, planning, and performance data to all interested stakeholders, including Congress and the public. This portal should address requirements in OMB's Open Government directive, and could be expected to reduce the Agency's workload in responding to multiple stakeholders' requests for reports and information. Agency staff may also find the portal useful, as a reliable source of Agency-wide information.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

8.2 TARGET ORGANIZATION & BUSINESS LAYER

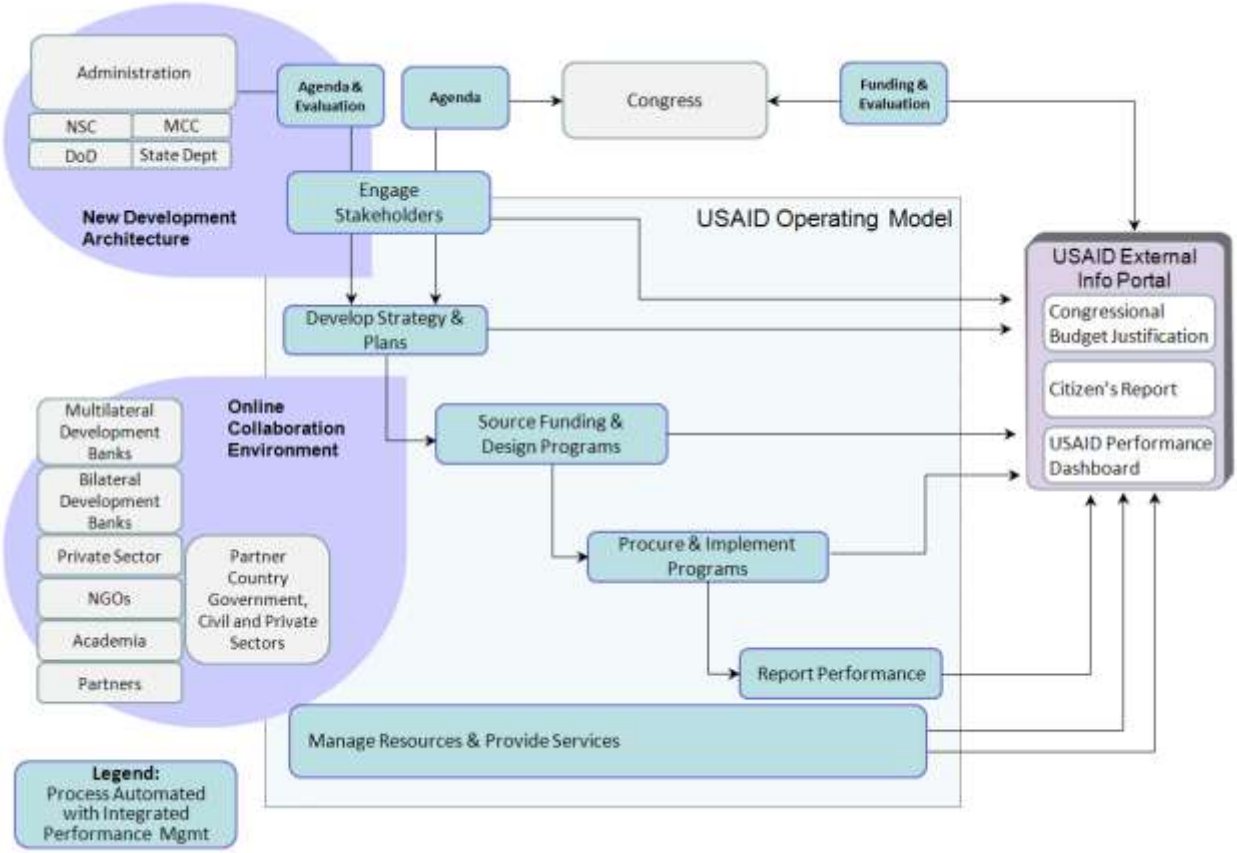


FIGURE 12: USAID'S TARGET ORGANIZATION & BUSINESS LAYER

8.2.1 TARGET ORGANIZATION & BUSINESS LAYER DETAILS

The Target Organization & Business layer will be developed and implemented through the following set of change management initiatives:

Enterprise Data Management Initiative

The approach to data management that focuses on developing a common framework for generating, qualifying, managing, accessing, and reporting Agency data is commonly referred to as Enterprise Data Management (EDM). EDM affects policy, business practices and processes, cultural behaviors, and technology.

A core component of EDM, and the one with which most staff and managers at the Agency will directly interact, is a standard "USAID Dictionary". Whether online or physically published and distributed, a

WHAT THE TARGET ARCHITECTURE MEANS TO ONE USER: BUSINESS & ORGANIZATION

An Executive Officer in Egypt uses the Agency Performance Portal to compare acquisition cycle times in her office to similar Missions in LAC and AFR, and finds she spends 20% more time on acquisitions below $5M; by pulling up their acquisition process model online, she sees that the Mission in LAC practices "just in time" sourcing, while the mission in AFR relies on exception handling to ensure process quality; she combines these two approaches, and shares a new process with her counterparts in AFR and LAC; the new process is distributed to three similar Missions; the final result is a 15% decrease in the amount of time spent on acquisitions below $5M for the six Missions.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

USAID Dictionary will demonstrate that the Agency truly speaks with "one voice" about development. The commitment and effort required to developing and implementing a USAID Dictionary is a key signal to the Agency that transparency, accountability, and reporting reliability are critical to senior management.

A dictionary is only the start of EDM, however. Additional elements of the EDM initiative include defining roles and rights for managing and accessing data, and implementing appropriate policies and technologies to enforce and enable reliable information access. A successful EDM initiative would unlock the tremendous value of Agency information, and allow development professionals to tremendously increase their impact.

Agency Innovation Initiative

We recommend that the Business Transformation Executive Committee (BTEC) initiate and oversee a comprehensive process improvement and automation initiative, focused on innovation and process management. This initiative should be driven at the operating unit level, with each operating unit establishing a business process performance review program. The focus of these programs should be to continuously identify opportunities for performance improvement, as well as collaboration with other parts of USAID and external organizations.

The "change management" aspect of this initiative cannot be overstated – clear, consistent, and repeated communications to all organizations will be a key part of this initiative. Risk taking and collaboration need to become integral aspects of the Agency culture. Technologies that will support this initiative are described in the Target Technology Architecture below, and include performance measurement and business process management. The EDM initiative described above will also support this initiative, by ensuring that process designs and performance data are clearly and consistently defined and used.

Human Capital Initiative

We recommend a focused initiative bringing business process improvement and IT services to support the execution of the Agency's Human Capital Strategic Plan. This initiative will be able to take advantage of all of the capabilities described above for Agency-wide innovation and performance management. One objective of this initiative is to support the Agency's compliance with requirements to utilize HR LOB (Line of Business) shared services. We also recommend that this HR transformation initiative present its implementation plan to the BTEC, and that the BTEC provide ongoing oversight and guidance throughout its execution.

IT Transformation Initiative

The Target Organization & Business layer is the EAS's "vision" for providing information services to the Agency. The OCIO will provide the key services enabling the transformation initiatives above, including collaboration, business process management, performance management, and data management. The OCIO is also embarking on its own transformation initiative, which includes process, accountability, and performance improvements in the CIO organization. In addition to process improvements, the OCIO is implementing a transformation of the Agency's physical information technology infrastructure. The comprehensive transformation goals and detailed implementation plans for the OCIO will be formulated in the IT Strategic Plan (Volume 5 of the EA Program Structure Operating Model).

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

9 TARGET ARCHITECTURE DESIGN: THE INFORMATION TECHNOLOGY OF USAID

9.1 TARGET TECHNOLOGY ARCHITECTURE APPROACH

The following figure illustrates a set of themes that encompass the "Technology Capabilities" identified for the Target Technology Architecture in Section 7.2 above (see Figure 10: USAID Target EA Technology Capabilities).

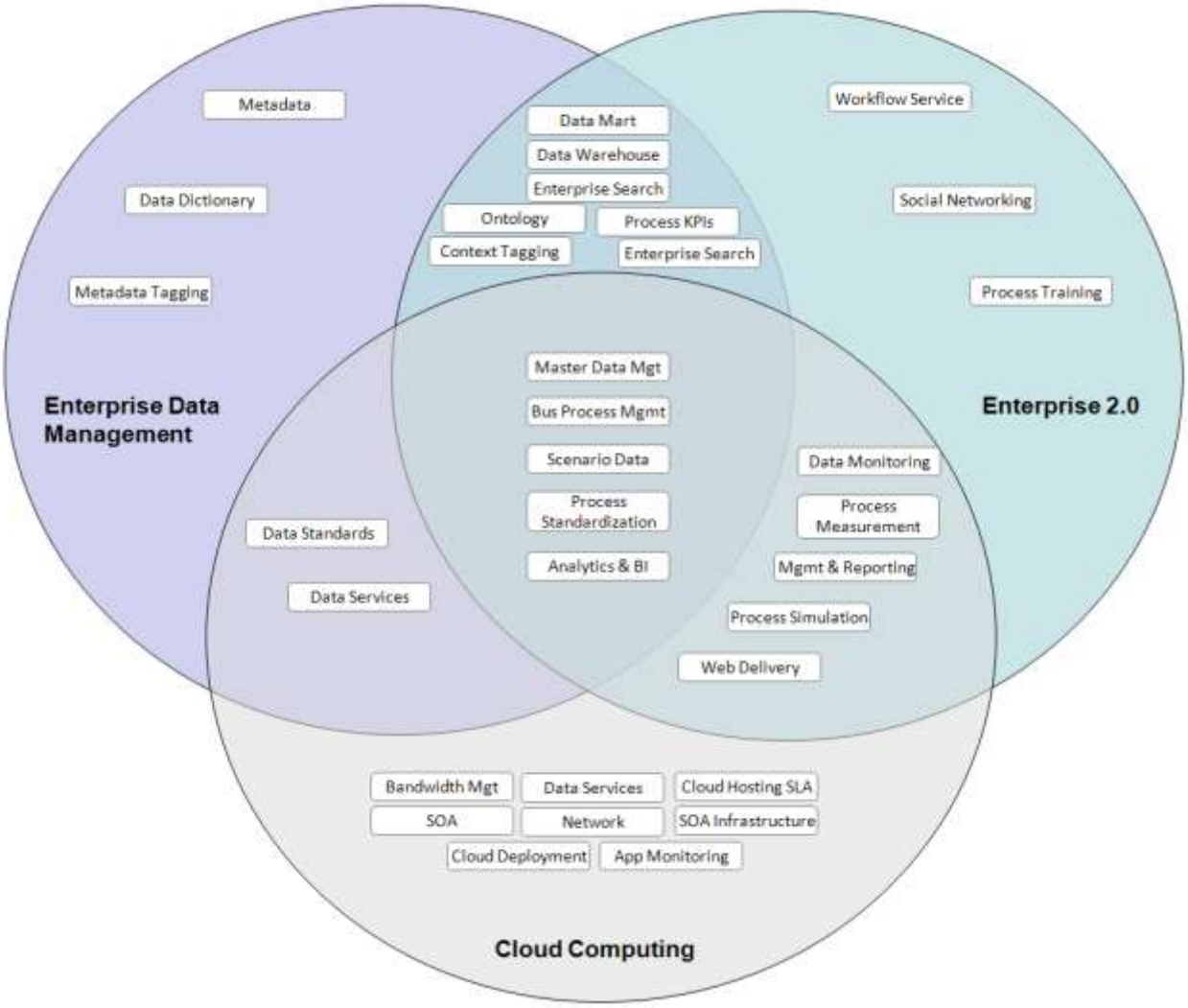


FIGURE 13: USAID TARGET TECHNOLOGY ARCHITECTURE CAPABILITY THEMES

Organizing the Technology Capabilities into the three themes of: Enterprise Data Management, Enterprise 2.0, and Cloud Computing illustrates two aspects of the Target Technology Architecture, both of which provide some confidence in the capabilities identified:

1. A fairly small number of key themes (three) encompass all of the new capabilities required for the Target Technology Architecture.
2. Most capabilities are used by more than one theme, and many are used by all three.

The first point shows that the Agency might use these themes to identify investment programs - each program would have a clearly defined role in implementing the capabilities in a specific theme. This

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

approach would simplify performance measurement, resource allocation, and risk mitigation for all change management and IT investments that implement the Target Technology Architecture.

The second point shows a high degree of capability "re-use" by the three themes, and indicates that the capabilities have been defined at the right level of abstraction (because they can be grouped together meaningfully), and that the capabilities are complementary and mutually reinforcing, rather than driving the Target Architecture in different directions.

The themes identified in Figure 13: USAID Target Technology Architecture Capability Themes, have been used to design features of the Target Technology Architecture at each of its three layers. The capabilities represented in Figure 14 have been translated into standard industry technology components, and the operational dependencies among them have been identified and mapped. Figure 14: The USAID Target Technology Architecture, illustrates the technology environment envisioned to enable USAID to improve its strategic performance and enhance its leadership role in delivering international development assistance and humanitarian aid.

