Business analytics in the cloud

Driving business innovation through cloud computing and analytics solutions
Abstract

Analytics is big business, holding the potential to identify subtly emerging patterns that allow companies to nimbly respond to shifting markets ahead of their competition. The book, *Moneyball*, tells the behind-the-scenes story of the Oakland Athletics and how they changed baseball by leveling the playing field with cash-rich teams through the innovative use of analytics. Analytics allowed the As, a team with the lowest budget, to consistently compete against the deep-pocket teams. By breaking the model of recruiting players based on conventional wisdom, they were able to build business models and formulas that used information in new ways to analyze a player’s on-field potential.

Businesses that build strong analytically oriented teams can play “moneyball” by adopting new ways to use information and new ways to leverage the power of the cloud to challenge conventional wisdom and jump ahead of the competition. Innovative technologies will enable businesses to quickly respond to rapidly changing events in unprecedented ways, allowing highly personalized and coordinated real-time interactions with their customers, suppliers and partners. Presented with fact-based choices and tangible results from sophisticated systems, businesses will rely on individuals who are comfortable with balancing quantifiable benefits against risks to make decisions, instead of depending on intuition and gut feel.

Disruptive business models, enabled by analytic and cloud technologies, will change the game of corporate sales and supply chain operations similar to the way moneyball changed the way professional athletes are being selected to produce winning teams with smaller cash outlays.
**The case for cloud analytics**

The “moneyball” phenomenon (using analytics to challenge conventional wisdom and change the game) has made its way through the business community similar to the way it has influenced global professional sports such as soccer and hockey. The influence analytics has had in professional sports can be seen in the topics covered at MIT Sloan’s Annual Sports Analytics Conference and in segments on BBC Radio. They have been matched by the impact of analytics in business, as covered in major business publications such as the *Wall Street Journal* and others. For example, in the *Harvard Business Review* article, “The Future of Shopping,” the success of traditional retailers is portrayed to be dependent on their ability to implement disruptive technologies such as omnichannel retailing. To achieve disruption, in-store experiences and online presence are merged to provide families with a personalized, two-way, visually interactive shopping experience. By seamlessly combining preferences, loyalty, rewards and promotions with entertainment, a shopping experience is created for the entire family, as opposed to just another in-store sale.

Retail supply chains will also benefit from using analytics in new and unique ways. For example, a sense-and-respond network could supplement traditional demand planning by aligning manufacturers with retailers to develop products according to emerging trends before they break out. In effect, by using cloud analytics to more nimbly respond to changes in market sentiment, retailers and manufacturers create a more agile and event-based value chain. Playing the new game of moneyball will require retailers and manufacturers to invest in specialized teams that can develop business rules, abstract them into models, deploy them in a cloud, interpret the results and agilely implement them in a business environment.

**New technologies conspiring to drive business change**

Several key technology trends (Figure 1) have emerged that are fundamentally changing the way businesses interact with customers and their suppliers, but they also introduce some difficult challenges that organizations must address in order to reap the benefits:

- With the mobile revolution instantly connecting businesses, consumers and governments, there is increased need to deliver relevant content in real time to people making decisions for the next best action. Whether they are customers making purchase decisions, employees making decisions on customer inquiries, or constituents deciding how governments should regulate a product, the decisions they make could be influenced by the right content.

- Social media is a primary means for communication and collaboration and delivers key insights that can be used to truly understand the potential lifetime value of customers. But organizations are struggling with how to leverage this volatile and potentially noisy source of information.

- Hyper digitization is a fact of life. Organizations are gathering data in many different ways and are finding more creative ways to use it for deeper insights into customer behavior or market conditions. However, most companies still struggle with getting the insight they need from new and existing sources of information.
• Analytics are becoming more pervasive and usable. This is powered by advances in intensive computing resources and more business-oriented interfaces for developing insights using advanced analytics. But organizations are not always able to infuse analytics and the insights they generate into their business processes and deliver the insights to people who would benefit from them in making better decisions.

• Cloud computing is changing the business model for many organizations and is forcing them to rethink the traditional way of providing IT services. It is also enabling organizations to come up with new ways to do business, but today relatively few organizations are actively harnessing the cloud to drive innovation.

