

Business Case Development and Return on Investment Methodology

This paper is excerpted from a GITA research publication entitled, “A Practitioner’s Guide to Business Case Development and Return on Investment Methodology for Geospatial Information Technology.” The full report is scheduled to be published in the fall of 2005.

Introduction

Geospatial Information Technology (GIT) is a complicated investment. The initial costs can be high, and the tangible benefits can take several years to materialize. The technical intricacies of relative positional accuracy, feature content, and spatial data processing can be overwhelming. Often, elected and appointed officials do not have time to delve into the finer points of the technology before being asked to make an investment decision. Armed with only a basic understanding of GIT, they must weigh the project against countless other opportunities and choose where and how their organization will spend its money. Their best tools for making these decisions are bottom line cumulative costs and cumulative benefits for determining payback period, break-even point, and return on their investment.

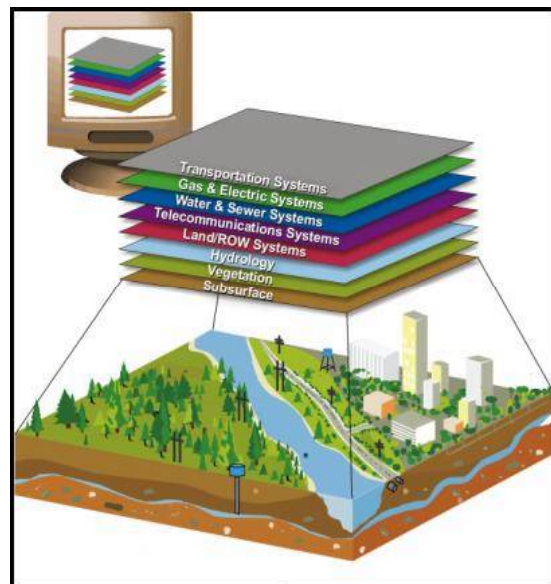
For GIT project managers, this poses a tricky problem. The costs of a proposed system are not terribly difficult to research, but the potential benefits are much harder to document. Somehow, an organization must identify these benefits and then predict their financial impact. This task is usually left to the GIT project manager or other staff members who are promoting the investment. Because the early costs of the system are typically high, officials are understandably sensitive to the benefit estimates. They want to be sure the financial analysis is sound.

This research report is a culmination of several years of ongoing research by GITA. It presents a rational methodology that is focused on ways for developing benefit estimates that should instill a sufficient level of management confidence for ultimately determining a credible business case and return on investment.

This document, a workbook for practitioners, is a combined guide for GIT business case development and Return on Investment (ROI) methodology. This workbook includes: Introduction and Business Uses of GIT (Section 1), Basics of Return on Investment (ROI) Analysis and Business Case Development (Section 2), GIT Benefits (Section 3), GIT Costs (Section 4), Financial Analysis (Section 5), Strategic Analysis and Business Case (Section 6), and Research Findings (Section 7).

GIT Overview

The simplest definition of GIT is “an automated system for managing and analyzing information with a geographic, i.e., spatial reference.” More specifically, GIT is a collection of hardware,



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software, data and procedures functioning together to capture, manage, analyze, maintain and display information that has geospatial reference to the real world.

Information has a spatial reference if it can be tied to a map. Typically, over 80 percent of an organization's information necessary to support its business has a geospatial reference.

GIT is not simply a computer system for making maps, although it can create maps as required. GIT is a sophisticated management, query and analysis tool that allows the users to identify display the geospatial relationships among related features. There are many generic questions that a well designed GIT and integrated database environment can answer, including:

- ***Location - What is at a given location?*** Data management is simplified when the user can quickly find out what exists at a particular location. The location can be described in many ways including place name, zip code, billing and street address, geographic coordinates, or by pointing to the feature on a computer screen. For example, by pointing to a street on the computer screen or entering an address, the location and characteristic of all assets, planned construction activities, outages, property sales, main breaks, demographic data, etc., can be immediately identified.
- ***Condition - Where is it?*** This question is the reverse of the location question. Instead of identifying what exists at a given location, the user finds locations where certain conditions are satisfied. For example, show all distribution lines that were installed before 1990 that have had a specific category of repair performed on them.
- ***Trends - What has changed over time?*** This question can involve either location or condition and seeks to find the difference over time. For example, show ground water contamination within an environmentally sensitive area where levels of contaminate and extent of intrusion have continued to increase over a certain percentage during a specified period of time.
- ***Patterns - What spatial patterns exist?*** These types of questions can get very sophisticated. For example, showing the spatial distribution of new home building permits and correlating this information with locations of existing community services, including such things as schools, police and fire stations, medical clinics to help determine if additional services are required to support growing areas within the community.
- ***Modeling - What if...?*** These types of questions are posed to predict the consequences of proposed changes. For example, being able to model a variety of emergency situations ranging from a contaminant spill to a terrorist attack and how the survivors can be safely moved out of harms ways.