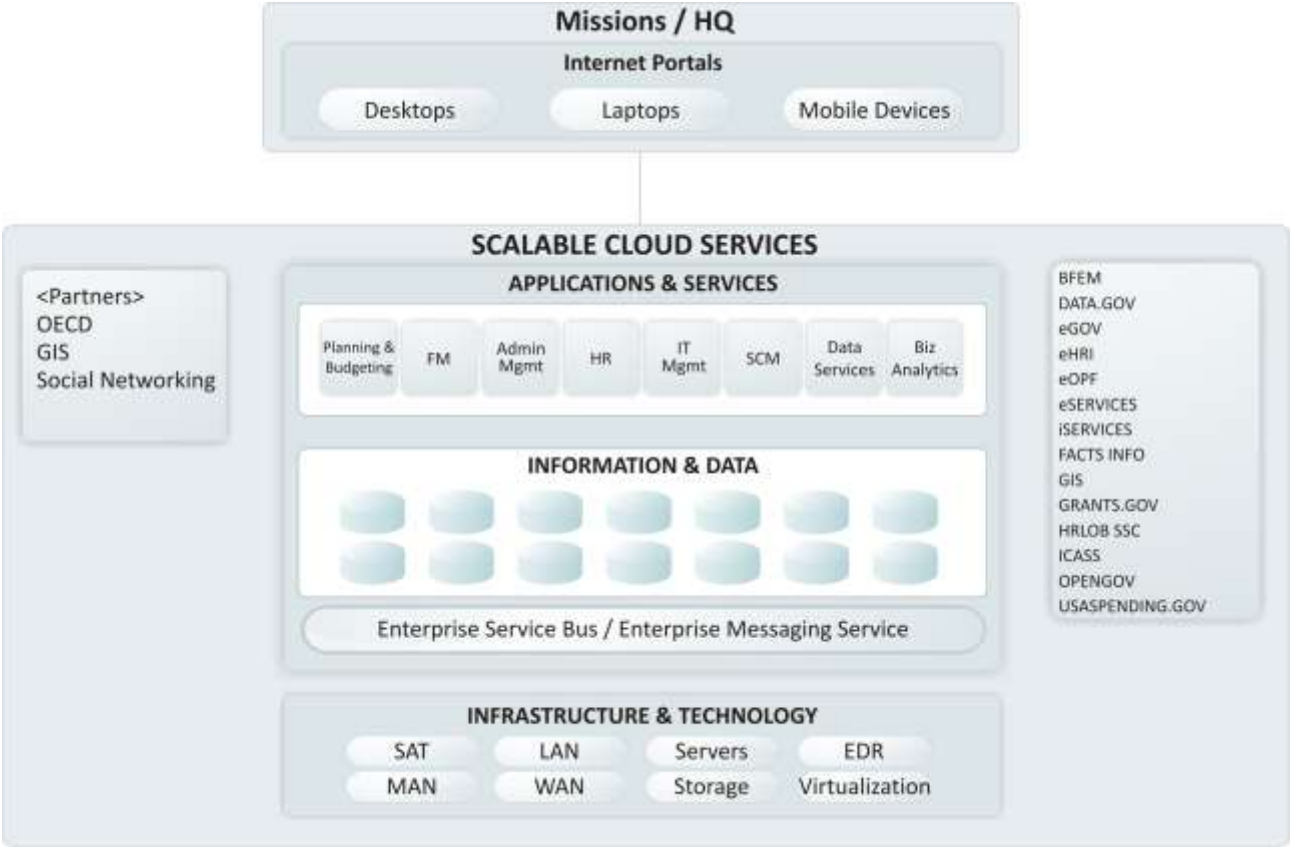


FIGURE 14: THE USAID TARGET TECHNOLOGY ARCHITECTURE

9.1.1 INFORMATION ON DEMAND - ENTERPRISE DATA MANAGEMENT AND OPEN GOVERNMENT

The Target Technology Architecture will provide USAID staff, stakeholders, and partners with relevant, timely, and consistent data, anywhere, anytime. The Enterprise Data Management strategy will precisely define, integrate and effectively retrieve data for both internal applications and external communication. The data architecture will be focused on the creation of accurate, consistent, and transparent data, while the improved global cloud infrastructure, tiered security, and services capabilities will deliver that data wherever it is needed.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

The term "Open Government" refers to the President's "Transparency and Open Government" Initiative (Open Government Memorandum and Directive, M10-06) which describes the principles of transparency, participation, and collaboration the new Administration is embracing in promoting openness in government. The Initiative directs OMB and GSA to work with executive agencies to develop an Open Government directive, to be issued by the Director of OMB, that instructs executive departments and agencies to take specific actions to implement these principles. The three principles of transparency, participation, and collaboration form the cornerstone of an open government:

- **Transparency** promotes accountability by providing the public with information about what the Government is doing.
- **Participation** allows members of the public to contribute ideas and expertise so that their Government can make policies with the benefit of information that is widely dispersed in society.
- **Collaboration** improves the effectiveness of Government by encouraging partnerships and cooperation within the Federal Government, across levels of Government, and between the Government and private institutions.

The USAID Target Technology Architecture, through its increased flexibility, scalability, and focus on Information, will provide increased value to Agency data by establishing context, adding metadata, and improving access, relevance, and quality while adhering to the principles of Open Government.

9.1.2 INNOVATION AND PROCESS EFFICIENCY - ENTERPRISE 2.0

"Enterprise 2.0" describes the application of traditional IT and emergent social technologies within a commercial or public sector organization. It includes institutionalizing modern collaboration capabilities into the fabric of an organization's work, processes, culture, and toolsets. Harvard Business School professor Andrew McAfee is credited with coining the "Enterprise 2.0" term when he saw the potential to apply to business the concepts of Web 2.0 tools, which until recently had been used primarily by teens and college students to build social networks. Enterprise 2.0 is based on the integration of technology, social interaction, and content development and management.

One of the goals of the Target Technology Architecture is to support a more efficient and innovative organization. Achieving a more innovative and process efficient organization can be facilitated by utilizing Enterprise 2.0 principles and providing USAID user's with more the tools, data, and platforms for creating content, applications, and sharing knowledge. USAID's staff of professionals understands best how to do their jobs and know what they need to accomplish difficult tasks in changing and challenging circumstances all over the world. Providing broad access to the Agency network through any and all user access points (laptops, smart phones, and any other mobile device), wireless infrastructure, and improved services the global workforce will continue to be empowered. In addition, the Target Architecture will provide new self-service tools for user's to engage with Agency data, structured and unstructured, to create their own applications on common platforms, and engage more directly with development efforts. Process efficiencies and innovations will be encouraged and supported through new communications tools and increased collaboration.

9.1.3 EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY - CLOUD COMPUTING

Cloud Computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

be rapidly provisioned and released with minimal management effort or service provider interaction.[9] The Cloud Computing model offers a new and compelling transformational opportunity for USAID, by leveraging a new technological model designed to meet the world-scale IT infrastructure required to create and sustain a globally networked and integrated development organization.

While many definitions of Cloud Computing exist, all share the same key tenet: creating and sustaining a massively scalable and rapidly "elastic" IT infrastructure, which can deliver capabilities 'as a service' to users or systems, using well-known internet technologies. Although Cloud Computing is a proven technology, with evidence of providing financial benefits as well as reducing operational and infrastructure constraints within organizations, its implementation for USAID will require an incremental, stepwise adoption model similar to any large-scale IT transformation. Figure 15 illustrates an overview of the Cloud Computing model in relation to traditional IT models.

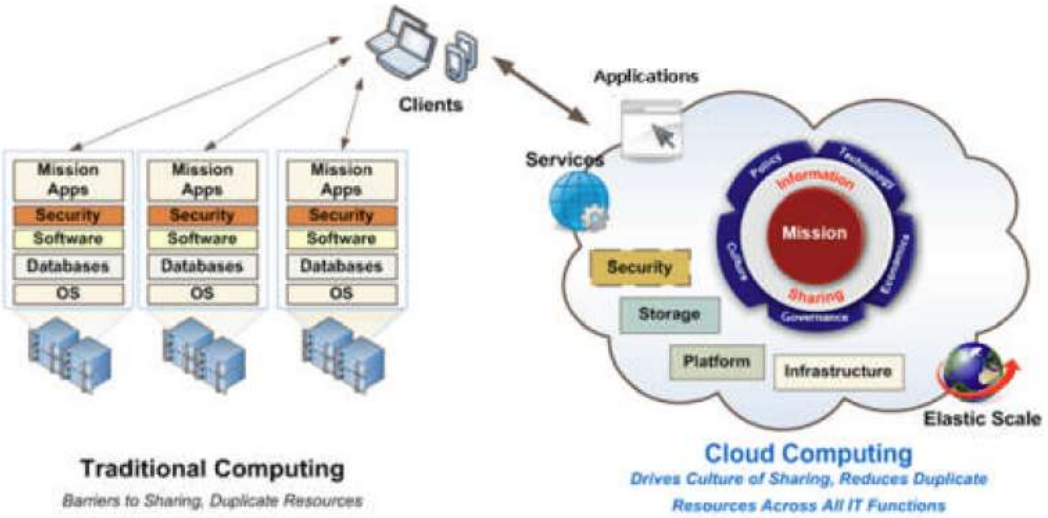


FIGURE 15: OVERVIEW OF CLOUD COMPUTING

The transition to a Cloud Computing model is motivated by the limitations of the traditional IT model and USAID's need for increased data sharing, mission resilience, and enhanced security. In the traditional model, hardware, software, storage, and computing capabilities are procured and governed by the Agency, program office, or often an individual project. Adopting a Cloud Computing model for service delivery as a strategic initiative provides the Agency with a highly flexible technology environment that can readily adapt to changing business needs from all sides without needing re-engineering or re-investment. Such an environment provides maximum value to users by effectively and efficiently connecting users to information and knowledge while also minimizing operational costs.

Cloud Computing allows IT capabilities, including infrastructure, platforms, and software services, to be elevated from many duplicative traditional installations into a single shared, scalable, integrated enterprise. The transition process will need to be incremental, allowing traditional IT systems to coexist with Cloud Computing, to deliver the best capability model for the wide range of IT missions conducted

[9] National Institute of Standards and Technology – Information Technology Laboratory, Cloud Computing: http://csrc.nist.gov/groups/SNS/cloud-computing/

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

across the USAID enterprise. The Cloud Computing model can be divided into six key components, illustrated in Table 3: Components of Cloud Computing, each providing unique mission functions which can be consumed independently by Cloud clients or traditional IT systems.

COMPONENT	FUNCTION
CLIENTS	Computer hardware and software systems, located anywhere on Earth, which rely on the Cloud architecture for delivery of data, applications, and services.
SERVICES	Net-centric software services which are consumed from system-to-system, such as user authentication.
APPLICATIONS	Software used by clients in the Cloud, such as analytic tools, tasking applications, word processing and office automation applications.
PLATFORMS	The bundled stack of software, such as a web hosting platform or database services delivered as a service to a client in the Cloud, without the cost and complexity of hardware procurement and management.
INFRASTRUCTURE	The delivery of computing infrastructure, such as networks, virtualized servers and workstations, or storage, to clients in the Cloud.

TABLE 3: COMPONENTS OF CLOUD COMPUTING

Strategically transitioning USAID from its current siloed data processing and storage environments to an Agency-wide Cloud Computing environment represents more than a technical challenge. In order to deliver the most value and impact, How to plan, budget, provision, operate, govern, and secure the Cloud as well as how to develop the policies, procedures and agreements that enable the development and operation of the Cloud will require changes in management philosophy and policy among the Agency system and data owners.

9.1.4 CLOUD COMPUTING FOR DEVELOPMENT

As the OCIO moves forward over the next few years implementing its Cloud Computing initiative, it will be learning and developing new skills and knowledge that can be applied around the developing world. Cloud Computing, along with being a technology innovation for US Government and private sector organizations, has the potential to be a ”leapfrog” technology that delivers strategic value for developing economies, similar in nature to the adoption of cellular telephones. By avoiding the need to install an expensive physical infrastructure of landlines and switched networks, cell phones have been adopted in the developing world at a rate much faster than in the developed economies. Cloud Computing has the potential to bring the commercial and consumer goods and services, along with the productivity benefits of the current generation of electronic media and internet business models directly to developing economies, effectively allowing them to “leapfrog” the last ten to 15 years’ worth of economic experimentation that the developed economies have experienced.

The OCIO’s expertise and understanding of Cloud Computing, developed through its direct experience applying these technologies, will be a differentiating tool in supporting the Agency’s development mission, adding a new and potentially transformational area for Information and Communications Technology (ICT) development assistance with USAID partners.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

To truly support such an innovative role for the OCIO, relationships and roles will need to be developed and defined over the next few years as the architecture is put into place. The first step is for the OCIO to identify a group to capture and maintain this new skill and to put in place a strategy and plan to build the capacity along with the new architecture. In addition, relationships between the OCIO and the appropriate development professionals who work on ICT around the Agency will need to be developed. The potential for USAID partners to benefit both from the potential impact of Cloud Computing, as well as from the Agency's own IT transformation, is an important additional benefit and one that should be exploited for its cost savings and development leadership implications.

9.2 TARGET APPLICATIONS & SERVICES LAYER

The USAID future Cloud-based Architecture will enable a more flexible approach for deploying and scaling USAID applications and services. Cloud Computing promises real costs savings and agility to the Agency by allowing the OCIO to rapidly deploy applications where the underlying technology components can expand and contract with the natural ebb and flow of the business life cycle. Traditionally, once an application was deployed it was bound to a particular infrastructure, until the infrastructure was upgraded. The result was generally low efficiency, utilization, and flexibility. Cloud enablers, such as virtualization and grid computing, allow applications to be dynamically deployed onto the most suitable infrastructure at run time.

