

WHITE PAPER

Driving Business Value with Geographic Business Intelligence

with David Loshin

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Introduction

Today, organizations are collecting data at every level of their business and in volumes that in the past were unimaginable. Data sets are stored in different database systems or in files with distinctive formats, all reflecting business process, application, program software, or information type dependencies. Adding to this complexity is the distribution of these data sets across the enterprise in silos requiring a varied set of tools and/or specialized business rules for data transformation, classification, matching, and integration. Because of the massive amounts of data stored in a variety of representation formats, decision makers strain to derive insights and create business solutions that adequately span and integrate information from these disparate technology islands.

To be most effective in meeting their business requirements, these decision makers must process information on demand from everywhere, along with the means to visually render, critically evaluate, and carefully develop accurate understandings of all their business transactions and activities. The importance of this outcome highlights the criticality of the decision makers' need to establish valuable information flow throughout the enterprise.

Currently, due to the way that most enterprises collect and store data, the critical eye of the decision maker is frequently blinded by vast amounts of data that remain inaccessible to open and timely analysis. Spatial data, in particular, has long been considered ancillary to solving business process problems or in deriving actionable consumer and market insight, because of the challenges of integrating spatial and nonspatial data within traditional information management solutions. Yet spatial data plays a more centralized role than most organizations realize in the predictive and analytical underpinnings of complex business problems. Spatial data is essential to obtaining accurate and actionable insight, because there is a significant geographic dimension to every business transaction. Business questions focusing on where raw materials are obtained; where products are manufactured; where products are shipped; where product inventories are aging on the shelves of which stores; where products are advertised; or where products are consumed all highlight obvious geographic components. Ignoring the geographic dimension of inquiries such as these within the overall analytical capabilities of an organization's information management infrastructure can obscure insights that drive critical marketplace opportunities.

Decision makers who can solve more business problems with fewer technology tools are able to avoid business process bottlenecks and take the competitive lead within their local, regional, or global marketplaces. In turn, corporations achieving the most dramatic competitive advantages in today's highly sophisticated marketplace have the ability to rapidly access, compile and compare disparate, abstract data, both spatial and non-spatial, using a data-independent integration and visualization strategy. This geographic business intelligence approach can produce maps, charts, tables and graphs, as needed, to reveal the interdependent relationships of all business transactions for the most accurate intelligence. Geographic business intelligence can address and solve many data and technology challenges by delivering a single, information-critical platform for the design, deployment, and visualization of business process and information flows across the enterprise. The result is the ability to predict, analyze and gain actionable insight on all business transactions, throughout the enterprise.

What is Geographic Business Intelligence?

Geographic Business Intelligence is a collection of technology tools, applications and solutions that have been addressing a variety of information-driven business problems for nearly a decade. During the last 30 years, technology has become increasingly effective at storing volumes of data, while information management solutions have not been able to keep up with the growing demands of data transformation, classification, matching and integration. In parallel with these trends, the Internet has increased our demand for the rapid delivery of all information resources. In particular, the awareness of geographic information components, highlighting the geo-spatial pervasiveness of the Web, has begun to inform everyone on the power of visual geographic data presentations.

Geographic Business Intelligence (GEO-BI) addresses the challenges faced by decision makers within today's dynamic global marketplace by 1) applying a single, seamless architecture across corporate and

country boundaries, 2) integrating direct access to spatial and nonspatial data formats using high-performance analysis and visualization techniques, and 3) deploying actionable insight rapidly and to every corner of the enterprise. A successful GEO-BI implementation integrates all data assets by embedding extract, transform and load (ETL), data quality and geospatial components as attributes at the database level. The result includes enormous gains in operational efficiencies, the ability to leverage scarce resources, and a flexible platform for the rapid deployment of business process standards.

Deriving Insight from Spatial Analysis

Spatial analysis techniques begin with the use of geographic data. Geographic data includes, but is not limited to demographics, census data, physical geographies, transportation infrastructures, drive times, and political boundaries (cities/counties/states).

