Sanjeev Aggarwal
Laurie McCabe

Data Visualization: Charting the Best Course for Your Organization

Sponsored by: SAS Institute, Inc.

Key Highlights

- Data is the new business capital. But as data volumes and density grow, it becomes more challenging to view, explore and act on information.
- Traditional business intelligence tools and spreadsheets merely serve up historical data. Data visualization solutions need to offer advanced analytical capabilities to derive insights for future forecasts and planning.
- Data visualization collapses the traditional BI/analytics journey, enabling a more collaborative, real-time analytics approach and better decision-making.
- Organization and user requirements should drive solution selection to ensure that the solution is intuitive and practical for real users.
- It's critical that any data visualization solution be able to consolidate and easily integrate data from different sources and formats.
- Deployment choice (public or private cloud, on-premises) is a key determinant of total cost of ownership (TCO). It must include a multi-year value-for-investment equation rather than just a one-year software expense.
- Vendor responsiveness and support capabilities are just as important as the ability to meet specific solution objectives.

Data is the new business capital. But just like financial capital, you must invest wisely to reap value. As data volumes and density grow, it can be difficult for decision-makers to view, explore and act on information.

However, a new generation of self-service data visualization solutions promises change. With modern tools, people can explore data through different lenses to get fresh perspectives for problem solving and decision-making, isolate and resolve problems, and evaluate how different variables will affect decision-making outcomes.

Data visualization can benefit companies of all sizes, regardless of where they are on their analytics journey. If you already use other reporting and analytics tools, data visualization can help you realize greater value. If you're ready to move from spreadsheets to more sophisticated analytics solutions, data visualization can cut the time and resources required to derive insights from your data.

This report examines how data visualization can help organizations unleash the full value of information, and outlines key considerations to guide the solution evaluation process.

Section 1: Data Volume and Complexity Drive the Analytics Transformation

"Big Data" isn't just the latest buzzword. Every minute, over 200 million emails are sent, Google receives over two million queries, and 571 new web sites are created.

All types of information are becoming digitized:

- Doctors have moved from paper charts to electronic medical records.
- Merchants have switched from paper credit card imprinters to POS terminals to virtual terminals, and now to mobile payment devices.

- We get movies online from Hulu or Netflix instead of Blockbuster.
- We create and share photos on Facebook and Instagram instead of Kodak film and paper.
- "Smart" machines—from traffic sensors to seismographs—are replacing manual data collection.

Organizations must be able to sift through their data to develop the insights needed to identify opportunities, spot problems and make better decisions. Whether measured in megabytes or zettabytes, if you can't effectively manage, analyze and act on your data, you have a Big Data problem.

Although traditional business intelligence and analytics solutions can help address the Big Data problem, they have also created others. For instance, businesses often must buy and integrate multiple products to address different analytics requirements. Too often, they require significant heavy lifting by IT staff and data analysts to set up and configure reports. And decision-makers must wait too long for IT staff or data consultants to develop algorithms, reports and visualizations to answer critical questions.

Modern data visualization solutions remove many of these obstacles. They combine visualization and data analysis with a self-service interface so users can directly explore, query and manipulate information without having to involve IT or data analysts. By collapsing the traditional BI/analytics journey, organizations can create a more collaborative, real-time analytics approach.

Because data visualization solutions are designed to be self-service and user-friendly, more people can get involved in the analysis process, which facilitates more collaborative and creative problem solving and idea generation. When people have the power to visualize information, organizations can gain fresh perspectives and explore different courses of action more easily.

Data visualization provides different views to make information easier to consume and interpret. Solutions sometimes "bake-in" best practices to give users the most relevant and intuitive visuals for different situations. This helps take the guesswork out of spotting patterns, trends and relationships.

SECTION 2: COMPANY AND PEOPLE CONSIDERATIONS

Organizational and user decision-making requirements should drive the planning and evaluation process for data visualization to ensure that the solution addresses real-world and real-user objectives. Get stakeholders involved up front to provide input about the types of insights they need to perform more effectively. For instance:

- What information do shop floor workers need in order to flag potential issues before they become serious problems?
- How do executives need to see and manipulate information to better understand historical trends and develop more accurate forecasts?
- How do strategic planners want to slice and dice information for long-term planning?

Factor both immediate, specific triggers and longer-term goals into the equation. For instance, improving corporate performance management may drive initial requirements, but developing a more effective marketing strategy may be the next priority.

Consider collaborative decision-making needs within departments, or across departments and geographies. Collaborative data visualization solutions can spark fresh insights and serve as a catalyst for better decision-making. Once needs are articulated, look for solutions that make it easier for users to directly interact with information and get the "aha" moments that they seek. People are more likely to buy into and use solutions that help them do a better job and give them more confidence in their decisions.