WHAT THE TARGET ARCHITECTURE MEANS TO ONE USER: APPLICATIONS & SERVICES

A Program Officer in Indonesia wants to support the newly passed government information transparency laws; he contacts the OCIO and requests a consultation its with smart phone application developers in DC and a non-profit software development organization in Jakarta; by sharing their open source technology, USAID provides the non-profit with a set of "building blocks" for developing a smart phone reader for documents being released online; the free, online distribution of this phone app dramatically increases the distribution and impact of these documents.

9.2.1 TARGET APPLICATIONS & SERVICES LAYER DESIGN

The USAID Cloud-based Target Architecture will transform the way that applications and services are provided across the enterprise. The three main changes include the following:

- Through Cloud-based service models, applications will be provided completely as either web-based or on thin-clients for improved performance, mobile access, and flexibility. Infrastructure and platform hosting will be provided as Cloud-based services to enable rapid provisioning of systems with minimal effort and reduced cost and complexity across the globally dispersed enterprise. A flexible deployment strategy and cloud architecture will permit delivering services to areas of the world with constrained network capacity or reliability.
- A **Service Oriented Architecture (SOA)** for improved openness of applications and better accessibility to business logic/functions and data. Adopting SOA design principles also makes it easier to update applications to suit the ever-changing business needs and enables reuse of business logic and information.
- New services will be provided to users including **Data services** (for Master Data Management), **Business Process Management** (the management and automation of business processes), **Performance Management** (automating and reporting process performance), and **Business Analytics** (statistical analysis of enterprise data)

Together these changes will create a Target Applications & Services Layer that allows USAID to better meet the challenges of being a world class international development organization, including providing information on demand internally and externally, increasing transparency and accountability, creating

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

more effective mechanisms for service delivery with cost savings and flexibility, and providing a sustainable IT foundation for supporting process improvement and innovation.

Cloud Computing

A key benefit of the Cloud-based Architecture is to enable a more flexible approach for deploying and scaling USAID applications and services. The Cloud computing model provides agility to the Agency by allowing the OCIO to rapidly deploy applications where the underlying technology components can expand and contract with the natural ebb and flow of the business life cycle. Traditionally, once an application was deployed it was bound to a particular infrastructure, until the infrastructure was upgraded. The result was generally low efficiency, utilization, and flexibility. Cloud enablers, such as virtualization and grid computing, allow applications to be dynamically deployed onto the most suitable infrastructure at run time. This elastic aspect of cloud computing allows applications to flexibly scale and grow as well as contract without the traditional approach that requires a massive technology investment or has wasted resources with unused capacity.

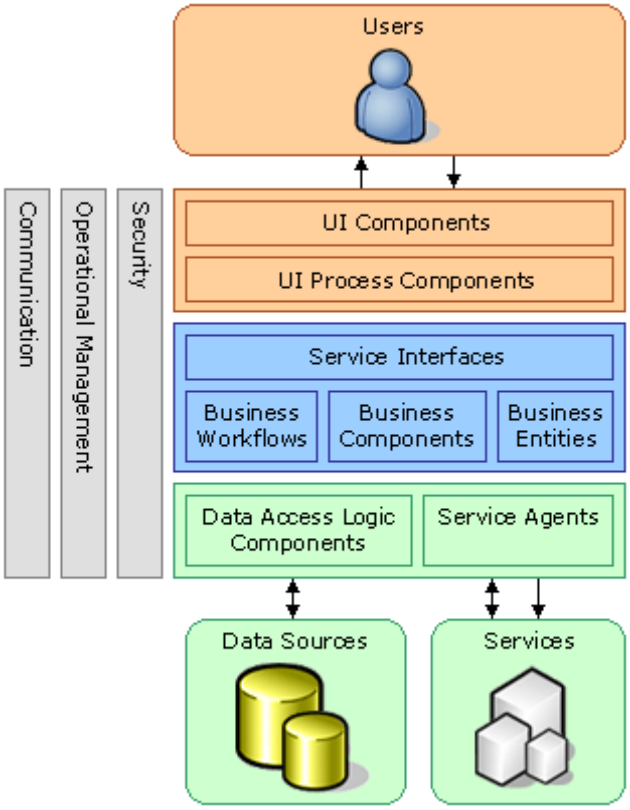


FIGURE 16: COMPONENT LAYERS FOUND IN DISTRIBUTED APPLICATIONS AND SERVICES

In order to be more efficient and accessible, USAID applications and services will be provided through one of two models: either a Software as a Service (SaaS) or Platform as a Service (PaaS) model.[10] SaaS refers to the capability to provide the Agency use of applications running on a cloud infrastructure (private, public, or government). The applications are made accessible from various client devices through a thin client interface such as a web browser (e.g., web-based email). The Agency will not manage or control the underlying cloud infrastructure elements, including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings. Software management issues such as license keys, bandwidth provisioning, and software upgrades are invisible to the consumer.

Many General Support Services (GSS) can also be supported using SaaS. Depending on its maturity a Whole-of-Government (Community) Cloud can provide a large percentage of the Agency's secure infrastructure needs, with applications such as the HR Line of Business and multi-Agency tools such as FACTS/FACTSinfo existing on the Whole-of-Government Cloud. For the USAID user, it will make no difference which cloud an application is supported by, as they will all be easily accessible via a thin-client such as the user's web browser. Finally, some collaboration or external data sharing services or applications could be supported on or purchased from vendors on the Public Cloud. This includes products providing services such as email, videoconferencing, social networking, and collaboration

[10] Ibid.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

software.Cloud Platform as a Service (PaaS) on the other hand is the capability to provide the consumer the ability to deploy onto cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider. The PaaS model has a number of uses at USAID, including for Agency-developed applications and for application testing environments.

Service-Oriented Architecture

The drive for cost savings, "greener IT", and increased agility in the federal government and at USAID, has led to the need for implementing a Service-Oriented Architecture model in the USAID Target Architecture. A Service-Oriented Architecture (SOA) is a flexible set of design principles used during the phases of systems development and integration. A deployed SOA-based architecture provides a loosely-integrated suite of services that can be used within multiple business domains. SOA defines how to integrate widely disparate applications for a world that is Web based and uses multiple implementation platforms. Service-orientation requires loose coupling of services with operating systems, and other technologies that underlie applications.

SOA separates functions into distinct units or services as seen in Figure 16: Component Layers Found in Distributed Applications and Services[11], which developers make accessible over a network in order to allow users to combine and reuse them in the production of applications. These services and their corresponding consumers communicate with each other by passing data in a well-defined, shared format, or by coordinating an activity between two or more services. Implementing Service Oriented Architectures (SOA) is an important component of cloud computing. SOAs distributed nature, service encapsulation; defined service level objectives, virtualized interfaces, and adherence to open standards aligns to and supports Cloud Computing's architectural requirements.

To implement SOA, the USAID Technology Architecture will support a number of new design principles both in application design and deployment:

- **Modular Design** – approach that subdivides a system into smaller parts, or modules, which can then be reused in different systems to meet similar functionality
- **Reusable Logic** – another design principle that focuses on the quality of the logic within the services so that they can be reused across the enterprise
- **Enterprise Service Bus (ESB)** – architecture construct for software which provides fundamental services via an event-driven, standards-based messaging-engine (the bus). An ESB does not itself implement a SOA but provides the features with which one may implement the architecture.
- **Orchestration Layer** – layer that sits on top of the services allowing for the process of coordinating an exchange of information through web services interactions

All of this ultimately provides the layer of abstraction needed to support expanded access to data and more mobility for applications. SOA enables users to create their own applications or services and easily connect to sources of information without developer intervention. These applications or services can then be leveraged or consumed by other users and systems as part of the greater USAID cloud environment. For example, the applications that support the USAID General Support Services will be rationalized and consolidated into service categories that can then be supported by a modular design with reusable components, such as content management, social networking and collaboration services. In addition, the layered approach to the architecture will separate out the presentation logic from

[11] http://msdn.microsoft.com/en-us/library/Ee817664%28pandp.10%29.aspx

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

reusable logic and shared business logic components such as those that can be shared across financial and performance management systems.

The benefits of using these SOA concepts for the Technology Architecture include the creation of more systems of record, reduced data duplication, increased analytical ability across USAID enterprise data, and a reduction in the proliferation of systems due to the reusable components and more accessible applications.

The framework applied to enable such services is described as an ESB, a component of cloud computing. An enterprise service bus (ESB) is software architecture for middleware that provides fundamental services for more complex architectures. ESB can be thought of as a mechanism that manages access to applications and services (especially legacy versions) to present a single, simple, and consistent interface to end-users via Web- or forms-based client-side front ends[12]. For an ESB to be successful it must be flexible. It needs to support many different protocols, be able to communicate synchronously and asynchronously, manage security, translate messages between services, and be programming language agnostic.

On top of this SOA framework USAID's application architecture will be made up of the distinct services that meet its business needs. The following services are based on the current understanding of the business needs but with SOA's flexibility and the agility of Cloud computing the Agency can easily evolve and adapt to changes in the business architecture.

Whole of Government Integration

One of the most important benefits of the new Technology Architecture that can be leveraged by USAID is the potential integration with Government-wide services such as HR LOB, FM LOB, ITI LOB, and others. The Office of Personnel Management's Human Resources Line of Business (HR LOB) service offering has the potential to be the first shared service that could be fully integrated into USAID business and technology services. Notionally, the SOA principles and flexible service delivery model of the new architecture will facilitate USAID's transition to making use of the HR LOB core functions, including Personnel Action Processing, Benefits Management, and Compensation Management. In addition, as it makes sense for the Agency other Non-Core Functions (see Figure 17: Notional HR LOB Concept of Operations/Service Delivery Model below) can also be leveraged for more efficient and cost effective HR service delivery. As other Whole-of-Government lines of business or enterprise services are made available, the new flexibility in the architecture will be able to facilitate a rapid transition both into, or as the Agency's needs evolve, out of, such arrangements.

[12] "Searchsoa.com, Enterprise Service Bus Definition, April 21, 2010"

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

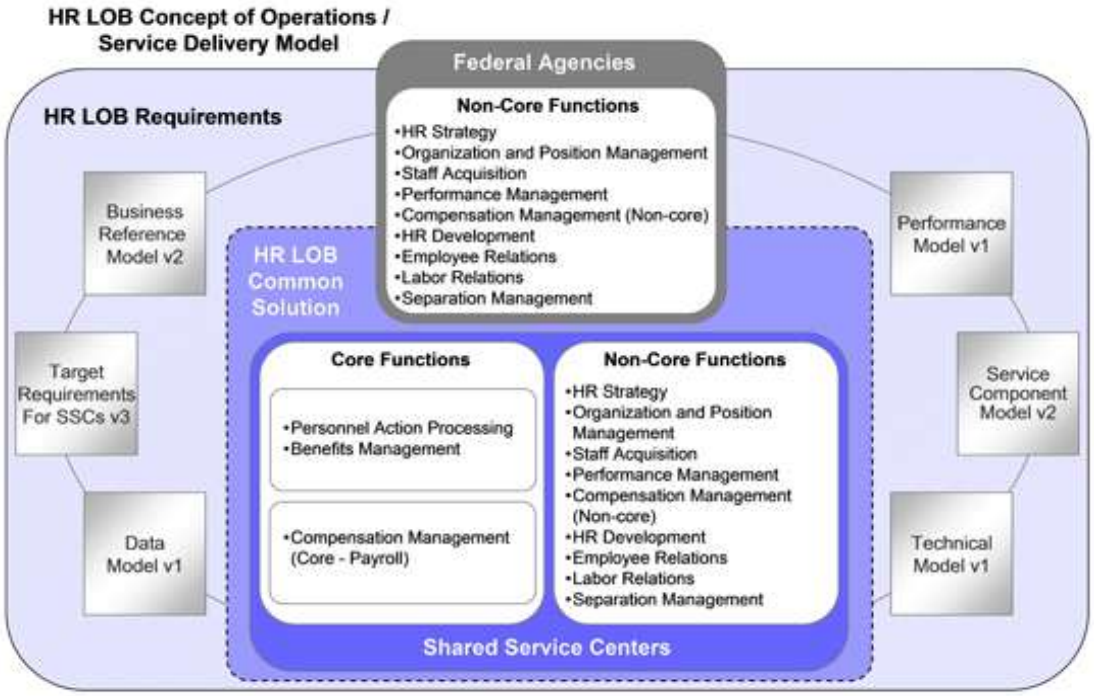


FIGURE 17: NOTIONAL HR LOB CONCEPT OF OPERATIONS/SERVICE DELIVERY MODEL[13]

In addition to the provisioning of services from Whole-of-Government service providers, another important change in the architecture is the addition of three new services that don't currently exist in the Baseline Architecture. The new services, *Data Services*, *Business Analytics*, *Business Process Management*, and *Performance Management*, are described in greater detail in the following section.

[13] http://www.opm.gov/egov/HR_LOB/index.asp

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

Data Services

Data Services support the usage, processing and general administration of Agency information. The Target Technology Architecture includes the addition of a data services realm and strategy to include specific components including an overall Enterprise Data Management strategy, data warehousing and data marts, enterprise ontology, Master Data Management, Metadata Management, and a Data Dictionary. Each of these services is needed to provide the foundation for many of USAID's higher level goals, including "Information on Demand", better results reporting and learning, meeting its Open Government initiative objectives, and increasing transparency and accountability across the Agency's activities.

