Mighty Guides

REAL-TIME ANALYTICS

Learn to Be More Agile, Responsive and Customer Focused

27 TOP EXPERTS SHARE THEIR SECRETS

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FOREWORD

Today, most businesses are software businesses. In industry after industry, a company's software is now the primary way it interacts with customers. To succeed, businesses must know their customers, but how do they do that when the interactions come through a screen instead of face-to-face meetings?

The answer is software analytics—transforming metrics and events from software into actionable data in near-real or real time. The coming together of technology and business metrics with business intelligence and software analytics tools allows business leaders and IT operations to better understand not only how their software performs but also how their business performs—while there's still time to do something about it. Real-time analytics—a key component of software analytics—helps companies be more agile, responsive, and customer focused than ever before. Best of all, it lets creative problem solving happen immediately.

This e-book was created to demonstrate the value of real-time analytics to a wide variety of companies, stakeholders, and use cases. We hope the first-hand experiences chronicled here offer you game-changing insights, best practices, and inspiration for how to leverage the power of software analytics to make better, faster, data-driven decisions.

Lew Cirne,
Founder and CEO,
New Relic
View Bio

New Relic is a software analytics company that makes sense of billions of data points about millions of applications in real time. New Relic's comprehensive Software as a Service–based solution provides one powerful interface for Web and native mobile applications and consolidates performance monitoring data for any technology in your environment. More than 200,000 users employ our cloud solution to analyze more than 200 billion data points across more than 3 million applications. When your brand and customer experience depend on the performance of modern software, New Relic provides insight into your overall environment. Learn more at newrelic.com.

One contributor to this e-book wisely points out that everything happens in real time, but not everything benefits from real-time analysis. That realization underscores the challenge facing analysts and decision makers today. The ability to capture massive amounts of real-time data often exceeds an understanding of how to use that information effectively.

To better understand how to get the most value out of real-time analytics—and with the generous support of New Relic— we collected answers to the following question from 27 top real-time analytics professionals:

A colleague has been tasked with implementing real-time analytics to transform her company (e.g., saving money, improving a product, or smarter marketing). Please share a story from your own experience or a critical piece of advice that will help her succeed.

The first section of this e-book focuses on when it makes sense to use real-time analytics to inform decisions and actions. The second section focuses on getting the most from real-time analytics. One recurring theme from the experts is that to derive value from real-time analytics, you must be able to take real-time action. We hope the insights and experiences these real-time analytics experts share help you strengthen your own business intelligence strategies.

All the best,
David Rogelberg
Editor

Mighty Guides

Mighty Guides make you stronger.

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.

New Relic.

Data helps us track our athletes' achievements.

Mark Shaw
CTO & Co-Founder
STRAVA™

We are *all* data nerds.

GETTING STARTED

In this section...

PIERRE-LUC SIMARD
CTO, Mirego

As Mirego's CTO, Pierre-Luc Simard spends most of his time working on projects revolving around mobile technologies. He's all about software running on small devices. He has spent a big portion of the past 16 years working on embedded and mobile platforms in different environments. When he's not working, Pierre-Luc is probably out on a hike somewhere or running.

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Analytics is a tricky thing. First, you must define the important metrics. Determine what your initial objectives are, and then find two or three things you can measure for each of them that will indicate that you have reached the objective. Doing so gives you maybe 10 or 15 core metrics—those you want to pay particular attention to. Out of that, pick two or three that you really want to work on, and make sure they are always visible to you. After all, if you're implementing real-time analytics, it's because you want to see the data in real time.

As you're rolling out analytics, make sure you also collect data on "foot traffic" in your system (i.e., where people are going, what they're using). Not all of your core metrics will give results that you expect, and you'll need to track events that surround them so that when the time comes to explain why you're not getting the numbers you want, you'll have data from which to create hypotheses and decide what you should put in place to improve the situation without the need for many iterations.

KEY LESSONS

1 CHOOSE TWO OR THREE METRICS TO FOCUS ON, AND MAKE SURE THEY'RE ALWAYS VISIBLE.

2 COLLECT DATA ON "FOOT TRAFFIC" IN YOUR SYSTEM.

3 YOU MUST STICK WITH THOSE METRICS FOR A WHILE TO SEE THE BENEFIT FROM THEM.

> " Pick two or three [core metrics] that you really want to work on, and make sure they are always visible to you. "

PIERRE-LUC SIMARD

CTO, Mirego

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Finally, remember that you're putting in analytics because you want to improve things. This means that the payback on your effort is not when you put it in place but when you change something and are able to measure the impact and make decisions quickly based on the data you're getting back. It also means that to get all the benefits of real-time analytics, you need to stick with your metrics for a while. Planning what and how you'll start measuring things will save you a lot of trouble in the long run.

> " Remember that you're putting in analytics because you want to improve things. "

TIM KOOPMANS

Co-Founder, Flood IO

Following a 12-year career as an Australian Army Officer, Tim Koopmans has spent the past 10 years working as an independent consultant in performance, development, and operations of IT systems. His clients include retail, finance, telecommunications, government, and private companies. Tim helps make the Internet fast at Flood IO, a distributed cloud-based load-testing platform for everyone. He works remotely with multiple clients in Australia and overseas and (in his spare time) farms cows.

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How do we extract meaningful information from data in real time?

This seems like an innocuous question, but there are essentially three dimensions to solving this problem. First is the type and quantity of data: How much data is your application, service, or system going to generate? What type of metrics do you intend to collect? Data that is ripe for collection include user events, system metrics, and application logs. If you need to log in somewhere to see it, collect it. If your data is distributed across multiple tiers or servers, collect it. If your data is linked in any way to your revenue or acquisition streams, collect it. Now that you have an idea of what to collect, think about how big these data sets are. Starting to get a feel for it? Don't be surprised by the size, density, or verbosity of what you intend to collect.

Second is the storage of data: How will you handle hot, warm, and cold storage of data? *Hot data* is the closest to real time. *Warm data* is a little cooler but perhaps still time sensitive, and *cold data* is the stuff in the back of the freezer. How will your data age over time? Don't be fooled into thinking that you'll just need daily, weekly, monthly, quarterly, and yearly buckets. Real power in analytics is the ability to report over any period and retain the ability to drill down into detail for periods of interest. What aggregation techniques will you need to employ? Min, max, and mean might not cut it. Think about percentiles or other descriptive statistics at hand, and be conscious of how data is rolled up over time.

KEY LESSONS

1 IF YOUR DATA IS LINKED IN ANY WAY TO YOUR REVENUE OR ACQUISITION STREAMS, COLLECT IT.

2 KNOW HOW YOU WILL TRANSLATE DATA INTO MEANINGFUL INFORMATION.

> **"If your data is linked in any way to your revenue or acquisition streams, collect it."**

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Third is the analysis of data: How will you translate this data into meaningful information? Information is derived from data and should help you resolve uncertainty. It should give you better perception, insight, or knowledge. How easily can you compare different metrics over different time periods? The ability to understand relationships among data sets or their dependence on each other is important. How will you query or interface with that information? Intuitive query-like interfaces that don't require programming knowledge will increase the uptake of information. If it's a pain to use, it won't be used.

The temptation for many is simply to collect the data and worry about these dimensions later. Data is easy to collect. Extracting information is difficult. Don't be surprised if your strategy falls apart early if you didn't consider these dimensions up front.

> " Data is easy to collect. Extracting information is difficult. "

HUNG VU

Chief Technology Officer,
VBrick Systems Inc.

Hung Vu has served as CTO with several companies, delivering top products in different markets. Adept at identifying disruptive opportunities, value propositions, and sustainable growth strategies, he works with executive teams and boards to bring strategy, technology vision, and product road maps to the fore before building world-class product teams to implement them. Voted a Top 10 Exec by *The Washington Post,* Hung's accomplishments include a best-in-class enterprise learning management system and a top TELCO interconnect optimization suite with business intelligence and decision support.

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Technology has been on a relentless march to perform more of the tasks that have traditionally been deferred to humans. Although we can naturally process, filter, aggregate, correlate, and analyze unstructured data to decide on an appropriate course of action—in real time—we weren't built to perform at a massive scale, 24x7. These nascent big data analytics technologies have been making excellent progress toward solving these challenges, but the market is still young and dynamic. Beware that well-researched comparisons among vendors and tools from six months ago might not be relevant today. You will do well to keep the following guidelines in mind as you harness the technology to uplift or transform your enterprise. Your selection of tools and implementation technologies will be more effective and expedient if you tee up the effort with the goal and major considerations in mind:

- **Decision Making.** This is the immediate goal of the investment. Ensure that there is proper deliberation and collective buy-in on the chosen metrics, the lines of business to align them with, and how leaders or systems are empowered to act appropriately and in a timely manner. Keep in mind that the bigger challenge isn't which technologies to implement but bringing about the targeted transformation in people, processes, and culture.

KEY LESSONS

1 ENSURE COLLECTIVE BUY-IN FOR CHOSEN METRICS.

2 ASSUMPTIONS IN YOUR CURRENT BUSINESS MODEL AND MARKETS CHANGE CONSTANTLY.

> " The challenge isn't which technologies to implement but bringing about transformation in people, processes, and culture. "

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- **Latency.** *Real time* really means *real fast*, and depending on the problems you're trying to solve, it can mean milliseconds in the case of a weapons system or a nanosecond for social media applications. Analyze costs against benefits carefully, and determine whether you can be successful with higher latency (more than one second) and cut the required budget significantly. In addition, decide whether you need to analyze large batches of data or smaller delta streams in real time.

