

E-Guide

Data Analytics Do's and Don'ts for the CIO

How to cull valuable business insights and communicate them effectively

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What good are data analytic programs if you can't present their results in a way that is meaningful- or even relevant to- business decision makers?

If your analytics efforts are not delivering the desired outcome, poor communication may be the culprit. Access this expert eGuide to find out why far too many analytics initiatives fall short- despite the best intentions and energy senior IT executives put into them. Uncover common gotchas and how the wrong questions can interfere with effective interpretation.

Tom Davenport on using analytics to influence business decision-makers

By: Linda Tucci

*In his forthcoming book, *Keeping Up with the Quants: Your Guide to Understanding and Using Analytics*, visiting Harvard Business School professor Tom Davenport offers managers a primer for surviving what he calls "the quantitative information age." For most CIOs, keeping up with the "quants" comes with the job. But as Davenport and co-author Jinho Kim drive home, the numerical data is only a means to the ultimate end: to influence business decisions.*

In this two-part SearchCIO New Books interview, Davenport talks about the goals of big data analysis, how best to communicate analytical results and why business intelligence (BI) should go back to being called "decision support."

The author of numerous books, including several firsts in the areas of big data and analytics, Davenport also serves as the President's Distinguished Professor of Information Technology and Management at Babson College in Wellesley, Mass. He's also co-founder and research director at the International Institute for Analytics, and a senior adviser to Deloitte Analytics.

Look for a chapter excerpt from his new book on SearchCIO.com later this spring.

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Tell me why your book would be useful for CIOs.

Tom Davenport: There was a McKinsey report on big data that got a lot of press about a year-and-a-half ago, and it argued that we need more than 1.5 million data-savvy managers who are going to be the effective consumers of what CIOs are pumping out. IT by itself is not going to be successful unless there is a group of effective consumers of all the data analysis they are providing.

So, this book is intended to create a more savvy manager. It's about how to think analytically, how to use all the tools at your disposal -- visual and otherwise -- to make effective decisions on the basis of analytics. We try to give some business examples and some real-life examples on how to use analytics: for example, using analytics to improve your marriage and how to measure quite subjective things, like -- well I don't want to go into details about this -- but we provide a measure for male erections to show that almost anything can be measured taking a scientific approach.

I'm sure that alone will sell some books.

Davenport: To college students maybe.

One of the topics you examine is the importance of telling a story with data -- in terms the audience can understand.

Davenport: Over the last several years, as I talked to good analysts, a lot of people would say, 'You know, you need to be able to tell a story with data.' And I'd say, 'Well, what do you mean by that?' I'd never really thought about it systematically. So, in this book we try to lay out what are the different types of stories that you can tell with data.

Some of this I got from a guy who is now at American Eagle Outfitters, Joe Megibow. He was at Expedia at the time. Expedia was very much into what he called 'the CSI story.' This was a way to find out what was wrong, or find a

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problem with their data: One example was discovering that people were dropping off and not completing the transaction because information was being requested they didn't have. For example, in Ireland, outside of Dublin, apparently postal codes don't exist, so people were dropping off the site because they didn't know what to put in that area.

There is the Eureka story, where you know something is out there and you're trying to find it. There are the basic 'what happened' stories, which all reporters know how to tell: the what, when, who, et cetera. There are stories about experiments: Increasingly with analytics we have a control group and a test group and people are randomly assigned to the two and you see if one group is statistically important -- those are becoming important with analytics. There are more predictive stories, survey stories. I tried to lay out what are the different types of stories that you can tell with data. And then you have to think about what's the best medium for it. Is it narrative with words? Is it numbers? Is it visual display? Is it video?

In the book, we talk about a group at the InterContinental Hotels Group who is charged with telling basic financial reporting stories, but to liven it up and get the attention of executives, they make videos that embed the information in them.

It's a completely different world now. We have so many choices of how to convey information, so we have to think about what's the type of story and then the medium -- or mixture of media -- that best conveys that information.

You've talked about another interesting example of an analytics person who made a 3-D model of data results for the business.

Davenport: That was Vince Barraba. I don't really know whether it was more successful, but you have to admire it so much because he's thinking about how these executives understand information and make decisions. That is really the key: to think about who's the audience, what's the context for the decision and how are they going to receive this information. Jeff Chasney, the CIO at CKE Restaurants -- they do Hardees and Carl's Jr. -- has studied cognitive science principles in order to learn about the ways people best

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absorb information. And one might argue that cognitive science could well become an essential skill or knowledge set for CIOs, because it is not about pumping out the information but whether people are using it effectively.

You drive home the message that data isn't the point, numbers aren't the point -- the data has to express some idea.

