

Success Stories of Interdisciplinary and Interagency GIS Solutions Using Commercial Data

There has been an unprecedented attempt by Federal, State and Local Governments to achieve results in analysis and production through a synergistic approach in utilizing COTS GIS, remotely sensed data. The once seemingly impossible due to different operating systems, end products and desired results has become a more routine reality. The panel will consist of members from Federal Civilian, DoD/IC, State, Local and Academic Agencies and will showcase success stories of how they achieved results through the use of and in spite of divergent systems, technologies, policies and procedures and expected results.

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Currently, Government geospatial data users face an array of challenges as they attempt to use disparate commercial data sets from a variety of internal and external systems to enhance their analysis and production and improve their decision-making processes. Successful convergence of internal partners' data and information can only be accomplished with innovative technology and improved partnerships with Industry. In turn, Industry has proven both willing and able to meet the demands of Government geospatial data users and has promoted the efforts to develop more mature government policy and regulations to allow a convergence of geospatial information. It is imperative that federal and commercial organizations continue to partner in developing policies, standards and processes that can support a rapidly progressing geospatial environment. The Industry is burgeoning with geospatial data derived from countless sources. Whether you consider previously classified Russian maps being merged with domestic satellite data or domestic aerial data being processed with international synthetic aperture radar data, geospatial information is rich in content and more widely used than ever before. The overwhelming amount of data, coupled with the need for rapid and effective dissemination makes effective interdisciplinary and interagency coordination critical to managing fiscal constraints and mission objectives. Unfortunately, today, most agencies are still grappling with the concept of shared GIS, and not enjoying the success of it. Even with cutting edge technology, it is still necessary for organizations to be politically enabled and culturally willing to share their coffers within the largest boundaries of their organization. The most daunting challenges to successful integration are: 1) lack of funding, 2) lack of expertise and 3) existing policy and practices hampering resistance to change. The financial benefits of interagency and interdisciplinary GIS will ultimately outweigh the financial cost in

achieving the goal. According to a recent report from the Director of Information Management Studies at GAO, federal agencies spend an estimated \$4.1 billion each year on collection and management of GIS data. A lack of standards for end-to-end GIS processes at a national level as well as within the Government and its Departments necessitates a significant fiscal commitment. The current and historical lack of a single funding authority for geospatial information requirements compounds the issue. Organizations have been encouraged through the budget process to invest in technology best suited for their specific mission and not for more global purpose. This historical, streamlined technology acquisition process served its purpose but is now a hindrance to rapid change. Streamlining has caused and rewarded pockets of focused expertise within organizations. Broader scope and greater depth of GIS expertise is required to navigate the Industry as well as the technology to make transition from the most comfortable to the most efficient process as smooth as possible. The process shift itself, from a single-agency solution to an interagency interoperable solution is heavily reliant on an organization's existing governing policies and regulations.

Efforts to integrate GIS for Interdisciplinary and Interagency use will undoubtedly benefit from the National Spatial Data Infrastructure (NSDI) Program and National Space Policy Directive Fifteen (NSPD-15). The program and policy highlight the need for government to work with industry to accomplish its long-term GIS goals. NSDI was established by executive order to address the problem of redundancy and incompatibility of national geospatial information while NSPD-15 encourages and challenges the Federal Government to improve its relationship with and make better use of the remote sensing industry. NSDI dictates national access to databases to include all types of spatially relevant information such as architectural, historical, transportation and environmental data (subterranean as well as feature foundation) for use in crises as well as in standard work environments. The space policy which was developed with participation from Industry, defines the remote sensing industry in general enough terms to include software developers, data sources, exploitation systems and other associated technology. And although NSPD-15 falls short of directing a specific Civil agency to conduct financial planning to meet its goals, the policy offers civil agencies impetus and support to taking a lead role on select action items, and an active role in defining standards for geospatial technology.

In spite of the ongoing challenges there have been pockets of success driven by unrelenting missions, ingenuity and old-fashioned fixed suspense dates. First, within the Federal Government, the Census Bureau has mitigated the frustrating and murky waters of merging commercial data from multiple agencies within the federal, state and local governments, which culminated in the successful 2000 census. At the State level, the Virginia Department of Transportation found a goldmine of data within the Department of History, and together they have enhanced and improved their holdings into one web-based library. And finally, within the Department of Defense, the Air Force has taken the lead with their efforts to merge and maintain a multi-tiered GIS database using commercial and legacy data archives from Civil Engineers, the Intelligence Community and Geospatial Specialists. The end product will be a virtual living library.

The US Census Bureau has a unique dilemma in that it has ten years to plan for a Federal activity that can be greatly affected by technological breakthroughs, impacted by policy decisions of potentially three different administrations and is heavily reliant on non-standardized State and Local databases. Each

census, the Bureau is destined to hire a nation-wide cadre of consultants and contractors ranging from college interns, summer hires and tested GIS experts to collect data from varying sources stored in just as many formats. A task that is followed by the need to manually enter all the collected data into a single system. Efforts to convince, cajole and intellectualize local and state database maintainers into following a unique standard for Census Bureau was difficult at best and resulted in hours of quality checking and rework at the back end of the process. Without the financial resources to fund technology standards and implementation among their multiple data suppliers and also without regulatory policy to enforce compliance to requested standards, the Bureau had little influence or authority. A consistent and comprehensive database was ultimately achieved by successful and aggressive teaming between contracted and legacy experts who were able to overcome the challenges created by outdated and incompatible software, hardware and archives. If new and emerging federal policy trends continue to head in the current direction of standardizing geospatial processes the Census Bureau may face a lighter challenge in 2010.

