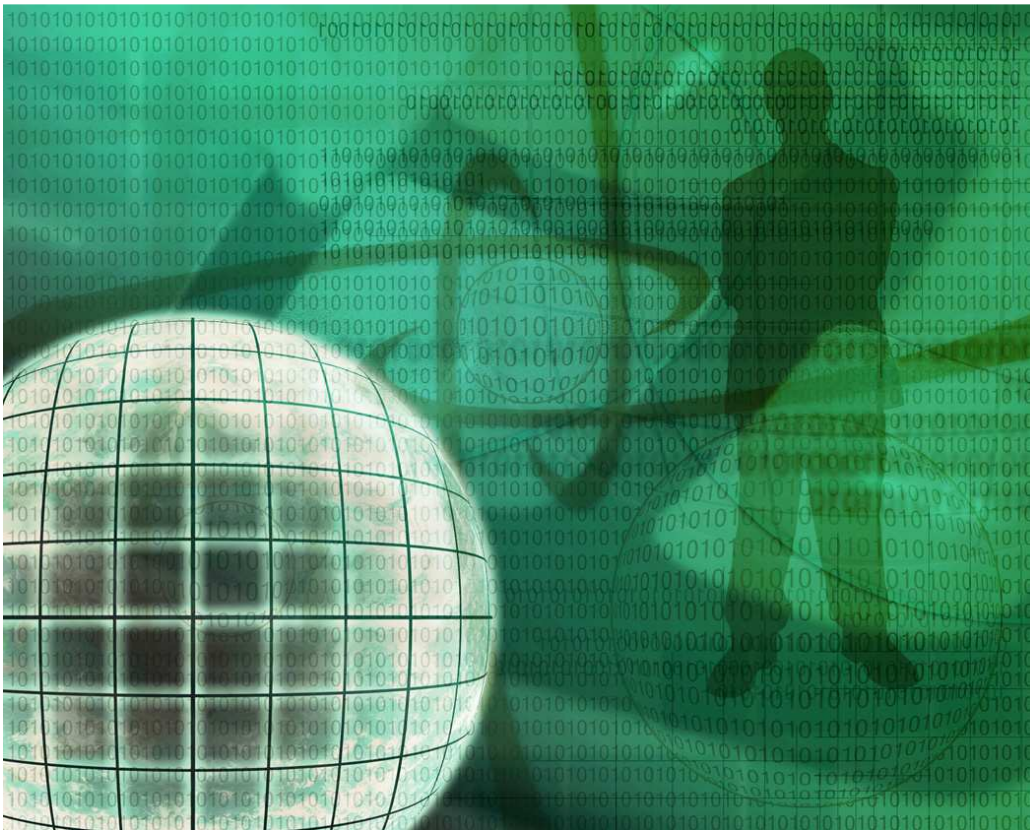


Business Planning for the Connected World

GIS Enabled Planning for Business



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Introduction

Executives in today's rapidly changing global business environment need to be more agile than ever. Global competition and the state of the economy have increased pressure on all industries, and required businesses to enact quick and precise planning in order to position and produce products and services that are available when and where customers want them in a rapidly changing environment.

In other words, variables have increased and predictability has decreased, adding pressure and demands to the planning process. Because Geographic Information Systems (GIS) technology is a flexible spatial analytic tool that combines graphics with attribute data, GIS modelling can help analyze and visualize planning data in almost unlimited ways.

What is GIS?

To answer this question, we will start first with what it is *not*. GIS is *not* simply a computer system for making maps, although it can be used that way. Nor is it only a mapping application used to help governments with planning and zoning, environmental planning, and other common tasks associated with maps.

A GIS is in fact a powerful analytical tool that allows you to identify and analyze spatial relationships within information. Any data you store in a GIS can be translated into an image and displayed visually to suit a particular purpose.

A GIS application built to aid your organization with agile planning processes could be a database or series of databases representing all important facets of your business. When examined through the 'lens' of a GIS this data could be turned into a powerful 2D / 3D graphic visualization of those facets with all the associated attributes that define them.

