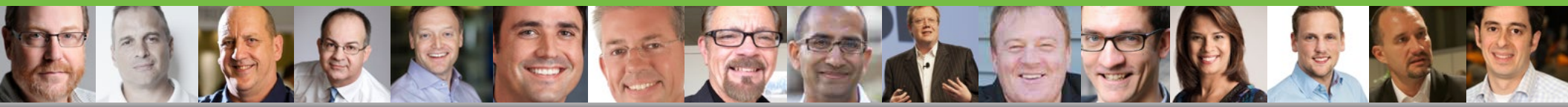
Data *Disruption*

Industry Examples



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INTRODUCTION

It is impossible to ignore the fact that we live in a data-driven civilization. Not only is the amount of data in the world doubling every two years, but the percentage of these data that are becoming valuable because of advanced analytics is also growing. The entire field of data capture and analysis is evolving so rapidly that organizations have difficulty keeping up. Yet data-driven business processes, competition, and the rewards of faster and more intelligent operations leave us with no other choice.

For a long time, our ability to capture data outpaced our ability to process it. This meant that large quantities of data were stored in data warehouses until some future time when tools would be available to find value in them or until they were discarded all together. Several things have happened in recent years to change this dynamic. One is the exponential growth in data; the other is the emergence of new platforms and technologies that make it possible to process data sets of almost unlimited size economically while lowering the cost and increasing the speed of analysis. These elements, combined with new analytic techniques and a growing use of machine learning to accelerate analytic methods, is changing almost every aspect of our lives.

To gain a fuller understanding of how modern analytical methods are being used in visible and not-so-visible ways, we approached data analytics experts from many fields and industries. I asked them to contribute essays about their experiences applying big data analytics. This e-book is a compilation of those essays. In it you will find discussions about new analytics technologies, how organizations can more effectively use their data assets, and many interesting use cases. The essays have been grouped into five sections:

- **Business Change.** Essays in this section speak to how advanced analytics are changing the way businesses operate. It is much more than a story about increased productivity and efficiency: it is a story about the complete transformation of traditional business models into something new and totally data driven.
- **Technology Platforms.** Essays in this section take a closer look at some of the tools and platforms that are making advanced analytics economical for organizations of all sizes.

- **Industry Examples.** This section continues the discussion of transformative analytics technologies in the context of specific business and public-sector use cases.
- **Research.** This section focuses on how new-age analytics are changing the way scientists are conducting research and how they are speeding knowledge acquisition.
- **Marketing.** This section focuses on advanced, analytics-driven marketing strategies and techniques. These techniques are being used for everything from brand marketing to personalization to public relations to attribution techniques that enable companies to analyze their most effective marketing activities in real time.

It is my hope that assembling knowledgeable insights and experiences from so many different perspectives will provide a valuable glimpse into this rapidly evolving technology. I have found many of these essays both eye-opening and thought provoking. There is no question that advanced analytics will continue to play an increasingly important role in business, government, health care, knowledge acquisition, and a broad spectrum of human endeavor.

All the best,
David Rogelberg
Publisher

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These authoritative and diverse guides provide a full view of a topic. They help you explore, compare, and contrast a variety of viewpoints so that you can determine what will work best for you. Reading a Mighty Guide is kind of like having your own team of experts. Each heartfelt and sincere piece of advice in this guide sits right next to the contributor's name, biography, and links so that you can learn more about their work. This background information gives you the proper context for each expert's independent perspective.

Credible advice from top experts helps you make strong decisions. Strong decisions make you mighty.

Industry Examples

AN AUTOMOTIVE REVOLUTION

FABIAN WILCKENS

EMEA Solutions Architect, MapR

Fabian Wilckens is a solutions architect at MapR, where his focus is on helping companies build next-generation data platforms. Prior to joining MapR, Fabian worked as a strategic architect at VMware, implementing Cloud Computing and Data Analytics solutions. Previously, Fabian started his own e-learning company and was also a senior consultant for Unisys Corporation. Fabian holds a B.S. in Computer Science.

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Everywhere you turn in the world today you can see the impact that real-time big data analytics is having on industry. One of the most-affected industries is the automotive industry.

Our relationships with automobiles have not fundamentally changed in 50 years. Cars have become much safer; they have much better fuel economy, and one-time luxury features have become standard equipment. Still, a car is just a car. Big data is beginning to make fundamental changes that affect the entire automotive ecosystem.