Figure 1: Mobility, social media, increasing digitization, analytics and cloud computing capabilities are driving broad business model changes, including the way that corporations personally interact with customers and suppliers throughout the value chain.
Effective use of analytics helps organization gain competitive advantage

Analytics has evolved from a business initiative to a business imperative. It is no longer considered an option to enhance business, but a requirement in order to compete in today’s volatile environment. It has expanded from analyzing historical data that is mostly structured and managed internally to a new concept often referred to as “big data,” which typically includes new types of unstructured data, data that needs to be analyzed in real time and data that might need to be combined with information outside the enterprise.

Analytics is also moving from advancing single organizations to transforming entire industries. For example, healthcare providers are personalizing patient care based on data and content never combined successfully until now. The result is optimized patient outcomes and a transformed industry.

With these trends, organizations have extraordinary opportunities to differentiate themselves through analytics. Leaders are distinguished by their ability to leverage all information, all people, all perspectives and all decisions at the point of impact. They must ensure that analytics are embedded in their business processes to maximize return on investment and that all forms of information (social media, chats, transactions, documents, sensor data, video, location, data warehouses) are used to make the right business decisions. The decisions must be made with all people (all departments, experts and non-experts, executives and employees) and must consider all perspectives (historical, current, real-time and future by means of predictive analysis). In addition, all decisions (major and minor, strategic and tactical, routine and exceptional, manual and automated) must be more informed to drive better outcomes for their organization.

A study done by IBM and MIT Sloan shows that analytics-driven organizations outperform their industry peers by 2.2 times, and more organizations are recognizing that analytics can truly help them be more competitive.¹

But not all organizations are at the point where they are able take the most advantage of analytics. In this study, the gap between the organizations who successfully used analytics for competitive advantage and those who were aspiring to be more effective with analytics was significantly wider than in a study conducted in 2010 (Figure 2).

In another recent study, Gartner found that some of the most common barriers to broader adoption of analytics include system cost, system complexity and lack of responsiveness to user needs for faster and more functional access to data and analytical tools.¹ Part of the reason for these barriers is that IT organizations are struggling with increased complexity and spending too much time, money and effort “keeping the lights on,” impeding their effort to moving the business forward. More than 70 percent of IT budgets are spent on operations and maintenance.¹
Cloud-based analytics can help organizations advance in their analytic sophistication

Utilizing the benefits of cloud computing could be a way for more organizations to broaden adoption rates and reap the benefits that analytics can provide. The term “cloud” can mean different things to different people. For IT organizations, it is often viewed as a way to minimize costs and improve efficiency while maintaining the necessary controls. From a business perspective, it is a model for enabling cost-effective outcomes through the use of shared application and computing services. Cloud services typically require technologies and approaches such as standardization, virtualization and automation, and they typically consist of the following characteristics:

- On demand self-service
- Broad network access
- Shared resource pools
- Rapid elasticity—dynamically assigned resources
- Measured service—pay as you go

Organizations are using the power of cloud to build enduring customer relationships, deliver IT without boundaries, improve speed and dexterity and transform the economics of innovation. Cloud analytics refers to applications that use cloud resources for analytics processing or the delivery of analytical insights.

Figure 2: The ability of organizations to create a competitive advantage with analytics has surged in the past 12 months

Source: The New Intelligent Enterprise, a joint MIT Sloan Management Review and IBM Institute of Business Value analytics research partnership. Copyright © Massachusetts Institute of Technology 2011
Many organizations are facing a number of barriers as they work to increase their use of analytics to improve their business, and cloud computing could be a way to address some of these barriers. A study done by the IBM Institute for Business Value and The Economist found that cloud computing can deliver six potentially game-changing business enablers (Figure 3). Organizations can use the combination of cloud and analytics to capitalize on their emerging trends, which in turn can reduce costs, increase profitability and open new markets.