With the advances in technology and system architecture, and inexpensive tracking devices, real-time and static geographic information is no longer available only to scientists and government agencies. Through GIS, space and location are actually becoming organizing tools. To make GIS even more palatable, there is no need to eliminate any of your current databases, a GIS can pull data from existing legacy databases, join it to spatial information and be used to perform spatial analysis. This means that there is no need to upgrade your legacy systems to take advantage of spatial analysis and visualization.

Definitions: 'spatial'

Visual Thesaurus defines 'spatial' as "*pertaining to or involving or having the nature of space*".

Spatial visualization ability, for example, is the ability to mentally manipulate 2-dimensional and 3-dimensional figures.

Spatial distribution, math aside, emphasizes locational patterns and their interpretation.

A GIS system in your organization could be a way to visually depict and analyze all the interacting parts of your business without eliminating any existing databases or replacing legacy systems.

GIS Analysis

People have always used pictures to help visualize and explain concepts. The intuitive powers of visual graphics reveal trends, patterns, and answers that are difficult to detect in other data presentation formats.

Some of the questions GIS analysis is best at answering are:

What has changed since . . . ? This question seeks to find the differences within an area over time. For example, if retail stores are no longer performing like they used to, you could analyze changes in demographics or other changes that have happened over time. This concept could also be applied to 'in-store mapping'. You could analyze customer foot traffic, against placement of particular items located inside a store, time of day or year, and gain a more thorough understanding of the movement of your customers and why certain items sell better than others over time.

What spatial patterns exist? This question is more sophisticated, and can be used to show complex relationships, and how changes in one part of the system might propagate to others and cause an unexpected change to another process. A supply chain could benefit greatly from this type of analysis. For example, a local airplane manufacturer could have used GIS analysis for their latest airplane design to determine and fully visualize the full effects of back-ordered components, integration challenges, language and cultural barriers, and many other complexities and risks associated with global production. Analyzing spatial patterns can reveal interconnections that are both obvious and hidden, and can also be used to expand the boundary of people's thinking beyond the insular view that comes from being a member of a particular silo or group.

Examples of things that can be viewed with this type of analysis include anything that is a function of a complex network, such as political unrest, customs delays, lack of cooperation due to competing business priorities, etc.

What if . . . ? 'What if' questions pose scenarios that allow hypothetical analysis. For example, you could determine the effects on performance if a new node is added to a network at a particular location, a new stop is added to a delivery route, or a new retail store is added to a particular city block. You could also analyze what might happen if you sold off a certain part of your business. For example, a local timber company has been systematically selling off parts of its business to position it in today's economy. GIS analysis could be used to help it examine otherwise hidden effects of various scenarios before making a decision.

What is at . . . ? This is the simplest use of GIS technology. This can display what exists at a specific location, for example a place name, a zip code, or a latitude and longitude. Assuming they've been captured, this could give you a view of all of your assets in a particular location.

Where is it? This is the converse of the first question and requires spatial analysis to answer. You could look for a location where certain conditions are satisfied; for example, a location with demographics that make it suitable for a retail store. Or you could also track a specific asset or assets, such as delivery trucks or pallets or shipments.

Soft Benefits of GIS Planning

GIS can also be the catalyst for organizational evolution. According to David Armano, VP of Experience Design with Critical Mass, and thought leader in the worlds of experience design and digital marketing, *“Visual Thinking can help us take in complex information and synthesize it into something meaningful. In an increasingly fragmented and cluttered world ... imagery ... can get people to understand the abstract...”*

GIS is a particularly horizontal technology: it has wide-ranging applications across the business and intellectual landscape. Because working with spatial information creates a shift from left brain (logical and analytical) to right brain (intuitive, holistic, synthesizing) thinking, it deepens a person’s ability to understand connections within systems, and increases overall comprehension of complex information layers by expanding the aptitude for spatial visualization and holistic thinking.

For this reason, no GIS planning and implementation can be a success without the right people involved. At the center of the planning process there must be at least one smart person who understands the vision, purpose, goals, objectives and mandates of the organization. This person must also be interested in deepening his / her understanding of the organization’s operations, and in discovering common connections between seemingly disparate things.

