ANE MIS/GIS PILOT SUPPORT PROGRAM

DEMONSTRATION REPORT

January 23, 2007

This publication was prepared by Booz Allen Hamilton for the United States Agency for International Development.

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I. Executive Summary

The U.S. Agency for International Development Asia and the Near East Bureau (USAID ANE) contracted with Booz Allen for a Management Information System/Geographic Information System (MIS/GIS) Pilot Support Project. A MIS/GIS was needed to assist the ANE Bureau to respond more effectively and efficiently to the increasing volume of requests for timely program results from external overseers and stakeholders. Furthermore, ANE wanted to demonstrate that such a system could be developed using commercial-off-the-shelf (COTS) technologies. The key findings resulting from the demonstrations showed that the MIS/GIS could make it possible to understand the impact of Bureau actions from start (planning) to finish (development results). It could also enable all Bureau staff to communicate the impact of their development achievements through powerful visual means. Acting in a complementary way with existing systems, the MIS/GIS can integrate and share information among functional systems for financial and procurement tracking, planning, and activity tracking.

For the project, Booz Allen conducted a needs assessment, followed by a system design, that led into a series of three hands-on demonstrations in the Booz Allen Service-oriented Architecture (SOA) Sandbox. Over a hundred interviews were conducted in Washington and select field missions to ensure the system design was grounded in the real needs of the potential users across the Bureau.

Key Findings from the Demonstrations

MIS/GIS closes the "air gap" for relating activities tracked in the field with stated development goals created through the Foreign Assistance Framework, thereby reducing significant staff hours in manually linking field activity progress with development results and strategic plans.

MIS/GIS effectively communicates program investments, beneficiaries and progress on maps or imagery, enabling all MIS/GIS users to visually communicate the impact of their programs.

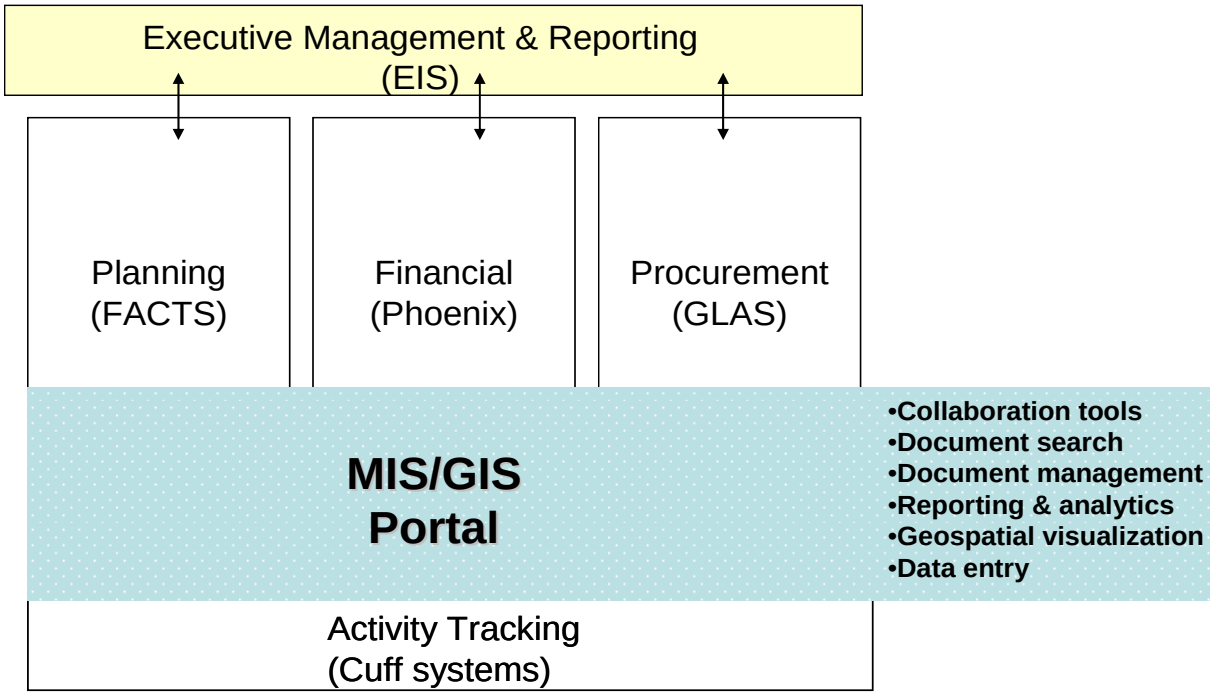
MIS/GIS provides complementary capabilities to existing systems of record through an information sharing and collaboration framework, thereby leveraging the investment in existing systems.

The MIS/GIS demonstrations showed that COTS technologies integrated in a common architecture could help the ANE Bureau to improve planning and reporting effectiveness and efficiency (likely at a lower system development cost than custom design). Furthermore, the approach to the demonstrations—continuously improving and adding functionality through an iterative development cycle—enabled the team to rapidly reconfigure the system in order to support the new Foreign Assistance Strategic Planning Framework.

Figure 1 depicts the concept of MIS/GIS as a complementary system for integrating programmatic and planning data with field-level activity data in order to support effective and efficient reporting. Demonstration participants-- primarily desk officers who often bear the main burden of answering questions from multiple sources--readily saw how and where MIS/GIS could bring real value to their day-to-day work. Additionally, demonstration participants readily recognized how MIS/GIS could strengthen USAID's

reputation for accountability with its oversight committees, other decision-makers and the U.S. public, including assisting the validation of completion of work by implementing partners in areas that are difficult or dangerousto visit in person. Finally, although Mission personnel were not able to attend the demonstrations, much of the discussion focused on how MIS/GIS would be used by Mission staff, especially where data is needed from Implementing Partners and where collaborative work with Washington staff is needed.