Through the new SOA framework, data services that can be developed and made available include the following service components:

SERVICE COMPONENT	DEFINES THE SET OF CAPABILITIES TO
DATA EXCHANGE SUPPORT	Interchange of information between multiple systems or applications; includes verification that transmitted data was received unaltered
DATA MART SUPPORT	Analyze a subset of a data warehouse for a single department or function within an organization
DATA WAREHOUSE SUPPORT	Archive and store large volumes of data
META DATA MANAGEMENT SUPPORT	Maintain and administer data that describes data
DATA CLEANSING SUPPORT	Remove incorrect or unnecessary characters and data from a data source
EXTRACTION AND TRANSFORMATION	Support the manipulation and change of data
LOADING AND ARCHIVING SUPPORT	Populate a data source with external data
DATA RECOVERY SUPPORT	Restore and stabilize data sets to a consistent, desired state
DATA CLASSIFICATION	Allow the classification and categorization of data

TABLE 4: SOA FRAMEWORK DATA SERVICES

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

Business Analytics

Business Analytics defines the set of capabilities supporting the extraction, aggregation, and presentation of information to facilitate decision analysis and business evaluation. The business needs for improved business analytics can be can be met by maturing the Agency capabilities to include better visualization, knowledge discovery, business intelligence, and reporting.

Through thin-clients and modular software these business analytic services can be provided within the SOA framework of the Target Technology Architecture. While some services are currently being provided in an ad hoc way (e.g. Mapping/Geospatial) new Visualization services will be developed to better support the evolving Agency needs in this area. Service components to be provided through the Business Analytics services include:

SERVICE COMPONENT	DEFINES THE SET OF CAPABILITIES TO
IMAGERY SUPPORT	The creation of film or electronic images from pictures or paper forms
MULTIMEDIA SUPPORT	The representation of information in more than one form to include text, audio, graphics, animated graphics and full motion video
MAPPING/GEOSPATIAL/ ELEVATION/GPS	Provide for the representation of position information through the use of attributes such as elevation, latitude, and longitude coordinates
DATA MINING	Provide for the efficient discovery of non-obvious, valuable patterns and relationships within a large collection of data
MODELING	Develop descriptions to adequately explain relevant data for the purpose of prediction, pattern detection, exploration or general organization of data
SIMULATION	Utilize models to mimic real-world processes and system dynamics
DEMAND FORECASTING/MGMT	Facilitate the prediction of sufficient production to meet an organization's demands
BALANCED SCORECARD	Support the listing and analyzing of both positive and negative impacts associated with a decision
DECISION SUPPORT AND PLANNING	Support the analysis of information and predict the impact of decisions before they are made
AD HOC REPORTING	Support the use of dynamic reports on an as needed basis
STANDARDIZED/CANNED REPORTING	Support the use of pre-conceived or pre-written reports

TABLE 5: SOA FRAMEWORK BUSINESS ANALYTICS SERVICES

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

Business Process Management

The Target Business Architecture describes four change management initiatives (Enterprise Data Management, Process Innovation and Efficiency, HR Transformation, and IT Transformation), each of which will encompass business process improvement. Business Process Management (BPM) provides a core set of capabilities that support business process improvement and performance management. As a general overview, BPM solution suites include the following components:

BPM COMPONENTS	DEFINES THE SET OF CAPABILITIES TO
PROCESS MODELING	Create process models in graphical form
PROCESS MODEL MANAGEMENT	Manage, version control, and present graphical process models
PROCESS EXECUTION	Automate process models by distributing forms and messages to process participants
BUSINESS RULE MANAGEMENT	Define, capture, manage, and implement business rules defined to control business process execution
SYSTEM INTEGRATION	Provide for the integration of all necessary systems via SOA-compliant design and the Enterprise Services Bus to support message and forms distribution to process participants
PERFORMANCE MEASURE MANAGEMENT	Define performance measures as integral elements of the process models, manage and automate the collection of process performance measures as processes are executed
PROCESS SIMULATION	Simulate the operation of process models to identify dependencies, refine process flows, and estimate expected operational parameters and performance levels

TABLE 6: BUSINESS PROCESS MANAGEMENT COMPONENTS

These components address the needs of the enterprise to define its business processes, automate them, and measure their performance. As the performance of different approaches is demonstrated in operation, BPM tools allow the process models to be refined and redeployed. In this manner, opportunities for innovation, and the efficient dissemination of successful approaches, can be rapidly shared across the Agency.

Performance Management

In the context of USAID's business architecture, "Performance Management" refers to the processes for creating, capturing, analyzing, and reporting Agency performance indicators in order to measure both operational processes internal to USAID, as well as the impact of the development programs the Agency funds. As described above in the Business Process Management section, BPM provides a platform for implementing the performance management programs the Agency defines.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

9.2.2 TARGET APPLICATIONS & SERVICES LAYER DETAILS

The future framework provides an open mesh of service capabilities to support the reuse of business components and services across the Agency. IT investments provide services to Agency users. A flexible and open design using SOA constructs of Web Services and the Enterprise Service Bus facilitates efficient discovery and reuse of data and business logic components across USAID applications.

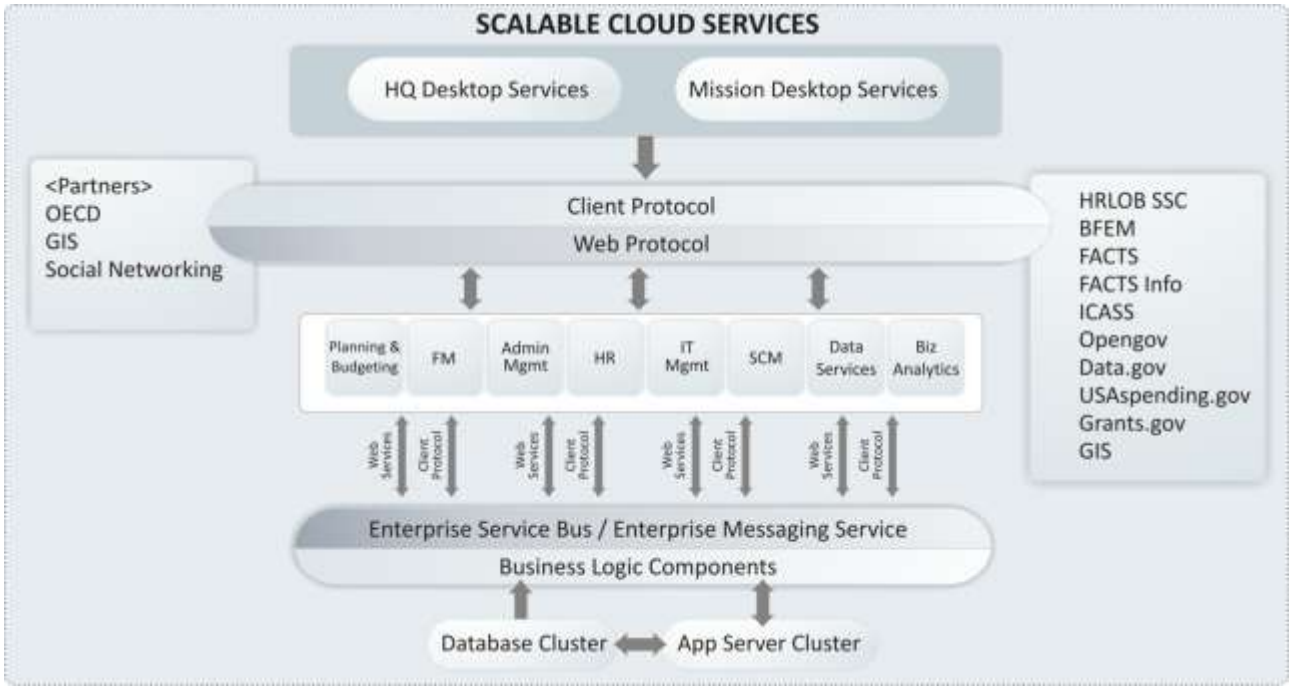


FIGURE 18: THE USAID APPLICATIONS & SERVICES TARGET ARCHITECTURE MODEL

A detailed model for this layer can be found in Section 11.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

9.3 TARGET INFORMATION & DATA LAYER

The Information & Data Layer identifies the capture, generation, management, and use of data within the USAID environment. It provides a standard means by which data may be described, categorized, and shared. It also assists in the identification of common data, promotes data reuse and sharing across the Agency, and reflects the vision for collecting, using, and sharing data within the Agency.

USAID staff expects data to be accessible always and located in one place. A traditional model in which data is located and centrally managed near headquarters has been embraced by the Agency. Encouraged by the procurement of hardware, software and computing capabilities that are governed by the Agency, program office, Mission or by the project, the Agency has faced several growing pains as data has become increasingly decentralized and inaccessible. Moreover, the data management strategy of the Agency has not adjusted to meet the growing needs of the business. The completion of the Baseline Architecture indicated the Agency has the following data-related challenges:

WHAT THE TARGET ARCHITECTURE MEANS TO ONE USER: INFORMATION & DATA

A Program Officer in Haiti is concerned about economic distortion created by the aid flows following the January 12th earthquake; she wants to share growth rates across sectors, and compare them with targeted aid flows, and needs this information across all donor organizations – public, private, multilateral, and bilateral; she connects her website to the External Info Portal through an easy-to-use RSS feed, and shares it with her colleagues; they find a strong correlation between aid flows into the vehicle sales and rental sector, which they use to develop a long term automotive sector growth strategy to leverage the aid flow's stimulus.

- Weak application of data standards negatively impacts communication, aggregation and interoperability between headquarters and the Agency's missions
- The prevalence of cuff systems and lack of visibility by AID/W highlight the shortcomings of the Agency's data and presents a challenge for the OCIO to address business needs and management of knowledge
- USAID lacks a enterprise data management model which directly impacts the capacity to use data and ability to provide information on demand

The Target Information & Data layer seeks to overcome these challenges in leveraging the SOA and Cloud Computing principles presented in the Applications & Services layer. Additionally, a SOA and Cloud Computing approach complement the three strategic themes of the Target Technology Architecture:

EA STRATEGIC GOAL	INFORMATION AND DATA ARCHITECTURE ADD-VALUE
INFORMATION ON DEMAND	A comprehensive SOA strategy will link services and data together to meet the needs of the business
INNOVATION AND PROCESS EFFICIENCY	Coupled data management design and modern governance strategies encourage seamless technology performance and promotes Agency wide collaboration
EFFECTIVE AND EFFICIENT IT SERVICE DELIVERY	Retooling the data infrastructure to support a Cloud Computing environment creates a universal platform for services and data to integrate and perform at a world class level

TABLE 7: TARGET TECHNOLOGY ARCHITECTURE STRATEGIC THEMES

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

The impact of a modernized approach to the logical and physical management of data allows the Agency to more easily adapt and respond to the business needs of its customers. An agile, scalable, and managed architecture requires the use of an enterprise framework and in turn, provides a solution for the Agency where infrastructure can be consolidated without performance loss, data is accurate and accessible, and the demand for cuff systems is reduced.

9.3.1 TARGET INFORMATION & DATA LAYER DESIGN

The Target Information & Data Layer utilizes a Service-Oriented Architecture (SOA) and Cloud based approach. SOA provides the benefits of faster implementation, high system availability; centralized/consolidated data stores, reduced data entry and processing errors, faster access to current and relevant information, improved quality of the data, and shared data across the Agency with proper security and privacy control. A SOA architecture that provides abstraction between the consumers and repositories of data has the following key principles:

- Authorized consumers (users and systems) will be able to access data needed for performing the business activities for which they are responsible
- A consumer accessing data will not need to know what system manages the data, where the data is physically stored, or the format in which it is stored
- Sharing and access of data will be constrained and regulated by appropriate security and privacy considerations as well as other governmental, legal, and policy requirements
- An Enterprise Data Management strategy will be implemented to eliminate duplicative data entry and storage, facilitate integration, standardize and streamline the exposure of business data, and provide resilient storage of data
- Data to be shared will adhere to common interchange formats to reduce or eliminate the need to transform data

The advantage of SOA is that the Agency can continue to evolve and move closer to managing data in a prioritized manner that supports specific applications, recognizing data as an asset in terms of value and utility. The Agency will move towards individual data environments and identify hubs of clustered and related data to expose data environments that support specific service domains. This is a significant step forward from the traditional model that the Agency has been supporting. One of the results of this approach is adoption of service-oriented design paradigms where applications and data can work together as peers and truly be recognized as an enterprise asset with the following characteristics:

- Single logical sources from which to get a complete view of the enterprise data objects
- Increased awareness of the profile and characteristics of the data in the enterprise
- Improved data quality across the enterprise
- Enforced data standards by using a data services layer
- Data that's clearly visible and readily accessible
- Reduced reliance on custom interfaces and proprietary formats
- Clearly identified authoritative data sources that are effectively used throughout the enterprise
- Integrated security with enhanced credentialing, authentication, and authorization to ensure proper access to data and information
- Data that's easily discoverable by potential consumers across the organization

Cloud computing, when combined with a SOA approach, presents a complementary environment where the cloud enables for the provisioning of services on the fly. Working within the cloud, the identified services of SOA can be deployed and the Agency will have the comfort in knowing that the data that is driving the applications is flexible, secure, accessible and accurate.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

As described in the previous section, the Target Information & Data Layer design provides layers of abstraction between the consumers of data, the business functions that service the data, and the storage and management of the data. This abstraction facilitates data standardization, sharing, and interoperability without compromising integrity and quality.

Data standardization reduces the life cycle cost of data through data integration, standardization and the identification and use of authoritative data sources, structures, and exchanges. Documenting data in a structured way promotes the understanding and meaning of data. A data standard provides the framework for how data will be formatted for implementation within systems and in the data exchanges between systems.