Davenport: Exactly, and the idea might be conveyed in multiple ways. At some point, we'll try to have more experiential ways of understanding data. Right now, you can look at data from a call center and what customers are complaining about, but it is obviously much more effective to require executives to spend some time on the other end of the line in a call center -- and some companies do that. That's much more memorable than seeing statistics. Alfred Sloan used to do this at General Motors. On his vacations, he would go out and visit dealerships and spend time with customers of GM to understand their concerns. So, it is not only about conveying the information, but is the information conveyed in a memorable way so the person will understand, remember and act on it.

You wrote that firms increasingly embed analytics in the processes of the company. Can you talk about this?

Davenport: There are multiple ways of addressing that issue. One is you could create a new product or service, based on that analytic, which is quite common in the big data world of online companies. LinkedIn or Facebook, Google have been doing this for a long time -- they are constantly creating new products and services that are based on big data. Once you create that, it is no longer an add-on; it's part of the basic offering. Another way is to just embed it into the system and the process for running part of your organization.

How can CIOs help their analytics and BI people focus more on using data effectively?

Davenport: I think communicating the thought that it is not their job to present information, it's their job to influence decisions. At Merck, the commercial

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analytics group has a very good reputation. People will come to them and say, 'I hear you do promotion analysis.' And the analytics people will say, 'Yeah, we do.' 'So do one for me.' The analytics people will say, 'Well, we'll come back with one of three answers: the promotion is incredible, marginally effective or ineffective. Give me a sense of what you're going to do in each of those cases.' You can say it's a little cheeky for an analytics person to ask a decision maker that kind of question, but it basically demonstrates that this is about making better decisions, and if you're not going to make a decision on the basis of this work, we shouldn't waste each other's time.

So, putting everything in a decision context is important. You know, this whole area of BI and analytics was initially known as 'decision support.' And unfortunately, I think we've gotten away from that and often it is not very clear what if any decision is being made on the basis of the data at all. One of the reasons I admire the group at Procter & Gamble who renamed their IT organization 'Information and Decisions Solutions' is that they are clearly working very closely with their senior executives on decision making.

In part two, Davenport digs into the various means to this end, and explains how visualization tools are critical but still quite underdeveloped.

Ten big data case studies in a nutshell

By: Nicole Laskowski

You haven't seen big data in action until you've seen Gartner analyst **Doug Laney** present 55 examples of big data case studies in 55 minutes. It's kind of like *The Complete Works of Shakespeare*, Laney joked at **Gartner Symposium**, though "less entertaining and hopefully more informative." (Well, maybe, for this tech crowd.) The presentation was, without question, a master class on the three Vs definition of big data: Data characterized by increasing variety, velocity and volume. It's a description, by the way, that Laney -- who also coined the term *infonomics* -- floated way back in 2001. The 55 examples are not intended to intimidate, but instruct. Laney told the audience not to feel overwhelmed, but to home in on the big data case

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studies that might improve business performance at their own companies: "Yes, I know you're in industry x, but there are tremendous ideas that come from other industries that you need to consider adapting and adopting for your own industry," he said.

Here are 10 of them:

1. Macy's Inc. and real-time pricing. The retailer adjusts pricing in near-real time for 73 million (!) items, based on demand and inventory, using technology from **SAS Institute**.

2. Tipp24 AG, a platform for placing bets on European lotteries, and prediction. The company uses **KXEN** software to analyze billions of transactions and hundreds of customer attributes, and to develop predictive models that target customers and personalize marketing messages *on the fly*. That led to a 90% decrease in the time it took to build predictive models. **SAP** is in the process of acquiring KXEN. "That's probably a great move by SAP to fill a predictive analytics gap they've long had," Laney said.

3. Wal-Mart Stores Inc. and search. The mega-retailer's latest search engine for Walmart.com includes semantic data. **Polaris**, a platform that was designed in-house, relies on text analysis, machine learning and even synonym mining to produce relevant search results. Wal-Mart says adding semantic search has improved online shoppers completing a purchase by 10% to 15%. "In Wal-Mart terms, that is billions of dollars," Laney said.

4. Fast food and video. This company (Laney wasn't giving up who) is training cameras on drive-through lanes to determine what to display on its digital menu board. When the lines are longer, the menu features products that can be served up quickly; when the lines are shorter, the menu features higher-margin items that take longer to prepare.

5. Morton's The Steakhouse and brand recognition. When a customer jokingly tweeted the Chicago-based steakhouse chain and requested that dinner be sent to the Newark airport, where he would be getting in late after a long day of work, Morton's became a player in a social media stunt heard

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'round the Interwebs. The steakhouse saw the tweet, discovered he was a frequent customer (and frequent tweeter), pulled data on what he typically ordered, figured out which flight he was on, and then sent a tuxedo-clad delivery person to serve him his dinner. Sure, the whole thing was a publicity stunt (that went viral), but that's not the point. The question businesses should be asking themselves: "Is your company even capable of something like this?" Laney said.