GIT As A Core Enabling Technology

Organizations who have implemented GIT programs are finding that it is a core technology that increasingly defines their information management strategy and practices.

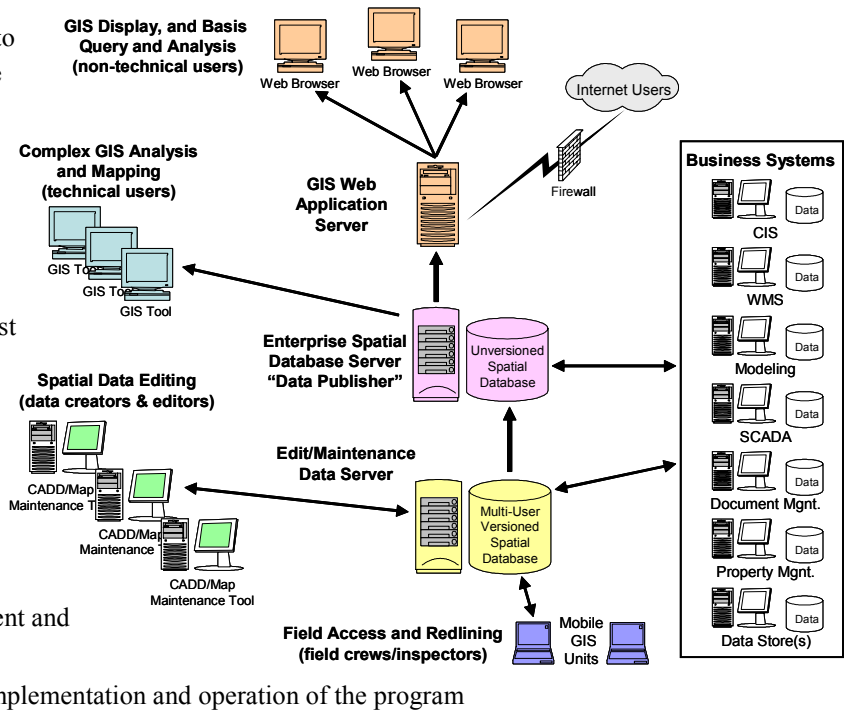
The primary reason is that as previously noted a majority of all data and information used by organizations is geographically referenced. Consequently, any technology that provides the capability to capture, organize and make available the majority of an organization's data will be, by definition, a core technology.

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As GIT capabilities increase, the applications which access the data expand and increase in complexity, and, as more geographically referenced information is made available to the organization, the skills of the staff, the organization structures and the work practices all develop to reflect the chosen technologies.

It is important, therefore, that as an organization deploys GIT across the enterprise, both management and staff must have a clear understanding of:

- What the technology will allow the organization to achieve (e.g., business value)
- What changes the technology will drive within the organization
- The most cost effective way to implement and integrate this technology
- The time and resources necessary for implementation and operation of the program



Ultimately, the implementation of a GIT program will assist an organization’s ability to reduce operational costs and data redundancy, improve analysis process, and increase the ability to access and integrate information. The result will offer better decision support and increased data sharing and services -- both within a technical framework that integrates data from the various systems across the organization.

Business Uses of GIT

Successful GIT applications are designed to support specific business needs of an organization. It is these applications, rather than the mere presence of the technology, which provide the true benefits through the use of GIT.

Following are a list of common business uses of GIT. Specific examples are cited for each business use. These examples are *GIT applications*. In this workbook, the term *application* refers to a business process supported by people, data, software, and hardware. In the IT world, the term *application* is sometimes used to refer to a software product or a piece of custom code. However, software alone is typically too narrow an item to constitute a true GIT project or investment. The full costs of any GIT endeavor will include human and business process costs as well as technology costs, and the benefits of the investment can be realized only in the context of the business processes that the technology supports.