Data sharing involves the distribution of data between and amongst consumers to support business functions and services. Data sharing can be constrained by security, policy, or business rules. Data sharing also leverages standardization concepts including authoritative data sources, data exchanges, and promotion of database schemas and other standards based upon a common understanding of an enterprise data management strategy. Implementing and structured data management strategy increases integrity, quality, and consistency of the data and reduces the cost and complexity of conventional data architectures.

Data interoperability involved coordinating the technical mechanisms used by diverse systems to capture, store, exchange, and access data. Data architecture aims to enhance information sharing through interoperability standards by establishing a coordinated set of access methods for enterprise data within the appropriate security context regardless of the owner/steward/manager of the data or the physical system that the data resides in.

9.3.2 TARGET INFORMATION & DATA LAYER DETAILS

Establishing a Canonical Data Model following XML development methodologies and specifications is needed to govern the sharing and interchange of data across enterprise systems. The data framework is dependent on the identification, acceptance and proliferation of data standards. The complexities of data interchange and establishing a common understanding of data will require standard definitions and procedures. Governance provides the policy and structure that allows this to take place. For each proposed data standard, the myriad of interactions requires that a governance framework be developed to handle all aspects of proper data architecture development.

Another key component of the data framework is the need to have current, reliable, and trusted data sources. Establishing a methodology and structure for USAID authoritative data sources and metrics help to analyze and adjudicate the enterprise data source prior to publishing data for consumer use and will minimize data duplication. The mechanisms in use can be used for reference data as well as managing structured and un-structured data in different data source including database, file system, web site, or external sources.

For data governance to be truly successful within USAID a Master Data Management (MDM) solution, accompanied with tools such as data dictionaries, metadata, and controlled taxonomies, is needed. MDM is an enterprise-wide infrastructure for managing and harmonizing “master data”, that is, core business data categories, to ensure that information is integrated, coordinated, completely consistent, trusted, and supportive of sound business decisions to enhance organizational value. MDM builds cross-references for federated data and creates an authoritative ‘Golden Records’ that represents a single truth for each and every master data entity in the form of a data dictionary. MDM will allow USAID to have detailed knowledge of every type of data that exists within the organization. By leveraging MDM applications and services will no longer need to create separate and unique silos of

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

data. Data can simply be pulled from an existing structure and internally transformed to suit the needs of the application or service.

Implementing MDM will allow USAID to facilitate data integration to ensure cross-system data consistency, accelerate the execution of business processes, and greatly improve decision-making. A MDM foundation and a SOA environment go hand-in-hand to allow USAID to realize the full potential of an effective and efficient information management environment. Implementing MDM solves a critical problem that can reduce the effectiveness of a SOA solution - clean data - and for MDM to realize its full potential, a SOA environment is needed to propagate master data to applications and expose master data to business processes. Deploying MDM as the foundation for SOA allows quality, consistent data to find its way to every application and service that needs it. The combination of information consolidation and streamlining through MDM and SOA provides an organization long-term cost reductions through elimination of redundant infrastructure, reduced training, development, and maintenance.

Cloud-based data replication and synchronization provides continuous data movement of enterprise application data. Once established, this environment can be automated to ensure that information is replicated to meet changing business demands. Such an environment facilitates essential data movement activities such as:

- Distribution and synchronization of data across geographies to multiple systems and sites
- Providing real-time availability of application data for reporting
- Enabling business continuity and DR solutions for the enterprise
- Compliance with regulations and mandates

Additionally, maintaining multiple, synchronized data repositories facilitates scaling performance when normal utilization levels are exceeded during high-demand periods or activities such as reporting, data warehousing and mining, or other online analysis.

Replication and synchronization allows USAID to locate data where it is needed and/or best serves its consumers through bi-directional data sharing. It allows a complete Agency overview of distributed operations and associated data that is very close to real time. Distribution of data coupled with replication and synchronization facilities enables the OCIO to find the right balance between centralization and decentralization. It also puts necessary data in the hands of the decision-makers without regard to geographical location while maintaining central control over enterprise data.

Finally, hosting the enterprise data sources within the USAID Cloud Computing environment; whether private, public, or government; provides a high-performance, resilient, and highly accessible location from which data services can be delivered on-demand to consumers (users and systems). Leveraging the distributed and shared services within the cloud environment enables USAID to protect its institutional information with advanced security while still permitting broad access to data to the parties that are authorized to access it. In shared service models such as PaaS and SaaS, performance in ad-hoc tasking and reporting becomes a non-factor compared to conventional methods of stove piped services being provided by discrete computing and storage elements.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

The figure below illustrates the relationships between the various components of the Target Information & Data layer.

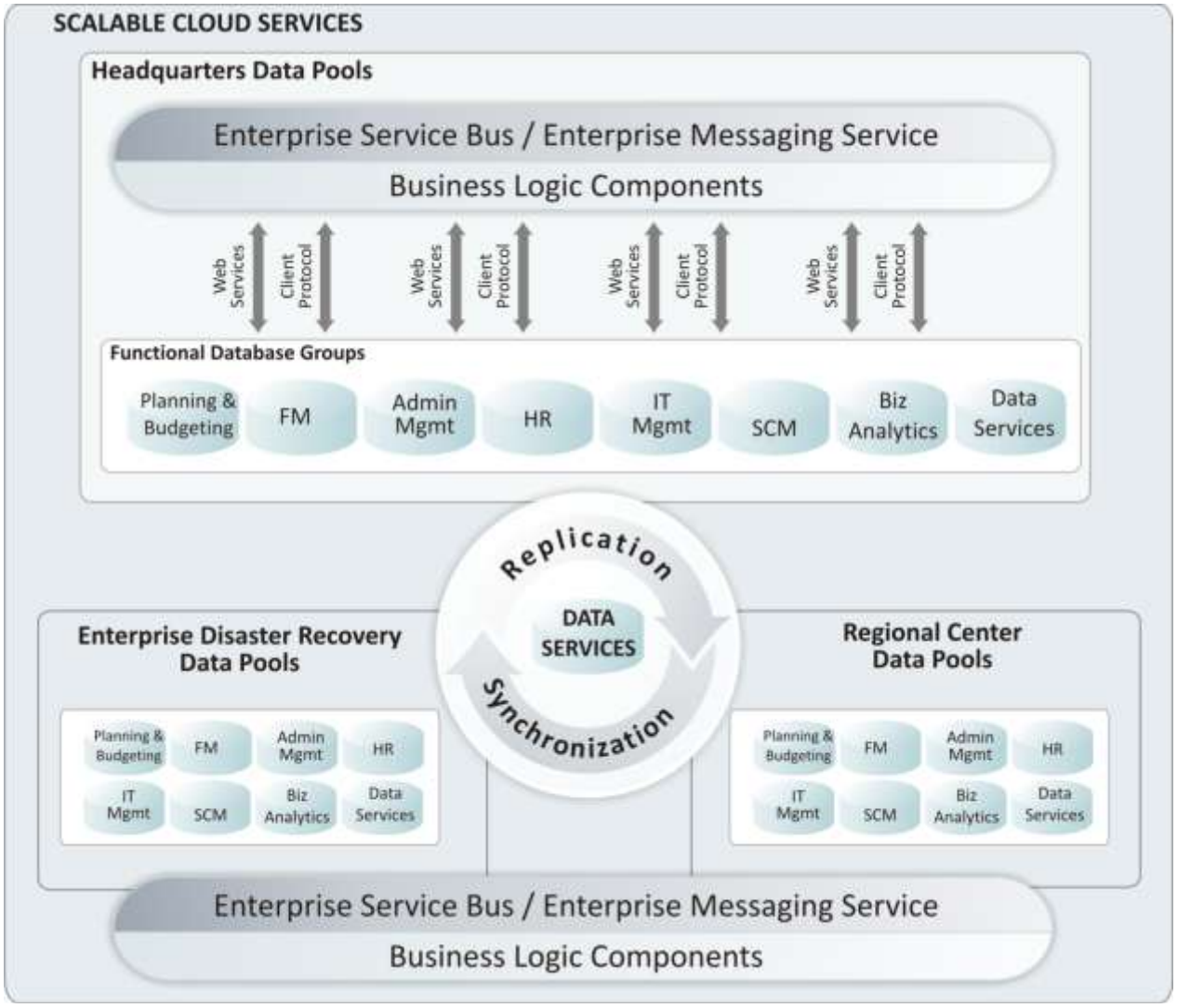


FIGURE 19: THE USAID TARGET INFORMATION & DATA MODEL

A detailed model for this layer can be found in Section 11.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

9.4 TARGET INFRASTRUCTURE & TECHNOLOGY LAYER

The Infrastructure & Technology Layer is a component-driven, technical framework categorizing the standards and technologies to support and enable the delivery of the capabilities from the Applications & Services and Information & Data layers. It also advances the reuse and standardization of technology and service components from an agency-wide perspective.

The USAID Target Infrastructure & Technology layer will be a Hybrid Cloud Computing environment, reflecting the need for achieving security, cost savings, Green IT, and increased flexibility. In a Hybrid Cloud, the infrastructure is a composition of two or more types of cloud services (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and/or application portability (e.g., cloud bursting for load-balancing between clouds). By leveraging cloud features, USAID will realize benefits in improved performance and reliability, improved security, increased speed-to-delivery for deploying new applications and services, and Green IT aspects of improved levels of resource utilization and reduced environmental footprint.

WHAT THE TARGET ARCHITECTURE MEANS TO ONE USER: INFRASTRUCTURE & TECHNOLOGY

A Program Officer is stranded in Tbilisi when the country's internet infrastructure suffers a "Denial of Service" attack from unknown assailants; his internet connection with the local ISP fails, but his cell phone still works; by using cloud-based applications, he does not have to connect to a server at the Mission, but can access the Emergency Staff Locator through a lightweight application on his phone, which uses a cloud service hosted outside of Georgia; he is able to let his team and family know where he is, that he is safe, and what his travel plans are.

9.4.1 TARGET INFRASTRUCTURE & TECHNOLOGY LAYER DESIGN

The Agency will deploy a Cloud Computing environment to host its data and applications. This cloud will enable USAID to maintain its own security, data integrity, and independent service capabilities. Within the cloud, virtualization services will provide a scalable and resilient platform to host application systems and store data. Additionally, desktop services and application presentation services such as server-based computing, virtual desktops, and application virtualization will deliver flexible, lightweight, and reliable business productivity services to the USAID user community without depending on deployment of desktop and software systems to every user endpoint.

The USAID cloud will be capable of expanding beyond the constraints of any single physical site. This capability enables USAID to more quickly and effectively deploy cloud infrastructure and its associated components to regional centers around the globe to provide services to the user community that are localized and more responsive due to the closer geographical proximity to the user endpoint. Extending computing, storage, and application services to include a comprehensive Enterprise Disaster Recovery role at a remote computing facility also is enabled by transitioning to a cloud environment. The site-agnostic nature of cloud computing lends itself to residing in multiple physical locations and creating a mesh of services that yields high scalability, resilience, and reduced management overhead.

The Agency will make as much use as it is able of a Whole of Government or Community Cloud model. Depending on the scale and maturity of such a USG Cloud the Agency can provision applications, storage, or infrastructure support from what will amount to a secure internal government vendor. A key USG service that will utilize significant savings for USAID is the E-Gov Human Resources Line of Business (HR LOB) – a set of Government-wide standardized and interoperable HR solutions that provide common, core functionality supporting strategic human capital management by: (1) Improving human capital management; (2) Achieving and increasing operational efficiency in acquisition, development, implementation, and operation of human resources management and support systems;

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

(3) Achieving cost savings/avoidance by reducing duplicative systems and resources and increasing the competitive environment; (4) Improving customer service by increasing accessibility, improving communications and responsiveness, and enhancing timeliness, quality, accuracy, and consistency.

Other USG services such as platforms for OpenGov, Data.gov, Grants.gov, and USASpending.gov also allow government and other external stakeholders to leverage information and functionality without needing USAID to provide it directly.

Finally, where it makes sense, the Agency can use services provided in a Public Cloud. There are areas like external collaboration tools or new technologies that are not currently available that may be more cost effective to be accessed through the public cloud. The option of using the public cloud may also be an important option for supporting the Agency's global infrastructure, namely its overseas Missions. Many Missions currently suffer from low bandwidth and are often required to maintain their own infrastructure over and above the standard corporate infrastructure as defined by the OCIO in order to effectively execute their mission. Using Public Cloud services can provide a way to standardize, improve, and consolidate Missions infrastructure needs.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

9.4.2 TARGET INFRASTRUCTURE & TECHNOLOGY LAYER DETAILS

The USAID Target Infrastructure & Technology layer cloud environment and its deployment model are illustrated in Figure 20: The USAID Target Infrastructure & Technology below.