Finding these common connections is the hidden fruit behind a successful GIS implementation. Since the uncovered connections will most likely cross silos and departmental boundaries, it is especially helpful if this person or team is skilled in leading transformational change. Using GIS for analysis has high potential to create increased organizational unity around a common strategy –now visible for complex analysis.

Case Study - PJM

PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia. PJM’s vision is to be the electric industry leader – today and tomorrow – in reliable operations and efficient wholesale markets. Their foremost responsibility is the safe and reliable operation of the electric transmission system to ensure that a reliable supply of energy makes it from source generation to wholesale customers.

PJM was looking for a flexible and visual way to communicate with high level stakeholders and analyze the impacts and evolution of their power grid. To do this, PJM’s GIS partner incorporated temporal management systems (Microsoft Project) with 2D/3D GIS. This integration gave PJM a powerful analytical tool that allowed them to easily leverage mission critical information, visualize their power grid, drill down to detailed information

and display it to critical stakeholders in an easy to comprehend manner. At the same time, this gave them a new, spatially dynamic visualization and decision support tool to support future planning and analysis.

In the GIS, each element of PJM's electrical system --substations, generators, circuit breakers, transformers and transmission lines and their associated attributes: voltage ratings, type and circuit identification-- was intrinsically related to service cost, project scheduling and facility information. The GIS effectively bridged the gap between spreadsheets, facility locations, cost allocation, planning and business modelling tools. As a formal data resource, a GIS makes information that was previously scattered among many sources readily identifiable and easily accessible to users of all skill levels. This enables decision makers to consider alternatives more quickly and effectively.

PJM's System Planning GIS (SPGIS) is composed of three scales of information: transmission, cluster and subcluster. The three scales are topologically connected into a single fabric of information encompassing all layers of data. Geodatabase relationships and rules govern other interdependent behaviours.

The resulting SPGIS is a powerful tool that allows PJM to visualize geographic relationships between facilities distributed over its vast system. For example, PJM studied 501 generation interconnection requests totalling more than 137,000 MW in 14 different queues. Decisions made in Queue A might have significant impacts on later queues such as Queues B or C. Planners using the GIS had the immediate benefit of analyzing dynamic project schedules and costs associated with transmission system upgrades. As PJM's charter continued to expand as a Regional Transmission Organization (RTO), better visibility of larger amounts of data with geographic relevance was necessary.

In summary, the geodatabase created a visual tool that allowed PJM engineers to analyze and visualize system planning data in ways only limited by the imagination, and as technology advances, they continue to discover ways to apply GIS to help them make strategic and tactical decisions. For further information about this project, see the article titled [PJM Snaps the "Big Picture"](#) in the October 2004 issue of Transmission & Distribution World.

Case Study - IBM, Retail In-Store Analysis

One of the biggest challenges for retail stores is to analyze what customers do in their store and why. The better these answers are known, the better organizations believe they can influence shopping behavior. IBM was looking for a partner to help create a GIS based solution that would help answer questions such as:

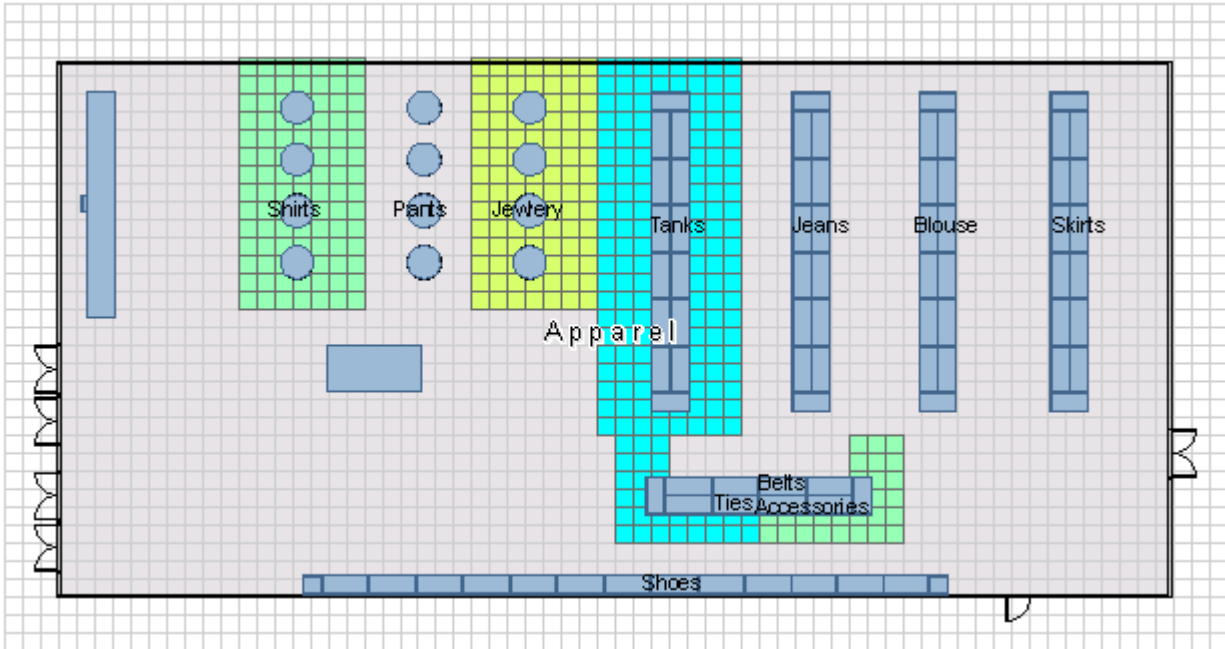
- Who are my customers?
- What do they need?
- What do they want?
- What are they doing?
- What are they buying?
- What are they looking at?
- How long do they stay?
- Where do they stay in the store?
- Are my promotions working?

At the macro level, general buying patterns are known, and these vary by socio-economic grouping, age, gender, national and regional location, day of the week, and time of the day. It is also known that customers behave differently when changes are made to personal space, lighting, temperature, smell, etc.

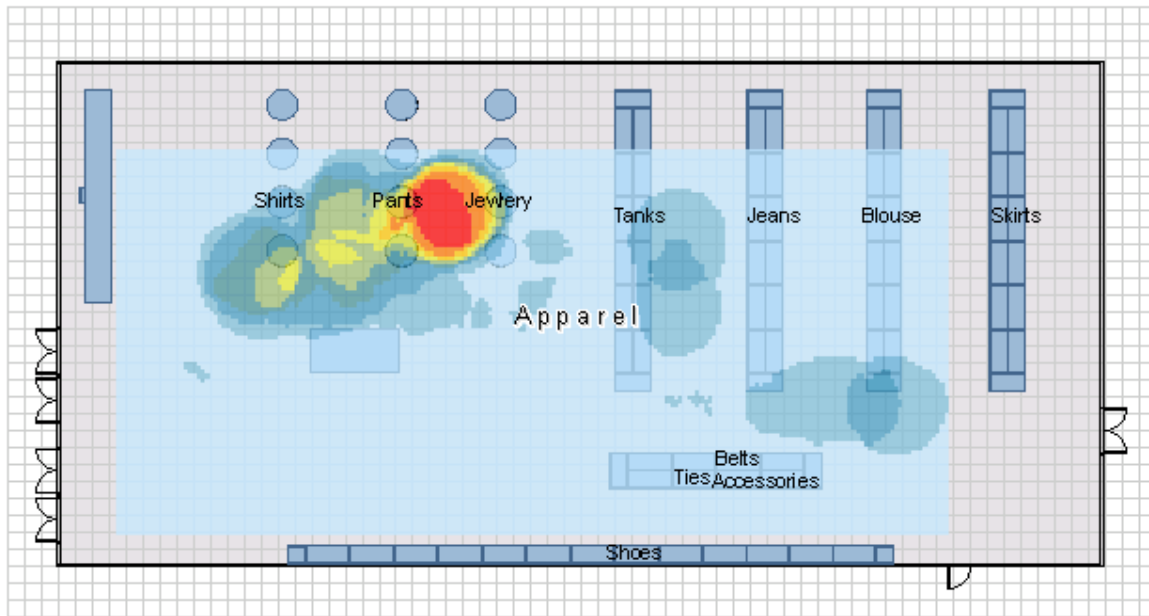
But retailers would like to know “how does this apply to my store – exactly?”