KEY LESSONS

1. EVERY CAR TODAY IS BECOMING A CONNECTED DEVICE THAT GENERATES ENORMOUS AMOUNTS OF DATA.
2. THIS INFORMATION CAN BE USED TO ALERT THE CAR OWNER OF AN IMPENDING SERVICE REQUIREMENT AND SCHEDULE A SERVICE CALL AT THE OWNER'S PREFERRED SERVICE CENTER.

Every car today is becoming a connected device that generates enormous amounts of data. These data are available for remote monitoring and analysis. For instance:

- All cars now have one or more computers to control the transmission; antilock brakes; and engine operation based on sensors that measure air and engine temperature, air pressure, oxygen, and other inputs. Performance data from these systems can be monitored remotely.

> "Big data is beginning to make fundamental changes that affect the entire automotive ecosystem."

AN AUTOMOTIVE REVOLUTION

- Some cars have hundreds of built-in sensors that provide data about the use and wear of important components. By applying predictive maintenance algorithms to these data, vehicles can anticipate mechanical problems before they occur. The vehicle can then use this information to alert the owner of an impending service requirement. The same data could also be used to notify and schedule a service call at the owner's preferred service center and trigger shipment of the failing part to that service center so that it is there when the car arrives for service. The manufacturer can use these same data to compare the actual service life of car components in real time to projections based on engineering models and perhaps make design adjustments based on that analysis.
- Many cars have connected navigation systems capable of providing navigation and optimal routing information based on real-time analysis of traffic patterns. These systems are already beginning to include commercial information, such as locations of preferred stores and restaurants; they are capable of supporting individualized special offers in real time from preferred establishments on a particular route.
- Some cities are experimenting with on-street parking sensors and systems that provide that information directly to navigation systems so that drivers can request and receive direction to the nearest available parking spot.

> "Real-time analysis of data from automobiles is changing the way automobile manufacturers, service centers, car owners, and cities engage with each other."

These are just a few examples of how real-time analysis of data from automobiles is changing the way automobile manufacturers, service centers, car owners, and cities engage with each other. This technology also opens the door to new car ownership and service package models. For instance, automobile manufacturers or dealers might one day offer a monthly subscription service that covers data packages, maintenance, and insurance. Rates might vary depending on individual driving habits as measured by the car itself.

All of this is possible, and I have not even touched on the next big big data thing for automobiles: self-driving cars.

RANDAL SCOTT KING
Managing Partner,
Brilliant Data, LLC

Randal Scott King is the managing partner of Brilliant Data, a global consultancy specializing in big data, analytics, and network architecture. During his 16-year career in IT, he has done work for such industry-leading clients as Sprint, Lowe's Home Improvement, Gulfstream Aerospace, and AT&T. Scott lives with his children on the outskirts of Atlanta, GA.

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Big data analytics makes it possible to see everything differently based on real-time analysis of streaming data. It allows us to perform predictive analytics on historical data side-by-side with streaming analysis and machine learning. The question of the impact of big data is really the visible and not-so-visible ways it is changing our lives.

We already take for granted the custom ads that pop up on our Google search pages. Most people are not even aware of the real-time fraud protection that happens at the check-out every time they swipe a credit or debit card, nor do they think about the smart power grid automatically balancing its loads when they turn on an appliance in their house. These are all big data–driven functions that have become a daily part of our lives, to the point we don't even think about how they happen.

KEY LESSONS

1. BIG DATA ANALYTICS IS PLAYING A GROWING ROLE IN SOCIAL SERVICES, TRANSIT AND LAW ENFORCEMENT.

2. THE USE OF BIG DATA COMES WITH THE UNRESOLVED ISSUE OF ETHICS, WHICH IS HANDLED DIFFERENTLY DEPENDING ON CULTURAL ATTITUDES.

> "The question of the impact of big data is really the visible and not-so-visible ways it is changing our lives."

PUBLIC USES OF PRIVATE DATA

There are many examples where public-sector agencies are beginning to use big data, but whether some of these use cases benefit society is up for debate. For instance:

- Social services agencies are adopting big data analytics to identify outliers in their service allocation data that may suggest fraudulent activity.
- Municipal transit agencies have benefitted from analysis of their data, leading to improvements in efficiency that have resulted in better, faster service.
- Big data is also playing a growing role in law enforcement. For example, an application called *Predpol*, which stands for *predictive policing*, is being used in many communities across the United States. Predpol analyzes the place, time, and type of past crimes in a community, and then predicts where and when crimes are most likely to happen—before they actually occur. Police departments can use that information to adjust the frequency of their patrols in certain areas. Recently this has caused civil rights groups to speak out, claiming that human biases about minorities are finding their way into data analysis methods.
- In Russia, The Center for Research in Legitimacy and Political Protest is rumored to have developed an application call *Laplace's Demon* that monitors individual and organizational posts on Facebook and Vkontakte, a Russian social network. By analyzing sentiment and content, the tool can predict the place and time of "unauthorized" protests. It will soon begin to monitor Twitter, as well.