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Automated Map Production, Data Maintenance, and Data Access
<ul style="list-style-type: none">▪ Automated tools to create the graphical representation of digital spatial data (maps and atlases, which may be distributed electronically or as hard plots or books)▪ Automated tools to facilitate a timely and standardized update process for digital maps and the non-spatial records associated with the map features▪ Automated tools to capture field data and updates▪ Enterprise or community data access and viewing tools (e.g., web portals to spatial data)
Emergency Preparedness and Response / Critical Infrastructure Protection
<ul style="list-style-type: none">▪ Applications that identify and quantify risks to public safety and/or critical infrastructure▪ Applications that safeguard the public and/or assets that are essential to an organization's core business▪ Applications that support community collaboration related to emergency preparedness and response
Property Appraisal / Legislative (Voting) Districting / Tax Assessment
<ul style="list-style-type: none">▪ Applications that support cadastral mapping and property appraisal▪ Applications that support property tax assessment and revenue projections▪ Applications that support sales tax assessment and revenue projections▪ Applications that support the delineation of special districts related to public improvements that benefit particular properties and affect tax rates for those properties▪ Applications that support the delineation of legislative (voting) districts and analyze demographic information related to these districts▪ Applications that support the planning and management of public election activities
Quality of Life Management / Public Health and Safety / Community Services
<ul style="list-style-type: none">▪ Applications that support crime pattern analysis and other public safety planning and management activities▪ Applications that support epidemiological analysis and other public health planning and management activities▪ Applications that support land use planning, public open space (park) acquisition and planning, and economic development and redevelopment▪ Applications that support vector control (e.g., mosquito control) and animal control (e.g., vaccination programs and licensing, loose and dangerous animal programs)▪ Applications that support code enforcement, including inspections and investigations of building code violations and other municipal code violations

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Field Infrastructure Management
<ul style="list-style-type: none">▪ Applications that support maintenance planning, scheduling, and work assignment (for preventive and predictive maintenance programs, planned repairs, and construction)▪ Applications that support route development and optimization (for maintenance programs, meter reading, etc.)▪ Applications that support field infrastructure performance and condition analysis and repair/replace decision making (capital project planning)▪ Applications that support isolation of networked field infrastructure▪ Applications that provide map-based access to detailed infrastructure drawings▪ Field system analysis applications that predict the location and/or impact of point sources of pollution/contamination/illegal use▪ Applications that support monitoring programs for tanks and other potential contamination sources▪ Applications that support field infrastructure project coordination and/or joint planning of complex (multi-agency) work▪ Applications that support underground utility line location
Facility (Plants, Buildings, Grounds, Land) Asset Management
<ul style="list-style-type: none">▪ Applications that support maintenance planning and scheduling (preventive and predictive maintenance programs, repairs, and construction)▪ Applications that support facility asset performance and condition analysis and property valuation▪ Applications that provide map-based access to shop drawings, schematics, operations manuals, and/or training videos▪ Field system analysis applications that predict point sources of pollution/contamination/illegal use that have affected or may affect production/treatment facilities
Call Management, Outage Management, and Dispatch
<ul style="list-style-type: none">▪ Applications that support call management and dispatch functions▪ Applications that support analysis of customer complaints and trends in customer-generated work▪ Applications that support outage response coordination in order to minimize incident impact and expedite service restoration▪ Applications that support AVL (automatic vehicle location) and optimization of reactive work assignments

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Customer Relationship Management
<ul style="list-style-type: none">▪ Applications that track customer locations (service premises) and associated consumption/usage and work/complaint histories▪ Applications that identify and protect customers with special needs, including interruptible and non-interruptible customers (e.g., customers that have agreed to controlled service interruptions, customers that cannot tolerate service interruptions, and customers that require a certain quality of service such as water pressure or water quality)▪ Applications that support customer communications▪ Applications that track monitored/regulated customers and support associated monitoring programs (e.g., significant industrial users, cross-connection control, storm water discharge monitoring)▪ Applications that support the identification and marketing of new services
Planning, Engineering, Design, and Construction
<ul style="list-style-type: none">▪ Applications that support the development of engineering drawings, including design optimization (selection of design alternatives based on predefined criteria)▪ Applications that automate job costing and procurement▪ Applications that project demographic trends, forecast future demand, and analyze capacity relative to demand projections (e.g., load/volume capacity analysis)▪ Applications that support site/corridor analysis (evaluation of soil types, property values, natural and cultural resource protection, and other factors that affect infrastructure reliability and development costs)▪ Applications that support site selection and right-of-way/easement acquisition▪ Applications that support surface and subsurface models, including three-dimensional models and hydrological models▪ Applications that support construction project management, including inspections and acceptance/commissioning▪ Automated tools to update system models (e.g., hydraulic models, gravity models, water quality models, load models, transportation models)▪ Applications that display model results