Figure 1 provides additional detail about key organizational and user considerations.

Figure 1: Specific Company and User Considerations

Requirement	Key Considerations
Company	• How does your company make decisions today? • What's the appetite for taking a more data-driven approach? • Is your company ready to move beyond historical reporting and use analytics for planning and forecasting? • What are the initial scope and scale of your requirements? When and how far will you need to extend the solution? • What's the budget, both initially and over time?
User roles and use cases	• What types of users will create and consume analytics and reports? • Do you have a process that allows different types of users to test the solution and ensure that it meets requirements and expectations? • What types of requirements do users have for decision-making and for visual interfaces? • Will you need licensing/subscription options to accommodate power users, frequent users and users who only need viewing access to reports?
Ease of use/ training	• How much time and tolerance do users have for training? • What level of training will the organization support?
Integration	• What other applications and business processes need to be integrated with data visualization solutions to get the most benefit from them?
Collaboration	• How many departments and people will need to use and collaborate with the solution? • Does the solution facilitate secure collaboration (internally and with external partners/suppliers, if needed)? • How easy is it to collaborate by sharing entire data models used to construct visualizations?
Vertical/industry	• What industry-specific capabilities (terminology, best practices, etc.) will you need to make the solution more intuitive for users?

Source: SMB Group, 2013

SECTION 3: FUNCTIONALITY CONSIDERATIONS

Because every organization has its own starting point and end goals, there is no one-size-fits-all formula for functionality. Each will have requirements for analysis, visualization, scalability, performance, integration, data management and security.

Crowdsource to select the most usable features and weed out those that really aren't necessary when it comes to analytics, reporting and visualization needs. Consider both immediate and longer-term requirements for what will make information most usable and actionable for decision-makers.

Just as important, assess the organizational appetite and resources available for custom coding, integration, mobile capabilities, performance and scalability. Key questions to ask are highlighted in Figure 2.

Figure 2: Functionality Considerations

Requirement	Key Considerations
Analysis	• What does ease of use look like for the different types of users in your company? • What analytics capabilities do you expect/need to get out of the box? • What time and resources can you apply to develop customized capabilities? • How do you need to apply predictive/prescriptive analysis for forecasting and planning? • Will you need to analyze unstructured text and social media?

Visualization	• Do you need a solution with automated visualizations and filters? • Can you group different visualizations to see a more holistic picture? • Can you see and compare the impact of different predictive models? • Does your company need date, time and geographic perspectives on visualizations for drill-downs?
Reporting	• What types of reports need to be generated? • Who will develop reports and visualizations? • How do reports need to be shared?
Scalability and performance	• Can the solution easily scale to support larger data sets and/or more users? • Is it important to have a system that is designed to handle large data sets? • How much speed and power do you need, and will the solution you select require new technologies (Hadoop, MapReduce, R, etc.) to boost performance?
Integration	• What different data sources do you need to connect? • Do you need to integrate and use existing data stored in SQL databases and Microsoft Office data?
Security	• What security and access solutions (e.g., Active Directory) does the solution need to support?
Mobile	• Do users need remote access, and if so, for what purpose and via what types of devices?

Source: SMB Group, 2013

SECTION 4: DATA CONSIDERATIONS

Many companies need to better analyze structured, internal data. But much corporate data is found in different silos that are inconsistent and hard to support and rationalize—let alone analyze. If you don't already have the means to pull this information into an integrated data store, you'll need to find a way to do so—regardless of the data visualization solution you select.

Over time, it's also likely that you'll need to bring unstructured and/or external data into the mix to develop the insights you need to get ahead. It's critical that any data visualization solution be able to consolidate and standardize data from the different sources and formats.

Consider your data locations and volume, as well as what's needed to ensure quality so that your data visualization solution can extract the maximum value from it.

Key data areas to assess include:

- **Data variety/sources:** Most companies start with their own structured corporate data. But where is this data? Is it already consolidated, or is it in different "silos," such as an on-premises financials application and a cloud-based HR or CRM solution? Do people need to view unstructured data such as company emails or external sources like social media? You'll want to integrate disparate data sources and/or make sure that the data visualization solutions you're evaluating can pull in data from different places as required.

- **Data volume/velocity:** How much data do you need to analyze? Evaluate both current data volumes and what's coming down the pike. For instance, better market analysis might be the initial driver for data visualization. But your company will probably want to expand into other areas, from inventory management to customer service. Look for solutions with the data-crunching power you need now and in the foreseeable future.