The last two points lead to a discussion of the biggest gap in big data: ethics. There are significant cultural differences in attitudes about the use of the vast quantities of data being captured and analyzed. What would be completely permissible in China might be frowned upon in the United States and outright forbidden in the European Union. Each region operates according to its own best practices, but the Internet knows no boundaries. The application of big data is growing as time passes, and both companies and government entities are operating in the grey space left by a lack of ethical standards.

“The application of big data is growing as time passes, and both companies and government entities are operating in the grey space left by a lack of ethical standards.”

MIKE KAVIS

VP/Principal Architect, Cloud Technology Partners

Mike Kavis has served in numerous technical roles, from CTO and chief architect to VP. He has more than 25 years of experience in software development and architecture and has been a pioneer in cloud computing, having led a team that built the world's first high-speed transaction network in Amazon's public cloud—a network that won the 2010 AWS Global Startup Challenge. Mike is an analyst and blogger at *Forbes* and *The Virtualization Practice* and is the author of Architecting the Cloud: Design Decisions for Cloud Computing Service Models (IaaS, PaaS, SaaS).

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Not long ago, I communicated with a wind farm company that produced energy for the open market. That industry requires solid forecasting to predict levels of power generation over given periods. Accurate forecasting equals lower risk, which in turn equals greater profits. The company wanted to conduct preventative maintenance on its turbines to keep up capacity, so it began attaching sensors. That decision effectively made the turbines Internet of Things (IoT) devices, capable of detecting and recording among other things wind and weather patterns that affect energy output. The sensor data allowed the company to correct the turbine actuators and tilt the blades to precise angles, taking maximum advantage of available wind.

KEY LESSONS

1. OPTIMIZED BUSINESS PROCESSES BRING MORE INTELLIGENCE UP FRONT, AND THAT MEANS THAT YOU CAN MAKE IMPROVEMENTS EARLIER.
2. THE TECHNOLOGY NOW MAKES ONCE-INTRACTABLE BUSINESS PROBLEMS READILY SOLVABLE AND CREATES BUSINESS OPPORTUNITIES THAT HAD NOT EXISTED BEFORE.

Over time, the devices collected loads of small data from the sensors and pooled them into a data lake for analysis. Tactically, the company used that information to keep making miniscule equipment adjustments. Strategically, on the back end, it did the data mining, batching, and analysis to bring the bigger picture into focus: Why does this vendor's piece break down so often? When I see an electrical storm, what should I anticipate? Over time, the machines learned. So did the company, which has gotten out of the wind turbine business. Realizing that its true value proposition lay in the data it was collecting, the business is now a software provider.

> "The sensor data allowed the company to correct the turbine actuators and tilt the blades at precise angles, taking maximum advantage of available wind."

Connectivity has improved. The costs of sensors, software, and storage have plummeted. The cloud era means that an organization does not have to buy 50 petabytes of physical storage on day one; it can just consume storage as data trickle in and pay only for what it uses. What's more, the organization can realize lightning-fast cluster computing through innovations like Apache Hadoop and Spark. Application program interfaces liberate coders from the scourge of auto-scaling, so now the company does not have to worry if someone sends it 10 billion rows instead of 1 billion. It does not have to worry about more clusters popping up. All that is done automatically.

> "Everything is changing, and you have to move at the new speed of business or be crushed."

The final, possibly crucial element that has emerged and that is bringing the industrial IoT to life is machine learning. The IoT really works when technology is set loose to detect business patterns and instruct the business to exploit or adjust them. That is a lot better than having some poor soul run 5,000 queries in analytics and come up with little more than a hypothesis.

To me, therein lies the future. The more the machine learns, the faster you can do things like change the precise angles of your wind turbine blades, or offer personalized insurance discounts to safe drivers, or streamline your delivery truck service. We have reached an age where technology makes once-intractable business problems readily solvable. Industries are discovering that they can act on data in near–real time, providing new service levels that drive price down and improve customer service. In other words, we can:

- **Optimize business processes.** We now get much more intelligence up front and can make process improvements earlier in the life cycle, resulting in better products or services at a lower cost.
- **Understand our data earlier in the life cycle.** That creates business opportunities that had not existed before. Just ask those wind farm guys.