6. *PredPol Inc. and repurposing.* The **Los Angeles** and **Santa Cruz police departments**, a team of educators and a company called **PredPol** have taken an algorithm used to predict earthquakes, tweaked it and started feeding it crime data. The software can predict where crimes are likely to occur down to 500 square feet. In LA, there's been a 33% reduction in burglaries and 21% reduction in violent crimes in areas where the software is being used.

7. *Tesco PLC and performance efficiency.* The supermarket chain collected 70 million refrigerator-related data points coming off its units and fed them into a dedicated data warehouse. Those data points were analyzed to keep better tabs on performance, gauge when the machines might need to be serviced and do more proactive maintenance to cut down on energy costs.

8. *American Express Co. and business intelligence.* Hindsight reporting and trailing indicators can only take a business so far, AmEx realized. "Traditional BI [business intelligence] hindsight-oriented reporting and trailing indicators aren't moving the needle on the business," Laney said. So AmEx started looking for indicators that could really predict loyalty and developed sophisticated predictive models to analyze historical transactions and 115 variables to forecast potential churn. The company believes it can now identify 24% of Australian accounts that will close within the next four months.

9. *Express Scripts Holding Co. and product generation.* Express Scripts, which processes pharmaceutical claims, realized that those who most need to take their medications were also those most likely to forget to take their

medications. So they created a new product: Beeping medicine caps and automated phone calls reminding patients it's time to take the next dose.

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10. Infinity Property & Casualty Corp. and dark data. Laney defines *dark data* as underutilized information assets that have been collected for single purpose and then archived. But given the right circumstances, that data can be mined for other reasons. Infinity, for example, realized it had years of adjusters' reports that could be analyzed and correlated to instances of fraud. It built an algorithm out of that project and used the data to reap \$12 million in subrogation recoveries.

Want better analytics? Start asking 'crunchy' questions

By: Nicole Laskowski

John Lucker hasn't applied for a new credit card in 20-plus years. But in the last three he has received more than 300 offers from banks, hotel chains, affinity groups -- you name it. It's a tactic sometimes called spray-and-pray marketing, and it's "pretty old science," Lucker, consultant with Deloitte Consulting LLP, said during a Harvard Business Review webinar on leveraging customer data.

If the companies spraying him with offers had analyzed his past and present behavior -- how often he applies for a credit card or how he interacts with their businesses -- they could have predicted his response and saved their prayers for a more likely customer. Lucker's personal experience has convinced him that rudimentary practices like this need to be refined. CIOs, it's time to help your marketing departments implement better analytics. But achieving better analytics by using predictive analytics is no trivial task, Lucker said. It requires sophisticated tools and techniques as well as innovation and creativity -- the stuff of data scientists. Together, they lead

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businesses to answer "crunchier" questions -- his label for those "practical and detailed questions about the toughest business issues you might face." Crunchy questions are aligned with strategic goals, relate to key performance indicators (KPIs), are designed to be actionable as well as informational, and provide foresight rather than hindsight. Examples? Lucker suggested:

- What's the online buzz about your company and how could that impact future sales or products?
- Who are the next 1,000 customers you will lose and why?
- What factors impact customer loyalty the most and why? What can you do to increase loyalty?
- Can you map out the aftershock of a bad customer experience and what could you do about it?

Can you map out the aftershock of a bad customer experience and what could you do about it?

Coming up with a list of questions is just the starting point, though. "You should work to categorize them into relevant groupings and help organize ideas and aggregate them around your overall corporate and customer strategies, as well as desired KPIs," he said.

Smart, simple design

Visualizations can help people grasp complex data, but creating visualizations to deliver that easy-to-digest characteristic can be tricky. In a webinar from The Data Warehousing Institute, Lyndsay Wise, president and founder of the independent analyst firm WiseAnalytics, outlined five best practices that can help.

1. Simplify the presentation layer. "Giving someone an overabundance of information doesn't make it easy to consume," Wise said. Customize visualizations based on the audience. Data scientists, for example, have tech know-how and, most likely, have access to different kinds of data than a general user. Also, make the metrics and any action items easy to find.

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2. Design for every device. Mobile devices must be factored into self-service business intelligence (BI) apps and visualizations, Wise said. For IT departments, that means following the customer. "Business solutions [should] reflect the type of technology used externally and outside of work," she said.

3. Highlight important data. Figure out why the data needs to be visualized, which can help identify how to represent it. Data points that reveal change over time, for example, are prime candidates for animation, which can help users identify trends and opportunities.

4. Focus on consistent design. "Develop an internal design style to reflect the branding of an organization and what you're hoping to achieve through analytics," Wise said. It's easier on users who might have to jump from one visualization to another, but it's also easier to maintain and scale out as needed. Plus, you can train the whole organization at once, she said.