What can a retailer do to overcome the challenges and mysteries surrounding the illusive customer / to drive new life into existing and even new revenue streams? Can the surveillance network help? Does it all depend on the depth of statistical analysis offered by the solution?

GIS analysis can answer these questions!

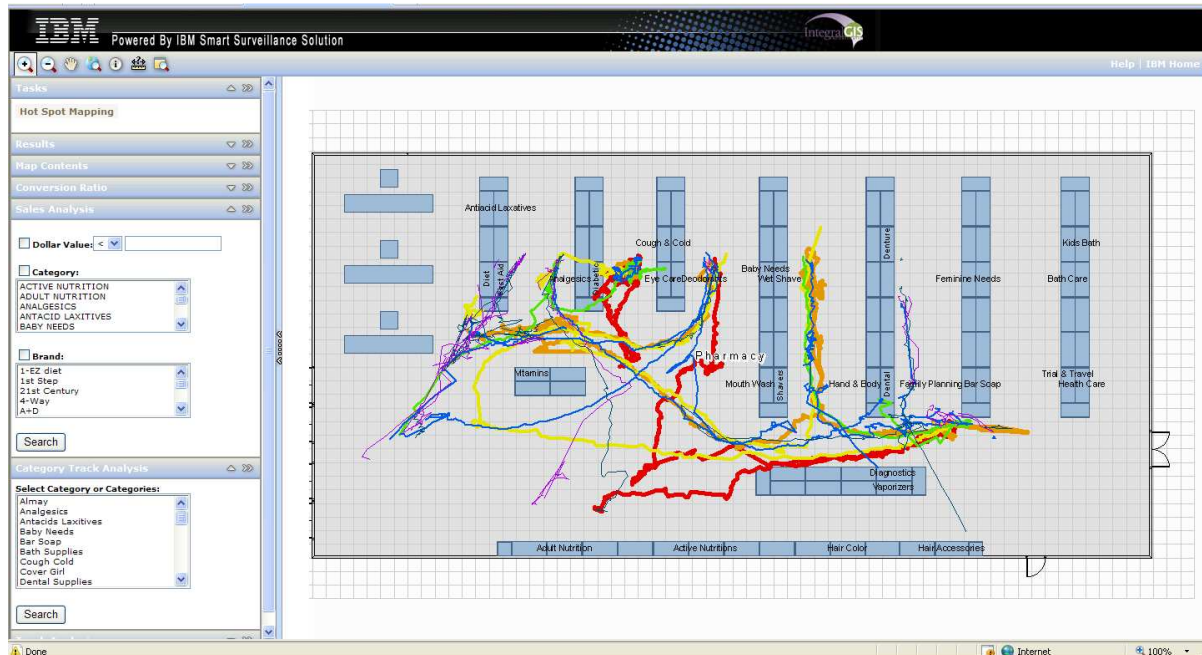


How many times have we heard retailers say: “If I only knew how many customers were in my store at any given time, then I would know what to do”?



What if it were possible to not only know how many customers are there at any given time, but also where they went once they entered?

A retailer might take advantage of this simple knowledge regarding customer count and traffic patterns to be able in real-time to reroute sales associates away from unpopulated areas of the store to where the customers actually are.



Sales associates might then have the ability to actually help customers with information to facilitate a buying decision and offer cross-sell / up-sell suggestions along the way. Retailers would be able to prioritize stocking procedures to maintain shelves fully stocked in those aisles most traveled by customers. And they would be able to stock those shelves with product that customers were actually looking for. Wow, that would change everything!

We can use sales (transaction) information to build insight models about our customer preferences.

Some of the questions a retail based GIS analytical solution seeks to answer are:

- ✓ What is the size of my audience?
- ✓ What are the customer hot spots in my store?
- ✓ When are my customers at those locations?
- ✓ How large is my audience in a category, department, in front of a display, promotion, sign, shelf or other ?

- ✓ Where and when are my target customer segments throughout the day, week, month?
- ✓ How can I measure promotions, signage, display and other features effectiveness?
- ✓ Can I calculate the cost of promotions per customer (visitor vs reached vs converged)?
- ✓ What traffic increase and, from what customer segment, is needed to increase sales in a specific category by 20%?