**Cloud’s business enablers can help address analytic challenges**

1. **Cost Flexibility**
   - Shifts fixed to variable cost
   - Pay as and when needed

2. **Business Scalability**
   - Provides limitless, cost-efficient computing capacity to support growth
   - Significant computing resource requirements at peak times

3. **Market Adaptability**
   - Faster time to market
   - Supports experimentation
   - Increased demand for solutions— not able to react quickly enough
   - Need to address broader set of users

4. **Masked Complexity**
   - Expands product sophistication
   - Simpler for customers/users

5. **Context-driven Variability**
   - User defined experiences
   - Increases relevance

6. **Ecosystem Connectivity**
   - New value nets
   - Potential new businesses
   - Variety of information
   - Need for easy access to new sources of data

**Figure 3**: How cloud computing can help to address key analytic challenges
Cost flexibility
Cloud computing introduces new pricing models for acquiring capabilities and resources. Businesses can pay for what they need instead of paying upfront for services. This is key for organizations who cannot afford to make the large initial investment in infrastructure that is often required to implement analytic solutions.

The pricing models for cloud computing can make it possible to deliver insights to a broader set of users or provide more computing resources when needed and then scale down when the resources aren’t necessary. It also makes it easier to do shorter-term projects or proofs of concepts for justifying larger programs. In addition, midmarket companies who have more difficulty making the upfront investments will be able to use cloud computing resources to get started.

Business scalability
With the increase in the amounts of data that organizations are processing for analytics, they can have trouble keeping up with the computing demands. Analytics in particular have dynamic processing requirements; the number of users that need access to insights can vary significantly at different points in the business cycle or there can be significant spikes in the amount of computing resources that are required for processing.

One of the key differentiators for organizations that are transforming themselves with analytics is their need to make near real-time decisions that are based on empirical data. These types of decisions require precise and accurate insights to be available quickly. Cloud analytics provides the scalability needed to improve the speed and agility of decision making.

Market adaptability
Analytically transformed organizations adopt analytics more broadly—beyond the traditional areas of financial forecasting, budgeting and supply chain optimization. They also apply analytics to enhance customer interactions, determine business strategy and optimize human resources. Cloud computing makes it easier and more efficient to deliver many new applications to a broader set of users because it provides an infrastructure that enables organizations to deliver value more quickly.

Masked complexity
A key benefit of cloud computing is standardization. It simplifies the user interactions with the system. Transformed organizations use analytics to optimize operational decisions, which means results need to be delivered to less sophisticated users in formats that they can use easily. Cloud computing can help mask the complexity of the analytic infrastructure so more people can be data oriented.

Context-driven variability
Transformed organizations understand their customers and engage them in more authentic or personalized ways, which requires the analysis of more sources of data in a variety of formats. Because a cloud computing environment is scalable, organizations can analyze more data and deliver personalized results.

Ecosystem connectivity
Because cloud computing facilitates new value nets of partners, customers and other external players, it can be used to enable and facilitate external collaboration. Ecosystems can also be new sources of additional analytics insights that will provide their input for innovation and drive growth.
Although cloud computing is often viewed as a way to reduce the cost and complexity of delivering traditional IT services, companies see cloud as having significant impact on the way they do business today and into the future. There are tremendous expectations for cloud in helping businesses—from reinventing customer value propositions to transforming the value chain and driving substantial impact on customer relationships. The same has been said about the value of analytics. The benefits of cloud computing together with the benefits of effectively using analytics is a powerful combination.

**Improving business outcomes:**
**Opportunities for cloud-based analytics**

Business analytics can be broadly applied in all kinds of industries. Business benefits can include cost reduction by identifying and eliminating inefficiencies and top-line revenue growth by attracting and retaining profitable customers. Enterprises that are going to drive change with business analytics tend to start in one of four areas:

- Grow, retain and satisfy customers.
- Increase operational efficiency.
- Transform financial processes.
- Manage risk, fraud and regulatory compliance.

![Disciplined approach to analytics](image-url)

*Figure 4: Using insight to achieve breakthrough performance*
Successful business leaders follow an iterative and disciplined approach to using analytics to drive superior business outcomes (Figure 4). To capitalize on transformative opportunities requires a different approach to analytics, one that is holistic in its ability to turn information into insight and insight into results.

