Seeing is Believing: Harnessing the Power of Visualization

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Translating floods of data on increasingly complex supply chain operations into actionable decisions is one of the most difficult challenges facing practitioners today. And one of the most promising solutions is new ways to visualize and analyze the data. Companies are developing sophisticated data displays that augment supply chain talent by making it easier for managers to analyze, interpret, and act on operational data.

But as with any new development, there are some important issues to resolve before visualization analytics reaches its full potential. Who should have access to what data, for example, and how can displays be designed to maximize the performance of users?

Some 22 supply chain professionals from 14 organizations gathered at the MIT Center for Transportation & Logistics for a roundtable meeting this June to discuss these issues.

The Many Positives

The wide range of applications described by participants gives an indication of just how far the technology has advanced. Organizations are using visualization analytics tools to map global supply chains, support delivery vehicles, project service levels at the customer shelf, and develop mobile applications, for instance. The sources of data are just as varied, and include ERP systems, point-of-sale, factory instrumentation, GPS tracking, and third-party providers.

How are these applications helping or hindering practitioners? Here are some interesting examples.

Streamlined decisions. Shaving 10 seconds off the time taken to make decisions can add up when the number of employees runs into the thousands. Several companies said that their visualization programs have sped up decision making because the data is presented in more succinct, meaningful ways to staff members. Group decision making can

be enhanced too. Some enterprises are using visual interactive dashboards to help groups make better decisions and resolve issues around inventory management and new product introductions.

More clarity. A clever and well-designed chart, map, or image helps managers see patterns and spot anomalies, particularly when analyzing complex product flows. An equipment manufacturer created a four-layer map of a portion of its supply chain with suppliers on the bottom and customers at the top. The depiction showed product movements between stakeholders and countries, and highlighted how these spaghetti-like flows had become tangled. It was obvious that allowing customers to handle transportation for product deliveries was a root cause of the complexity. Untangling the issue gave the team a $120 million opportunity to streamline distribution. Even though managers had been discussing this situation for years, without this impactful visual representation the burning platform for change would not have been created.

Exception management is another area that benefits from the power of visualization. As one company pointed out, humans have a natural affinity for spotting anomalies and contrasts in patterns. Scatter plots of well-selected metrics leverage this talent by quickly highlighting outliers.

Neutralizing Babel. A picture is worth a thousand words—and is even more valuable when the words are widely misunderstood. The heavy use of jargon and/or language differences can make it difficult for supply chain managers to communicate with each other. This is a problem that is likely to worsen as operational teams become more dispersed across the globe. The language of a picture is universal, however. As one participant said: "You have solved 90 percent of the problem by seeing the information."

Stimulating healthy rivalries. Several participants noted that well-designed visualizations can motivate teams to perform better. In one company, staff members in distribution centers dreaded the

"red" designation on company-wide heat maps or performance dashboards. The teams that earned a low ranking tended to try harder or make an effort to find out why other DCs were outperforming them.

Data Downsides

The visualization picture is not all positive, however. So-called "shiny tool" or "executainment" problems refer to situations where users have become seduced by the technology and lost sight of its practical functionality. When some users are given the capacity to quickly create graphics, charts, and maps they can go too far and create clutter that hinders decision-making. There is also the question of access to visual information: Just because certain people can have access to view certain data does not mean that they should have access. A picture can convey a great deal of information, but in the wrong hands that intelligence can be misapplied. Also, visualization's role in improving decision-making can be less than clear. On the one hand, the clarity of a well-designed picture can support more objective decisions that are less swayed by politics or the influence of dominant team members. On the other hand, people sometimes read into a picture what they want to see. Again, these are factors worth considering when designing displays.

Tailored Pixels

Allowing for different user needs—and how to incorporate their feedback into display designs—was one of the topics of discussion at the roundtable.

There are tech-savvy users who want to delve into the technology and create displays for their workgroups, functions, or business units. Other individuals look for solutions that they can adapt to their information needs. A third group looks for ready-made solutions that need little or no customization. Mobile applications represent another class of user.

Because these groups use visualization and analytics technology in different ways, their preferences heavily influence technology choices and visual design. For example, some require "push-only" interfaces while others prefer more complex, interactive "pull" visuals. Frontline managers and busy executives need clear presentations that can be absorbed quickly, whereas specialists in data-intensive operational roles require more detailed representations.

System developers and supply chain analysts interact with these groups in various ways to develop more effective visual displays. An enterprise in the healthcare business created a group of about 20 super-users who meet monthly to share ideas and tools. These individuals help to spread the word about the analytical capabilities of the visualization technology, and to provide new application ideas.

There are more general demands that also have to be taken into account. Participants warned against creating displays that are too cluttered and hence blunt the technology's ability to convey information succinctly. Displays also need to be tailored to accommodate constraints like color blindness.

Asking users to help design visual displays is fraught with risk. Often, they are unaware of the technical capabilities or tend to focus on the shortcomings of current technology. It's important for designers to observe users when developing analytics and visualization systems so they understand the demands of each specific supply chain function. Several organizations at the roundtable carry out formal time-and-motion studies to understand how visualization tools fit into different supply chain work environments. Some even track eye movements to gauge what information a person focuses on and how long they dwell on that part of the screen.

An overriding goal is to provide simple presentations that offer drill-down capabilities in accordance with the demands of a particular role. The participants described a number of approaches to rolling out visualization technology to users. A leading consumer goods company implemented a new tool in multiple offices across the globe simultaneously. In contrast, a healthcare organization adopted a targeted approach starting with senior management.

Training methods also vary. In creating a dashboard for operations staff, one company scoped the tool to limit the amount of training required. The organization wanted to minimize the amount of disruption caused by the tool's introduction, and purposely limited the degree of complexity so that the tool could be taught to users in two to three hours.

Future Challenges

The importance of visualization and analytics in helping supply chain practitioners to do their jobs will grow. Supply chains are increasingly complex, and the upcoming generation of managers is attuned to highly interactive games and the creative screens that come with devices such as iPads.

Research is needed into the best visual patterns for supply chain applications. Also, although the companies at the roundtable came from diverse industries, a problem they shared is how to present the technology in a meaningful way.

Another issue that stimulated much discussion is the skills and talents required by visualization development teams. Finding the right combination of experts to develop effective supply chain visualization solutions is difficult. This requires expertise in supply chain management, computer science skills, as well as input from graphic designers. Some of these individuals are not attracted to traditional IT or supply chain organizations, and have different approaches to the work involved. ∞