Figure 1. Concept diagram of MIS/GIS as complementary capability to existing systems of record



II. Overview & Technical Approach

As brought out in the Needs Assessment, ANE currently must rely on e-mail, phone, MS Word, and MS Excel to get its business accomplished. This has proven to be a significant labor drain on ANE personnel in Washington and the field. For example, time is lost in sharing information—either by phone or e-mail—between Washington and the field due to geographic time differences. Frequent calls from Washington to the field for information on activities' status takes time away from field officers engaging with local counterparts and partners on their substantive development work. A clearance process based on iterative e-mail exchanges can create significant delays and lead to version control problems. Furthermore, two key gaps exist in information-sharing: a "data gap" between Washington and the field, and a "knowledge gap" across Missions and regions that must learn from one another's field experience. They are manually overcome through the telephone, e-mail, and fax machine. The MIS/GIS system was designed to bridge these two gaps with a suite of tools integrated in a common environment, and an information architecture that seams information from corporate systems with data from Mission cuff systems. The MIS/GIS demonstrations served to test and validate the system design in order to define a robust set of requirements for a future system procurement and deployment.

Overview of the Demonstrations

Booz Allen hosted three MIS/GIS demonstrations: the first on July 19-20th, the second on August 23rd, and the third on November 16th 2006. Booz Allen designed these three demonstrations to allow USAID personnel from Washington and the field to experiment with and help shape the system as it evolved, in a hands-on test environment. The demonstrations were the means for USAID to provide immediate feedback on functionality needs that would make the MIS/GIS most valuable to ANE operations.

Booz Allen used feedback from the first two demonstration sessions to add and enhance the functionality of MIS/GIS for the final demonstration. From this iterative development process, it was clear that MIS/GIS can not only be a spatially-enabled reporting and planning system (as initially conceived), but also serve as an enterprise-wide tool for data and business operations integration. It can manage the data for and visually communicate the impact of field activities, support information sharing and collaborative work between Washington and the field or across offices, and promote integration across USAID's critical business functions (e.g. planning, financial, procurement, etc.).

Technical Approach for the Demonstrations

Booz Allen purposefully included as part of the demonstrations multiple COTS products in order to engage USAID staff in assessing the user "look and feel" and comparing the functionality offered by different products. This approach enabled Booz Allen to fully understand ANE's MIS/GIS functionality requirements, not just as system requirements but as operational interactions with the system. It also resulted in a more user-friendly system design that will be comfortable for USAID personnel, thereby helping to mitigate

the resistance to learning new tools and promote quicker adoption of new technologies and business processes.

A detailed technical description of each demonstration is provided in the Technical Appendix to this report. Building the MIS/GIS is best described as an integration of a wide collection of COTS products and custom code, each providing a basic functional service. Therefore, it is useful to provide an overview of what COTS products were used and how the software integration process was approached.

Products and Custom Applications

Working with several industry partners (IBM, ESRI, Microstrategy, MapInfo, and Sanz Earthwhere), Booz Allen integrated their software with other software Booz Allen had been working with in order to build the MIS/GIS system. Table 1 lists the many products and their associated functional service that was demonstrated in the MIS/GIS. While many software applications were shown in the first demonstration, the demonstration and associated evaluation process led to a core set of functional services and related software applications that achieved a highly robust MIS/GIS capability by Demonstration 3.

Table 1. Software products used for the MIS/GIS demonstrations

Product	Vendor	Functional Service	Demonstrations
Plumtree Portal Server	Plumtree (now BEA)	User Interface Portal	1 (1st day)
WebSphere Portal Server	IBM	User Interface Portal	1 (2nd day), 2, 3
Windows XP Professional	Microsoft	Client Operating System	all
Internet Explorer	Microsoft	Client Web Browser	all
Active Directory	Microsoft	User Management	1 (1st day)
Domino	IBM	User Management	1 (2nd day), 2, 3
Microstrategy	Microstrategy	Business Intelligence	all
Chiliad Search	Chiliad	Enterprise Search	1 (1st day)
OmniFind	IBM	Enterprise Search	2, 3
Documentum	EMC[2]	Enterprise Document Management	1 (1st day)
DB2 Document Manager	IBM	Enterprise Document Management	3
ArcIMS, ArcSDE	ESRI	Geospatial query	1 (2nd day), 2, 3
MapInfo LIC	MapInfo	Geospatially enabled Reporting	all
Earthwhere	SANZ	Imagery Provisioning	3
Lotus Collaboration Suite (Sametime, QuickPlace)	IBM	Collaboration	1 (2nd day), 2, 3
Systinet Server	Systinet (now HP-Mercury)	Middleware	1 (1st day)
Oracle Database	Oracle	Database	all

In addition to the products described above, Table 2 lists several custom applications developed during the Demonstration to support customized functions for MIS/GIS.

Table 2. Custom Applications Developed for MIS/GIS

Application	Function provided	Dependent technologies
USAID Business Layer	USAID Planning Data Entry	Struts, Hibernate frameworks
Geospatial Query	Searching features on a map; creating new features	ESRI ArcIMS, ArcSDE, JDBC

Integration Process

Booz Allen tested two main points of data integration using various software applications: (A) the User Portal and (B) the Database. A third approach was tested using uniquely-integrated applications. A fourth integration approach, Service-oriented Architecture is recommended for a Bureau or Agency-wide implementation.

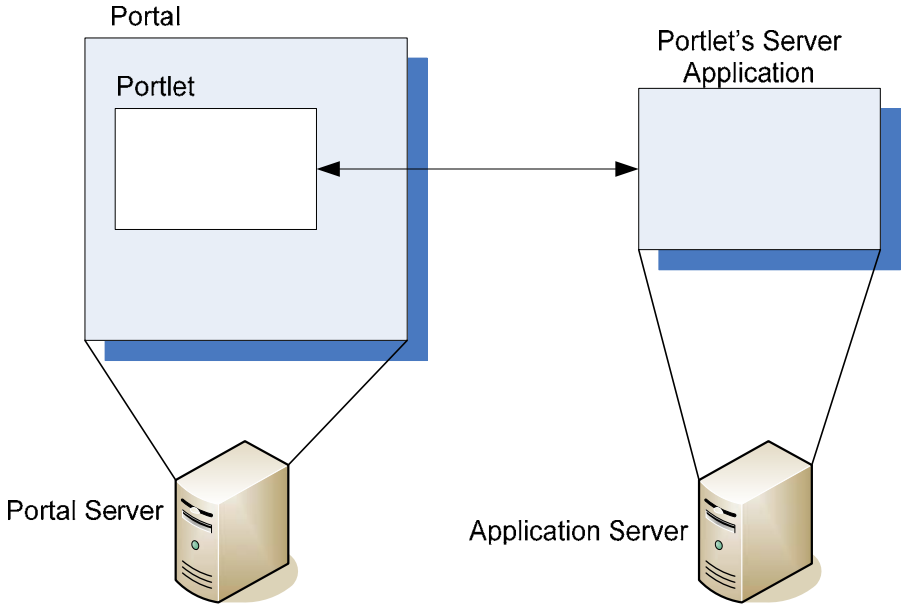
A. Portal Integration

There are three basic methods of integration between a Portal and another application.