The world is running at a speed we have never seen before. Everything is changing, and you have to move at the new speed of business or be crushed. Understanding data is the new gold.

THE REVOLUTION WILL BE VISUALIZED

GIORGIA LUPI
Design Director,
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Giorgia Lupi is an information designer. Her work in information visualization frequently crosses the divide between digital and print, exploring visual models and metaphors to represent dense and rich data-driven stories. She is co-founder and design director at Accurat, a data-driven research, design, and innovation firm based in Milan and New York.

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My company works in information design, so we conceive and build custom visual analytics tools that can explore and analyze disparate data types at various scales. Recently, we worked with a multinational group to process geo-referenced financial data from multiple cities. To do that, we built a next-generation visual data–workflow integration engine using Apache Spark, Scala, and Apache Kafka combined with real-time geographic information system analysis.

One of our analysts, while actually working on something else, accidentally noticed something strange in a crucial district within one of our cities. Visually comparing current data from that locality to data from the same month the previous year and the same day the previous month in the same place, he spotted major unexplained revenue fluctuations. Something was wrong.

We immediately analyzed the anomaly. It turned out that a vendor contract, which had been placed on hold, was affecting our client's bottom line far more than anyone expected. Corrective measures were taken within hours.

> "Visual analytics blends art and science to communicate meaning."

KEY LESSONS

1. DATA VISUALIZATION CAN HELP BUSINESSES CRUNCH MOUNDS OF DATA RAPIDLY AND TAKE FAST CORRECTIVE ACTION.
2. NEW TOOLS, POWERED BY VISUAL ANALYTICS, WILL SOON EMERGE, WITH CAPACITIES WE CAN SCARCELY IMAGINE.

THE REVOLUTION WILL BE VISUALIZED

In a way, visual analytics blends art and science to communicate meaning within organizations or externally with their stakeholders. Our data visualization interfaces provide insights, guidance, and decision-making support to different audiences.

Visual analytics allows business users and analysts to explore and find value in big data. Users can instantly execute analytic correlations on billions of data rows, and then present results cogently in intuitively designed dashboards. They can identify new patterns, trends, and relationships in their data and quickly act on them.

Doing what I do, I believe that superfast data processing will soon lead to an explosion of visual analytics solutions that take advantage of unprecedented, real-time connections. Our tools monitor large-scale real-time processes. They can track incidents on a worldwide distributed computer network. They can monitor real-time credit card transactions across an entire nation. They can aggregate vast amounts of information with minimal delay. They are scalable and adaptable. Many new, innovative tools based on these technologies are certain to emerge.

> “A superfast, in-memory computer processing revolution is under way.”

It is a complex task to visualize millions of data points, network mappings, and cluster analyses, and we have been accustomed to long processing times. But I believe that will soon change. A superfast, in-memory computer processing revolution is under way. Because of that, I think we will eventually see the emergence of visual analytics tools, operating seamlessly in time-sensitive environments that at present we scarcely imagine.

Watch this space.

IAN HOWELLS
Chief Marketing Officer, Argyle Data

Dr. Ian Howells is a recognized thought leader on the transition to big data machine learning applications. He wrote the book *Fighting Future Fraud: A Strategy for Using Big Data, Machine Learning and Data Lakes to Fight Communications Fraud* and has written widely on the subject on fraudtechwire. Howells has spent his career in senior marketing roles, building companies based on disruptive technology from their early stages to IPO or acquisition.

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Data volumes are orders of magnitude bigger than anything businesses ever witnessed in the old relational database days. Fortunately, the Apache Hadoop distributed storage and processing model is fundamentally better at managing these big data stacks—so good, in fact, that Hadoop is changing the game. I firmly believe that every enterprise application will eventually be rewritten in a data-driven way and operate in real time—at Hadoop scale.

My company performs real-time fraud analytics for major mobile communications providers. Astonishingly, the mobile industry loses $46 billion per year to fraud—2 percent of its revenue. Its problems do not end there. If a fraud incident hits the press, the provider loses subscribers. It also finds itself dealing with a major brand problem.