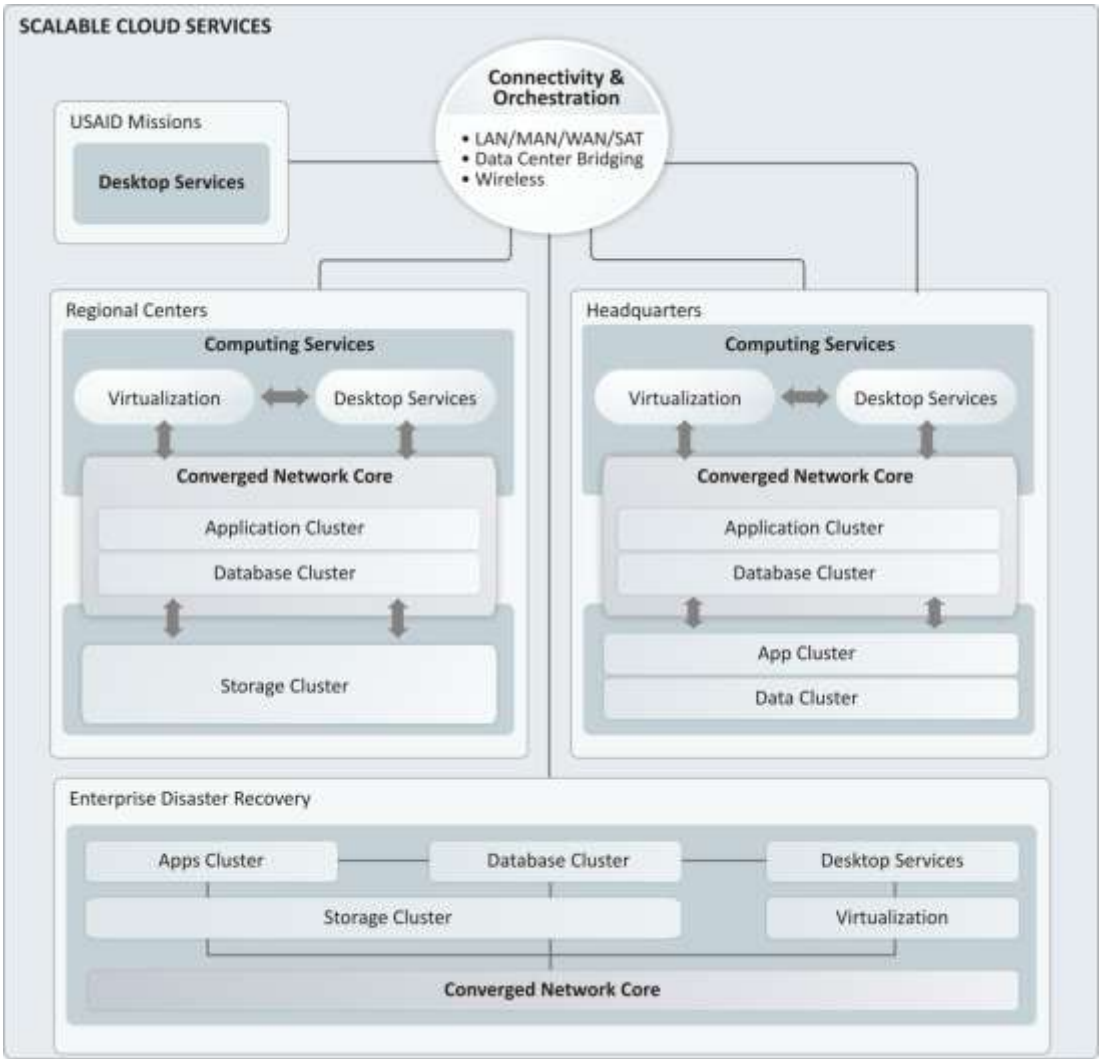


FIGURE 20: THE USAID TARGET INFRASTRUCTURE & TECHNOLOGY MODEL

USAID's Infrastructure & Technology layer will be flexible and adaptable to a dynamic business environment. The modernized infrastructure will feature improved accessibility and security, while reducing the number of control points and supporting the demand for integrated Whole of Government operations. The flexibility provided by using all three types of cloud models will enable the Agency to adopt new technologies and services that can enhance its ability to communicate and interact with other USG agencies, its partners, vendors, and ultimately better deliver foreign assistance.

A detailed model for this layer can be found in Section 11.

9.4.3 INFRASTRUCTURE & TECHNOLOGY LAYER APPROACH

The approach for providing the necessary infrastructure to support USAID Target Technology Architecture is to meet the internal and external needs of the Agency by accessing as wide a range of infrastructure providers as possible. The building blocks of cloud computing are rooted in hardware and

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

software architectures that enable innovative infrastructure scaling and virtualization. Many data center and cloud providers deploy these capabilities today. However, the next infrastructure innovations will enable more dynamic provisioning and management in larger clusters both within and external to the conventional corporate data center. There are also implications for next generation application design to make optimum use of massively parallel processing and fault tolerance in order to enable data analysis and application performance at a much larger scale and scope that previously available.

INFRASTRUCTURE VIRTUALIZATION

Virtualized Infrastructure provides the abstraction necessary to ensure that an application or business service is not directly tied to the underlying hardware infrastructure such as servers, storage, or networks. This allows business services to move dynamically across virtualized infrastructure resources in a very efficient manner that is based upon predefined policies that ensure specific service level objectives are met for these business services.

The layer of physical abstraction provided by virtualizing infrastructure services also facilitates distributing infrastructure geographically. By virtue of the physical abstraction and logical management of the cloud capabilities as a set of services (software or platform) that is agnostic to geographic location, the USAID infrastructure can be moved away from the centralized model. This enables the OCIO to meet Enterprise Disaster Recovery (EDR) needs and IT Regionalization initiatives natively and easily within the USAID cloud platform. By extending cloud infrastructure and its accompanying services to regional sites around the globe, the consumers of the services are best served by the closest resources. Availability and resiliency are also enhanced by using a meshed connectivity model that provides continuity of service via in the event of a link failure through the use of intelligent routing and cloud services monitoring.

Modern virtualization services within the cloud now not only include enterprise applications and platforms but also an open architecture that encourages and facilitates custom application development and hosting, desktop virtualization to reduce the dependence on deploying traditional PCs to each user, and application virtualization to centralize software management to a singular image that is flexibly delivered on-demand.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

A conceptual model of fully meshed regional USAID computing centers including an EDR site is shown in the figure below.

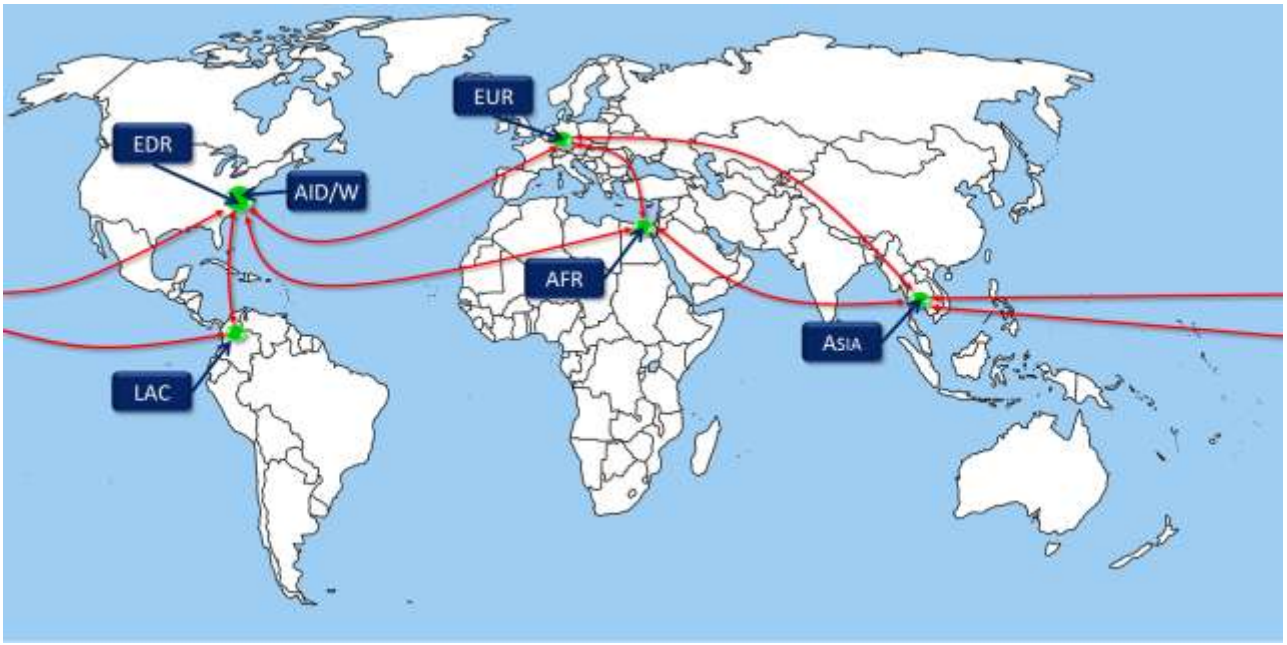


FIGURE 21: GLOBAL USAID REGIONAL COMPUTING CENTERS

Convergent Technologies

Consolidation and virtualization technologies have demonstrated success in reducing total cost of ownership while increasing performance and utilization of enterprise resources. Convergence of applications, servers, storage, and networking inside of a cloud services environment facilitates improvements in service levels, capabilities, flexibility, and performance while reducing management overhead and complexity. New developments in infrastructure technologies such as 10 Gigabit Ethernet (10GbE) and Fibre Channel over Ethernet (FCoE) permits enterprises to unify previously separate data and storage networks into a single fabric that enhances efficiency, performance, security, and cost-effectiveness while supporting Green IT initiatives such as energy savings realized through reduction in physical infrastructure and components.

Rapidly transforming network implementations of converged networks have precipitated further development of core capabilities such as the Data Center Bridging (DCB) specification that provides seamless extension of geographically dispersed networks. When combined with 10GbE and high-performance distance networking, DCB permits extending USAID cloud services (SaaS and PaaS) and its inherent infrastructure systems, storage, and services to sites beyond headquarters. The converged network delivers optimal performance to its globally dispersed missions and enables core functions such as enterprise disaster recovery.

Cloud Computing

As described in section 9.4.1, Cloud Computing has several different operating models for delivery of services. The Target Architecture envisions utilizing two different operating models in the USAID future state. Enterprise applications will follow the SaaS method of service delivery to the user community. This reduces or eliminates any dependence on deploying infrastructure (hardware and software) in order to provide business applications and enables the enterprise to realize increased speed-to-delivery, higher performance/reliability, advanced security, and significant cost reductions/avoidance.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

In many cases, a mature Cloud Computing environment facilitates extensive self-service functions for users to request and receive Cloud-based services without need to interact with IT.

Enterprise applications such as GLAAS and Phoenix will be hosted in the USAID SaaS Cloud environment. Deploying these applications in the SaaS model allows the applications to benefit from increased performance and reliability inherent to the cloud environment. Productivity applications and services in communications (email, voice, video), collaboration (document management, records management, and social networking), business intelligence (analysis and reporting), and business productivity applications will also be hosted within the USAID SaaS Cloud environment.

Platform-as-a-Service (PaaS) is the other operating model envisioned by the Target Architecture. This model delivers hardware (server, storage and network), and associated software (operating systems virtualization technology, file system), as a service. This model provides users with a robust, extensible platform upon which they can deploy their own software or customize existing services to fit their own needs. As with SaaS, providing PaaS services to the user community provides improved speed-to-delivery, cost reduction/avoidance, and increased performance without incurring significant deployment costs. The USAID PaaS services will include virtual servers, storage, database services, and virtual desktops.

As shown in Figure 22: Enhanced USAID Technology Infrastructure, the infrastructure needed to deliver SaaS and PaaS services in the USAID cloud environment will consist of an interconnected mesh of server hosts, networked storage, and a multi-service network that provides connectivity, orchestration, and security to all infrastructure components as well as ingress and controlled access to all end-user endpoints such as laptops, cell phones, blackberries, wireless networks, work stations, and storage devices.

Regionalization of computing centers also becomes feasible through a combination of virtualization, cloud services, and convergence of technologies.

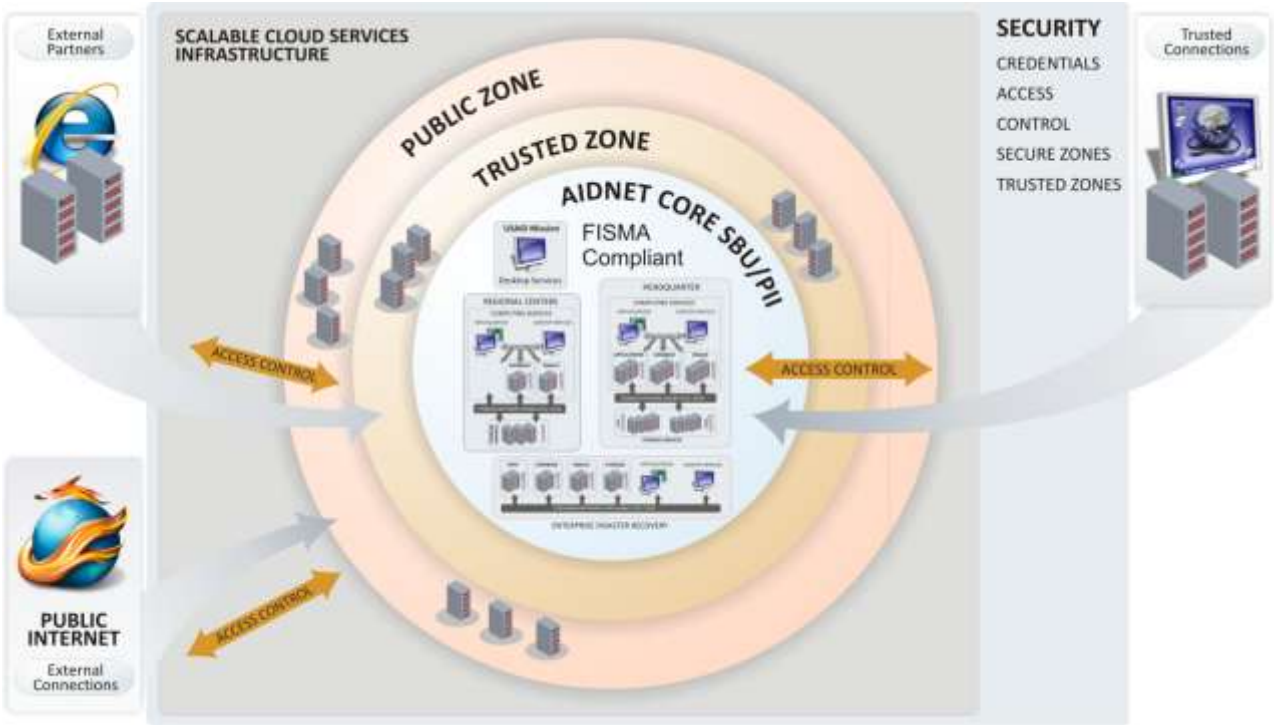


FIGURE 22: ENHANCED USAID TECHNOLOGY INFRASTRUCTURE

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

The consolidation and regionalization of technology services demands that the USAID cloud services be highly available, resilient to failures, adaptable to a changing business environment, and facilitate multiple modes of secured access including 2-factor authentication, secure wireless, VPN, and trusted partner extranet. The infrastructure will be segregated into zones of access to permit distribution and dissemination of information to authorized parties – public, trusted partners, and internal USAID interests. Advanced security controls including network access control, credentialing, and active monitoring will ensure that data remains secure and accessible to consumers while remaining compliant with regulations and mandates such as the Federal Information Security Management Act (FISMA) of 2002 that requires each federal agency to develop, document, and implement an agency-wide program to provide information security for the information and information systems that support the operations and assets of the agency.