Portal Integration Method 1

In the first case, which was most common, applications integrate with the Portal by deploying a lightweight user interface component (a Portlet) into the Portal environment. The user interface component (the client) handles display and user interface events, and interacts with a server component, running on another machine (the server). The server provides more complicated processing, such as complex business logic and database access. Figure 2 depicts this general structure.

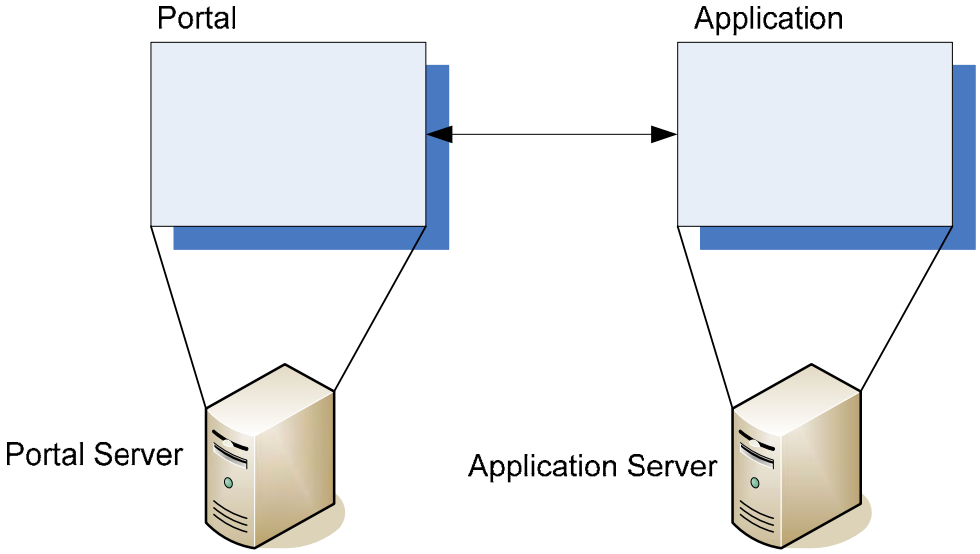
Figure 2: Portal Integration Method 1



Portal Integration Method 2

In the second case, no user interface component is deployed to the Portal environment. Rather, interaction occurs directly between the relevant component and the Portal. In particular, the Portal and User Management systems integrated in this way. See Figure 3.