Organizations need to be aligned in order to meet their objectives, and analytics based on trusted information is critical to this alignment, starting with the business questions they need answered, an understanding of the kind of information required to answer the question and the best way to obtain the information to help solve the problem.

Organizations then need to determine the right capabilities to anticipate, predict and shape business outcomes. After these capabilities are applied to the task, they can be integrated throughout the organization to promote shared insights—whether for optimizing a marketing campaign, closing their financial books faster and more accurately or managing fraud in claim processing.

Finally, businesses need to embed analytics into their core processes so that they can act with confidence at the point of impact to optimize outcomes.

Each time the align-anticipate-act cycle is executed, an organization’s systems and people learn from the outcomes of the decisions made. The models get more accurate and precise and decisions are better informed each time through. Organizations use these lessons to transform how they do business—not just making incremental process improvements, but truly transforming the way they operate to drive breakthrough results.

Cloud based analytics helps the business in different ways
So how can cloud-based analytics help line of business managers reach their goals?

Marketing
The goal for marketing organizations is to find innovative ways to grow, retain and satisfy customers. They can typically use analytics to:

- Identify which customers are likely candidates for churn.
- Create a single view of customers that is the same for all interaction channels.
- Spot and analyze trends and sentiment in social media to cross sell and up sell.
- Determine the propensity to buy or next best action

They often have more analytic projects than their technical resources can deliver and limited computing resources for the type of analytics that they would like to perform. They also have limited time windows to attack opportunities in today’s fast moving marketplace.

Cloud computing can help them complete more projects by simplifying (see “Masked Complexity” in Figure 3) the underlying infrastructure setup process. Cloud computing can also help speed the time of product development by accelerating the design, test and deployment of consumer-focused products and services.
Marketers are also interested in micro segmentation to deliver more targeted, personalized experiences for customers, but that often requires analyzing more types of information and larger volumes of data, and they often have limited computing resources available to them. Cloud computing could be a way to easily increase their scalability so they can implement more advanced and context-driven analytics-based solutions that are not possible with their existing resources.

**Finance**

Finance organizations are looking for ways to transform their financial processes and meet the financial goals of the business.

They can typically use analytics to:

- Transform the planning process with rolling forecasts and the ability to rapidly adjust and realign resources.
- Automate the financial close process and meet new disclosure and filing mandates.
- Deliver engaging, up-to-the-minute dashboards to lead the organization.

Finance is challenged with meeting the performance goals of the business with constrained budgets. Large capital investments are very difficult to manage. From a technical perspective, they are not always given high priority for back-office functions such as financial dashboards and analysis. They are also under extreme pressure to shorten the amount of time it takes to close the books, so their processing requirements can be very heavy for end-of-period processing, but that is often not enough to justify increased investment in processing capacity.

Cloud-based computing for analytics can help financial organizations in a number of ways. The subscription-based pricing model (see “Cost Variability” in Figure 3) can be easier to budget for and can minimize the need for large capital outlays for new projects. For financial processing requirements, cloud-based computing can provide the ability to scale up resources for period end processing and then scale it back down for less critical periods (see “Business Scalability in Figure 3). Cloud-based analytics can also be an alternative for delivering financial dashboards with less IT overhead.

**Operations**

Increasing operational efficiency and finding ways to minimize costs are important for many parts of an organization. Analytics can be used to:

- Predict when maintenance is needed on expensive and critical machinery.
- Identify quality issues early.
- Optimize routes for more effective transportation.
- Improve customer service and post sales support.
- Optimize inventory levels and other supply chain processes.

Organizations that are trying to optimize their operations often suffer from limited visibility of all of the data and the full value chain. Processes can be very complicated with different parts of the organization responsible for different phases and lots of moving parts. There is constant pressure to minimize costs at every point in the process.
Cloud-based analytics can enable suppliers and partners to optimize delivery by making it easier to connect into the entire ecosystem and provide insight into the supply chain dynamics (see “Ecosystem Connectivity” in Figure 3). Complexities can be masked by standardizing on common analytic platforms or applications so employees can focus on high value-add work without IT complexities (see “Masked Complexity” in Figure 3). Costs for major hardware investments can be minimized with cloud-based computing by more effective use of the resources with elastic scaling and sharing with multiple parts of the organization (see “Cost Flexibility” in Figure 3).

