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MARCH 2014

Business Information

INSIGHT ON MANAGING AND USING DATA

SPECIAL ISSUE

Visualize This

More organizations are relying on visualization tools to make sense of reams of data. But users need to focus more on substance and less on flash.



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Eyes Wide Open

IN TECHTARGET'S 2013 Analytics & Data Warehousing Reader Survey, 36% of 664 respondents said their organizations were using data visualization and discovery tools, while another 41% said deployments were planned in the next 12 months. In response to another question, 44% said they expected their organizations to increase spending on data visualization initiatives over the next 12 months. That was the third-highest percentage among 10 technology categories, narrowly topped only by the figures for data warehousing and predictive analytics.

It isn't surprising that data visualization would be gaining in popularity. Business intelligence and analytics are becoming more central to business strategies—and business success. As a result, many organizations are looking to broaden the use of BI data in decision making. Visualizing that data can make it easier for users to grasp.

But it's easy to go awry on data visualization. In an August 2013 blog post, Forrester Research analyst Ryan

Morrill cited “a cascade of bad examples” of infographics and other types of visualizations with data errors and overly complicated designs. He recommended focusing on two things in creating visualizations: engaging graphics, yes, but also a “data-driven design” in which the visual elements help to accurately depict the information being presented.

This special edition of *Business Information* examines the dos and don'ts of managing successful data visualization processes. First we offer advice from experienced users on finding and deploying the [right BI and data visualization tools](#). Next we provide tips on [building effective visualizations](#) for use in BI dashboards. We finish with a look at the [use of geographic information systems](#) to help improve the quality of health care. ■

CRAIG STEDMAN is an executive editor in TechTarget's Business Applications and Architecture Media Group. Email him at cstedman@techtarget.com or follow him on Twitter: [@craigstedman](https://twitter.com/craigstedman).

VISUALIZATION MAKES SENSE OF MESSY DATA—IF YOU DON'T MESS UP

The sheer volume of information today is pushing IT and BI managers to look for tools that can help business users sort through the clutter. But it takes a keen eye to spot the right one—and a solid plan to deploy it.

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Logistic Specialties Inc. knows all too well how tangled data sets can become—and how that can hamper business intelligence processes without the right BI and data visualization tools in place.

LSI provides supply chain management services to government agencies on defense and aerospace projects; the Layton, Utah, company also consults with other organizations to help them bid on government contracts. Several years ago, a large contract to manage the delivery of airplane landing gear to Hill Air Force Base in Utah put its analytics capabilities to the test. Answering the request for proposals and estimating the profitability of the job, and then working with parts manufacturers and tracking payments to them, were big undertakings for LSI. Data was being pulled in from numerous sources, including its own databases and government ones. When the project started, LSI's data infrastructure couldn't keep up.

“In order to get this business, you have to be fast,” said Mark de Amici, LSI's chief information officer. “And

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when we initially did [the Air Force project], we were tracking our data on this ginormous spreadsheet, and it was just a mess.”

To help clean up that mess and better meet the analytical needs of its business users, LSI in 2010 decided to implement a BI and data visualization tool from Logi Analytics. The Logi Info software lets IT teams build Web-based [BI dashboards](#) and reports with built-in visualizations through a drag-and-drop interface. In order to successfully deploy such tools and gain valuable business insights from them, it’s crucial to start with a long-term plan, de Amici said.

User Knowledge Is Good

One key element of that, he added, is to know your users; otherwise, you might end up buying BI tools and data visualization software that don’t get used to their fullest—or at all. LSI evaluated a lot of different [visual analytics](#) products, including ones from larger vendors. But de Amici said some of the tools came with “bells and whistles” that a typical user in LSI’s finance or marketing department would never take advantage of. That would have left the company overpaying for functionality it didn’t require. “It’s feature-rich,” he said. “But do you need those features? And do you have people on your staff who can really make use of that stuff?”

Another question to answer is how involved you want the IT team to be in the use of the BI system and the development of data visualizations and reports. De Amici said the goal at LSI was to enable business users to be

agile in analyzing data and empower people in all departments to build their own reports, a capability that Logi supports.

SIGMA Marketing Insights, a marketing services company in Rochester, N.Y., began using Tableau Software’s [self-service BI](#) and data visualization tools in 2013. Andrew Lucyszyn, a vice president who heads the company’s Web analytics operations, said he wanted to

THE VISUAL ANALYTICS MARKET IS STILL TAKING SHAPE AND GENERATING NO SMALL AMOUNT OF BUZZ.

empower end users to do their own analyses and visualizations because that eliminates IT bottlenecks and shortens the decision making process. “Give them [tools] where they manipulate the metrics that make sense to them, and they can produce the visualizations they need,” he said.

The visual analytics market is still taking shape and generating no small amount of buzz—and de Amici said vendors are only too happy to perpetuate the buzz if it supports their product claims. Prospective buyers need to cut through all the hype when evaluating which data visualization technologies are right for them, he advised.