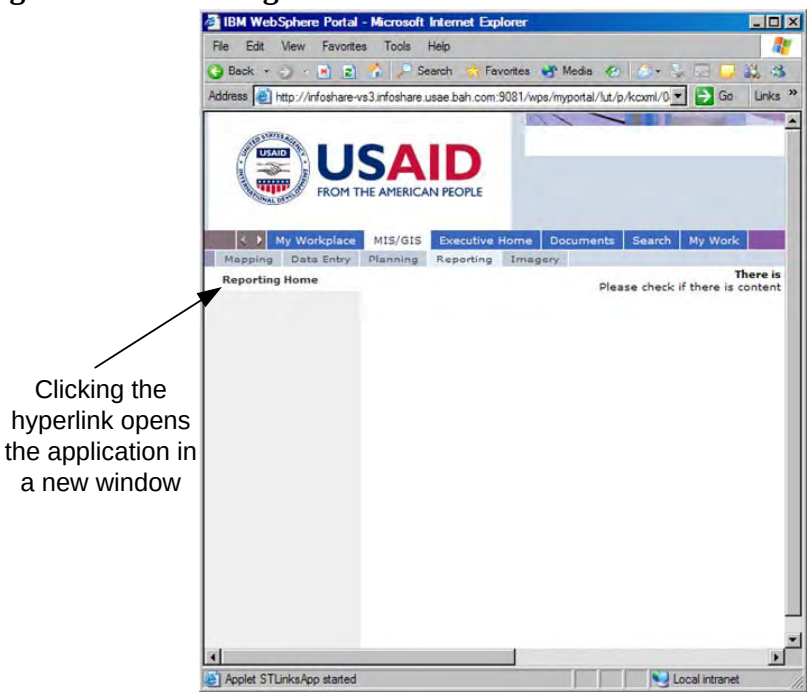
Figure 3: Portal Integration Method 2



Portal Integration Method 3

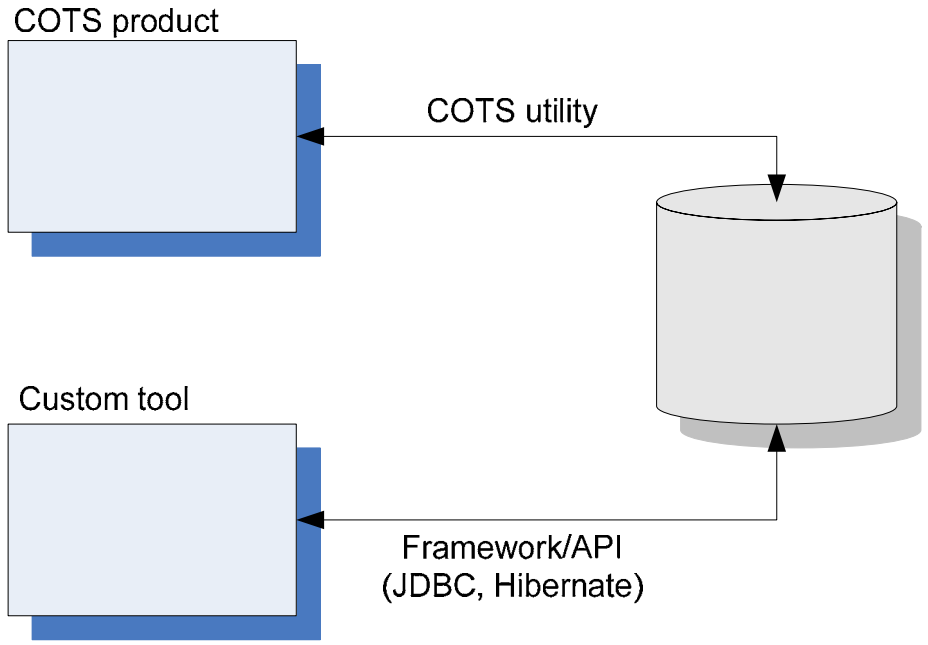
When integrating some products, notably Microstrategy, Earthwhere, and the USAID business layer, the MIS/GIS Team did not deploy a user interface component into the Portal Environment for technical reasons. To be more specific, deploying a lightweight user interface to the Portal environment (as described in Method 1) requires developing a user interface with proprietary Application Programming Interfaces (API). In cases where this method was used, either the vendor did not provide a compliant user interface (Microstrategy, Earthwhere), or due to time constraints the user interface was not developed to be compliant (USAID Business Layer). To circumvent this issue, a hyperlink was provided in the Portal that, when clicked, opened up the application's user interface in a separate window. See Figure 4.

Figure 4: Portal Integration Method 3



B. Database Integration
Some applications required direct access to the USAID database: Microstrategy, ArcSDE, Geospatial Query, and the USAID business layer. COTS products that required database access provided utilities for database connection. Custom applications accessed the database via standard Java-based frameworks and APIs as shown in Figure 5.

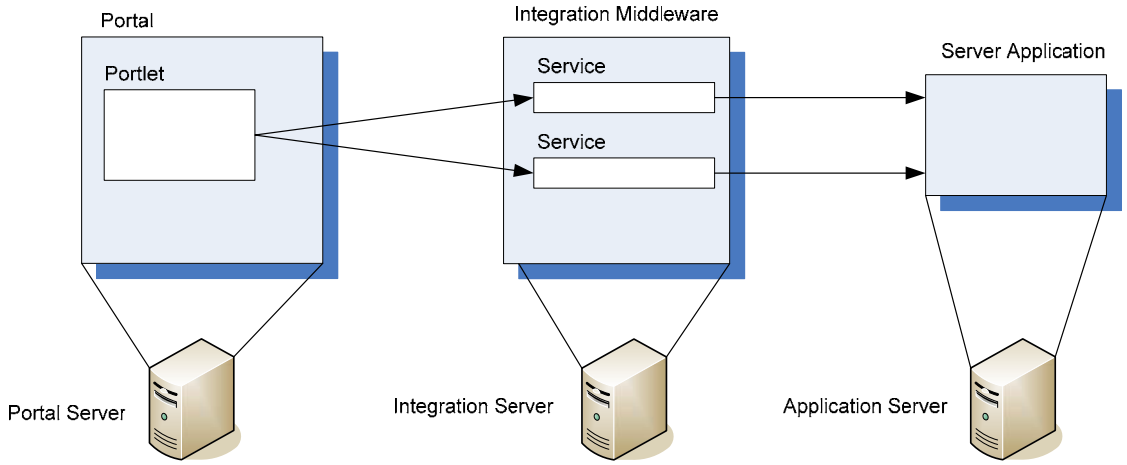
Figure 5: Database Integration Methods



C. MapInfo and Microstrategy Integration
The integration between the MapInfo LIC and Microstrategy is a unique case. MapInfo and Microstrategy are business partners, and the MapInfo LIC product integrates directly with Microstrategy. To be more specific, the integration provided the capability to perform mapping operations from within the Microstrategy user interface, and users were able to perform some business intelligence functions from a map. Thus, the line between geospatial functions and business intelligence functions was blurred.

D. Services-based Integration
In the final integration method for the MIS/GIS, an integration layer is deployed to serve as an intermediary between the Portlet and its corresponding server application (see Figure 6). This type of integration, characteristic of a Service-oriented Architecture, is the most flexible approach, because it decouples the server application from the user interface. As a consequence, a new server application may replace an existing server application, without affecting the user interface, and vice versa. Often, the connection of intermediate services to server applications is facilitated by middleware, such as an Enterprise Service Bus.

Figure 6: Services-based Integration



III. Demonstration Findings

Demonstrations

As noted above, the demonstrations were designed to give USAID participants an opportunity to "play in the sandbox" to provide feedback on all aspects of the demonstration system through an interactive user experience. The Booz Allen team collected the feedback and used it to make improvements and add functionality in the next iteration of the demonstration system.

A wide cross-section of users were able to evaluate the system throughout the three demonstrations. This included numerous Subject Matter Experts who generate reports and respond to data calls, Program Office staff who develop the Bureau's strategy and plans, and technology experts (software developers, database administrators, etc.). Although representatives from the field were invited and interested in participating, workload and travel costs precluded their participation.

In summary, the three demonstrations were designed to gain maximum feedback on desired functionality and user experience of the MIS/GIS system. This served to not only provide a working MIS/GIS demonstration system, but also a robust set of requirements to support a future system deployment.

July 19 & 20 –Demonstration 1 Findings

The response of the USAID evaluators was positive. Their evaluation comments revealed that the functions demonstrated by the system were highly relevant to their work and information needs. In particular, functions such as document management, report creation, geospatial visualization, document search and collaboration capabilities were noted to have significant potential in assisting USAID with managing day-to-day business and reporting on development results.

Other comments from the USAID participants highlighted the fact that a common user interface was preferred and that the ad-hoc report creation needed to be simplified. Users requested a data entry capability and wanted the ability to assure and validate data quality entered into the system. The participants noted that the search results were helpful, but more information would help refine the search capability (e.g., relevancy ratios, a self-correcting "did you mean" feature, etc.). The geospatial visualization impressed the USAID participants, but they wanted to see a more enhanced image for the next iteration of the system. Users also wanted a function to be able to "drill down" in the business data and, potentially, a dashboard function that would aggregate data in order to quickly report on progress against financial status and program results indicators.