Conclusion

GIS is not simply a computer system for making maps, and it is so much more than a tool that can assist governments with planning and zoning, environmental planning, and other common tasks. The intuitive powers of visual graphics reveal trends, patterns, and answers that are difficult to detect in other data presentation formats, and because Visual Thinking is so powerful, it can help us take in complex information and synthesize it into something meaningful.

We have attempted to capture your imagination with a few of our current and past projects. If you are curious about how a GIS might help your organization enact quick and precise planning to position and produce your products and services in a way that makes them available when and where your customers want them, please visit our website for more information. www.integralgis.com or contact Kristin Halberg at Kristin@integralgis.com

About Us

Integral GIS, Inc.

Integral GIS, Inc. is a seven person Seattle based technology consulting firm specializing in Geospatial Information System (GIS) design, development, and comprehensive information visualization. Our mission is to develop software solutions that allow our clients to view, analyze, and manage information in new and innovative ways. We do this by using integrated visualizations of data and objects, in combination with other factors that drive an enterprise's critical decision making process.

We have been an authorized Environmental Systems Research Institute (ESRI) business partner (Consultant, Developer, Reseller, and Instructor) since our 1999 incorporation, and we've continued to work with unassailable ethics and passion to deliver powerful solutions that enable timely and enhanced decision making capabilities to our clients. We are also a certified Solutions Provider for a variety of Microsoft Products; such as MapPoint, Share Point, Project Server, and SQL Server. We value being a strong contributor in work relationships that are stimulating, fun, collaborative, and successful.

Our innovation is demonstrated by our development of the first 4D project management tools, which were used for the construction of Safeco Field in Seattle and Disney Hong Kong, and by PJM Interconnection. We work closely with the Port of Tacoma and provide the Port hosted custom web applications, as well as GIS and GPS tools to support its maritime transportation system.

Our flexibility is further illustrated in the diversity of our portfolio, which includes: traffic and security application development for the City of Jerusalem, Israel; interactive, user customized web-based 'smart maps' that are easy to update and implement (T-Mobile, USA; NW SEEDS; PRISM; GEC.) We continue to expand our portfolio by seeking complex and interesting projects that allow us to apply our talents in new ways. Our projects are successful because we comprehend and assimilate the needs of our clients.

Early in our history, we were awarded a Small Business Innovative Research grant through the Department of Defense to develop tools and applications garnered from our work on the Oklahoma City Bombing for application to security and response during the 2002 Salt Lake Olympics.

We have a broad mix of projects to display our depth of expertise and demonstrated innovation in the field of GIS and as application developers, as well as Integral's commitment to enabling the attainment of our client's goals.

Patrick Moore - Patrick@integralgis.com

Patrick brings 20 years of software development experience and 15 years of developing spatial software applications to Integral GIS. He started his professional software career at Microsoft after obtaining degrees in Computer Science, Physics, and Mathematics from the University of Washington. He also holds an MSc in Civil Engineering, and was exposed to many more concepts through a UniGIS certificate program at Simon Fraser University.

Patrick believes that both clients and communities can be better served by the incorporation of spatial technologies, and that if we can develop spatial applications for clients, they will benefit in ways that are not only measured with money, but also with large conceptual and philosophical gains. He works under the preconception that the information and decision making systems of an organization can benefit widely from the proactive application of spatial information.

Kristin Halberg - Kristin@integralgis.com

Kristin synthesizes information with creative and intellectual curiosity, and combines strategic change consulting experience with 15 years of operations management in varied industries such as high tech, retail, supply chain, and hospitality. She believes today's business environment requires not only new technology, but also new behavior and a new way of viewing information.

Kristin thrives on simplifying complex problems, and has a broad spectrum of industry experience. She began her professional career in the fast paced and ever-changing telecommunications industry, and led teams through several mergers, acquisitions, and major industry and global technology changes where adaptive change was a necessity. She is passionate about the way spatial technology helps integrate right and left brain thinking, and believes organizations can benefit both quantitatively and qualitatively from the application of GIS technology.