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

10 TARGET ENTERPRISE ARCHITECTURE MANAGEMENT PROCESS

The Target Enterprise Architecture is an integral part of the Agency's overall governance and performance management process. Reviewed on an annual basis to match the Agency's strategic planning cycle, the Target EA supports a repeated conversation between Agency management and the OCIO, ensuring that the Agency needs and expectations are effectively communicated and reflected in IT strategy, investment, and operations.

Agency strategic planning, according to ADS 200, occurs at various intervals: every five years for Agency (the Joint USAID – Department of State Strategic Plan) and country development cooperation planning (CDCS), every three years for mission planning (MSP), and annually for operating plans (OPs). As described in Section 2, the Target EA is revisited as the Agency Strategic Plan is updated. If strategies or priorities have changed significantly, the Target EA will be re-aligned. Agency change management initiatives and IT investments will then be guided to pursue the new Target EA, which might include re-prioritizing existing initiatives, or identifying entirely new programs. Figure 23: Target Architecture Management Process illustrates the process of reviewing and revising the Target Architecture.

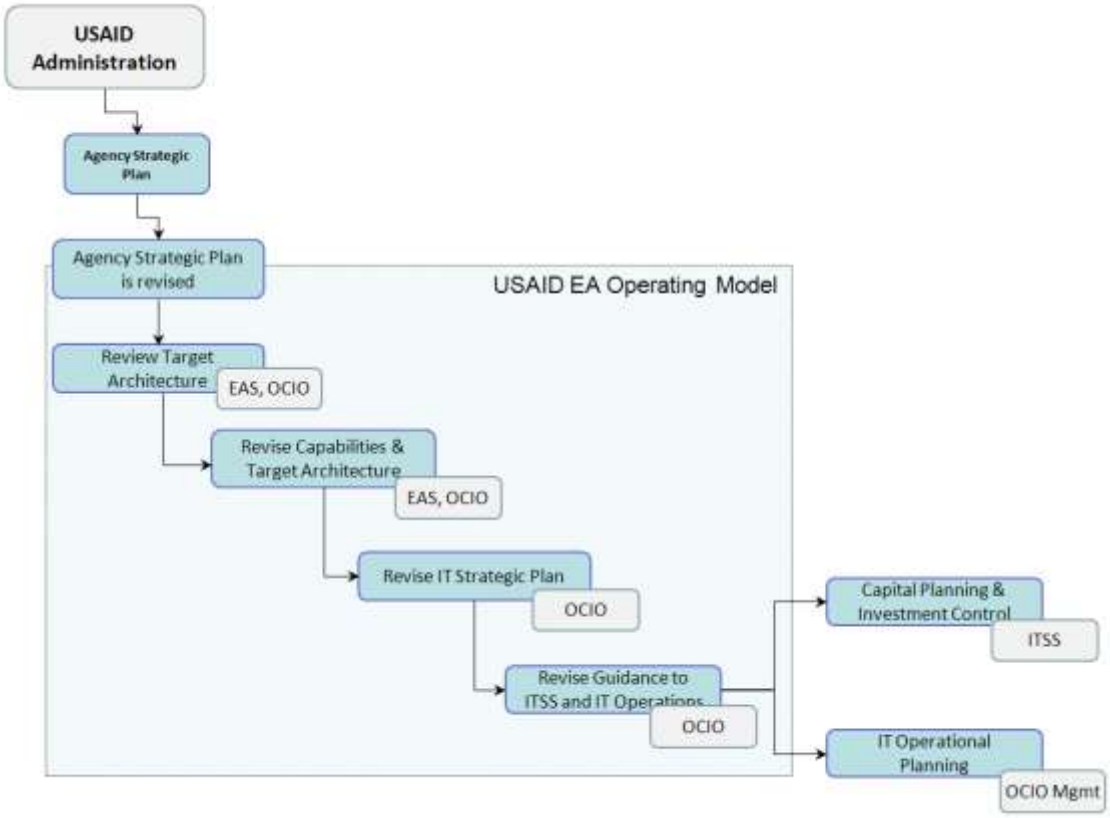


FIGURE 23: TARGET ARCHITECTURE MANAGEMENT PROCESS

The goals, timing, and scope of implementing the Target EA through improvements in either the "Strategy & Performance" or "Organization & Business" layers are change management initiatives for the Agency, because of their impact on organization, people, and processes. These layers directly address strategic outlook, performance management, business organization, and process improvements. Bringing change to these elements of the organization requires a commitment to Agency-wide communications, behavior management, and leadership that differentiates them from more direct, technology-focused initiatives and planning. There are generally significant elements of IT

Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

change involved in these initiatives as well, reflecting the observation above that the Agency is fundamentally an information-based organization.

The Target EA provides critical information to the OCIO organization for the annual refresh of the IT Strategic Plan. IT strategic planning takes the outputs of the segmentation process and utilizes them in establishing the long term evolution of the delivery of IT services to the Agency, generally in the form of a time-sequenced Enterprise Transition Plan (ETP). IT strategic planning then goes farther, deriving implications from this transformation that determine strategic goals relative to areas such as workforce management, financial management, customer satisfaction, and procurement management.

The Agency's IT investment management committee (currently the Business Transformation Executive Committee, supported by its IT Steering Subcommittee) also takes the segment identification and prioritization into account, along with the EATP, in determining the timing and priority for specific IT investments. By clearly understanding the rationale for each segment's capabilities, and the business needs they are addressing, the IT capital investment decision makers are better informed in making timing and scope trade-offs often required for funds allocation.

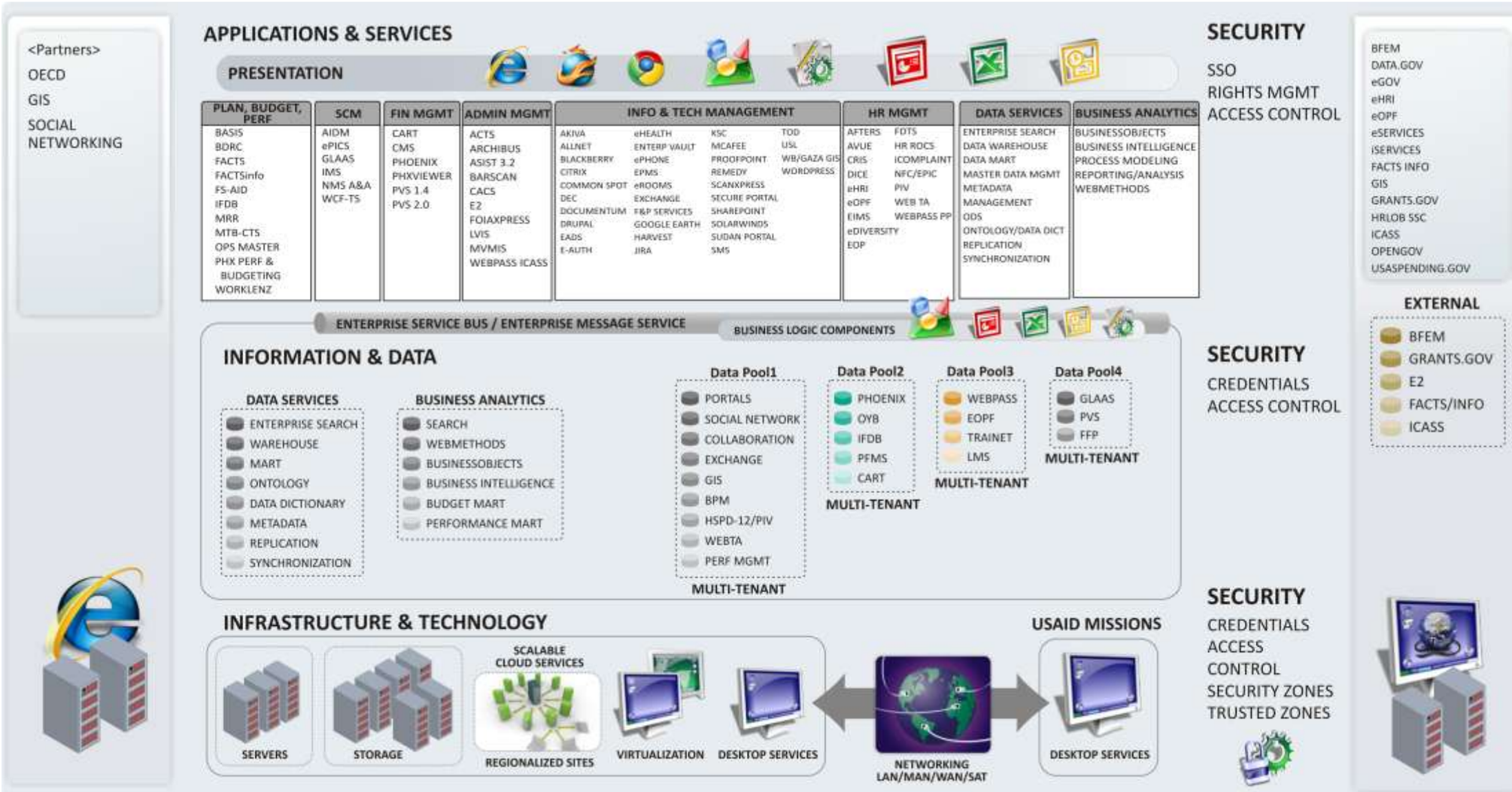
Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

11 APPENDIX C: USAID FY2013 TARGET ARCHITECTURE ARTIFACTS

This section contains the artifacts that detail the technology layers of the Target Architecture.

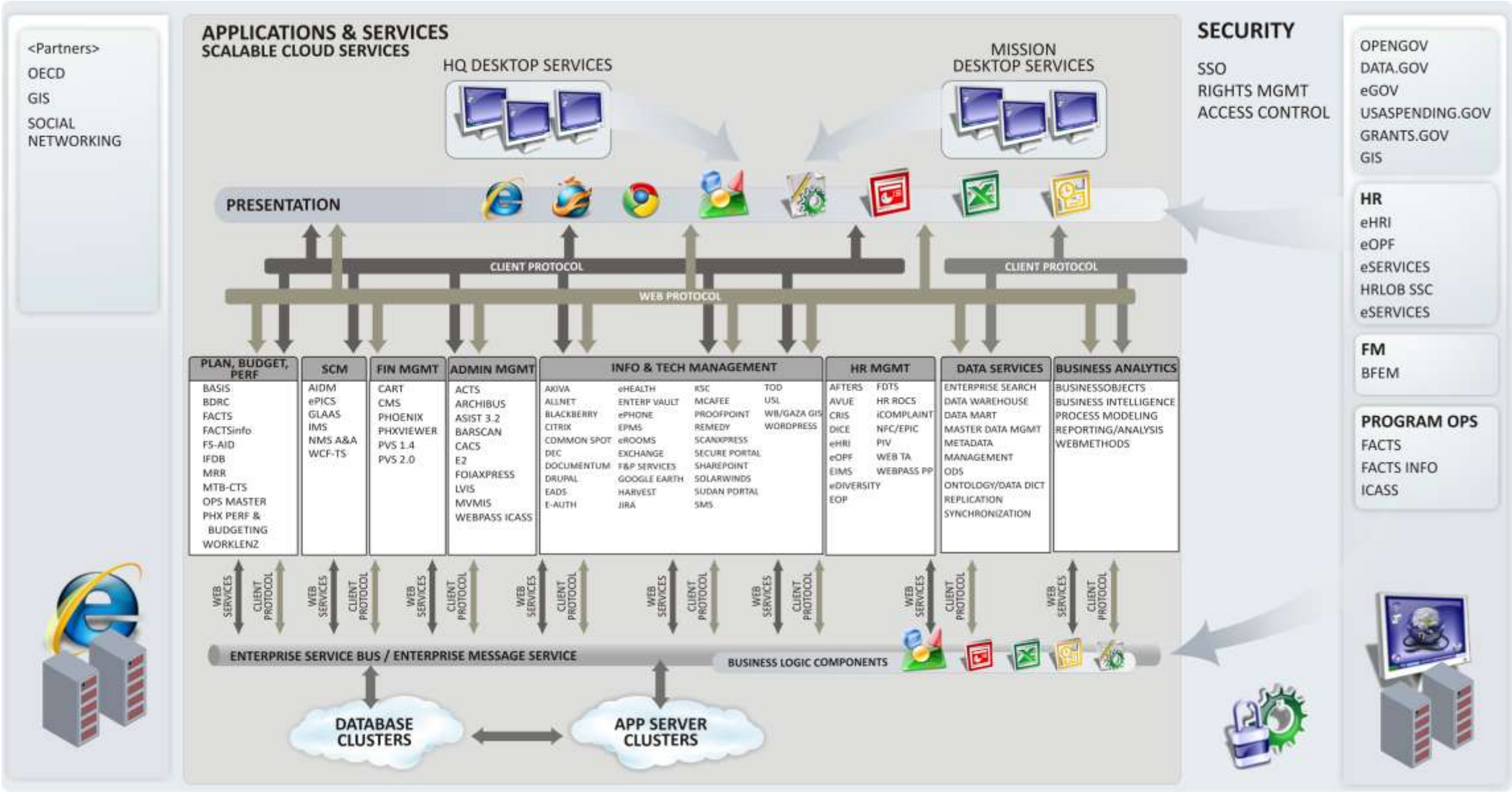
Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