- **Continuous Improvement.** Assumptions in your current business model, markets, and customer behavior do change as you design and implement the phases of this analytics process, so budget for and plan to continuously tweak or even overhaul parts or all of it.

- **Super Charts.** Go super or go home! Look for opportunities to design "super charts," where you can tell the larger story compellingly with a balanced mix of concomitant data (multivariate) and stunning graphics. When well designed, this transformative artifact can advance mindshare and adoption more than almost anything else. Although it leverages an enormous amount of data (lending credibility), it introduces a more cognitively digestible situation report (the "aha moment") and simplifies the narrative to stakeholders. This isn't an easy task to pull off. Most of the time, this grand "aha" design won't come to the fore until you've paid the dues of delivering on a number of great dashboards.

> " Look for opportunities to tell the larger story compellingly with a balanced mix of data and stunning graphics. "

RAISING THE BAR WITH REAL-TIME ANALYTICS

TED RUBIN

Social Media Strategist,
Brand Evangelist and
Keynote Speaker,
The Rubin Organization, LLC

Ted Rubin is a leading Social Marketing Strategist, Keynote Speaker, Brand Evangelist, and Acting CMO of Brand Innovators. Ted is the most followed CMO on Twitter, according to *Social Media Marketing Magazine*, one of the most interesting CMOs on Twitter according to Say Media, number 13 on *Forbes* Top 50 Social Media Power Influencers (2013), and number 2 on the Leadtail August 2013 list of Top 25 People Most Mentioned by digital marketers. Follow him @TedRubin, @R_onR, or @Parentng.

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The past few years have transformed the way organizations use data. Today, the volume, variety, and velocity of data are taking the business world by storm. Organizations that are able to understand and act on the data—based on analytics but with the relationship at the forefront—will emerge as winners.

Social media, cloud, and mobile have added a layer of urgency to the big data wave. As the velocity of information increases, there's a need to process the data and analyze it for relevant use cases, but gathering and analyzing real-time data from various structured and unstructured sources are not easy, especially while keeping it human at the same time.

Smarter organizations understand this and invest in people, process, and technology that enable them to use real-time analytics for strategic and operational benefits while keeping relationship enhancement at the forefront. Real-time analytics is not just for smarter marketing but also for cutting inefficiency from operations, improving customer service, and watching trends that can affect the bottom line.

KEY LESSONS

1 INVEST IN PEOPLE, PROCESS, AND TECHNOLOGY TO USE REAL-TIME ANALYTICS FOR STRATEGIC AND OPERATIONAL BENEFITS WHILE KEEPING RELATIONSHIP ENHANCEMENT AT THE FOREFRONT.

2 USE REAL-TIME ANALYTICS, AND ORGANIZE TEAMS AND PROCESSES FOR REAL-TIME RESPONSE.

3 MONITOR YOUR COMPETITORS, AND OBSERVE THEIR WEAKNESSES AND STRENGTHS IN REAL TIME.

> **"Real-time analytics is not just for smarter marketing."**

TED RUBIN

Social Media Strategist,
Brand Evangelist and
Keynote Speaker,
The Rubin Organization, LLC

Ted Rubin is a leading Social Marketing Strategist, Keynote Speaker, Brand Evangelist, and Acting CMO of Brand Innovators. Ted is the most followed CMO on Twitter, according to *Social Media Marketing Magazine*, one of the most interesting CMOs on Twitter according to Say Media, number 13 on Forbes Top 50 Social Media Power Influencers (2013), and number 2 on the Leadtail August 2013 list of Top 25 People Most Mentioned by digital marketers. Follow him @TedRubin, @R_onR, or @Parentng.

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Here is an example of how a company used real-time analytics to implement those changes in its operations and customer service.

A technology service provider wanted to transform its reputation from a slow, sleepy company to one that is nimble, customer responsive, and attentive. It started by setting up teams that worked in two shifts, ensuring continuous and timely review and response. Next, it looked for a product that could provide social listening, real-time analytics (share of voice, sentiments, time to resolution), workflow, and reporting. After it had selected a product and trained its team, the company defined the process-es and business rules for handling and coordinating customer queries, issues, and rants—and how to properly engage.

By using real-time analytics and organizing teams and processes for real-time response, the company's social customer service team had a big impact on customers and improved brand reputation. Real-time response management and the ability to analyze interactions provided the company with unprecedented insights into its customers' issues, attitudes, and behavior.

Real-time analytics was also tremendously valuable for identifying emerging issues (service down in a geography, delays in meeting service levels) and for preparing responses to any incidents. In addition, the company monitored its competitors and observed their weaknesses and strengths in real time. It was able to generate leads from customers who were unhappy with the competition or who had just moved into the target geography.

Within a few months, this company went from just another Internet and cable services provider to one that was considered agile, sensitive to customer needs, and responded to its customers within minutes of their post. It not only made its customers happy but lifted its brand value—all through the smart use of real-time analytics.

> " A social customer service team can have a big impact on customers and improve brand reputation. "

ANDREW ALLAWAY

Data Scientist,
Philips Healthcare

Andrew Allaway is a data scientist at Philips Healthcare. Math, science, and art (MSA) are his passions, and ensuring that he applies MSA to his daily life is vital to his creativity and ability to create solutions to complex problems. Andrew has an undergraduate degree in Communication from the University of Dayton and an M.S. in Information Systems from DePaul University.

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Analytics is a nebulous term that refers to a continuum of needs: (1) reporting, (2) analysis, (3) dashboards and scorecards, (4) prediction, and (5) simulation. To understand the issues you are implementing analytics to solve, you must evaluate the problems stepwise. Each of the five steps of analytics solves a unique type of question, ranked in order of business value. *Reports* answer the question, What happened? *Analyses* are performed to answer why something happened. *Dashboards and scorecards* show what is happening now. *Prediction* attempts to answer what might happen. Finally, *simulation* indicates what will likely happen[1].

In his groundbreaking 1943 paper, "A Theory of Human Motivation," and subsequent book, *Motivation and Personality*, psychologist Abraham Maslow outlined the Hierarchy of Needs, which posits that people have an innate desire to be all they can be (i.e., self-actualization). However, people can only attain self-actualization after they have attained lesser, more fundamental needs, the most important of which are basic needs (e.g., breathing, food, water). From there, you have safety needs followed by social needs, esteem needs, and finally self-actualization.

KEY LESSONS

1 THERE IS AN ANALYTICS CONTINUUM: (1) REPORTING, (2) ANALYSIS, (3) DASHBOARDS AND SCORECARDS, (4) PREDICTION, AND (5) SIMULATION.

2 EACH STEP OF THE ANALYTICS CONTINUUM ANSWERS A UNIQUE QUESTION.

3 CREATING ANALYTICS AS A FORMAL DISCIPLINE OF DATA SCIENCE ENSURES THAT YOU UNDERSTAND THE INITIATIVE BEFORE YOU BUILD THE DATA SCIENCE SOLUTION.

4 SOLVE ANY LOWER UNMET NEEDS BEFORE IMPLEMENTING REAL-TIME ANALYTICS.

> 66 To understand the issues you are implementing analytics to solve, you must evaluate the problems stepwise. 99

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Data Scientist,
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When you mash up Maslow's Hierarchy of Needs with the analytical continuum and the questions that analytics help to solve, you have a framework that you can use to analyze any business data science initiative, which I call *Maslow's Hierarchy of Data Science Needs*. You can start to see that there is a natural cross-walk when comparing these seemingly different concepts. For example, the most basic analytical need is *reporting*, which answers what happened. The second need is *safety*, which answers why something happened, and so on. Therefore, creating *analytics* as a formal discipline of *data science*, which refers merely to the tools used to answer questions ranging from the ordinary (e.g., reporting what happened) to the complicated (e.g., simulation—what will likely happen) will ensure that you understand the initiative before you build the data science solution. Should you determine that the analytical solution you're implementing is higher on the continuum than what already exists (e.g., creating dashboards when there are no existing reports), that would signal to leadership that the solution won't solve all data science quandaries. Consequently, the business will need to ensure that it has solved any lower unmet needs or accept that your analytics solution can't solve everything.

> " The business must solve any lower unmet needs or accept that the analytics solution can't solve everything. "

[1] S@R (2012), Budgeting Revisited, available at http://www.strategy-at-risk.com/2012/06/05/budgeting-revisited (accessed September 7, 2014).

BOB GOURLEY

Publisher,
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Bob Gourley is the publisher of CTOvision.com and a co-founder and partner of Cognitio. At Cognitio, Bob leads research and analysis activities, due diligence assessments, and strategic consulting.

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Until recently, the worlds of fast/real-time analytics and business intelligence (BI)/batch processing were architected in totally different ways. Optimizing for both real-time and batch analytics resulted in different designs, technology stacks, code bases, data stores, and applications. One set of solutions might look at individual messages and alert you to some criteria. Another set of solutions might answer predefined questions over large quantities of formatted data. And clunky designs were put in place to move streaming data into data warehouses, where they could be indexed and used in some future batch of questions.

Architects designing systems today are not bound by those old approaches. The three components of hardware, software, and communications have evolved together to the point where enterprises can establish one unified data architecture for a wide array of workloads. Real-time analytics can be performed over streams of data, and those data streams can be added rapidly into data stores and immediately available for iterative search, Structured Query Language (SQL) queries, or data correlation and discovery tools. Workloads around batch-like traditional BI can work over the same data store, as well. In addition, the increased capacity and reduced cost of storage means that much more data can be held in this operational architecture, so knowledge can be retained in accessible forms.