Traditionally, mobile providers have coped by summarizing data into piles and batch-importing those piles into rules-based systems. Then, human analysts would sift though endless data to detect fraud. Mostly what they found were false positives and mental exhaustion. Rules fail. By definition, rules define only what is already known. If a provider got hit with a new, unknown fraud assault, rules-based systems could never detect that. Criminals have plenty of time to re-stage attacks to elude any rules adjustments.

> “Rules fail. By definition, rules define what is already known.”

KEY LESSONS

1. MACHINE LEARNING MUST NOT BE OVERLOOKED. IT CAN DETECT ANOMALOUS PATTERNS NEVER BEFORE SEEN, INCLUDING NEW, UNKNOWN FRAUD ASSAULTS.
2. EVERY INDUSTRY SHOULD INVESTIGATE NATIVE HADOOP AND SPARK APPLICATIONS.

A data-driven approach is the answer. If I see someone placing high volumes of calls to the United States from abroad, for example, I should be able to detect whether that is a long-time enterprise customer who has acted that way for years or someone new trying to scam customers into placing calls or texts with premium services.

Today, we can ingest massive amounts of data into data lakes and machine-scan them for anomalies. Then, we can compare the findings against customer relationship management and billing data. Through machine learning, we can even detect anomalous patterns never before seen.

Compared to rules-based antifraud systems, the big data approach detects 280 percent more fraud incidents, with 25 times fewer false positives. We can even pick up clues that a crime ring is involved, something that was never before possible.

“Compared to rules-based antifraud systems, the big data approach detects 280 percent more fraud incidents, with 25 times fewer false positives.”

These lessons apply not only to the mobile industry, however. Every data-intensive business should investigate made-to-Hadoop and made-to–Apache Spark applications. Over time, prepackaged, data-intensive applications built on those platforms will emerge, in turn driving greater demand for the platforms themselves.

Machine learning must not be overlooked, either. Think of it this way: if you have 1,000 times more data to deal with, you would never meet that challenge by hiring 1,000 more human analysts, particularly if you are scanning for fraud. You would only find more false positives, and the analysts would drive themselves batty.

New methods are needed. Machine learning, we feel, is the only way.

RETAIL IS BECOMING AN ANALYTICS-DRIVEN BUSINESS

TAMAS SZIRTES

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Dr. Tamas Szirtes is director of Innovation and Technology at SOA People Nederland. He is an SAP Mentor, HANA Distinguished Engineer, speaker, and author. He has 17 years of consulting experience from international projects in major Fortune 500 companies. He is active in mobile and in-memory (big data) technology consulting. Tamas has a Ph.D. in knowledge management, a master's of science degree in business administration, and a master's of science degree in computational engineering.

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By using an in-memory computing platform like SAP HANA with Apache Hadoop and other analytics tools for processing big data from many sources, including business data, it becomes possible to more intelligently run every aspect of the retail business. For example, analytics makes it possible to personalize interactions with customers in a store. You can provide them with alerts or shopping recommendations based on an analysis of their location in the store, their purchasing history, and any marketing campaigns the store may be running at that time.

Data-driven engagement also helps retailers deliver the best shopping experience possible for customers. Part of this ability involves creating a uniform online and in-store experience for customers, who can search for products online, order online, and pick them up in the store or order online and have a product shipped. Some mobile store apps not only locate products in the store but also direct a user to the product. It is even becoming possible for users to build shopping lists, and the app will provide them with an optimum route through the store to minimize the time it takes to find all the items on the list. Along the way, the app can provide recommendations and promotions.

KEY LESSONS

1. USING NEW ANALYTICS TOOLS THAT PROCESS BIG DATA FROM MANY SOURCES MAKES IT POSSIBLE TO MORE INTELLIGENTLY RUN EVERY ASPECT OF THE RETAIL BUSINESS.

2. ARMED WITH A COMPLETE PICTURE OF CUSTOMERS AT THE GRANULAR LEVEL, RETAILERS ARE IN A STRONG POSITION TO NEGOTIATE THE BEST PRICES FROM THEIR WHOLESALE SUPPLIERS.

> "Data-driven customer engagement helps retailers deliver the best shopping experience possible for customers."

RETAIL IS BECOMING AN ANALYTICS-DRIVEN BUSINESS

Customers can scan items with their phone to get pricing or other product information. This entire process is data driven in that it combines sales and marketing data with inventory information and personalized information that the customer provides in the form of product lists, shopping history, and real-time scanning inputs. In this way, analytics improves the shopping experience for customers while relying less on in-store staff to help customers find what they are looking for.