August 23 –Demonstration 2 Findings

Capabilities. Many of the technologies and capabilities shown in Demonstration 2 were well-received as "very useful." Users were also pleased that their feedback had been incorporated to help design and refine the system. Capabilities such as document workflow and inserting the technology to mirror the workflow was especially welcome. For example, the USAID participants liked that document edits were not final until someone in the approval chain approved the edits; that the user could submit the document for approval or save it as a private draft if it needed to be worked on further; that a user could add a document approver (as well as a short description of the document, the language it is written in, etc.); and, that the user could get a quick preview of the document history, including who created it, who last modified it, and the history of the editing trail.

Reporting. Participants showed great interest in the *ad hoc* reporting functionality. In this version of the demonstration, Booz Allen described the pros and cons of using a COTS reporting tool such as Microstrategy, which was designed for "power users" as well as novice users, for ad-hoc reporting vs. a custom-developed tool that could be designed specifically for novice users. One strategy with a COTS product would be a "train the trainer" approach, i.e., to train a few USAID staff as software experts and have them serve on a day-to-day basis as creators of report templates to be used in the portal. If USAID decided to invest in creating a customized reporting tool to work inside the portal, then all MIS/GIS users could create their own ad-hoc report templates. (Note: The downside of a custom reporting tool is the continued reliance upon the developer for future enhancements and maintenance of the tool).

Information Governance. The issue of information governance generated considerable discussion focused on whether the Bureau (or Agency) should standardize program terminology (such as "project" or "activity") and require uniform use of it. The positive side of a standardized approach would be the ability to aggregate and compare information across Missions and technical areas. Some participants warned that centralization and standardization may cause the Agency to overlook important nuances of development interventions that are significant below the Agency level, i.e., at the country, region or technical level. Booz Allen assured the USAID participants that the technology could support whichever direction USAID wanted to go, but that USAID

must decide the level at which they needed and wanted to govern data standards. (By Demonstration 3, some of this standardization issue became moot, as the newly appointed Director of Foreign Assistance implemented a new strategy planning framework at USAID and the State Department specifically to standardize planning and results terminology and metrics).

Another key data governance issue discussed was that of "semantic interoperability." A powerful example of the systemic issues arising from the lack of semantic interoperability is that of associating an activity with multiple benefits. For example, an irrigation project may be funded as an environment activity but may also have positive impact on public health. The "semantics" of associating and counting the irrigation project as an environment activity versus a public health activity has been a challenge for USAID for many years. The cascading or "multiplier" effects of development interventions are critical to understanding both the development process and the total impact of foreign assistance in any country or region. Booz Allen assured the participants that the MIS/GIS data model and technology could be designed to handle semantic interoperability. The issue was not one of determining appropriate "pseudonyms" so much as tagging or coding the data linkages in terms of their priority impacts (e.g., primary or secondary relationships). This is particularly important in any effort to associate data in a new system like the Foreign Assistance Coordination and Tracking System (FACTS) or MIS/GIS with older activities that are "grandfathered" in from predecessor systems.

Unstructured Data. The USAID participants also highlighted one of the main benefits of the system as being able to search large amounts of unstructured data (i.e., reports, pictures, PowerPoint presentations, etc.) stored anywhere (on the web or in a specified drive on a server, such as the "P:" drive). The participants believed this capability would be immensely beneficial. Finally, the group noted that all technology changes must be followed by a change in business process to allow the system to be successfully implemented.

November 16 – Demonstration 3 Findings

Once again, participants expressed strong approval of the prototype system – noting that it showed considerable design progress since the second demonstration. They were impressed that MIS/GIS had already incorporated the Foreign Assistance new strategic planning framework taxonomy into the data model of the system design. The participants also noted that "GIS is incredibly important for security and defense, humanitarian or emergency assistance," and reacted positively to the mapping functions of the system. Additionally, they underlined the importance of activity-level data to effective reporting and welcomed the MIS/GIS' central design feature of reaching into field cuff systems for activity-level data.

MIS/GIS Reach. Participants emphasized that the MIS/GIS system capabilities offered potentially significant improvements in terms of time savings, archives, speed, and responsiveness; however, they warned that unless the system is implemented Agency-wide, the benefits wouldn't be realized because of the parallel and duplicative systems

and the potential business process conflicts. They also recognized the need to resolve parallel process and policy questions in conjunction with system implementation in order to ensure that the system is sustainable (e.g., policy directives on field-level data gathering, processing data geospatially, information security, progress against targets and indicators, common standards and definitions when entering data, etc.). Booz Allen stated that corporate experience shows that, unless large technology projects are implemented hand-in-hand with large-scale business process changes, the technology projects fail. So, the challenge for USAID will be to ensure that the technology is tailored to USAID needs, implemented agency-wide, and accompanied by corresponding business process changes.

One capability that users highlighted as useful to incorporate in the future would be an ability to link the search capability with a geographical identification capability. While COTS technologies exist that can support this desired function, there were resource and time constraints to adding such functionality for Demonstration 3.

IV. Implications

Participants' Recommendations.

Participants' positive response to the demonstrations led to their recommendation that the MIS/GIS functionality—if implemented at the Agency-wide level—could help transform USAID's credibility as both an action agency and knowledge leader. Users recognized the need for both vertically linking mission and headquarters data ("bridging the data gap") and horizontally linking the field missions' learning process with the rest of the Agency ("bridging the knowledge gap"). Furthermore, in order for MIS/GIS to succeed in large-scale operation, users recommended the need for a Program Management Office (PMO) to provide high-level support and ensure buy-in and ownership from management. Finally, participants recognized the need to resolve parallel process changes and policy questions in conjunction with system implementation to ensure sustainability and survival of the system's useful functions and capabilities.

System Development Implications.

In carrying out three demonstrations of system functionality, Booz Allen also has identified several key implications for future system development:

- MIS/GIS needs additional review by field personnel. Although the initial MIS/GIS application was reviewed by a meaningful cross-section of headquarters-based personnel, acceptance by field personnel--those who will be closest to the primary data generation functions-- is essential for the MIS/GIS to achieve its full potential. There may be risk of failure without this review.