For example, de Amici said he has looked at cloud-based visualization tools. But he’s concerned about a lack

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of standards, which might make it difficult to change vendors if data can't be migrated from one cloud service to another. "A lot of the buzz in the marketplace is just that," he said. "It's stuff that isn't really buying you anything."

More to Do—and Avoid

In a December 2013 webinar hosted by the Marketing Science Institute, Tom Davenport, an author and a management and IT professor at Babson College, said a number of other factors can also prevent organizations from successfully implementing and using data visualization software.

For example, project managers need to make sure that upper-level management is on board with putting data discovery and visualization tools in the hands of the average worker and that funding is in place to support an initiative over the long term. Failing to address [data governance issues](#) before deploying the technology can lead to big problems with inconsistent information down the

road. To succeed, visualization projects require "a whole set of capabilities, from technology to organizational [ones]," Davenport said.

Cost is another issue. Up-front costs are typically easy to understand, but de Amici said the people involved in the technology evaluation and selection process need to weigh the long-term cost of ownership before deciding what BI and data visualization software to buy.

BI and visualization tools often are complex and require lots of development and maintenance investments over time, he said, noting that a business might have to pay consultants to help out on projects for many years to come.

That model can work for large businesses but wasn't affordable for LSI, according to de Amici. "We don't have those kinds of resources," he said. "So we need something agile that isn't going to wear us out." ■

ED BURNS is site editor of *SearchBusinessAnalytics*. Email him at eburns@techtargt.com or follow him on Twitter: [@EdBurnsTT](https://twitter.com/EdBurnsTT).

DASHBOARDS REQUIRE MEASURED APPROACH ON VISUALIZATION

With an increasing demand for graphics in dashboards, organizations must remember this: Just because you *can* visualize all that data doesn't mean you *should*.

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Fifty years ago, the philosopher and social commentator Marshall McLuhan coined the phrase, “The medium is the message.”

While there are many perspectives on his intended meaning, this is a common interpretation: The method by which a message is conveyed may influence both the way the content is understood and the context through which the medium itself influences and affects that understanding.

Unfortunately, business intelligence practitioners and business analysts often neglect that concept when developing BI dashboards. While the availability and use of a broad palette of data visualization widgets suggests that there's ample demand for graphics in dashboards, the plethora of choices shouldn't dictate that flashy visualizations be employed whenever possible.

Instead, it raises two fundamental questions about [dashboard development](#): How do different data visualization techniques convey messages to business users? And how should BI developers decide what kind of graphics are right for different dashboards?

In general, any type of visual representation has its

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pluses and minuses. Consider this basic issue: When is it better to use a pie chart versus a bar chart? Both methods can be used to convey comparative magnitude, such as the percentage of a population that drives different vehicles. But it might be difficult for users to differentiate between the sizes of the slices in a pie chart, especially when the numbers are relatively close—in that case, a bar chart could be the preferred method. On the other hand, a pie chart is often better for showing how a specific group of drivers compares to the entire population, which can be more difficult to discern from a bar chart.

Proper Balance a Must to Maintain

Viewed from that perspective, making the right choices for visualizing data becomes an art that balances the medium and the message. The decision must be driven by the business directive and user needs: What business decisions are informed as a result of the data presentation, what types of questions will data analysts and business users ask, and which visualization methods most effectively help to answer those questions?

First, consider which of these common data analysis activities are performed by the workers who will be using a particular dashboard in your organization:

- Finding specific values, such as the number of people driving SUVs in the Washington, D.C., area
- Finding aggregate values, such as the average number of minivans sold monthly by suburban car dealerships

- Filtering down to subsets of data based on a set of desired conditions—for example, focusing on households with both an SUV and a minivan
- Identifying outliers and anomalies, such as households with more than 10 automobiles
- Sorting a collection of data in ranked order using specific measurements, such as ordering communities based on their average household income
- Clustering groups with similar characteristics—as an example, organizing buyers of different car models based on age, sex and education levels
- Correlating attributes to determine relationships, such as relating gender to automobile preferences

Second, the decision process for determining the optimal course on data visualization will hinge on a number of factors that can influence [dashboard design](#) objectives. Some of them include the following:

Intended actions. What do you expect the user's next step to be? For example, do you anticipate that a specific business process will be triggered based on the presented information, or will users want to drill down into the data in search of additional insight? The answers to those questions can—and should—lead you down a variety of data visualization paths.

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User sophistication. Different types of users absorb information in different ways, so you'll want to gauge who your audience is and how analytically sophisticated it is. Ensuring that the level of data visualization complexity is properly tailored for the users of a dashboard will keep them from being overwhelmed by the graphics.

Delivery requirements. The ubiquity of mobile devices makes it likely that users will view dashboards on different types of systems. You likely will have to select a data visualization approach that takes into account the differences in usable real estate between a smartphone, a 10-inch tablet and a full-sized computer screen.

Geographic content. If the measurements to be displayed involve [location data](#), it might be necessary to include visualizations that incorporate geographic information and make it easy to understand.

Time frame. It's one thing to provide a static view of data fixed at a particular time. But some analyses are designed to convey how sets of data have changed over time, which might call for the use of animations to help show the changes.