KEY LESSONS

1 REAL-TIME ANALYTICS CAN BE PERFORMED OVER STREAMS OF DATA.

2 WHEN BUILDING A REAL-TIME ANALYTICS CAPABILITY, CONSIDER IT IN THE CONTEXT OF ALL OF YOUR DATA WORK-LOADS.

> 66 The three components of hardware, software, and communications have evolved to the point where enterprises can establish one, unified data architecture for a wide array of workloads. 99

BOB GOURLEY

Publisher,
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Bob Gourley is the publisher of CTOvision.com and a co-founder and partner of Cognitio. At Cognitio, Bob leads research and analysis activities, due diligence assessments, and strategic consulting.

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One thing this means for real-time analytics is that data coming into an organization can not only be considered on its own but in the context of what the enterprise already holds. Now, analytics can assess the meaning of new data in the context of all enterprise data holdings and can alert the enterprise if some previously produced analysis should be reconsidered in the light of new data.

More good news on this approach is that the concepts for fielding it and the software required are all available via open source. Firms like Cloudera assist in the design and support of the full stack of capabilities.

All this leads to critical design advice: when building a real-time analytics capability, consider it in the context of all of your data workloads, including stream processing, batch processing, analytic and interactive SQL queries, search, machine learning, and third-party apps. Considering all workloads together unlocks incredible potential.

> " Analytics can assess the meaning of new data in the context of all enterprise data holdings and can alert the enterprise if previously produced analysis should be reconsidered. "

KRISTIAN ØLLEGAARD

CEO, Plecto

Kristian Øllegaard is the CEO of Plecto, a European Software as a Service company working with real-time analytics for sales departments. He has helped implement real-time analytics for many organizations, transforming them to be more performance aware.

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In my experience, real-time analytics is a powerful tool for transforming a company, but it is important that management keep a constant focus on the implementation period. People have access to key performance indicators (KPIs) and analytics from many places. Convincing them to use a new system or platform isn't easy, but if you can align the entire company to use the same platform to benchmark results, the increase in results will be instant.

Furthermore, analytics won't change anything unless you can see the information. My best advice (which is what we do at Plecto) is to put the essential KPIs on a TV that is visible to everyone who can affect those KPIs. If you're forced to look at them every day, you are more likely to take actions that affect them.

Finally, I encourage you to limit the number of metrics you want to display to your colleagues. When you get started with real-time analytics, you quickly realize that you could display just about any kind of data. My general rule is that you should only show metrics that people can influence or that significantly contribute to the company's success or failure. If you bundle useless metrics with the interesting ones, the interesting metrics won't be as visible, and the effect of exposing them diminishes.

KEY LESSONS

1 PUT ESSENTIAL KPIS ON A TV THAT'S VISIBLE TO EVERYONE WHO CAN AFFECT THEM.

2 LIMIT THE NUMBER OF METRICS YOU WANT YOUR COLLEAGUES TO SEE.

> 66 Analytics won't change anything unless you can see the information. 99

JEFFREY HAYZLETT

Primetime TV Show Host,
Bestselling Author, and
Sometime Cowboy,
The Hayzlett Group

Jeffrey Hayzlett is a global business celebrity and speaker, bestselling author, Contributing Editor and Host of *C-Suite with Jeffrey Hayzlett* on Bloomberg Television and *Mind Your Own Business* on C-Suite TV. He is the CEO of The Hayzlett Group, an international strategic business consulting company focused on leading change and developing high-growth companies. Connect with Hayzlett on Twitter, Facebook, or LinkedIn.

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Data and analytics are critical to any business but especially to those that are about to launch new businesses areas or products. Prior to any launch, it's important that you do your homework. You can't launch a product or business without researching, narrowing down, and developing your target audience.

Everyone wants to focus on selling to the core business leaders: it's where the biggest sales lie. But they do that trying to go through *The Today Show* or *Good Morning America*. Those are good shows, but do you really believe that C-Suite executives are watching either of them?

I recently launched C-Suite TV, a web-based digital on-demand business channel that features interviews and shows for c-suite leaders and business executives. To get to C-Suite TV's target audience, my team and I did our homework. There are more than 8 million businesses in North America. Of those 8 million, 7.5 million are small businesses. They are not the target audience of C-Suite TV because they don't necessarily have C-Suites. They may have heads of finance or sales, but not CEOs, CMOs or CFOs. That leaves 600,000 or so businesses in North America that have C-Suites and revenues of $10 million or more. That's the target audience of C-Suite TV.

KEY LESSONS

1 DO YOUR RESEARCH TO DEFINE YOUR TARGET AUDIENCE.

2 USE REAL-TIME ANALYTICS TO UNCOVER THE PSYCHOLOGY OF YOUR DEMOGRAPHIC.

> " You can't launch a product without researching and developing your target audience. "

JEFFREY HAYZLETT

Primetime TV Show Host, Bestselling Author, and Sometime Cowboy, The Hayzlett Group

Jeffrey Hayzlett is a global business celebrity and speaker, bestselling author, Contributing Editor and Host of *C-Suite with Jeffrey Hayzlett* on Bloomberg Television and *Mind Your Own Business* on C-Suite TV. He is the CEO of The Hayzlett Group, an international strategic business consulting company focused on leading change and developing high-growth companies. Connect with Hayzlett on Twitter, Facebook, or LinkedIn.

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As we built the site and looked for distribution partners, we knew that to justify ad spending we needed to provide hard numbers. We partnered with Piksel to host our programming. Through them, we knew how many people watched, how often they watched, when they watched, and from which countries. All of this data helped us tailor better content for our audience to increase our engagement and viewership. We have also used tools like Vidyard that offer real-time analytics to provide even more insight into the psychology of our target audience.

We launched in July 2014, and it has been awesome to watch the data pile in. Not only do we have Google Analytics running 24x7, but all of our links are built using Google's URL Builder, which allows us to add custom campaign parameters and see from where people are visiting our site. No matter where the link is placed—whether in a press release or shared on social media—we can see the most popular places where people are coming from. This knowledge allows us to share more information on those networks and sites and even reach out for potential advertising leads.

Real-time analytics, from building to promoting new episodes, has been critical to C-Suite TV's success. The information gives us the opportunity to better tailor our content and develop new programming that the C-Suite wants.

> " Real-time analytics gives us the opportunity to better tailor our content and develop new programming. "

DR. KIRK BORNE

Professor,
George Mason University

Dr. Kirk Borne is a Data Scientist and Professor at George Mason University. Having worked for nearly 20 years in positions supporting NASA projects, he has extensive experience in big data and data science, including data mining and data systems. Kirk was named a 2014 Big Data and Analytics Hero by IBM and was identified as #1 Big Data Influencer on Twitter in 2013.

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The twin towers of big data are massive static data and streaming real-time data. In the case of massive static data, the biggest challenge is the "first mile challenge": data inertia—that is, the difficulty in terms of resource engagement, workflow choreography, and bandwidth bottlenecks of getting massive, distributed, heterogeneous data moving in and out of storage devices, memory, and databases. In the case of streaming real-time data, the data are already moving (streaming into the system or through the processing system); consequently, the biggest challenge is the "last mile challenge": learning from and making decisions based on streaming data in a fast, dynamic environment—in other words, deriving actionable insight on the fly.

Part of the reality check of real-time analytics is accepting that complex models or deep data integration is probably beyond the scope of most organizations. With the exception of massive Internet giants, most companies do not have the computational and network resources necessary for that degree of complexity. However, there are some ways to improve, streamline, and automate the real-time workflow.

KEY LESSONS

1 COMPLEX MODELS OR DEEP DATA INTEGRATION IS PROBABLY BEYOND THE SCOPE OF MOST ORGANIZATIONS, BUT THERE ARE WAYS TO IMPROVE, STREAMLINE, AND AUTOMATE THE REAL-TIME WORKFLOW.

2 EXISTING STANDARDS SUCH AS BUSINESS PROCESS EXECUTION LANGUAGE (BPEL) AND PREDICTIVE MODEL MARKUP LANGUAGE (PMML) CAN BE APPLIED TO ENABLE MORE EFFECTIVE, EFFICIENT, AND REPRODUCIBLE REAL-TIME ANALYTICS.

" In the case of streaming real-time data, the biggest challenge is the "last mile challenge": learning from and making decisions based on data in a fast, dynamic environment—in other words, deriving actionable insight on the fly. "

DR. KIRK BORNE
Professor,
George Mason University

Dr. Kirk Borne is a Data Scientist and Professor at George Mason University. Having worked for nearly 20 years in positions supporting NASA projects, he has extensive experience in big data and data science, including data mining and data systems. Kirk was named a 2014 Big Data and Analytics Hero by IBM and was identified as #1 Big Data Influencer on Twitter in 2013.

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One of those ways is the Business Process Execution Language (BPEL). Although this tool is considered outdated by some business process experts, it is nevertheless a vetted international XML-based standard that encodes and shares tasks (including analytics or any other business task) across a distributed computing environment. BPEL allows you to define the executable tasks down to the atomic unit of execution, the business rules that govern them, the triggers (inputs) that drive them, and the results (outputs) generated from them. Another standard that is particularly applicable to analytics is the Predictive Model Markup Language (PMML), an XML-based standard language developed by the Data Mining Group to represent, describe, and exchange learned analytics models across multiple tasks and processors.

In your real-time analytics deployment, as models are updated and learned from streaming data (e.g., the discovery of new customer behaviors, new segments of the population, emerging trends), you can quickly deploy these analytics models to other processors through PMML and implement them dynamically through BPEL (or an equivalent language). Standards such as these enable more effective, efficient, and reproducible real-time analytics.