5. Don't forget about governance. Data visualizations can help open up data across the enterprise. Incorporating privacy and security features into the design is critical and requires advance planning. "These data factors are important and could affect pricing, cost in development and how data is utilized interdepartmentally," Wise said.

Analytics -- au naturale

QlikTech Inc., a data discovery vendor, is rolling out something called natural analytics. The technology is designed to "use our innate skills and build on what we already know," Donald Farmer, vice president of product management for QlikTech, said during a recent webinar. Here's how he went on to describe it: Natural analytics is to analytics as using a mouse is to swiping a screen. In other words, users have to learn how to manipulate the mouse, but touch "is a natural experience," Farmer said. QlikTech's "natural analytics" is built to capitalize on pattern recognition, outlier detection, sorting and categorization.

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C-suite CIO Chatter: Bad information analytics spells poor data interpretation

By: Emily McLaughlin

According to Harvard University professor Gary King, big data isn't necessarily about the data -- it's about the analytics. The problem is, analyzing massive amounts of data to extract business value is no easy task and typically leaves the door wide open for poor data interpretation -- and backwards decision making.

In her recent CIO Matters column, *Big data, bad analytics*, Executive Editor Linda Tucci delved into why research focused on applying empirical methods to social science research doesn't always work, and shared how King's team suggests remedying bad information analytics.

Our SearchCIO readers had quite a bit to say about data gathering and interpretation, highlighting the importance of hiring math experts, selecting proper business intelligence (BI) tools and implementing real-time analysis for valuable intelligence.

As a prompt, Tucci asked, "Let's assume your company is working on a big data project. Are you confident it has the right analytics to derive business value from it?"

Only 37% of readers polled felt confident in their information analytics program, while some admitted, "No, we don't have the right analytics in place." Here are two not-so-optimistic responses to Tucci's question:

"Not yet, but we are working on it."

"At this moment, we are not confident at all. There is still long way to go on big data analytics implementation."

But several readers among those polled are currently tackling information analytics. Here are their thoughts and stories:

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"We've taken the steps to assess our business intelligence needs, find a BI solution to fill those needs and implement the BI solution throughout the entire company. From the CEO to low-level employees, everyone has access to how their efforts fit into the company's goals and strategies. This is due to the fact we selected a BI solution with real-time data feeds, dashboards and collaboration. It's changed our company."

"We had many successful analytics projects based on statistical analysis and data mining before going to big data. We want to now apply this on a massive amount of data."

"The off-the-shelf 'big data' analytics technology is still in its infancy, but in-house solutions are not the best answer to this kind of project challenge. According to some proof of concept (POC) I've carried out to test-market solutions, HP Autonomy and IBM Content Analytics have the best answers to face this challenge, but both require some customization (in my opinion, HP Autonomy is the 'top' solution for Big Data)."

"For big data analytics, one algorithm is not a silver bullet! For example, the Centers for Medicare & Medicaid Services data released for pharmacy drugs and mobile health is complicated. After applying regression, I looked at the bias in coefficients. The results were dates of services that had patients paying nothing or less than the total cost of drugs. But we needed to quantify 'less.' What about \$10 less or \$20 less? Only then can patient behavior can be interpreted because Medicare patients who had to pay the least (or largest price differential) would be filling the medications often, hence the need for segmentation. I suggest CIOs apply mathematics like differential calculus and Taylor's Power Series to get the proper, actionable results." Speaking of applied mathematics, readers stressed the need for understanding numbers and equations for effective data interpretation:

"Here in Mexico, hiring professionals with seniority in statistics and math is increasing very fast. This situation answers the questions of the issue here."

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Companies must hire statistics experts in order to lead with big data and social media data."

"You are applying a metaphysical equation: Multiplying the unknown with the uncertain!"

"Focus on mathematics and prepare to be surprised by the variety of data; results may be a bit different than what you thought the math equations would do."

King's research team experimented with sentiment analysis by word count, focusing on social media posts containing certain keywords related to "jobs" to identify a correlation to the monthly unemployment rate. They found that their analysis technique wasn't always successful, especially when Steve Jobs passed away and his death dominated the news.

Errors like this happen all the time, so what can be done to ensure better information analytics? King suggests computer-assisted reading, verbal fact-checking and reframing the analysis of social media censorship. Readers offered more advice:

"It's highly essential to have real time analysis for having effective results."

"Big data is job one, but a lot of smarts must go into the analytics part."

"Having supplied BI solutions since 1998, we've noticed the first requirement for success is that the company application users get [provides] the answers they need with chosen solutions. Solutions must allow users to have the situation under control and then react accordingly. While one has to begin from somewhere with regard to big data, specific know-how and mature software are necessary. But I am not sure about existence of the latter."

Do you have advice for CIOs looking to turn big data and information analytics into business value? Share your tips in the comment section below.



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