Another step is to examine the various operational scenarios in which data analysts and other users will be accessing data. Continuing with the automotive theme, one

example might be a marketing application to help car dealerships determine the best locations for newspaper advertising; another might be a mobile app for prospective buyers looking for dealers with particular car models and configurations in stock.

The most visually appealing and flashiest graphics aren't always the optimal ones for communicating the desired information.

With all of that information in hand, test different types of visualizations in dashboards to see which are best able to satisfy the business requirements. And in doing so, remember that the most visually appealing and flashiest graphics aren't always the optimal ones for communicating the desired information. When the medium engulfs the message, a visual may look pretty—but it won't accomplish your business goals. Two enduring words of wisdom from Henry David Thoreau's *Walden* fit here, 160 years after he wrote them: Simplify, simplify. ■

DAVID LOSHIN is the president of Knowledge Integrity Inc., a consulting, training and development services company. Email him at loshin@knowledge-integrity.com.

GIS SOFTWARE HELPS HEALTH INDUSTRY VISUALIZE PROBLEMS

Health care providers are turning to geographic information systems to map out public health issues and eliminate variations in patient care delivery.

Health care providers and policy-makers are increasingly looking to geographic information systems to spot issues that are having an impact on public health. The hope is that the data visualizations enabled by GIS technology will help address some of the health industry's most intractable problems, including high costs and poor treatment outcomes.

David Goodman, an M.D. and a professor of pediatrics and health policy at The Dartmouth Institute for Health Policy and Clinical Practice, spoke about the use of geographic information systems at the 2013 Esri Health GIS Conference in Cambridge, Mass. He said GIS software can help health organizations stamp out costly and potentially dangerous variations in the delivery of patient care.

In the mid-1990s, Goodman and his research team at the institute, located in Lebanon, N.H., started using

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[GIS tools](#) to map out the differences between how patients are treated in various regions of the U.S. The initiative, which became known as the Dartmouth Atlas of Health Care project, first looked at how well doctors were following guidelines for treating heart attack victims across the country.

Goodman said evidence-based treatment guidelines recommend giving patients who have suffered heart attacks medications known as beta blockers as soon as they enter the emergency room, in order to reduce the stress on their hearts. But after mapping out adherence to that recommendation with the GIS software, the researchers found that fewer than 70% of doctors in some regions were giving beta blockers to heart attack patients. In higher-performing regions, the adherence rate was more than 90%.

A Lot at Stake

Identifying the geographic variations enabled local public health agencies and hospitals in underperforming areas to re-examine how heart attack patients were being treated. Today those kinds of variations are almost nonexistent, according to Goodman. He views data analysis efforts such as the study done by the institute as vital to the industry, government officials and patients alike: “All of those hundreds of billions of dollars that we spend as a country [on] health care—we need to understand what it’s worth,” he said.

GIS software can help health care organizations identify geographic areas where certain problems occur

frequently. But to achieve that, conference attendees said, users need to know how to properly organize their data so that they get accurate results.

Kathy Kliebert, secretary of the Louisiana Department of Health and Hospitals (DHH), said her state’s efforts to use GIS software to track and improve the health of pregnant women and newborn babies only started bearing fruit when the agency let the data speak for itself.

Initially, DHH officials assumed that most preterm births happened in specific New Orleans neighborhoods. Kliebert said the first impulse in creating [GIS visualizations](#) was to overlay data along traditional neighborhood boundaries. But she said the department soon realized that approach would have overlooked hotspots straddling two or more neighborhoods. Once it was clear where the true trouble spots were, with visualizations documenting the locations, state health workers could distribute resources to the areas that needed them the most.

Needs First, Tools Second

There are other problems that can sink a health care data analysis initiative built on top of GIS software. Kliebert said public health departments and health care providers may be tempted to implement the technology first and then figure out what they want to do with it later. But she cautioned that it should only be put in place after a planned use has been identified.

In addition, there are relatively few qualified programmers available who know how to leverage GIS tools, according to Kliebert. Getting existing workers to

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incorporate GIS findings into their everyday workflow is another problem. The solution for the DHH was to partner with local colleges and universities and area companies, which provided the agency with access to new pools of workers as well as training programs for existing employees.

THERE ARE NUMEROUS PROBLEMS THAT CAN SINK A HEALTH CARE DATA ANALYSIS INITIATIVE BUILT ON TOP OF GIS SOFTWARE.

Kliebert said the DHH is continuing to expand its use of GIS software. For example, she's taking steps to get information from the tools into the hands of more workers as part of an effort to increase [data-driven decision making](#) at the agency. "Once you start sharing [data]," she said, "the excitement and understanding of what it can do is remarkable." ■

ED BURNS is site editor of *SearchBusinessAnalytics*. Email him at eburns@techtarget.com or follow him on Twitter: [@EdBurnsTT](https://twitter.com/EdBurnsTT).

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Annie Matthews, Director of Sales,

amatthews@techtarget.com

TechTarget, 275 Grove Street, Newton, MA 02466

www.techtarget.com

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