> " You can quickly deploy analytics models to other processors through PMML and implement them dynamically through BPEL. "

AMIT BENDOV
CEO, SiSense

A Software as a Service industry veteran, Amit Bendov is leading SiSense's rapid growth as a trailblazer in high-performance business intelligence software. Amit has been at the helm of SiSense's strategy, vision, and customer acceleration since July 2012, leading the company to triple subscription revenue growth, closing $10 million in Series B funding and $30 million in Series C funding, and significantly expanding SiSense's global footprint in 49 countries.

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As CEO of a startup in hyper-growth mode, I understand the challenges that other rapidly expanding businesses face as they attempt to rein in and leverage an avalanche of big data. But by taking advantage of business analytics, your team can increase efficiency and profitability in a variety of ways.

Employing proactive analytics can safeguard an organization's survival and promote its growth. Waiting hours, days, or weeks for analysts to comb through data is a luxury many businesses can't afford, and if you work for a startup or small to medium-sized business, you might find that you're charged with this mighty task without a support team. The ability to quickly build dashboards and reports allows for faster fact-based business decision making and identification of problems in real time.

You can employ analytics to fuel growth, prevent customer churn, increase sales, and implement data-driven decision making across all departments. Increasingly, companies are coming to understand that they can use "proactive analytics" to help address evolving business and customer needs in real time. Because businesses today face ever-increasing data loads, their analytics environment must scale with the data and keep up with company growth.

KEY LESSONS

1 EMPLOYING PROACTIVE ANALYTICS CAN FUEL GROWTH, PREVENT CUSTOMER CHURN AND INCREASE SALES.

2 EMPOWER YOUR COLLEAGUES SO YOU CAN ELIMINATE QUEUES OF PENDING REQUESTS.

> " Waiting hours, days, or weeks for analysts to comb through data is a luxury many businesses can't afford, and if you work for a startup or small to medium-sized business, you might find that you're charged with this mighty task without a support team. "

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It's important to develop a single source of truth that can funnel all of your growing data to one central point that users from the CEO down to the customer-facing support team can log in to from any device and leverage in a timely manner. By putting big data in the hands of business users, each department can build comprehensive dashboards on the fly and gain insights to achieve a variety of goals.

Where analytics used to be the exclusive domain of IT, it is now possible to put big data in the hands of sales, marketing, and operations. You can encourage a data-driven culture by providing business users with an easy-to-use visualization and analytics solution, freeing your IT team and engineers to focus on their core mission.

Empower as many of your colleagues as possible so that you're not faced with a long queue of pending requests from every department. Then, you can focus the energies of your tech team on queries whose answers are mission critical or require deeper know-how.

> " Empower as many of your colleagues as possible so that you're not faced with a long queue of pending requests from every department. "

LISA ARTHUR

CMO, Marketing
Applications,
Teradata

As Teradata's Chief Marketing Officer, Marketing Applications, Lisa Arthur drives customer-centric initiatives and serves as global industry thought leader around data-driven marketing and Teradata's Integrated Marketing Cloud solutions. A 30-year marketing veteran, Lisa is the author of *Big Data Marketing; Engage Your Customers More Effectively to Drive Value*. Her industry thought-leadership blogs have appeared on the Forbes.com CMO Network, and she is a contributor to *Lean back*, a marketing blog of The Economist Group.

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When it comes to improving your business through smarter, customer-focused, integrated marketing using real-time analytics, one important fact you must remember is this: Real-time analytics don't all have to be performed in real time—they just need to be *used* in real time. In this sense, *real-time* is a relative notion.

Let me offer an example.

I have a friend who leads the e-mail marketing organization at a major online retailer. He's a wizard at real-time analytics, and e-mail is a core strategic channel his firm uses to stay engaged with customers. In conducting e-mail and digital campaigns, however, it's not uncommon for him to use customer attributes and communication history—data that might have been captured from an earlier online session or from other channels—as real-time criteria for decision making. Here, the analytics themselves don't all have to be executed in real time every time. As long as they're available to be used in real time, all is well, because customer engagement becomes stronger with more relevant messaging.

KEY LESSONS

1 KEEP AN OPEN MIND ABOUT THE KINDS OF METRICS THAT WOULD BE USEFUL FOR YOUR ENVIRONMENT.

2 DON'T LIMIT YOURSELF TO ONLY THOSE ANALYTICS THAT RUN IN AN INTERACTIVE ENVIRONMENT.

3 CHOOSE ANALYTICS THAT SPAN CUSTOMER ENGAGEMENT CHANNELS.

> " Real-time analytics don't have to be performed in real time—they just need to be *used* in real time. "

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To put this another way, for real-time analytics to be valuable, you don't actually have to be performing the analytics at the precise moment of customer interaction. Analytics on your data—any time you use them—will help you engage better with customers at any point of interaction.

This is a subtle but important distinction.

What this implies for data-driven marketers on the quest to implement "real-time analytics" is this:
- Take a broad view of the types of overall customer and business analytics that would be useful to you in real time.
- Don't limit your thinking only to analytics that can be run in an interactive environment (mobile app, Web, chat, customer care).
- Always remember: Often, it's customer analytics that span all customer engagement channels (not just real-time interactive environments) that offer critical insight that you can then use to guide the interactions that take place in real time.

Real-time analytics for effective customer interaction management involves a lot of moving parts that have to work in concert, within nanoseconds, to determine the best offer, message, or experience for every customer interaction. Underneath it all, a lot of data are flowing throughout an integrated marketing and analytical ecosystem, and any change in data quality anywhere along the flow can affect your customer's experience.

Always put your customer's ideal experience first, and your data and analytics will serve you well—in real time, every time.

> " Always put your customer's ideal experience first, and your data and analytics will serve you well. "

MICHAEL CAVARETTA

Data Scientist/Manager,
Ford Motor Company

Mike Cavaretta is a data scientist and manager at Ford Motor Company in Dearborn, Michigan. He is a leader for the Predictive Analytics group in Research and Advanced Engineering, where he guides the team to work as internal consultants using technologies in big data, machine learning, artificial intelligence, data mining, text mining, and information retrieval to improve business processes across the enterprise. Mike has worked at Ford Motor Company since April 1998.
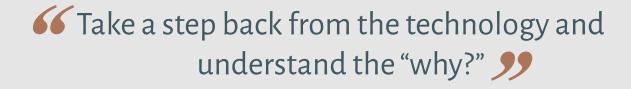
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My advice is to take a step back from the technology and understand the "why?" Like big data, real-time analytics can include simple rules like, "If SignalA > 422, then send_message714," to the application of deep-learning neural networks. When you have specified the goal, you need to get some quick wins and build credibility so that you can take the company from superficial transformation (e.g., a few "skunk works" projects) to true transformation (e.g., a data-driven and experimental company).

The key in real-time analytics is in the name: *real-time*. The value of the data and subsequent decisions based on the data depend strongly on time—think real-time stock trading or fraud detection. To find company value, identify where automated decision making provides a significant competitive advantage. In my experience, these areas are generally found at the interfaces of a company. Start with your customers: Can you make better, faster, and more targeted offers? Can you predict when customers are likely to defect? Then, move on to the other interfaces, such as vendors.

KEY LESSONS

1 SPECIFY A GOAL, THEN GET QUICK WINS TO BUILD CREDIBILITY.

2 FIND COMPANY VALUE BY IDENTIFYING WHERE AUTOMATED DECISIONS PROVIDE COMPETITIVE ADVANTAGE.

> " Take a step back from the technology and understand the "why?" "

JIM STERNE
Founder,
eMetrics Summit

Jim Sterne is an international consultant who focuses on measuring the value of the Web as a medium for creating and strengthening customer relationships. Jim has written eight books on using the Internet for marketing, is the Founding President and current Chairman of the Digital Analytics Association, and produces the eMetrics Summit.

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Stop!

Don't do it!

For the love of data, do not move a muscle until you have answered one critical question: *Why are we doing this?*

> "Real time analytics is all the rage!" they said.
> "This is totally the next phase!" they said.
> "We want to get to the next stage!" they said.

Why are we doing this?

> "Well," they said, "because we can save money, improve our product, and do smarter marketing."

Pick one, and tell me how you will know we've succeeded.

> "We're going to transform the company!"

Bring in your old high school buddy or the woman who lives in the next apartment. Ask that person to wear a white lab coat, stand at the white board, and explain *SOS*: Shiny Object Syndrome.

Until you know the desired results of implementing *fill-in-the-blank,* you cannot know which resources are required, when the project will be finished, or why they might think you're brilliant or a natural disaster.

If they can tell you why, you can show them how. If they can tell you why, you can tell them when. If they can tell you why, you can give them how much. If they can tell you why, you can advise them on who, what, and where.

Then, you can plan like crazy with clearly identified deliverables. You're being asked to implement something new, so you need a step-by-step project map to show progress, especially when desired results might be months away.

Start off simple, with straightforward alerts. Those alerts are more real time than anything you have now, and they can be very effective.

KEY LESSONS

1 CLEARLY DEFINE AND IDENTIFY DELIVERABLES.

2 CREATE A STEP-BY-STEP PROJECT MAP TO SHOW YOUR PROGRESS.

> " If they can tell you why, you can show them how. "

New Relic.

Data helps us
revolutionize fashion.

Camille Fournier
Chief Technology Officer

RENT THE RUNWAY

We are *all* data nerds.

In this section...

ANIL BATRA
Consultant

Anil Batra is a Digital Marketing and Analytics professional with 15 years of experience. He has worked with companies ranging from Fortune 50 to startups, including Microsoft, SmartMoney.com, ESPN, T-Mobile, Hoovers, RealNetworks, Starbucks, and TheStreet.com. Anil holds a B.Tech. in Electronics and Communication Engineering from India and an MBA from the University of Washington, Seattle. He has taught digital marketing and analytics for the past nine years at UBC and the University of Washington, spoken at conferences, blogs, and served on the Board of the Digital Analytics Association.