The State of Virginia recognized it held a wealth of geospatial data that was only marginally exploited largely due to the data being maintained by two distinct Departments, for distinctly different purposes. The State's goal became to combine data from Virginia Department of Transportation (VDOT) with that from the Virginia Department of Historic Resources (VDHR) so that the historic information could be used to support and improve both of the participating organizations geospatial efforts. VDHR's legacy database was maintained in a commercial proprietary and single-use system that couldn't be directly networked and mandated that the data be painstakingly converted for ingestion into a more flexible system. The effort to join the databases resulted in more comprehensive information being rapidly accessed by a wider decision-making body that in turn brought improved balance to the Commonwealth's interests in support of transportation planning requirements and historic preservation. The interagency coordination is now more efficient and better informed. This was accomplished utilizing a team of consultants from a single company who had resident expertise in GIS software (ArcIMS, ArcSDE, Arc/INFO, ArcView), System Network Engineering, and Remote Sensing. The data involved was a combination of aerial and satellite data and totaled more than 300,000 square kilometers.

Likewise the Air Force has been merging aerial and satellite data for their lead role in building a DoD-wide GIS Library. The Air Force has successfully wrestled with using interdisciplinary databases to build a single multi-tiered geospatial library that can be universally accessible, and tests the limits of flexibility. The GeoBase Program allows the Air Force to leverage multiple stand alone geospatial and remote sensing libraries previously used by Civil Engineers, Environmentalists, Bomb Range Foresters, Geospatial Analysts and the Intelligence Community to create a standard database for every military installation that will satisfy geospatial, analysis and planning requirements. The individual users' requirements vary in resolution, spectral content and releasability, yet all disciplines readily identified the value they could glean from others' information. Historically, the cost of using other types of data that was useful or innovative but did not wholly satisfy unique requirements was prohibitive. Merging the data into a single library opened the door to creative problem solving and ultimately cut costs of maintaining and archiving the data separately. Culturally, the GeoBase Team also learned that in the Intelligence Community a Requirement is a specifically stated, adjudicated and approved need that is vetted through the community. To a Civil Engineer, a requirement is what you need to do your job.

GeoBase successfully erases the barriers of vocabulary, funding and policy and sets the standard for future efforts that require an accurate and consistent database over any military installation. The space policy referenced earlier was both directive and definitive in laying out the Department of Defense's charter to achieve what has been demonstrated by the Air Force, on a much larger scale. This charter coupled with a robust Defense budget could translate into innovative breakthroughs in Military-Industry and Interagency Partnerships.

The examples above show that partnerships can not only improve operations, but also allow organizations to support customers in new ways. Beyond each individual example there are certainly common lessons learned. For their part, State and Local Governments have not fully bought into the idea of purchasing satellite data as it is constrained in resolution by Department of Commerce, more tightly constrained by user licenses and less timely acquired, for their purposes, than aerial data. Also, users of remotely sensed data, rarely move easily between aerial and satellite data as internal architecture tends to support one or the other, but rarely both with ease. This tendency to use single source geospatial data is being chipped away at by the efforts of organizations as described above whose funded missions and goals help steer the GIS industrial base. Within Industry, the software, storage and dissemination technology has made huge strides toward standardization and compatibility of exploitation, archiving, and analysis tools for both aerial and satellite data. The Industry has undergone a flattening as companies are merging more frequently with larger conglomerates and satellite technology companies are seeking opportunities to form more long-term partnerships with software providers in an effort to satisfy customers' end-to-end needs. The increased standardization and partnering within the industry has helped create the technical environment necessary for interagency cooperation and collaboration. And although it's difficult to determine which entity is driving the change it's clear that Industry and Government are taking turns at steering the course. Enterprise-wide GIS solutions simply cannot be executed without Industry and Government first partnering to acquire sound budgets, develop technical expertise for innovation and promote the development of supportive policies.

National policy will continue to impact governments' requirements to engage the industry more aggressively in improving the process for using geospatial information in decision-making throughout all levels. And although the marriage between disparately sourced and archived data and spatially relevant information is in many aspects new, the user community continues to hunger for more rapid change within their processes. Users of geospatial information are becoming increasingly aware of how much data exists in neighboring archives and are leaning forward in forging new paths to access it while broadening their expertise to ensure more complete exploitation of that data. The hope is that Government funding and more clearly defined financial responsibilities will catch up to where organizations are already headed. The expectation is that the new and emerging government programs and policies are driving home the need to gray the lines between and within organizations that have historically promoted the separation of geospatial technology investments. It remains clear that Government and Industry must work together to secure financing, develop broader expertise and influence cultural obstacles by promoting evolution in policy and regulation.

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