- Role-based data entry and data access protocols are important features that need additional refinement. Roles could be mapped to specific operational responsibilities and technical functions within the MIS/GIS application. Additionally, security and

access authorities would also be assigned by roles, ensuring that data is appropriately protected so that those who have the need to share the information can, but the system is not open to free access by everybody.

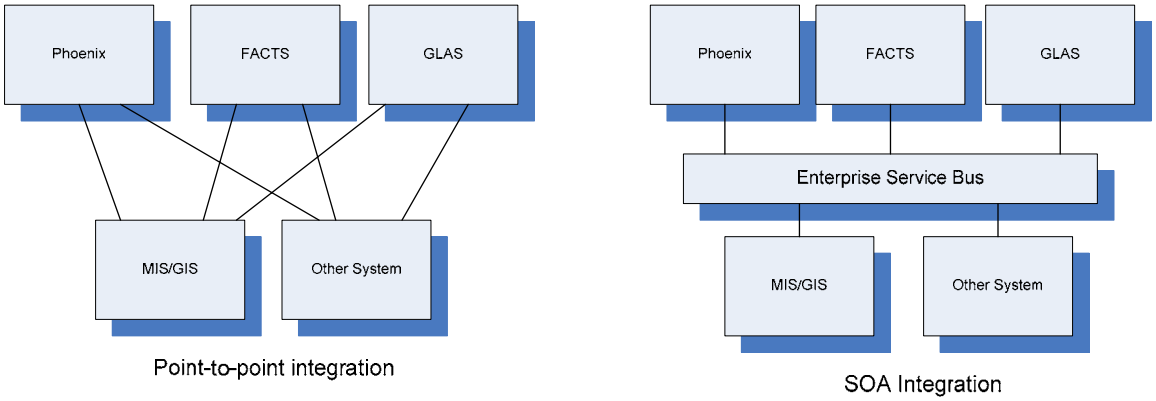
- To assure data quality and limit the amount of bad or ambiguous data entering the reporting chain, it may be useful to adopt a formalized *application schema* based on the data model, with specific extensions for specific application domains (e.g., wastewater, education, economic growth, etc.). The application schema is typically written in a markup language (e.g. Geographic Markup Language, Extensible Markup Language [XML]) and specifies the classes of features that might occur in a specific discipline (e.g. public health, sanitation, economic development) and the relationships between these features. More information, with links to examples can be found at http://en.wikipedia.org/wiki/GML_Application_Schemas.

- The need to resolve Agency-wide ambiguities in terminology and to better coordinate between multiple systems points to the importance of creating a forum, working group or governance body to address these issues. This group could address many of the technical issues, such as semantic ambiguity and application schemas, but it could also deal with policy issues such as system compliance or a protocol for data collection standards. It could develop a flexible approach that allows USAID staff and Implementing Partners across multiple domains to tag the same projects with descriptive metadata in ways that are meaningful to their specific contexts.

- There is also a need for establishing a single, enterprise-wide geospatial data environment that all MIS/GIS tools, and other enterprise applications using geospatial data can access. This could save the Agency resources by acquiring and maintaining worldwide geospatial data once, while reaping the benefits of its application many times over.

- Implementing MIS/GIS according to a Service-oriented Architecture (SOA) approach is the most desirable solution, but would require further enhancement of existing systems. In particular, each external system that MIS/GIS interacts with (e.g. Phoenix, FACTS, GLAS, and any other system) should expose its functionality via standard Web Services protocols (I.e. SOAP, WSDL). Further, integration middleware such as an Enterprise Service Bus, can allow existing systems to discover and access information in other existing systems in a non-invasive fashion. This would be a more flexible and maintainable approach than the conventional point-to-point integrations currently implemented at USAID (See Figure 7).

Figure 7: Point-to-point vs. SOA integration



Summary. In summary, the implications are offered as important components of an approach to a final Bureau or Agency-wide deployment of MIS/GIS. The MIS/GIS demonstrations proved that COTS technologies integrated in a common architecture could help the ANE Bureau improve planning and reporting effectiveness and efficiency (likely at a lower system development cost than custom design). Furthermore, the MIS/GIS demonstrations showed it to be a complementary system to existing functional systems for financial, procurement, planning, and activity tracking. In fact, the MIS/GIS serves to bridge two critical information-sharing gaps at USAID: a "data gap" between Washington and the field that is important for maintaining accountability, and a "knowledge gap" across Missions and regions that must learn from one another's field experience. Additionally, through the demonstration process, we learned that a successful implementation of MIS/GIS—Bureau or Agency-wide—will depend upon the development of a shared vision around how USAID needs to function in the foreign assistance realm (business process) and how technology can help them get there (data architecture). People, process, and data governance issues are as central to a successful information management system as physical infrastructure and technology. However, with a shared vision and the strategic approach that MIS/GIS enables, USAID can transform itself into a high-performing agency of both action and knowledge leadership.

V. Technical Appendix

July 19 & 20 –Demonstration 1

Features

Booz Allen hosted the first pilot demonstration of the ANE MIS/GIS system in a two-day event on July 19th and 20th. Several participants attended from USAID, representing ANE/IR, M/PMO/BTIP, ANE/SPO, and M/IRM.

The first demonstration presented two MIS/GIS systems for evaluation. Each system was developed using different COTS products that gave USAID evaluators different user interfaces and functionality. The different vendor options enabled USAID to provide immediate feedback on which "look and feel" was preferable.

Demonstration 1 included capabilities to find and manage documents, collaborate locally and globally, and to use reporting and search tools to respond to information requests quickly and accurately.

USAID evaluators accessed the MIS/GIS portal through Internet Explorer. In the portal, they found tools for document management, document search, dynamic report generation, map/GIS reporting and online collaboration.