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Real-time analytics is helpful only if you are ready for real-time actions—which you should be. To capture customers' mind and wallet, you must be able to act in real time.

Real-time Web analytics provides a view into what's happening on your site at that moment. It allows you to see the issue as well as take corrective actions—in real time. It allows you to drive more action from your site visitors.

Here are a few cases where you might want to use real-time Web analytics:

- You launched a new campaign— paid search, an email newsletter, a television ad—and would like to see how people are reacting to it.
- You placed new promotions on your site and want to see how visitors are reacting to them so that you can tweak the promotions in real time.
- You added new stories, links, and so on and want to see if anyone is clicking them so that you can make changes based on instant feedback.
- You designed a new site and would like to make sure that everything is working as expected. Real-time analytics is a great quality assurance tool.

KEY LESSONS

1 **REAL-TIME ANALYTICS HAS TO RESULT IN REAL-TIME ACTION TO BE USEFUL.**

2 **REAL-TIME ACTION RESULTS IN MORE ACTION FROM WEBSITE VISITORS.**

> " Real-time analytics is helpful only if you are ready for real-time actions. "

ANIL BATRA
Consultant

Anil Batra is a Digital Marketing and Analytics professional with 15 years of experience. He has worked with companies ranging from Fortune 50 to startups, including Microsoft, SmartMoney.com, ESPN, T-Mobile, Hoovers, RealNetworks, Starbucks, and TheStreet.com. Anil holds a B.Tech. in Electronics and Communication Engineering from India and an MBA from the University of Washington, Seattle. He has taught digital marketing and analytics for the past nine years at UBC and the University of Washington, spoken at conferences, blogs, and served on the Board of the Digital Analytics Association.

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- You launched a new feature on your site, added a video, or deployed a new game and would like to know if your visitors are using it so that you can push out alternative versions, if necessary.

- You analyze the data in real time and personalize users' experience in real time, to show the next logical piece of content or push a product that they might be interested in.

Here's an example. About seven years ago, I was working with a large business-to-business technology company. The agency I worked for launched a beautiful new site with some great functionality. The client spent millions of dollars driving visitors to this wonderful new experience.

One of those new features was a landing page with an interactive map. This map allowed visitors to chose their country and go down a path that was created for that country in their local language. Unfortunately, in some browsers, that "cool" functionality did not work, resulting in high page abandonment. We didn't know about this bug until the next day, when we analyzed the data. It would have been really nice to have real-time analytics back then.

> " In some browsers, that "cool" functionality did not work, resulting in high page abandonment. We didn't know about this bug until the next day. "

GARY ANGEL
Principal, EY

As President of Semphonic, Gary Angel led his company's growth from a two-person organization to one of the leading digital analytics practices in the United States. When Ernst & Young acquired Semphonic in 2013, Gary became the leader of EY's Digital Analytics practice. Voted the most Influential Industry Contributor by the Digital Analytics Association, Gary writes an influential blog, has published numerous white papers on advanced digital analytics, and is a frequent speaker at industry events.

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The single worst example of real-time analytics I was ever a part of occurred when I was in a team of analysts monitoring Web traffic from a Super Bowl buy. We sat by our monitors, producing minute-by-minute reports of traffic and sending them off to an executive team (most of whom were too busy watching the game to notice). By halftime, we knew our buy had generated disappointing results. It was useful knowledge... for next year.

People can fail at analytics transformation in countless ways, but three reasons collectively account for a substantial percentage of that failure:
• Confusing real-time events with real-time analytics
• Performing analytics without an operational strategy
• Picking the wrong problems

Everything happens in real time—Super Bowl ads are shown, prospects show up at the website, cash registers ring. But just because you collect data in real time doesn't mean that your analysis must or should be in real time. Real time matters when you need to (and can) make decisions immediately following observations.

The only real-time decision from our Super Bowl effort was that the chief marketing officer got a jump on updating his resume.

> ❝ No matter how good your analysis is, it isn't worth anything if you don't have the operational wherewithal to take advantage of it. ❞

KEY LESSONS

1 DON'T CONFUSE REAL-TIME EVENTS WITH REAL-TIME ANALYTICS.

2 BEFORE PERFORMING ANALYTICS, YOU MUST HAVE AN OPERATIONAL STRATEGY IN PLACE.

3 TRANSFORMATION DOESN'T COME FROM LITTLE PROBLEMS.

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Principal, EY

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Which brings me to operationalizing analytics. No matter how good your analysis is, it isn't worth anything if you don't have the operational wherewithal to take advantage of it. That's critical in real time, because it can be so difficult to "productionize" real-time decisions. Without the ability to serve personalized content on your website, all the analytics in the world won't matter. By focusing on operations when you first choose your analysis project, you increase your chances of success by an order of magnitude.

Finally, transformation doesn't come from little problems. Identifying funnel errors in real time is probably a good application for real-time analytics. It's practical and valuable, but it's not transformative. Tuning digital campaigns in real time is likely a similar case, although there are times when dramatically reducing the cycle time on marketing analytics can be transformative. If you can expunge 50 percent of the cost of underperforming campaigns and shift it into better marketing drives, you may well deliver something close to transformational improvement.

> " For most businesses, real-time analytics is transformational only when they use it to tailor the customer experience. "

For most businesses, real-time analytics is transformational only when they use it to tailor the customer experience. Inventory and lifetime value pricing, real-time offer matching, gamification, and massive path optimization are the places where real-time analytics can drive fundamental transformation.

Understanding the difference between real-time data and real-time decision making, choosing analytics projects because you have a clear path to production, and focusing on the things that will deliver true competitive advantage are key to effective real-time analysis.

ANU CHITRAPU

Senior Vice President,
Bank of America

Anu Chitrapu works in the Vendor Analytics group at Bank of America. With 20 years of experience in business intelligence, analytics, marketing, and general management, Anu has a passion for using analytics to make smart business decisions. She holds an MBA from the MIT Sloan School of Management and is President of Vision Aid, a nonprofit organization that serves the visually challenged in India. She is also on the advisory board of Saheli, an organization that seeks to empower victims of domestic violence.

Blog

Real-time analytics is the ultimate manifestation of the old adage, "time is money."

Broadly speaking, real-time analytics can be tremendously useful for its cost-saving ability as well as to increase revenue. These benefits come from two drivers:

- Spotting a relevant event faster than you otherwise would
- Responding to an event faster than you otherwise would

By spotting and responding to an event faster, you can make money. High-frequency trading on Wall Street is a good example: by identifying patterns in stock movements milliseconds before the competition, hedge funds have made a killing. Moving from Wall Street to Main Street, fashion retailers that spot the next must-have trend can not only be the first to market with hot products but can also preemptively lock up sources of supply before the competition gets wind of it.

By spotting and responding to an event faster, you can save money, as well. If the **Checkout** button on your e-commerce site isn't working, every second can cost you thousands of dollars. Before you know it, frustrated customers are venting on social media. Real-time monitoring of key sections of the site, coupled with analytics that can determine whether what is happening is normal or anomalous, can flag these problems and avert disaster.

KEY LESSONS

1 BY SPOTTING AND RESPONDING TO AN EVENT FASTER, YOU CAN MAKE AND SAVE MONEY.

2 FOCUS ON A PROBLEM, OR FOCUS ON DATA.

> " By spotting and responding to an event faster, you can make money. "

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Blog

As you examine your business environment for opportunities to apply real-time analytics, start with two places: focus on a problem, or focus on data.

Take a pressing business problem and brainstorm it: "Can I solve this problem better if I had more timely data?" Similarly, take data that has recently become available (perhaps because of the completion of an IT project) and brainstorm it: "To which problem areas is this data pertinent? What can I do with this data to make a dent in this area?" If you get stuck with one approach, switch to the other.

The most impactful applications of real-time analytics have three ingredients: data, a problem, and imagination. Only you can provide that last ingredient!

> " As you examine your business environment for opportunities to apply real-time analytics, start with two places: focus on a problem, or focus on data. "

CHRIS RIETH

Program Manager,
Open Performance,
Socrata, Inc.

Chris Rieth joined Socrata to help governments, nonprofit organizations, and nongovernmental organizations find new and exciting ways to measure performance, improve transparency, and empower citizens to better understand and track progress toward a better future. Chris previously served as a senior aide to Governor Martin O'Malley. A steadfast proponent of public-sector innovation, he enjoys finding new ways for citizens to engage with government to help solve our most pressing public policy challenges.

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We are living in an age of data, and citizens are demanding smarter, more sustainable cities; safer communities; and better educational outcomes than what we have achieved to date. The old way of "promises absent data" has given way to the new politics of performance. Citizens don't just believe that their government can or should do more, they are demanding a whole new pattern of engagement with their leaders.

Citizens are choosing leaders who understand the power of engaging citizens directly, setting measurable goals for all to see and sharing the underlying data so they can see how goals will be met and progress measured. They are choosing leaders who understand how to operate in real time with transparent and open data.

States like Maryland are breaking down traditional silos of information, bringing agencies in the room together along with citizens and stakeholders to find solutions to problems as large as climate change and childhood hunger. And they're giving citizens a window into how they can take action to move the needle on these urgent challenges.