- **Data veracity:** What shape is your data in? Layering data visualization on top of outdated, inaccurate or inconsistent data only creates pretty pictures of meaningless information. Incorporate data cleansing, integration and standardization into your strategy so that visualization tools can paint an accurate picture of what's going on in your business and the market.

- **Data value:** Data value is only realized when people can readily see what's happening in the data and use it proactively. Do you have the internal resources to develop best practices for end users? Do you want a solution that provides built-in line-of-business and industry performance indicators to help illuminate the most actionable information?

SECTION 5: COST CONSIDERATIONS

Many companies underestimate the acquisition and ongoing costs of a new technology solution. For example, resources are needed to adequately maintain a solution; upgrades and patches are required to keep things running securely and at peak performance. Training employees will be required, or they may never use the software productively. A total cost of ownership (TCO) comparison aids in evaluating competing solutions, and avoiding hidden costs and unwanted surprises.

TCO calculates the total cost of purchasing (or subscribing to) and operating a solution over its useful life, and provides a construct to evaluate costs that may not be apparent in the quoted software pricing alone. For example, if you're buying a new server, the hardware, operating systems, database software and storage usually account for only 15 to 25 percent of the overall costs to install, maintain, upgrade and support the server over time.

Therefore, the choice of deployment—on premises, public cloud and private cloud—is a significant factor in TCO because costs and pricing structures are fundamentally very different for each.

When calculating costs, also consider both the number of users and how long you expect to use the solution. In the case of a core business solution, such as data visualization, many companies look at TCO over four or five years (generally considered the useful life of hardware and software without the need for major replacements). Selecting a vendor that provides different deployment options and the flexibility to switch between them is advantageous if your requirements are likely to change.

Other costs to consider include:

- **Planning and selection:** How long will it take to evaluate the vendor, solution and service-level agreements (if applicable)? Can you try the product for free and/or do you need to invest to set up a test environment?
- **IT infrastructure requirements:** For on-premises solutions, what hardware and software do you need in order to run the solution? What associated expenses will you have for space, power and cooling? Do you need to add, shift or outsource IT personnel to manage and maintain the infrastructure? For a cloud solution, do you need to upgrade or add networking capabilities or bandwidth?
- **Application subscription or license costs:** What is the per-user charge for the license (on-premises solution), or the per-user subscription fee (cloud solution)? Does pricing differ by type of user (e.g., power user, view only)? Are ongoing maintenance costs (e.g., patches, bug fixes, upgrades) included or billed separately?
- **Application design, configuration and implementation:** What resources (internal and/or external) are needed to design and configure the solution to fit your business needs? Factor in data migration, integration and customization costs, and any system testing as necessary.
- **Administration and maintenance:** For an on-premises solution, how much time and money and how many resources will you need to invest to manage, upgrade, troubleshoot, patch, etc., over the solution lifecycle?
- **Training:** What IT administrative training and/or end-user costs are involved to get everyone on board with and productively using the solution?

Additional detail for calculating TCO is provided in Figure 3.

Figure 3: Detailed TCO Cost Considerations

TCO Categories	TCO Components
Planning and selection	• **Vendor evaluation and analysis:** Time/resources to evaluate features and functionality of competitive products; review and audit vendor license agreements, service levels and security requirements
IT infrastructure hardware, software and support *(primarily required for on-premises solutions; these are included in the subscription costs for cloud solutions)*	• **Server and storage hardware and maintenance:** Capital expenditures for servers and storage to run applications, databases and the test environment; operating expenses for maintenance, space, power and cooling • **Operating system, database, security, data backup software and maintenance:** Capital expenditures for operating system, database, security and data backup software; operating expenses for software support, upgrades, patches and bug fixes for this infrastructure • **Data management:** Resources and costs to cleanse and consolidate data sources • **Administrative IT costs for systems and databases:** Percentage of full-time equivalent (FTE) IT administrators' salary for time required for installation, management and ongoing updates of hardware, software, databases, security and backup
Application subscription *OR* application license costs	• **Application subscription or license costs:** In the case of cloud solutions, operational costs that remain constant for the life of the subscription service; in the case of on-premises solutions, initial deployment capital expenses • **Application maintenance:** Operational costs for bug fixes and upgrades; typically included in cloud solution subscription costs; usually a fixed percentage of initial licensing costs for on-premises solutions (In some cases, one to two years of annual maintenance costs are included in initial license costs.)
Application implementation, customization, integration, end-user support and administration	• **Detailed design:** Defining project objectives and scope; documenting existing workflow processes; identifying process gaps and data sources; documenting business requirements; developing a final project plan • **Configuration and deployment:** Application configuration; integration between systems and databases; data migration; system testing, etc. • **Application support and administration:** Time and costs for IT personnel to manage and upgrade server and client application software
Initial and ongoing training costs	• **User training:** Time and costs for end users to become productive with the solution and enhance skills as needed
Implementation	• **Implementation:** Cost for solution vendors (or their partner) to deploy either a cloud or on-premises solution

Source: SMB Group, 2013

SECTION 6: CONSIDERATIONS WHEN EVALUATING VENDORS

Several vendors offer capable data visualization solutions, including SAS, Tableau, QlikView, and Spotfire. Each vendor brings unique capabilities, breadth of features and functions, and experience to the visual intelligence market.