There were two days of presentations, hands-on scenarios, and "off-roading" to allow users to explore the systems on their own. USAID evaluators got to try out products using USAID data and documents provided by USAID Missions in Indonesia, West Bank/Gaza and Afghanistan. The evaluators had the opportunity to experiment with and test instant creation of maps of Afghanistan that showed where schools were built or refurbished in the context of ethnic regions. Additionally, the MIS/GIS mapping tools showed the data behind the schools shown on the map, to include the name of school, the number of students attending, and gender percentages of the students attending.[1]

Technical Description

As noted, each day of the first demonstration showcased a different MIS/GIS system, each having a different assortment of COTS products. The first day showed an implementation based on the Plumtree portal product, while the second day focused on an implementation based on the WebSphere portal.

Plumtree Implementation

[1] While the Afghanistan school data, including location and school name, was actual data provided by the Mission, Booz Allen created additional fictional information such as number of students attending and gender percentages in order to provide a more meaningful experience to the participants.

All software used in this implementation was hosted in the SOA Sandbox. This implementation integrated products from a wide variety of vendors. Specific products used were Plumtree Portal, Active Directory, Microstrategy, MapInfo, Documentum and Chiliad Search. Specific application integrations and their integration approaches (described in the Introduction) are given in Table 3.

Of particular interest is the integration of Documentum into the Portal. The Booz Allen team deployed a simple custom-developed user interface to the Plumtree Portal. This Portlet invoked generic Document Management web services, hosted on the Systinet server, to perform basic Document Management tasks. Using Systinet, these web services were integrated with the Documentum server application to form a complete solution.

Table 3. Plumtree COTS integration for Demonstration One

Products	Integration Method
Chiliad/Plumtree	Portal Integration Method 1
Microstrategy/Plumtree	Portal Integration Method 3
Documentum/Custom code/Systinet/Plumtree	Services-based Integration
Plumtree/Active Directory	Portal Integration Method 2
Microstrategy/MapInfo	Microstrategy MapInfo integration
Microstrategy/Oracle	Database Integration (utility provided)

WebSphere Implementation

This implementation focused on products from fewer vendors—only IBM and ESRI. IBM and ESRI, with guidance from the Booz Allen team, developed the initial implementation. The application included WebSphere Portal, Domino Server, Document Management and Search applications bundled with the Portal, Lotus Collaboration suite, and the Geospatial Query application. Integration approaches are provided in Table 4.

Table 4. Websphere COTS integration for Demonstration One

Products	Integration Method
Document Management/WebSphere Portal	Portal Integration Method 1
Search/WebSphere Portal	Portal Integration Method 1
Collaboration Suite/WebSphere Portal	Portal Integration Method 1
Domino Server/WebSphere Portal	Portal Integration Method 2
Geospatial Query/Websphere Portal	Portal Integration Method 1
Geospatial Query/Database	Database Integration (Java API)

Technical challenges and successes

IBM products integrated with relative ease because of the similar product line. Creating simple geospatially-enabled reports was straightforward with the Microstrategy/MapInfo integration. However, more complex operations required significant customization; these were not accomplished until Demonstration 3.

The biggest challenge in preparing for Demonstration 1 was uploading useful data to the database. This proved to be an extremely difficult process due to different format standards, and inconsistency in data content across the Missions. The challenges are

further detailed in Booz Allen's MIS/GIS Standards and Interoperability Report (separately submitted to USAID). In the end, the MIS/GIS team manually entered fictional data to add to the Mission data in order to create reports with sufficient content of interest such as number of students attending a school and the gender makeup of students attending a school. ANE will need to establish standards for describing the type of data that needs to be captured and maintained in the field in order to ensure relevant reports may be generated through the MIS/GIS tool suite.

August 23 –Demonstration 2

Features

On August 23, 2006, Booz Allen hosted the second of three pilot demonstrations of the ANE MIS/GIS system. Seven participants attended from USAID – four from ANE/SPO, one from M/IRM, one from ANE/TS, and one from ANE/MEA.

For this iteration of the system, Booz Allen incorporated feedback from the USAID participants from the first demonstration. In particular, the developers:

- Brought everything into the IBM Websphere portal for a common user interface;
- Created an approval workflow within the Document Management function;
- Provided enhanced search tools;
- Added simple form and map-based data entry;
- Added Indonesia and West Bank Gaza data to the previous Afghanistan data; and,
- Provided imagery, vector data, and zoom levels to enhance the geospatial capability.

USAID evaluators clicked on tabs in the portal to get to the tools for document management, document search, dynamic report generation, map/GIS reporting and online collaboration. As with the first demonstration, this workshop included a presentation on the updated capabilities of MIS/GIS, hands-on scenarios, and "off-roading" to allow users to explore the systems on their own.

The need to display activities on a map required Booz Allen to develop a new business entity that the developers called a "feature", which can be thought of as the tangible evidence of a development output. Features serve three main purposes for the MIS/GIS: basic storage structure for the relevant data of specific feature types (e.g., schools, clinics, etc.); a way to store the geospatial coordinates of the structures/actions for which MIS/GIS maintains data; and, as a way to visualize development activities on a map. This association of objective to "feature" spatially enables all USAID business data.

Midway through the MIS/GIS development, USAID underwent organizational reforms and the adoption of a new State/F-sponsored strategic planning framework. It was clear that the MIS/GIS needed to be flexible enough to accommodate this new taxonomy and terminology. In the second demonstration, Booz Allen discussed how they created the system using a portal and a Service-oriented Architecture approach precisely for its flexibility.

In Demonstration 2, USAID participants saw that upon logging in, the system would determine what access to data and functions were available based on the user ID using a system authentication process. This served to address concerns about future users gaining access to information they did not have a need to know, such as Implementing Partners seeing data beyond their own activities. Participants spent some time playing with the different functionalities of the system in order to work through scenarios such as Afghanistan education expenditures, site visit selection and preparation for a visit by the Secretary of State, and drafting a report on the success of democracy-building activities in West Bank/Gaza. Through the scenario exercises, users were able to view recent imagery and associated data in West Bank/Gaza, use advanced search tools, and create and edit reports.

Technical Description

In light of user feedback from Demonstration 1, the MIS/GIS team decided to forgo further development of the Plumtree Portal and focus on enhancing the WebSphere Portal instead. In order to provide a robust hosting environment, the MIS/GIS team decided to host the WebSphere Portal in the SOA Sandbox. This required recreating the Portal from Demonstration 1 in the Booz Allen environment. Thus, all IBM products needed to be installed, integrated, and configured appropriately. Based on user feedback, the MIS/GIS team customized the Portal User Interface to accommodate USAID user preferences.