KEY LESSONS

1 PEOPLE ARE CHOOSING LEADERS WHO UNDERSTAND OPERATING IN REAL TIME WITH TRANSPARENT AND OPEN DATA.

2 LEADERS MUST CREATE TRANSPARENCY AND REAL-TIME ACCESS TO PROCESSES AND DECISIONS.

> " We are living in an age of data, and citizens are demanding smarter, more sustainable cities; safer communities; and better educational outcomes. "

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Cities like Chattanooga, Tennessee, are launching an urban revolution powered by gigabit fiber and built by citizens and government exchanging information and ideas in ways previously not thought possible. Everything is connected in these new digital cities. The city's street lights power up or down to make an evening walk safe for families or to conserve energy. Fire engines are reporting back their water and oxygen levels in case they need backup during an emergency, all while downloading the floor plan for the building the firefighters are about to enter.

Citizens and public officials alike are also getting a window into their real-time data-powered city. Analytics from their open data portal and city website are available online in real time. This information becomes an actionable feed, allowing the city to respond in real time to the needs of citizens and visitors.

This new data-centric view of our public institutions is reshaping the connections between governments and citizens and will power new forms of on-demand, real-time services delivered by private enterprise, as well, ultimately leading to the creation of brand-new markets.

Somewhere along the way, we might just find that we're living in a world a little less cynical about our ability to effect change and a little more optimistic about the future.

> "
> Data-centricity is reshaping the connections between governments and citizens.
> "

JUNE DERSHEWITZ

Director of Digital Analytics,
Apollo Education Group

June Dershewitz has had a 15-year career driving analytics strategies for major corporations. Currently, she is the Director of Digital Analytics at Apollo Education Group, the parent company of University of Phoenix. Before that, she was a member of the leadership team at Semphonic, a prominent analytics consultancy now part of Ernst & Young. As a long-standing advocate of the analytics community, June was a co-founder of Web Analytics Wednesdays. She's also a Director Emeritus of the DAA.

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Imagine real-time data visualization splashed across the largest display in your corporate office. The images shift and move, revealing beautiful details as you stare at it with rapt attention, your mind blank.

Now snap out of it! That's precisely the wrong way to tap the potential of real time.

If you want to transform your company with real-time analytics, put the visualizations aside. Instead, start by imagining the value of real-time action.

In the era of big data, it's easy to accept the promise of data-driven decisions: start with data, develop insights, and then take action. But how long does that data-to-action cycle take? It depends on how the action plays out.

Often, a valid data-to-action cycle can take many days, especially when multiple people are involved. If your CEO needs to approve a strategic data-driven action, it simply won't happen in real time—nor does it need to.

So, if the key to finding value in real-time analytics is not in visualization and not in most decisions where people are involved, then where is it?

KEY LESSONS

1 CLOSED-LOOP AUTOMATED SYSTEMS HOLD THE GREATEST PROMISE FOR REAL-TIME ACTION.

2 IF YOUR CUSTOMERS CAN'T TRANSACT WITH YOUR BUSINESS, EVERY SECOND COUNTS.

3 REAL-TIME ANALYTICS IS ONLY WORTH DOING WHEN THERE IS A MATERIAL BENEFIT TO HAVING A TIGHT FEEDBACK LOOP.

> 66 Start business transformation by imagining the value of real-time action. 99

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Apollo Education Group

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Sometimes, a swift data-driven action is both achievable and worthwhile. That's exactly the sweet spot for real-time analytics.

What makes a real-time action achievable? Closed-loop automated systems hold the greatest promise for real-time action. Take several examples from digital marketing. Personalization, retargeting, and bid optimization—they all use details known in the moment to act in real time and deliver value. Automation infrastructure may come with a high overhead, but it's the most effective way to shorten the data-to-action cycle.

Humans, although no match for automated systems, can play a role in real-time analytics, too, but they must be compelled to "jump" when they see the data. Mission-critical processes like operational monitoring deserve real-time action. If your customers can't transact with your business, every second counts.

What makes a real-time action worthwhile? Just because it's possible to act in real time doesn't mean you should. You have a choice: you could invest in a system to make real-time decisions possible, or you could accept a lag.

Before you launch any real-time initiative, consider this: If you are able to act on an insight within two seconds instead of two days, how much do you stand to gain? Real-time analytics is only worth doing when there is a material benefit to having a tight feedback loop.

Here's my challenge to you: find the points in your business where real-time action is achievable and worthwhile. Then—and only then—will real-time analytics hold the potential to transform your business.

> " Humans, although no match for automated systems, can play a role in real-time analytics, but they must be compelled to "jump" when they see the data. "

ALLISON HARTSOE

Consulting Partner,
Allison Hartsoe LLC

A digital marketing analytics expert, Allison Hartsoe writes the blog *Schrödinger's Cat* to help marketers handle the impact of what they didn't see until it was measured. Previously a Senior Manager at Ernst & Young, VP Analytics at Semphonic, and founder and CEO of Aspyro, an eBay analytics company, Allison co-founded iSyndicate in San Francisco, a venture-backed marketplace that sold digital content to Fortune 500 corporations from media publishers. She has appeared on CNN Europe and NPR's Real Computing and spoken at eMetrics, eBay Live, and Internet World.

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Real-time analytics can be surprisingly effective. Unfortunately, however, the rules for capturing data through devices are increasingly complex. Unsuspected errors create poor visitor experiences and can lurk for weeks. Here are two examples where real-time analytics shines.

Online consumer retail is a high-speed environment. The need to push new web content live is so overwhelming that unintentional mistakes occur. One international retailer I know stumbled on a quiet, costly error caused by a simple device redirect. An IT bug caused Mac desktops to receive the mobile site. Tablets were downgraded to the same less-functional mobile site. Suddenly, an estimated $16 million was slowly bleeding from the retail cart. Real-time analytics could have caught this significant change in tablet and Mac desktop cart activity by segmenting the traffic by granular device (e.g., *Mac* desktop, not just desktop) and scanning for an unexpected, statistically significant drop, not a plain volume change.

KEY LESSONS

1 THE NEED TO PUSH NEW WEB CONTENT LIVE IS SO OVERWHELMING THAT UNINTENTIONAL MISTAKES OCCUR.

2 LOOK FOR A MEANINGFUL CHANGE WHEN MONITORING ONGOING TRENDS OR A SET A BENCHMARK FOR EVENTS.

> " Real-time analytics can be surprisingly effective. Unfortunately, however, the rules for capturing data through devices are increasingly complex. "

ALLISON HARTSOE

Consulting Partner,
Allison Hartsoe LLC

A digital marketing analytics expert, Allison Hartsoe writes the blog *Schrödinger's Cat* to help marketers handle the impact of what they didn't see until it was measured. Previously a Senior Manager at Ernst & Young, VP Analytics at Semphonic, and founder and CEO of Aspyro, an eBay analytics company, Allison co-founded iSyndicate in San Francisco, a venture-backed marketplace that sold digital content to Fortune 500 corporations from media publishers. She has appeared on CNN Europe and NPR's Real Computing and spoken at eMetrics, eBay Live, and Internet World.

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Large technology brands often have substantial marketing budgets, but these budgets may not be expected to generate immediate results. For example, "purchase intent" is measured by combining online traffic with offline product sales. These sales could occur a month later. One large technology company launched a campaign in China but occasionally sent visitors to pages that were not available or were in English. These Chinese visitors had a poor experience and immediately left. Real-time analytics could have detected high rejection rates immediately, recovering campaign funds that were being squandered by segmenting content by landing page and monitoring the rejection rate (aka *bounce rate*) against a benchmark.

As we move toward the Internet of Things, data and devices will only continue to multiply. Today, using real-time analytics to identify cost-saving measures is surprisingly easy. Look for a meaningful change when monitoring ongoing trends or set a benchmark for events.

> " Today, using real-time analytics to identify cost-saving measures is surprisingly easy. "

DOROTHY CREAVEN

Co-Founder and
Chief Executive,
Element Wave

Dorothy Creaven is Co-Founder and CEO of Element Wave, a software company specializing in Mobile Marketing technology and Mobile CRM. Featured in such publications as *The Sunday Times* and *VentureBeat*, she is regularly asked to speak at conferences in the area of mobile engagement and retention technology for the mobile app market. Element Wave's award-winning product is a mobile user engagement and customer retention tool that dramatically increases app usage for brands, through mobile analytics and push messaging, a proven way to significantly increase mobile app revenues.

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Real-time analytics is key when it comes to successful mobile marketing campaigns. Without it, mobile app publishers and brands are wasting valuable opportunities to connect with their target audience.

As a general rule, our handheld devices are rarely more than a meter away from us at any time. For brands, this opens a powerful and effective marketing channel through the highly persuasive combination of targeted push notifications and mobile app analytics. The live aspect is important here, because real-time feedback is critical to influencing mobile app users at exactly the right time. Through this live feedback mechanism, it's now possible to influence a buying decision in real time, which can greatly impact the success of a mobile marketing campaign, leading to significantly higher mobile revenues for brands.

Airlines use the power of real-time analytics extensively. For example, the relevance of a particular message depends strongly on the customer's context at the time. If a customer is at home four hours before his or her flight, a traffic alert relevant to the customer's location could be beneficial and goes a long way toward building brand loyalty.

KEY LESSONS

1 THE CONSTANT PROXIMITY OF MOBILE DEVICES OPENS A POWERFUL MARKETING CHANNEL.

2 USER ENGAGEMENT IS CRUCIAL TO SUCCESSFUL MOBILE APPS.

3 CREATE AN IMMERSIVE EXPERIENCE FOR YOUR MOBILE CUSTOMERS.

" Real-time feedback is critical to influencing mobile app users exactly at the right time. "

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Alternatively, if the customer is already at the airport but has not yet checked in, a last-minute special offer to upgrade to first class could be a great way for the airline to upsell. Either of these marketing messages in the wrong context, however, would be highly ineffective. Analytics such as real-time location combined with an awareness of the customer's context offers brands incredibly powerful ways to engage with their customers.