There are many ways that organizations approach and design their business strategies to capitalize on marketplace opportunities in relation to geographic location:

- A company may develop customer profiling models to drive its marketing, promotional, sales, support, and communication plans;
- A business wants to evaluate the performance of its sourcing, manufacturing, and distribution network to optimize approaches for delivering products to the right locations within the right times;
- Utilities such as telecommunications, energy, or broadband entertainment (e.g., cable TV or high-speed Internet) may evaluate its level-of-service provision based on physical distances and existing infrastructure, and explore how service disruptions may be remedied;
- Businesses want to enhance advertising or communication for target market relevance.

These objectives are all relatively straightforward, but success in any of these endeavors is driven by a number of critical questions that require spatial analysis, such as:

- How effective are the different advertising channels and promotions in drawing customers from the local trade area?
- How easy is it to evaluate the performance of the company's distribution network, as well as assess alternatives that are more beneficial?
- Is there an effective means to evaluate the level of service that a utility (such as, cable TV or mobile phone service) can provide based on overlapping regions of coverage?
- What are the available options for media and communications coverage in each region in terms of advertising? Do they match the target segment and deliver effective reach?

Unfortunately, most businesses have yet to realize the benefits of applying geographic business intelligence due to a common misconception that Geographic Information System (GIS) tools are required for the information management of spatial data and that a map is the only, or the best, visual rendering of spatial data. However, the data processing limitations imposed through traditional geographic information and mapping applications prevent organizations from quickly and easily accessing, manipulating, analyzing, and comparing data, both spatial and non-spatial data, from anywhere in their enterprise. GIS tools, while they can offer many ways of working with mapped data, typically cannot handle:

- Large data files;
- Unstructured or non-spatial data (i.e., data that is not geocoded for mapping or is from systems that do not track a spatial component);
- Cross-system data access and integration, including data quality assurance tools; and
- Real-time updating and incorporating of data improvements to enterprise systems, once they have been made within a mapping tool.

Traditional business intelligence vendors and their customers have attempted to meet demands for incorporating geospatial components into their information management flows by building data connectors and information technology bridges to incorporate spatial data into their solutions. However, building these data connectors are time-consuming, costly and typically unsuccessful.

Basically, *the apparent restrictions imposed by traditional tools and technology have impeded business analysts from integrating the most effective use of geographic data.* Business users, if they are to fully engage the geographic business intelligence knowledge discovery process, should be empowered with the kinds of tools that are independent of the source data structure, geographical region hierarchies, and the types of analysis to be performed.

This suggests a need for organizations to have the capability to efficiently and quickly add a geographical dimension to any enterprise data asset, by enabling integration of non-spatial and spatial data through the embedding of ETL, data quality services, and directly associating geospatial components as attributes at the database level. Geographic business intelligence can address and solve many data and technology challenges by delivering information-critical enterprise computing using a single platform for the design, deployment, and visualization of business process and information flows across the enterprise. The geographic business intelligence approach produces maps, charts, tables and graphs, as needed, to reveal the interdependent relationships of all business transactions for the most accurate intelligence. This enables business users to recognize how previously ignored geographic dimensions can be used to uncover business opportunities.

Overcoming Data Challenges

In order to institute GEO-BI into the enterprise, an organization is likely to have been encountering specific challenges to derive the most accurate evaluation and analysis of their data. In this section, we look at some of the historical, prevalent and critical data challenges:

1. **Organizational and operational scalability** – the ability to put the right technologies in place that can scale with the growth in data set size, breadth, and availability;
2. **Information integration** – the ability to integrate critical information from multiple, non-standardized data sources;
3. **Information quality** – the need to assess and ultimately improve the quality of all aspects of information integrated into the geographic and spatial analytics models, including data validity, customer data integration, the rules for extraction and transformation, and reporting/visualization of information.

Organization and Operational Scalability

Even in organizations that employ geographical information systems, these deployments are often segregated within islands of technology populated by individuals focused on the use and maintenance of GIS tools or designing, implementing, and maintaining numerous data set connectors, instead of gathering and manipulating all relevant and geographically related data sets quickly in order to act on the results. GIS may be used in conjunction with standalone data sets, perhaps derived from transactional systems or operational data stores (ODS). There is a need to recognize, however, that traditional GIS systems are not configured to support large-scale geographic business intelligence, nor are many organizations properly staffed to support the training, dissemination, and use of GIS tools across the enterprise.