**Governance, risk and compliance**

Organizations responsible for managing risk, fraud and regulatory compliance need to have a better understanding of where their highest risks are, and they need to know how to prioritize and assess risk mitigation in a time of constantly changing regulations.

They can use analytics to:

- Understand and manage operational and financial risk.
- Reduce unexpected loss.
- Reduce policy and compliance burden.
- Ensure financial controls integrity.

Cloud-based analytics can provide a platform with increased scalability for more advanced analytics to discover noncompliance and discrepancies (see “Context-Driven Variability” in Figure 3). They can take advantage of broader ecosystem experience and connectivity to provide access to industry-based external benchmarks that can help to prioritize compliance mitigation actions based on projected financial and business impact (see “Ecosystem Connectivity” in Figure 3).

These are just a few of the ways that different parts of an organization can benefit from the combination of analytics and cloud computing to positively impact business outcomes.

**Not all clouds are created equal: Common cloud analytics deployment models**

Many organizations have different perceptions of what cloud computing is, complicating their decisions on how to create and deploy their services. The confusion is partly caused by the industry trying to position cloud computing as the solution to all IT and business challenges. On a high level, cloud computing can be described in two aspects: the type of service being delivered and how the services are delivered. When considering the type of analytic services needed (for example, decision support, next best action, predictive planning), organizations can require different delivery platforms.

With regard to the type of service being delivered, most organizations are familiar with software as a service (SaaS), especially the popular sales performance management services. Analytics services can be delivered through a SaaS model; however, its results are dependent on the raw computation power delivered by the underlying infrastructure and how it navigates through supporting applications and databases. In designing an analytic software service, how you use the underlying infrastructure services and how results move between many different middleware layers are critical success factors for a highly available, highly reliable and secure service.
Analytic software service providers need to consider the optimal way to deploy and deliver their software services, along with their dependent platform and infrastructure services, to the targeted user audience. When it comes to deciding the type of delivery that is best for analytic services, the first choice is to determine whether to use a private or public cloud infrastructure:

- **Private clouds** are deployed behind firewalls, making their data and infrastructure available to the owning organization. An organization retains full control of the system, service management and security thus achieving maximum flexibility and conformance. In this deployment model, virtualization and standardization are the key ingredients in lowering cost of operations and service agility. Virtualization enables the environment to simplify, pool and allocate resources to where needed. Platform and process standardization brings agility so focus can be applied to higher value activities.

  The predominant usage pattern of analytics on private cloud is the foundation of an agile shared service, supporting different projects inside a large and diverse enterprise. In the marketplace today, mega vendors have announced offerings with the combination of private cloud to simplify service management and data warehouse appliances to lower operation complexity. This optimized system approach brings dramatic improvement in performance cost metrics over the traditional build-from-scratch systems.

- **Public cloud**, as its name implies, is deployed outside the customer firewall. Faster time to value without significant upfront capital investment is the primary characteristic. Most services and delivery management will be handled by the service vendor. The most common usage pattern is customers adopting standard prebuilt analytic applications to accelerate business.

  The marketplace today has a wide spectrum of offerings from niche vendors and mega vendors. Many SaaS applications have analytics embedded to support smarter decision making. Because of its unique deployment characteristics outside a customer's firewall, another emerging usage pattern is community clouds deployed on public clouds. A community is defined by a common purpose shared by its members. The members share specific insight so they each can benefit from the collective wisdom of the crowd for benchmarking and planning.