Crucial to the success of any mobile app is user engagement. One of the best ways to keep your mobile audience engaged is to get to know the customer app life cycle, and then develop a strategy around mobile customer relationship management. By using real-time analytics to understand the customer's context in different situations, you can create mobile moments to streamline the customer experience.

Furthermore, by analyzing drop-off points for your mobile app customers, you can preempt where they may disconnect and introduce incentives to encourage them to stay connected with the app.

For example, mobile gaming companies use real-time analytics to monitor a customer's path through a game and engage with the customer at opportune times. When the player has reached a certain level or accumulated a threshold of points, brands can engage with that customer in real time to continue his or her excitement and sense of achievement. This creates an immersive experience for the customer and ultimately leads to more usage and higher revenue for the brand.

> " By analyzing drop-off points for your mobile app customers, you can preempt where they may disconnect and introduce incentives to encourage them to stay connected with the app. "

KEN HERRON

Advisor,
Multiple Tech Startups

Ken Herron drives revenue by developing stronger emotional connections between companies and their customers. He has held executive-level marketing and sales leadership positions in multiple Web and mobile tech companies. A graduate of Stanford Graduate School of Business' Marketing Management program, Ken earned his MIM from the Thunderbird School of Global Management. Ranked the #2 CMO on Twitter worldwide by *Social Media Marketing Magazine*, he is an author and frequent speaker on leveraging technology for marketing. Follow Ken @KenHerron.

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The two most powerful tools for business-to-business and business-to-consumer marketers? Two little words: "What if?"

Asking the question, "What if?" gives you and your team the freedom to pursue as many out-of-the-box ideas you can conceive, but until recently, there has been a problem. No, it's not you and your team. You have no shortage of ideas to increase customers, sales, and profits. What you have not had, however, is the ability to know the impact your ideas are having on results—in real time. Rather than take the risk of driving blind, you have been forced to limit yourself to "safe" roads, eliminating your riskiest—and most likely your most transformational—ideas. Real-time analytics gives you the superpower of knowing the results of your marketing ideas fast enough to take advantage of market windows. Here are just two real-life examples of how I used real-time analytics to increase revenues from hotel bookings.

KEY LESSONS

1 REAL-TIME ANALYTICS LETS YOU KNOW THE IMPACT YOUR IDEAS ARE HAVING ON RESULTS IMMEDIATELY.

2 ANALYTICS FREES YOU TO FOCUS ON ACCELERATING CUSTOMER AND REVENUE GROWTH.

> "Real-time analytics lets you know the results of marketing ideas fast enough to take advantage of market windows. "

KEN HERRON

Advisor,
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Valentine's Day was coming up. My team and I asked ourselves, what if we could increase revenues by convincing some of the couples booking romantic getaway weekends to book a hotel suite in Paris instead of Las Vegas? (Yes, we made a lot more money booking hotel suites in Paris.) Using real-time analytics, we were able to rapidly test multiple marketing messages and images until we found just the right combination that convinced Vegas-bound couples to swap the lights of the Vegas Strip for the lights of the Eiffel Tower. We *liked* being marketing superheroes.

People sometimes forget that hotel rooms are just like bananas—perishable. If you don't sell all of them, you end up leaving a lot of money on the table. When we would have hotels with unsold inventory, we used real-time analytics to identify the smallest possible incentives that would convince travelers to book in those hotels.

Real-time analytics empowers you to answer—without limits—the marketing question, "What if?" It frees you to focus on accelerating customer and revenue growth for your brands.

> " Real-time analytics frees you to focus on accelerating customer and revenue growth for your brands. "

PRATIK BANG

Director of Alliances,
Data & Analytics,
Equifax

Pratik Bang is the Director of Alliances for the Data & Analytics group at Equifax, where he is responsible for developing partnerships with third parties and helping develop the overall analytical strategy. Before that, he was a consultant for McKinsey & Company, working on technology strategy studies for clients in many industries. He has held various leadership positions at Genesys Telecommunications, most recently Senior Manager of Engineering. Pratik has an MBA from Emory University and M.S. and B.S. degrees in computer engineering from the Georgia Institute of Technology.

Website

Companies are increasingly looking to real-time analytics to generate insights from the vast volumes of data they are collecting, and then using those insights to improve their profitability. Analytics have been used in a variety of situations, from streamlining company operations to improving customer acquisition, management, and retention strategies. Here is an example where real-time analytics is fundamentally transforming how companies conduct business.

Call centers pervade every industry today and typically track several metrics to assess their operational efficiency and adherence to customer contracts. For example, large corporate customers of a financial institution are guaranteed a wait time of no longer than 20 seconds when they call in, or the institution could face severe financial penalties. An increase in the time to handle calls may indicate issues with agent performance or inadequate training, leading to increased costs and lower profitability.

KEY LESSONS

1 CONSTRUCT CUSTOMER SEGMENTS INTELLIGENTLY TO GENERATE RELEVANT ANALYTICS.

2 REAL-TIME ANALYTICS INTRODUCES A NEW PARADIGM FOR HOW TO MANAGE CUSTOMER SERVICE.

3 INTERPRET THE INSIGHTS GAINED FROM THOSE ANALYTICS PROPERLY.

> **Companies are increasingly looking to real-time analytics to generate insights from the vast volumes of data they are collecting.**

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Traditionally, performance reports are generated at the end of the day and manually analyzed by managers the following day; however, any corrective action taken at that point will not negate the penalties incurred or the impact to operational metrics. In such a scenario, real-time analytics introduces a new paradigm for how to manage customer service. By gathering call center and agent performance data in real time, categorizing and aggregating that data across customer-defined dimensions or segments and applying sophisticated business rules to highlight areas of concern, managers and customer service executives can immediately detect where problems are occurring and remedy them, thereby achieving their target metrics and improving profitability.

However, this strategy is successful only if (1) the dimensions or segments are constructed intelligently so that insights derived from the analytics are relevant (e.g., segmenting agents by location versus by manager versus by function or product line, depending on how decisions are implemented in the organization) and (2) the insights are interpreted properly (e.g., a trend showing an increase in the wait time for a call center in Minneapolis could be interpreted as poor agent performance in handling the calls but is actually the result of poor weather conditions hampering staffing at the call center).

As the world becomes more digital and the amount of data available to companies increases exponentially, real-time analytics will help them better determine what their customers want, how to engage them, and how to deliver services in a more efficient and timely fashion. So far treated as a luxury, real-time analytics will become critical to a company's strategy, allowing it to differentiate itself from its competitors.

> " So far treated as a luxury, real-time analytics will become critical to a company's strategy. "

SETH YATES

VP, Technology,
Krux Digital, Inc.

Seth Yates is a technology entrepreneur who has been working in programmatic advertising since 2008, having founded and sold an early demand-side platform. Seth is now focused on leveraging big data management to benefit marketers and publishers.

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As the volume of data available for processing increases dramatically, more and more companies are showing up with solutions for "sensing" (or making sense of) this data. But this is only partially valuable. With the emergence of big data processing techniques and the continued reduction in the cost of data processing, "sensing" is table stakes. If any company comes to you and offers a "real-time" analytics solution that just senses all the data, you must demand more. What is more important is the type of insights and "actionability" provided to make sense of the data—for example:

- **Fraud Detection.** Are unwelcome parties stealing or skimming your data? How quickly are you getting those insights so that you can take action? It's not okay to get a monthly report: you need always-on monitoring that constantly helps you understand and ward off the data threats you face.
- **Real-Time Insight.** What types of insights are you getting? Do you know, for instance, that the users who visited your site yesterday were more likely to be women who are interested in fashion than, say, the women who visited your site last month when you were running a different campaign?
- **Real-Time Actionability.** The insights you get in real time are useless if you can't act on them in real time. Systems that function with a great deal of interoperability to execution systems are critical. In this area, marketers are going to find the maximum value from real-time analytics. Being able to detect a potential customer's intent and respond within milliseconds with changes to your website and marketing campaign can convert that potential customer into an actual customer.

KEY LESSONS

1 THE TYPES OF INSIGHTS YOU GET FROM ANALYTICS ARE MORE IMPORTANT THAN THE ABILITY TO MERELY "SENSE" DATA.

2 LOOK FOR ANALYTICS SYSTEMS THAT CAN INTEROPERATE WITH EXECUTION SYSTEMS.

> " The insights you get in real time are useless if you can't act on them in real time. "

RICHARD SINK

Founder,
Critical Connections

Richard Sink is the founder of Critical Connections. He has more than 30 years of tech experience and 10 years of experience in online business optimization. He is well versed in how new technologies, search engine optimization campaigns, Web development, and social media strategies can solve business problems, improve business processes, and achieve a competitive advantage that will positively affect his clients' bottom-line results. You can find Richard on LinkedIn, Facebook, Twitter, Pinterest, and Google+.
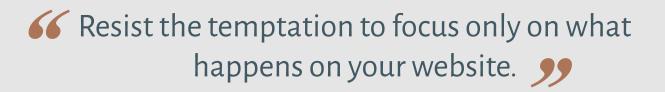
Twitter I Website

Whether your goal is to save money, improve a product, or employ smarter marketing, today's savvy business owners need deep analysis of how their consumers are behaving online. Businesses must identify target audiences, build social channels, listen to social conversations, and know where potential clients are investing their online efforts.

Today's consumers live in an always-on, always-connected world, and their attention spans are fleeting. They can move from one topic to the next in a matter of seconds. From weather concerns to financial trends and political affairs, search queries give valuable insight into what matters most to people at a specific moment. And given the proliferation of mobile devices, consumers are searching in a way that provides valuable insights into discovery and research. If you can address your consumers' needs through quick response, you put your business at a significant advantage.