Specific expertise in the peculiarities of existing GIS approaches is often needed for individuals to derive knowledge, yet it is the business analysts, not the technicians that have the most to gain from a GEO-BI program. In addition, relying on small-scale database implementations, even if they are configured as operational data stores, will not provide the appropriate level of performance to scale across the enterprise for business insight meeting the specialized needs of various departments. Leaders in the organization must admit that these island technologies wrapped around RDBMS systems are not the optimal solutions for either organizational or operational scalability for spatial analytics.

Information Integration

Often, business analysts assume that the existence of a data warehouse used for organizing, querying, and reporting on data should be the sole source of data that is to be subjected to any kind of analysis. However, the reports generated from the warehouse may be intended for operational reporting, suggesting that the selection of data objects (and their corresponding attributes and dimensions) is determined far in advance of deployment, and locks in place a finite set of options for analysis. This means that, contrary to what one might expect, the data that is available from a data warehouse for analysis may be limited by design.

However, when seeking insight through an iterative process of exploration, inquiries and discovery, the ability to incorporate data from alternate data sources will enhance the analysis and speed the acquisition of desirable results. In addition, even if the data that can be delivered through a data warehouse is suitable for supporting analytic models, continuing and newly determined data needs would also have to be facilitated using the same development lifecycle processes. Such an approach will introduce latency to incorporating the necessary information the analyst needs. The ability to rapidly integrate additional data sets and enhancements can augment spatial characteristics, provide deeper knowledge about different levels in the location hierarchies, and ultimately, drastically improve the way the organization exploits geographic, market and business data, driving efficiencies and profitability.

Information Quality

The data sets that have evolved to support the operational aspects of running a business usually meet business users' expectations for quality. But when data sets intended for their original operational objectives are repurposed for alternate uses, such as, cross-functional reporting and analytics, the quality of those data sets might not meet the expectations of the stakeholders driving the alternate use. In other words, using data sets for new purposes will introduce new data and information quality requirements that may not be met by the upstream data suppliers.

Addressing the Challenges

The issues of scalability, integration, and data quality should be addressed directly when initiating a GEO-BI project. When a chosen interactive analytics platform obviates an organization's need to address these barriers, users can concentrate on solving business problems. To begin to address the first challenge of scalability, a practical selection for a geographic business intelligence platform should exhibit two features:

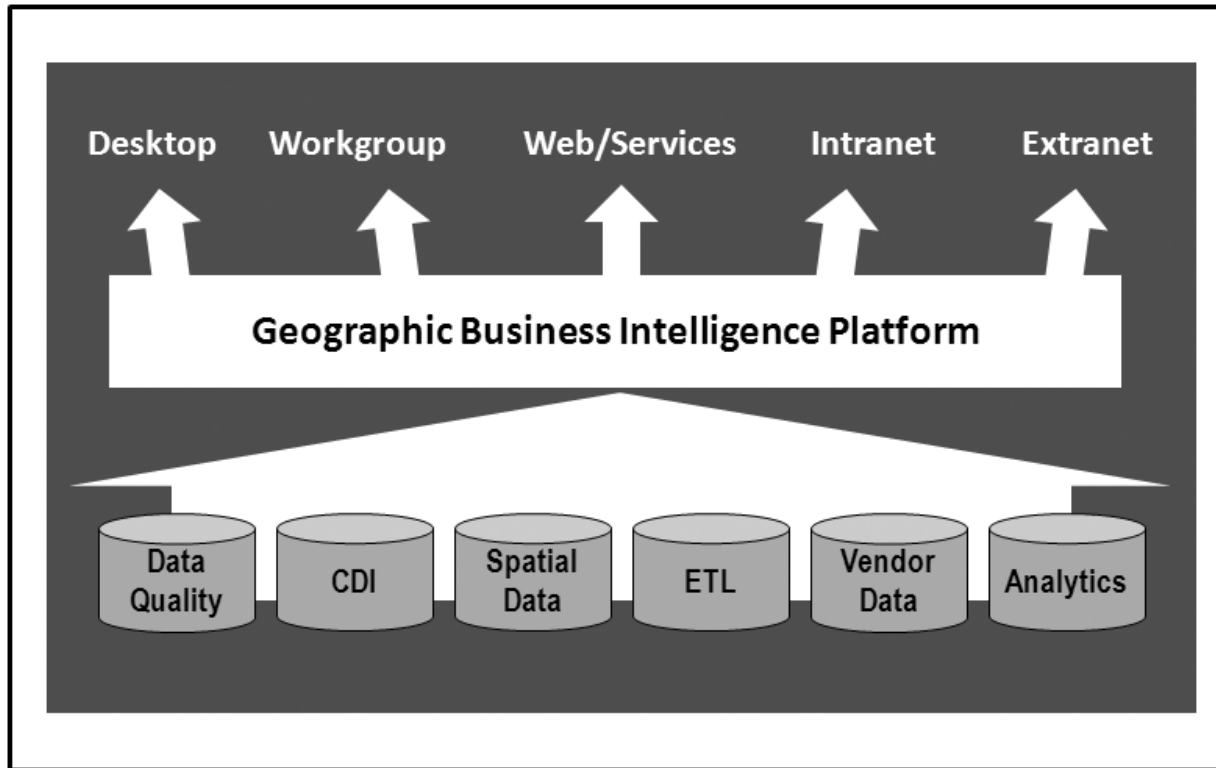
- 1) High-performance capacity, both in the streaming of data from selected data sources, and in the preparing and analyzing of data within geographic contexts; and
- 2) Ease of use, on many implementation levels, that democratizes GEO-BI and equips anyone in the enterprise with the means to achieve their business objectives.

Because depending on the data warehouse as the primary source of data can limit creative problem solving, the second challenge can be addressed by seeking an analytics platform that can import data from *any* source. The ability to integrate data sets with different formats from numerous sources, frees the analyst to explore many more avenues for knowledge discovery.

In addition to these key solution features, analysts must establish a best practice within the organization to determine when additional data can add value, and eliminate the dependency on internal resources for data preparation. To this end, analysts should employ a platform that can bring available data directly into the problem-solving environment as a way of enhancing the analytic process. See Figure 1.

Information quality is best addressed using a platform that augments its data integration components with data quality services. Parsing, standardization, scrubbing, transformation, and validation are an integral part of a GEO-BI solution, and put the business analyst in control of the definition and verification of the quality of the data used for analysis.

Figure 1



Geographic Business Intelligence Case Studies

Many large corporations with extensive data sets and marketplace requirements are leveraging geographic business intelligence technology to solve a variety of critical information management problems.

Direct to Retail: VF Corporation's Retail Floor Space Management

VF Corporation is one of the world's largest apparel companies. To maximize the performance of VF's products on the retail floor, a technique called Retail Floor Space Management (RFSM) was developed in collaboration with VF's retail partners. This technique is designed to support point of sale (POS) validation and analysis, sales planning, product assortment, category management, and product replenishment.

In the past, VF had purchased a marketing information product from a well-known supplier to work with their internally developed tools to analyze retail partnership data and store trade area information. This solution did not scale throughout the enterprise to provide timely results, did not reliably define syndicated trade areas, and did not accurately geocode.

To address these shortcomings, VF needed a solution that could be integrated easily with existing applications, was able to support the importation and processing of large amounts of POS data within reasonable time frames, and had accurate geocoding technology. VF selected SRC's geographic business intelligence technology solutions to converge their existing technology solutions to simultaneously analyze product placement, consumer trends within specific stores based on POS data and demographic information.

With a VF implementation of SRC's Alteryx™ GEO-BI platform, RFSM teams were able to better match products to consumer demand, while supporting their efforts to more accurately predict assortments and other product attributes at the individual store trade level. Performance throughout the entire retail channel improved significantly, enabling the process of integrating and analyzing data to take place in

minutes, rather than weeks. The SRC solution has led to the successful tracking of 10,000 retailer locations, more than 100,000 SKU's and 200 lifestyle variables for every store. Internal buy-in of the analytics processes has expanded to business analysts throughout the enterprise, compared to relegating these technology tools to power users. VF was able to save more than 50 percent of their marketing information costs by providing decision makers throughout the organization with a powerful set information management and analysis tools.