11.1 USAID FY2013 TARGET TECHNOLOGY ARCHITECTURE DETAILED OVERVIEW



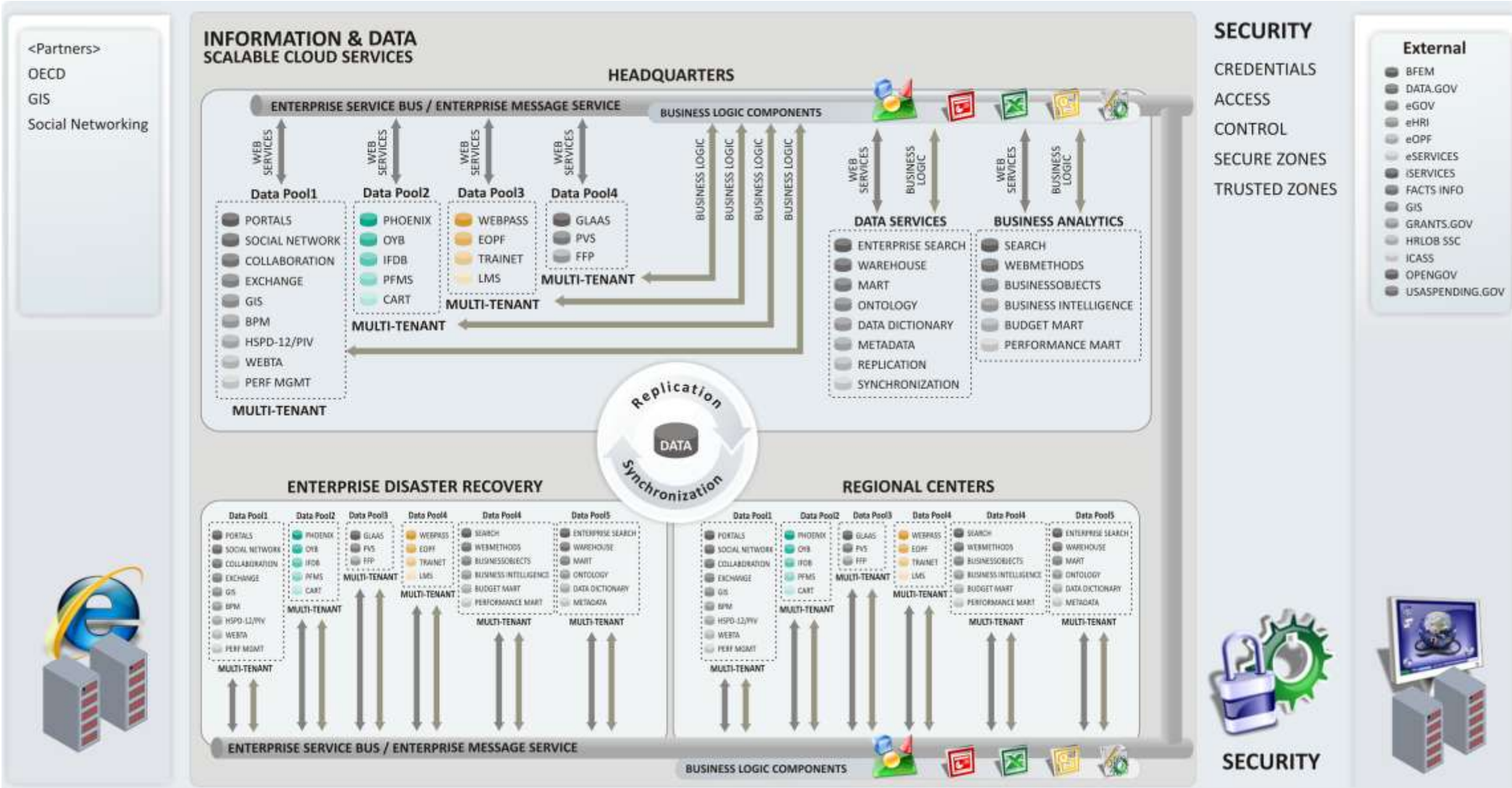
Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

11.2 USAID FY2013 TARGET APPLICATIONS & SERVICES MODEL DETAIL



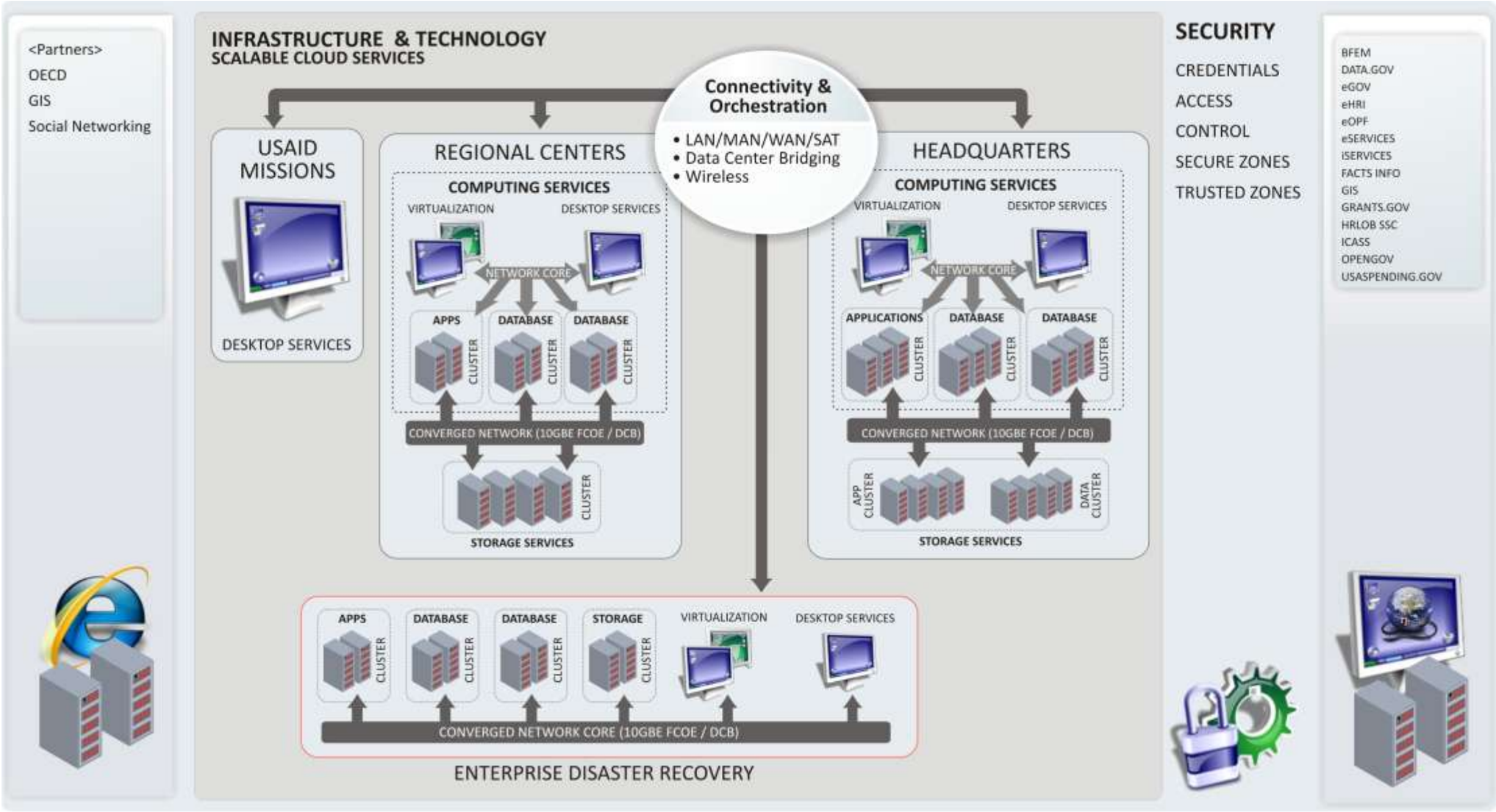
Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

11.3 USAID FY2013 TARGET INFORMATION & DATA MODEL DETAIL



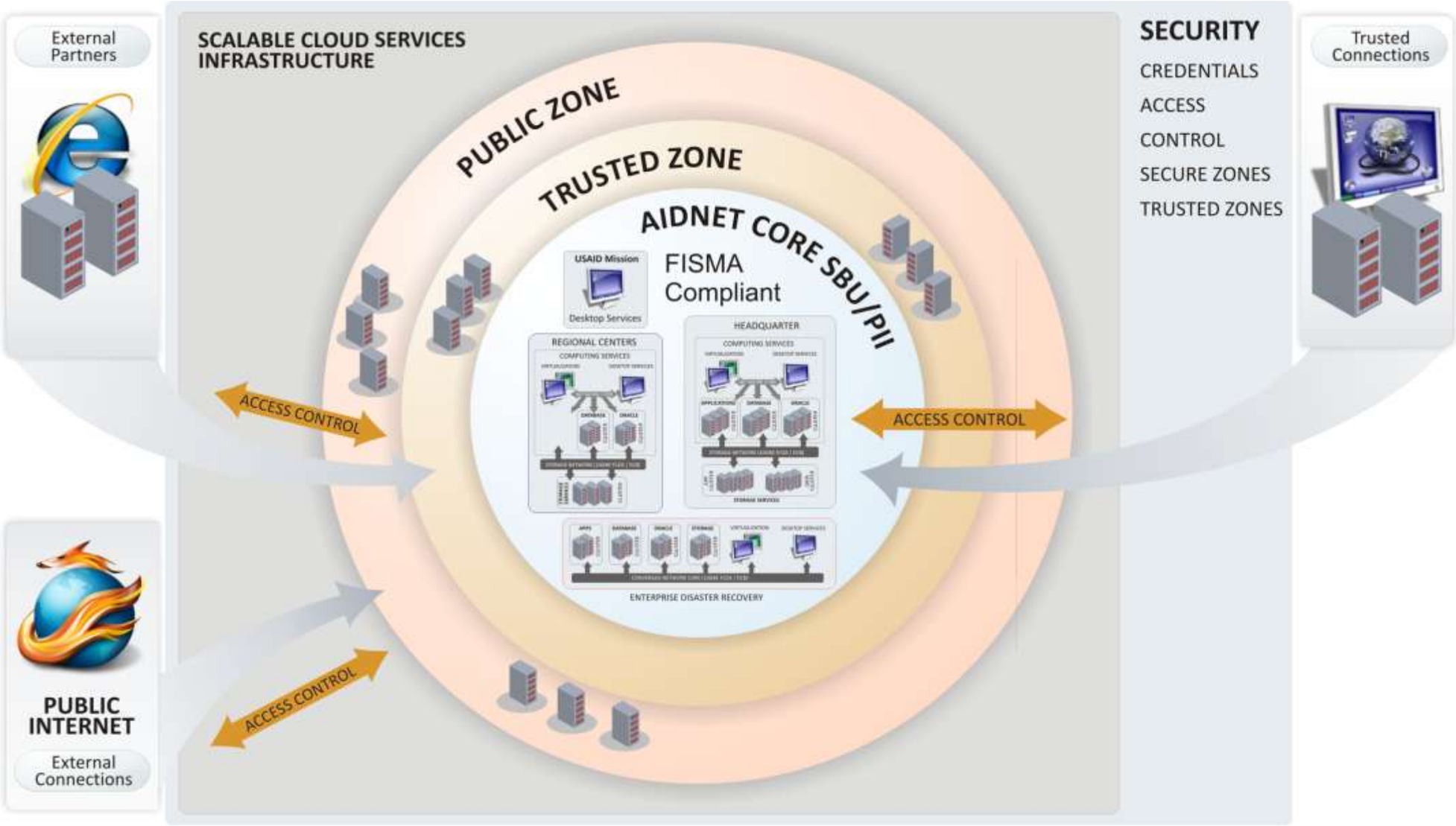
Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

11.4 USAID FY2013 TARGET INFRASTRUCTURE & TECHNOLOGY MODEL DETAIL



Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179

11.5 USAID FY2013 TARGET ENHANCED TECHNOLOGY INFRASTRUCTURE



Contact: Steve Jarrett, M/CIO
sjarrett@usaid.gov, 202.567.4179