Resist the temptation to focus only on what happens on your website. Instead, prioritize what happens around your customer's journey. If you focus your attention on every action, purchase, and sign-up, you can start to understand how your business functions.

KEY LESSONS

1 PRIORITIZE WHAT HAPPENS AROUND YOUR CUSTOMER'S JOURNEY, NOT JUST ON WEBSITE VISITS.

2 KNOW WHY YOU'RE SUCCEEDING.

3 TRACK WHAT YOUR CUSTOMERS ARE DISCUSSING ON SOCIAL MEDIA.

> " Resist the temptation to focus only on what happens on your website. "

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Richard Sink is the founder of Critical Connections. He has more than 30 years of tech experience and 10 years of experience in online business optimization. He is well versed in how new technologies, search engine optimization campaigns, Web development, and social media strategies can solve business problems, improve business processes, and achieve a competitive advantage that will positively affect his clients' bottom-line results. You can find Richard on LinkedIn, Facebook, Twitter, Pinterest, and Google+.

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Knowing you're succeeding is one thing; knowing why is even better. Most analytics tells us what's happening, but it's more important to know who's doing it, how they found us, what their profile is, and what they're purchasing.

Where can you find the signals for improving your business? One strategy is to follow what your customers and prospects are posting and discussing on social media. Make lists of relevant topics, ideas and trends. Follow popular industry blogs and pay attention to the posts that generate the most feedback and comments. All industry, company, and executive mentions should be captured and monitored to ensure a positive brand image. Sign up for Google Alerts to be notified of specific topics. Over time, relevant insights will begin to emerge, and you'll adapt your business operations accordingly. Armed with this data, you can begin to shape your customers' opinions and influence their purchasing behavior in ways never before imagined.

The next-generation Web (Web 3.0) is all about the data and analyzing it to produce more efficient and actionable results. Until that's a reality, you have to use what's available, when it's available.

> " Over time, relevant insights will begin to emerge, and you'll adapt your business operations accordingly. "

CHRIS NEUMANN
CEO and Co-founder, DataHero

Chris Neumann is CEO and co-founder of DataHero, the leading platform for visualizing data from online services. After helping create the Big Data space at Aster Data Systems, he has spent the past three years evangelizing an industrywide shift to the cloud, helping to position DataHero as the first truly freemium business intelligence platform in the cloud space. Chris holds an M.S. in Computer Science from Stanford University and a B.S. in Computing Science from Simon Fraser University.

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As data practitioners, when we think about the challenges of real-time analytics, we naturally focus on the technical bottlenecks: How can we make our systems faster and more efficient at delivering answers to our users. But what happens when the bottleneck isn't technical? What happens when the bottleneck is in our processes and people?

Today's business users have direct access to more data in more places than ever before. They rely on a myriad of cloud-based services for everything from customer relationship management to marketing automation to customer support. Although the monumental shift of enterprise services to the cloud has empowered business users like never before, however, it has also revealed a fundamental bottleneck in legacy business intelligence (BI) systems: our reliance on centralized databases and the BI teams themselves. Business users now have the data they need at their fingertips, but they aren't empowered to use that data without going through their company's BI team, preventing them from getting the answers they need when they need them.

KEY LESSONS

1 AVOID RELIANCE ON CENTRALIZED DATABASES.

2 EMPOWER USERS TO ACCESS AND ANALYZE THE BUSINESS DATA THEY NEED TO GET ANSWERS.

> " What happens when the bottleneck is in our processes and people? "

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I witnessed the growth of this bottleneck firsthand when I was at big data pioneer Aster Data. Companies in the emerging self-service BI space are trying to remove the process bottleneck inherent in centralized data architectures for the increasing number of situations when centralization doesn't provide any added value. How do you enable business users to get insights from the data they have access to in a safe, secure, and scalable way without having the BI team in the critical path?

Centralized big data systems will continue to be critical to our analytical infrastructure, but today's emerging category of self-service cloud BI solutions offers the potential for companies to empower their business users to get the answers they need in real time by removing the process and people bottlenecks inherent to our legacy systems.

> " Self-service cloud BI solutions empower business users to get the answers they need in real time. "

ADAM GOTTERER

Head of Engineering,
Nomi

Adam Gotterer is Head of Engineering at Nomi, an omnichannel marketing platform that helps retailers better engage with their customers. He has held roles as the co-founder of Shopalytic, VP of Engineering at Lot18, and the Director of Engineering at CollegeHumor/Bustedtees.

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Brick-and-mortar retailers and service providers often find themselves on the losing side of the data analytics battle when competing with online retailers. Online, there is access to an arsenal of tools such as cookies, click tracking, A/B testing, targeted advertising, and funnel tracking. In the physical world, decisions are often based on instinct, not data.

For years, the brick-and-mortar world has tried to use infrared tripwires, camera counting, and loyalty cards to understand customer behavior, but the battlefield is changing. Through the advent of new technologies like advanced cameras, Wi-Fi sensors, and iBeacons, the brick-and-mortar world can now effectively measure loyalty and conversation rates, perform A/B tests, calculate dwell time, count passersby, and measure bounce rates.

KEY LESSONS

1 BRICK-AND-MORTAR STORES CAN COMPETE WITH ONLINE RETAILERS BY USING NEW TECHNOLOGY TO MEASURE LOYALTY AND CONVERSION RATES.

2 RETAILERS THAT UNDERSTAND THEIR CUSTOMERS AND LEVERAGE TECHNOLOGY TO IMPROVE THE CUSTOMER EXPERIENCE ARE MORE LIKELY TO SURVIVE.

> " Brick-and-mortar retailers and service providers often find themselves on the losing side of the data analytics battle when competing with online retailers. "

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One such company that has leveraged this technology is a retail chain that hosts a yearly music festival. The festival represents a significant investment for the chain, and it needed a way to quantify its return on investment. In the months preceding the music festival, the company deployed Nomi's tracking sensors to all of its stores. The sensors collected data about the number of visitors and their loyalty across the chain. Sensors were also placed throughout the music festival, and these data were later compared with the data collected from the stores. The chain was able to learn a tremendous amount about the impact the festival had on new and repeat visits to its stores.

Some say there's a crisis in retail. It's more challenging than ever for brick-and-mortar retailers to compete against their online counterparts: the retailers that understand their customers and leverage technology to provide a better experience might just be those that survive.

> "Retailers that understand their customers and leverage technology to provide a better experience might just be those that survive."

KURT BALLARD
CEO, ACT Bridge Inc.

Kurt Ballard has spent 20 years in the human capital management field. Prior to coming to ACT Bridge in 2011, he had co-founded talent measurement leader PreVisor, helping to build a global leader in cloud-based talent measurement. As CEO at ACT Bridge, Kurt is leading the expansion of the company's products and services. Kurt is an industry speaker and past contributor to *BusinessWeek, Human Resource Executive*, SourceCon, and the Human Capital Institute.

Twitter l Website l Blog

If talent is the fuel that powers your organization, analytics is the performance accelerant. Human resources (HR) metrics and how they're used have been changing rapidly over the past several years. Talent, organizational development, and HR leaders should upgrade to cloud-based systems with powerful functionality and analytics that align to business outcomes. Here are a couple of areas to consider.

Using analytics to develop and deepen talent pools has never been easier or more readily available. Yet, Deloitte reports in its *2014 Global Human Capital Trends* that although HR leaders are beginning to use analytics for recruitment and development, 54 percent say they are still "weak" in this area. HR professionals should develop skills and comfort with data, statistics, and analytics. Talent analytics can be applied to identify the top sources of talent, build talent communities through social media, and cultivate prospective new employees using candidate relationship management tools to nurture passive job seekers. Analytics can be used to enable recruitment teams to collaborate about the candidate pipeline and gauge the efficiency of the talent-acquisition process. This collaboration saves time and resources by immediately sharing data across a disperse recruitment team. Companies that leverage big data and powerful analytics will improve the quality and efficiency of talent acquisition.

KEY LESSONS

1 COMPANIES THAT LEVERAGE BIG DATA AND POWERFUL ANALYTICS WILL IMPROVE THE QUALITY AND EFFICIENCY OF TALENT ACQUISITION.

2 TALENT MANAGEMENT LEADERS MUST LEARN TO LEVERAGE QUANTITATIVE METRICS THAT CONNECT TO BUSINESS OUTCOMES.

3 CULTIVATE TALENT THROUGHOUT YOUR EMPLOYEES' CAREER BY PROVIDING THEM WITH DATA-DRIVEN CAREER PATH-BUILDING TOOLS THAT USE ANALYTICS TO PRESENT OPPORTUNITIES.

> **If talent is the fuel that powers your organization, analytics is the performance accelerant.**

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Using analytics doesn't end when talent is hired, either. Analytics have replaced the annual employee engagement survey and performance review. Today, talent management leaders must learn to leverage quantitative metrics that connect to business outcomes. Measurables such as compensation histories, performance ratings, time and attendance, and training program participation can all be correlated with business outcomes. Take this even further and use analytics as part of an engagement strategy. Cultivate talent throughout your employees' career by providing them with data-driven career path-building tools that use analytics to present opportunities that align with the personal skills and aspirations of internal candidates. This will increase engagement and improve retention of top talent.

Using the appropriate metrics and taking action to improve people processes helps any organization build the best workforce possible.

> "Analytics have replaced the annual employee engagement survey and performance review."

New Relic®

Data helps us make messaging more fun.

Guy Fighel
Director of Engineering

Tango

We are *all* data nerds.