Conduct a comprehensive evaluation to identify which vendor's applications, support models, deployment options and technology platforms align with the goals of your data visualization projects. Keep in mind that "softer" capabilities are just as important. Is the vendor and/or its partners responsive to your needs during the sales process? Can they easily connect you with satisfied customers for references? And does the

vendor/partner have the resources to provide you with the type of ongoing support you need to get the best outcomes?

With the increasing interest in analytics among businesses of all sizes, every vendor is claiming to have some type of analytics solution. The costs and hassles involved in switching analytics vendors are very significant. When evaluating vendors, it is important to consider:

- The historic financial strength of a solutions provider; select a partner who will be there for the long run.
- The breadth of the solution provider's complete portfolio and analytical capabilities that will help you to grow your business: A one-trick pony may be able to meet your immediate need, but can it help you solve tomorrow's problems? Visualization without analytics is like a car without an engine.

Key vendor-related considerations are detailed in Figure 4.

Figure 4: Key Vendor-Related Considerations

Requirement	Key Considerations
Analytics capabilities	• What is the vendor's track record in the business intelligence and analytics area? • What analytics and data management capabilities does the vendor have beyond data visualization? Can the vendor accommodate needs as they evolve (e.g., deeper statistical analysis)? • Does the vendor have experience providing solutions in your industry? • Can the vendor provide relevant customer references? • Does the product roadmap dovetail with what you anticipate you'll need in the future?
Deployment models and licensing options	• Does the vendor offer a choice of deployment models? Can you switch between deployment models as your company and analytics needs change? • How simple and flexible are the vendors licensing options? Do they need both desktop and server licenses? • How does the licensing and pricing change between named-user and server licenses?
Support	• Is the vendor/partner professional and responsive to your needs during the initial evaluation? • Do you need—and does the vendor provide—24x7support? If so, is this standard or premium pricing? • Does the vendor provide dedicated account management support? • What training is included in the initial deployment? What fee-based training is available, and what are the costs? • How much training do organizations with needs similar to your own typically require to become productive? • Does the vendor provide sales and support outside of the U.S.?

Source: SMB Group, 2013

CONCLUSIONS AND PERSPECTIVES

There is a lot of buzz around "big data", analytics and visualization solutions that can potentially distract you from your initial objectives. But you can stay on track by keeping the end goal clearly in mind: gaining the capability to answer your business-critical questions.

Defining and documenting a data visualization strategy is the first step on the road to information insights that lead to business success. Don't make a quick "strategic" decision to use a glitzy vendor and hope it will solve your problems. Keep in mind that data visualization solutions provide better outcomes when they:

- Address historical needs AND provide the advanced analytical tools necessary for future planning.
- Enable a collaborative, real-time analytics approach. Best practices must be part of the solution to help users visualize and act on information more quickly and easily.
- Eliminate dependence on IT personnel and analytics staff, involving more end-users in decision-making.
- Offer a favorable TCO for your organization's needs and constraints, which considers more than just a one year software expense, but a multi-year value-for-investment equation.
- Meet product feature needs as well as performance, scalability, integration capability, data management and support requirements.
- Provide mechanisms to easily integrate different data sources.
- Provide choice and flexibility in terms of deployment options.

It's critical to develop comprehensive evaluation criteria for your short list of vendors. Lay the groundwork by creating thorough, clearly defined goals and conducting an internal assessment of analytics needs. Doing so will increase your odds of selecting an analytics solution and a solution provider that will deliver the insights you need to grow your business and stay ahead of the competition.

SMB GROUP, INC.

The SMB Group focuses exclusively on researching and analyzing the highly fragmented "SMB market"—which is comprised of many smaller, more discrete markets. Within the SMB market, SMB Group areas of focus include: Emerging Technologies, Cloud Computing, Managed Services, Business and Marketing Applications, Collaboration and Social Media Solutions, IT Infrastructure Management and Services and Green IT. Read our 2013 Top Ten SMB Predictions for our views on game-changers in these and other areas of the SMB market.