Business-to-Business Services: Experian's Micromarketer Generation3

Experian is a global leader in providing analytic and information services to organizations and consumers to manage the risk and reward of commercial and financial decisions. Experian houses global databases that have billions of records.

The Experian Marketing Services division enables business analysts at different companies to profile consumers, evaluate sales versus market potential, and to target communications more effectively through tools and product offerings. One of Experian's products, Micromarketer, is intended to be a geographical business intelligence solution that provides data segmentation, customer and market insight, and basic mapping capabilities.

Experian Marketing Services needed upgrade and extend Micromarketer to give their customers a more powerful and flexible consumer insight and marketing analysis tool. The objective of this upgrade was to allow customers to visualize, plan, analyze and execute upon targeted market analysis. Experian Marketing Services estimated five years of development time to revamp their current product to provide a decision support tool that was deployed globally from one common platform on both the desktop and over the Web. Rather than upgrade Micromarketer through their own development team, it was decided that a geographic business intelligence solution, provide by SRC, could meet their enhancement requirements for their product.

SRC architected the project based on a highly-integrated and functional platform using its proven and time-tested core Portfolio platform architecture. The architectural design offered speed, efficiency, and greater productivity in an intuitive thin client platform. The application design focused on robustness to handle any number of independent data sources, which would provide the sales tool's core intelligence. Sophisticated software algorithms were used to analyze thousands of data points with customized targeting and segmentation capabilities for profiling a market opportunity geographically, demographically and psychographically.

After just 18 months, Experian launched the Micromarketer Generation 3 (MMG3) product around the globe on both the desktop and the Web, achieving a 70 percent reduction in development time, and essentially saving Experian more than 10,000 staff hours of work. MicroMarketerG3 is now data-independent, allowing Experian customers the ability to work with any data content regardless of source, format or country of origin, and enabling them to plan, analyze and execute consumer and market analysis, targeting and decision-support worldwide.

Summary – Return on Investment

Exposing the often overlooked geospatial component of business processes opens new possibilities to capitalize on predictive threats and opportunities in today's highly sophisticated marketplace. In the case studies provided in this paper, we see that corporations are gaining a competitive edge by examining market and business process data to include a geographic perspective. Companies are able to reduce overhead, improve data quality, and significantly reduce processing and analysis times to deliver current marketing information. GEO-BI applications delivered better retail product selection, enhanced business-to-business service delivery, and saved these businesses money. Many other cases abound, ranging from analyzing the relationship between dropped mobile phone calls and customer churn, to providing healthcare market data, to retail site location selection, etc. It is valuable to review these cases to see what critical business value can be achieved, and how the ability to incorporate geographic information as a way of gaining market and consumer insight essentially changes the way business teams can exploit their operational data assets.

Business analysts have many questions to ask that depend on geographic knowledge. All of these questions suggest a common need for businesses to incorporate geographic information and spatial analysis within their operational and analytical applications. Apparent technological restrictions imposed by traditional GIS, Business Intelligence, and relational database tools have impeded business analysts from making the most effective use of geographic data, yet these barriers and challenges can be overcome. Employing a platform that provides high performance and scalability, rapid integration of data from almost any format or structure, and improved control over data quality empowers more individuals within the organization with the ability to use geographic business intelligence. Significant benefits can be achieved, especially when the analysts themselves can tailor their own deliverables with respect to their particular spatial intelligence needs. Democratizing geographic business intelligence can empower the organization to reach new heights in operational, strategic analysis and knowledge.

About the author: David Loshin is the president of Knowledge Integrity, Inc., a consulting and development company focusing on customized information management solutions including information quality solutions consulting, information quality training and business rules solutions. Loshin is the author of Enterprise Knowledge Management - The Data Quality Approach (Morgan Kaufmann, 2001) and Business Intelligence – The Savvy Manager's Guide and is a frequent speaker on maximizing the value of information. www.knowledge-integrity.com loshin@knowledge-integrity.com

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