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Development Review / Zoning / Permitting
<ul style="list-style-type: none">▪ Applications that support the development review process, including plat and construction plan approval, redlining, and street name and address management▪ Applications that track zoning and support zoning case management for development and redevelopment▪ Applications that support the process of issuing building permits, business licenses, certificates of occupancy, and other regulatory instruments affecting development and redevelopment▪ Applications that support regional (multi-agency) development coordination activities, including cooperative land use planning and zoning coordination
Regulatory Compliance
<ul style="list-style-type: none">▪ Applications that support utility/municipal permit application processes (for construction or operations)▪ Applications that support regulatory reporting▪ Applications that support monitoring and work activities related to permit compliance (e.g., water system sampling, leak detection, PCB management)▪ Applications that display and/or analyze monitoring results and/or permit violations (e.g., overflow/incident mapping, noise modeling, pipeline pressure mapping)
Environmental Quality and Watershed Management
<ul style="list-style-type: none">▪ Applications that identify and quantify risks to the environment/watershed and/or support associated operations planning, including time-lapse analysis▪ Applications that monitor environmental/weather conditions and/or support associated operational decisions▪ Applications that support environmental monitoring programs

It is important to note, that unless the needs of an organization are well understood, there is a risk of implementing a system that does not address the needs of the organization. GIT, as it is purchased from vendors, is a toolkit which can be used to build or configure the types of uses or applications identified above. The applications that are defined to support the various business needs of an organization will need to be prioritized for funding and implementation purposes. Once prioritized, the specific data, hardware and software, organizational, and training elements required to support that application can be further defined, and then developed or acquired.

Taking an Enterprise Approach to Implementing GIT

The implementation of GIT can be a long-term undertaking of time, effort, and money. An organization can greatly improve the value of its GIT implementation by taking an enterprise approach. The enterprise approach has been proven very successful as a means to minimize program costs. It is not uncommon for an enterprise GIT effort to take 3 to 5 years for an organization to see a return on its investment for its GIT program.

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Moreover, an enterprise approach enables an organization to more effectively leverage existing datasets and/or operational capabilities. As a result, it can bring about major efficiencies and savings through increased operational performance.

It is well recognized today that organizations often duplicate data that are already available and in use by other departments or organizations. Planning for enterprise architecture will reveal these areas of redundancy and provide an opportunity to make business decisions regarding cross-departmental data acquisition and management. An enterprise GIT program can enable an organization to "keep pace" with new mandates even when it faces a shrinking budget. In addition, sharing common data can build intra-organization, as well as inter-organization cooperation and expanded use of common information across these groups.

The task of justifying the cost of investment in GIT is well acknowledged to be difficult. Organizational resistance can be reduced if an extra effort is made to educate and involve the people within the organization who will benefit from the technology, thus improving the organizational willingness to deploy GIT. Increasingly, the ultimate goal of implementing an enterprise GIT program is to enhance an organization's performance for the purpose of improving service delivery to citizens and customers alike.

It is important to emphasize that one of the most useful features of a GIT system is its ability to overlay different views of a location. Combinations are limited only by the kinds of questions asked and the kinds of geospatial data available to answer them. This powerful ability to integrate different kinds of information about a location can lead to better-informed decisions about investments in services. GIT technology is an effective analytical and decision-making tool that enables its users to organize, compare, and analyze disparate types of information.

The full research report will take the concepts discussed above and will outline the basic elements necessary for conducting a return on investment analysis in order to develop a credible case for GIT program.

For more information on the status of the research project on, "A Practitioner's Guide to Business Case Development and Return on Investment Methodology for Geospatial Information Technology", please contact GITA by telephone at (303) 337-0513, or by mail at 14456 East Evans Avenue, Aurora, CO 80014.