Analytics also enables retailers to optimize their internal operations. By analyzing customer engagement data alongside other kinds of information, such as social networking data, events, weather, and even pricing, it becomes possible to apply accurate forecasting models to optimize other retail processes, such as in-store staffing, returns handling, product pricing, and inventory management.

Many stores offer guaranteed lowest prices. Customers often compare competitor pricing on their smartphone while in the store to ensure that they are getting the lowest price. Retailers themselves analyze competitor pricing and use those data with real-time adjustments of promotional strategy and inventory management to optimize the margin on merchandise they carry.

A complete picture of customers at the granular level gives retailers great power in their negotiations with suppliers. They can now know with a high degree of certainty what customers will pay for a product and how much of it they will buy next week or next month. Armed with this knowledge, retailers are in a strong position to negotiate the best prices from their wholesale suppliers. Retail is becoming an end-to-end analytics-driven business.

“Retailers can apply accurate forecasting models to optimize retail processes such as in-store staffing, returns handling, product pricing, and inventory management.”

PETER LANGNER
Consultant,
Adventas Consulting

Since 2006, Peter Langner has been a consultant advising mainly trading and finance companies on SAP implementation and upgrades. He is an experienced project manager, business consultant, and developer. Previously, Peter consulted in banking, business process modelling, and design and implementation of processes with SAP. He later joined a well-known German retailer as a project manager tasked with changing the systems landscape in such a way that the business could be rolled out to other countries.

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In a global trading business, traders buy product from a seller, and then sell the product to their customer—typically, a wholesaler. For example, one global trader purchases all the meat that McDonald's Germany uses. This trader purchases meat from suppliers in other parts of the world and sells it to its customers. The trader also manages shipping and other logistics related to getting that product to the customer. McDonald's Germany is just one ordinary customer for that trader.

Global traders are often family-run businesses that have been operating for generations. Many are large, but you do not hear much about them because they are silent; they focus on their business, which is trading large quantities of goods. Global traders tend to be slow to change their basic business processes. Some traders focus on one product or a few kinds of goods, and that is all they trade. That may be all they have ever traded for the last hundred years. Others are quicker to respond to new opportunities, sometimes deciding to take on a new product group on short notice.

KEY LESSONS

1. NEW ANALYTICS TOOLS WILL CERTAINLY PROVIDE A COMPETITIVE ADVANTAGE TO TRADERS THAT ADOPT THEM, BUT GLOBAL TRADERS ARE CAUTIOUS ABOUT ADOPTING NEW TECHNOLOGIES LIKE THESE.
2. RETAILERS ARE USING NEW ANALYTICS TOOLS TO PERSONALIZE THEIR CUSTOMER ENGAGEMENTS, WHICH HAS ALREADY HAD AN IMPACT ON THE WAY THEY BUY PRODUCT FROM THEIR WHOLESALE S UPPLIERS.

> "Trading is a goods-driven business; such businesses must acquire and deliver goods on time to meet customers' needs."

When those kinds of traders make a change, it can be challenging for the IT department. For example, a global trader dealing in textiles may suddenly decide that it is going to start trading cutting machines. This is an entirely different kind of product group with its own forecasting and planning needs, its own sales cycles, sourcing requirements, and distribution logistics.

Trading is a goods-driven business; such businesses must acquire and deliver goods on time to meet customers' needs. To do that, traders must be highly knowledgeable about their markets. They depend on demand forecasts, but they also need to know what is in storage, what is in transit, what goods are on which ship, and where those ships are located. Sometimes, deals take place and a ship that is en route will be asked to unload cargo that was sold after it was loaded onto the ship.

Traders depend on tools like SAP's Global Trading Management solution to manage many of the buying and selling transactions, tracking, and costs associated with trading, such as freight, loading costs, storage, commissions, insurance, and fees. Traders must also pay attention to currency exchange rates and commodity futures. The data structures that support global trading are complex.

In-memory computing makes it possible to run trading management applications faster and generate reports more quickly, which is important to traders that must track so many variables to ensure profitability. Some of the new analytics tools will certainly provide a competitive advantage to traders that adopt them, but global traders tend to be cautious about adopting new technologies like these. Near–real-time reporting will enable global traders to more effectively support their customers, especially traders whose customers supply retailers. Retailers are using new analytics tools to personalize their customer engagements, and this has already had an impact on the way they buy product from their wholesale suppliers.

> "The data structures that support global trading are complex."

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Credible advice from top experts helps you make strong decisions. Strong decisions make you mighty.