New capabilities required various efforts. The advanced search tool, OmniFind, was installed and integrated with WebSphere Portal using Portal Integration Method 1. Adding the imagery capability required uploading imagery and further customization (manual editing of configuration files) to the ESRI toolsets.

Technical challenges

Technical challenges assumed two forms for this Demonstration. The first difficulty encountered was in hardware resource constraints. There were too many applications and not enough machines. As a result, the portal ran very slowly, causing some frustration among users. In an operational implementation of MIS/GIS, it will be important to accurately assess the load requirements to ensure appropriate sizing of hardware resources.

The second difficulty in Demonstration 2 was the same one encountered throughout the Demonstration phase—insufficient relevant business data. As done in the first demonstration, a significant amount of fictional data was manually entered in the database. For this Demonstration, Booz Allen added a large number of geospatial data points and financial data for activities.

November 16 – Demonstration 3

Features

On November 16, 2006, Booz Allen hosted the last of three pilot demonstrations of the ANE MIS/GIS system. Thirteen participants joined from USAID & State, representing:

ANE/SPO (3) ANE/SAA (2), EGAT/IE/ICT, EGAT/NRM/LRM, AFR/SD, DCHA/OFDA (2), SEC/PSP, State/F (2).

Government changes in the strategic planning and reporting approach for USAID pointed to the need to modify the USAID ANE MIS/GIS project to become consistent with this new approach. The system was reconfigured to reflect the new Foreign Assistance Strategic Planning Framework. The final demonstration presented a complete implementation of the IBM Websphere COTS integration, similar to the second demonstration.

Based on feedback from the second demonstration, Booz Allen:

- Included a planning capability;
- Built in a data entry function;
- Aligned activities to the new Foreign Assistance Strategic Planning Framework;
- Enhanced the reporting and document search functions; and,
- Included collaboration tools, among other features, in this version of the system.

The system used financial data from the West Bank Gaza and Indonesia cuff systems. In this version of the demonstration, participants were presented the latest capabilities and functions of the system, and were able to "play in the sandbox" in the latter part of the session.

Demonstration 3 included:

- Linking cuff data to the Framework;
- Drilling up and down the Framework structure associating financial data at all levels;
- Showing the mapping from the legacy Strategic Objective structure to the new Framework; and,
- Illustrating how multiple Program Areas or Program Elements may be associated with a single activity.

In this last demonstration, Booz Allen was able to learn a great deal by working with cuff data from multiple Missions, and found that having structured and original source data is critical to being able to interoperate among the systems.

Users enjoyed the "MapIt" functions within the reporting tool, and the ability to visualize the impact resulting from overlaying different activities and different data sets together within the geospatial visualization tool. Booz Allen listened to users' feedback from Demonstrations 1 and 2 that ease of use in the mapping function was key, and that it should be accessible to users without GIS expertise. USAID participants also appreciated the flexibility of the system to manage the multivariate types of data in the model such as targets, indicators, tracking implementing partner in combination with data associated with activities, program areas, etc. Using and analyzing this data, users can then find out if things are NOT happening and then discover *why* through additional probing and analysis (e.g., Is it because of lack of resources or lack of work or a security issue, etc.). The ability to reach into activity-level data is a gap in today's systems, and causes a great deal of inefficiency in data gathering and results reporting.

The USAID participants noted that the document management piece was very responsive to the needs assessment, and to the feedback from the previous demonstrations, although the ease of use needed to be improved. Booz Allen had observed that USAID emailed documents back and forth frequently as a way to share documents, create and edit reports with colleagues around the world, and to institutionalize intellectual capital. Due to the high turnover of staff, and inefficient document storage capacities, there currently does not exist a way to track previous answers to congressional inquiries or other requests for information. With the document management system demonstrated in MIS/GIS, users were pleased to realize they could search, or create a drawer labeled "Congressional Inquiry," so they would not have to reinvent the wheel, give a different answer, or waste resources researching the request again. The USAID participants agreed that the document management function moved the MIS/GIS system from just a reporting tool to a business enabling and workflow efficiency tool.

Technical Description

For the third demonstration, significant effort was invested in a complete rework of the data model. There are two aspects to this change. First, USAID business data stored in the MIS/GIS had to reflect the new Foreign Assistance Strategic Planning Framework. Second, geospatial data had to be transitioned to a data format defined by the technology known as Oracle Spatial. The benefit of the latter change was that it is widely supported by geospatial application vendors.

After implementing the new data model, Microstrategy was configured to allow database "drill down," a more advanced Business Intelligence capability. Similarly, MapInfo was configured to show more advanced capabilities, such as drill-down within a map.

In order to improve the performance of the portal, applications needed to be redistributed in the SOA Sandbox. A machine was acquired to host Earthwhere, and OmniFind was moved to another server.

Two new applications were installed for Demonstration 3, Earthwhere and DB2 Document Manager. The MIS/GIS team integrated Earthwhere according to Portal Integration Method 3, and DB2 Document Manager was not integrated into the portal for schedule reasons.

Technical Challenges and Successes

A different set of tools was used during Demonstration 3 to create the new database. Database creation tools used for the first data model caused difficulties when making database changes. The new toolset allowed database changes to be made much more quickly. This was important because the data model had to undergo changes throughout development and could continue to need to adapt to changes in the USAID context in the future. It is therefore recommended in any future MIS/GIS implementation, that flexible database tools are used to ensure the greatest adaptability of the system to accepting new data types and structures.

Transitioning geospatial data to the Oracle Spatial data type improved an outstanding issue with data quality. In particular, all geospatial toolsets were able to access geospatial data from the same database, which was not possible before. In considering a future implementation of MIS/GIS across the Bureau or the Agency, consideration should be given to establishing a single, enterprise-wide geospatial data environment that all MIS/GIS tools, and other enterprise applications using geospatial data can access. This would serve to save the Agency resources by acquiring and maintaining worldwide geospatial data once, while reaping the benefits of its application many times over.