- **Hosted private clouds** combine the best of the two other cloud deployment models. Many platform-as-a-service (PaaS) offerings are often deployed on hosted private clouds. The service is hosted by the vendor, eliminating the need to deal with the full IT stack and thus allowing customers to focus on higher value work. Customers get a private environment for the application development and deployment with more control and flexibility on the application layer. This is a great way to augment a larger overall analytic delivery strategy. The service management and security will follow the line of customer and vendor ownership. In the marketplace today, there are growing numbers of vendors providing analytic platforms to accelerate the development lifecycle and production deployment of custom analytic applications.
<table>
<thead>
<tr>
<th>Business values</th>
<th>Analytic applications</th>
<th>Middleware</th>
<th>Service Management</th>
<th>Computing platform</th>
</tr>
</thead>
</table>
| ● Client retaining full control of stack  
● Standardization of analytics delivery  
● Lower total cost of ownership | Customer owned and managed  
Customer owned and managed  
Vendor owned and managed | Customer owned and managed  
Mixed customer and vendor  
Vendor owned and managed | Customer owned and managed  
Mixed customer and vendor  
Vendor owned and managed | Customer owned and managed  
Vendor owned and managed  
Vendor owned and managed |
| ● Minimize IT platform barriers  
● Improve service delivery, time to value and project quality  
● Convert CAPEX to OPEX for infrastructure | ● Line of business-focused analytics application on demand  
● Simplify adoption and consumption of Analytics with SaaS delivery  
● Low risk and easy on-ramp | | |

Figure 5: Attributes of the different cloud service and delivery models
In the world of analytics applications, cloud computing can play a significant role by improving the service delivery. The cloud journey has different entry points. A prime example is IBM’s own Blue Insight initiative. This is one of the world’s largest deployments of business analytics on a private cloud.

Before adopting a private cloud as a catalyst to standardization of business analytics, IBM suffered the typical pain points of siloed, complex systems:

- Siloed metric development
- Redundant and possibly competing solution approaches
- Lack of tooling standardization
- Multiple third-party vendors
- Limited visibility of the total cost for the enterprise

Blue Insight: The IBM internal private cloud for analytics

- Consolidated 115 multi-product, departmental business intelligence deployments to one deployment of IBM® Cognos® Business Intelligence on IBM System z®
- Support for IBM’s global workforce (200,000 in 2011)
- Realizing value from more than 60 data sources
- Projected $25 million in savings (60 percent consolidation, 35 percent standardization, 5 percent automation)

Blue Insight, IBM’s private cloud, overcame these challenges by providing a standardized analytics platform and delivery process. With standardization, different business units can accelerate and simplify the cost of business analytics. This includes:

- Common extensible infrastructure of hardware and software
- Common operational support and processes
- Common service definition and boarding process
- Defined tooling service scope (reports, ad hoc, cubing, pervasive and more)

“Our commitment to informed decision making led us to consider private cloud delivery of Cognos Business Intelligence on System z, which is the enabling foundation that makes savings of more than $25 million possible over 5 years.”

—IBM CIO Office
Another common usage pattern of cloud computing is to adopt platform services on a public cloud to accelerate the deployment of custom analytic applications. This is a very attractive option to customers. Using platform services on a public cloud, they can rapidly set up an environment without being hindered by data center capacity, long provisioning waits or an unstable stack. Many customers use this option to augment their existing delivery process and strategy. As seen in the common use cases, applying cloud computing in analytics does not require a rip-and-replace approach.

As mentioned previously, not all clouds are created equal. Each service and delivery model can solve a specific business problem. There is no one model that will address all needs. Before selecting an approach, organizations should carefully consider each unique circumstance. These key considerations are in the areas of skills availability, data center capacity, application performance and, most importantly, the nature of the data. Figure 6 outlines some considerations when determining the best deployment model for cloud-based analytic applications.

<table>
<thead>
<tr>
<th>Deployment Attributes</th>
<th>Private Cloud</th>
<th>Hosted Private Cloud (I/PaaS)</th>
<th>Public/Community (SaaS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available expertise to develop analytic applications</td>
<td>In house</td>
<td>In house</td>
<td>Prebuilt application available</td>
</tr>
<tr>
<td>Available skills to manage analytic platform</td>
<td>In house</td>
<td>Available from vendor</td>
<td>Available from vendor</td>
</tr>
<tr>
<td>In house data center capacity</td>
<td>No issues with capacity and provisioning</td>
<td>Unavailable, slow to provision</td>
<td>Unavailable, slow to provision</td>
</tr>
<tr>
<td>Workload performance characteristic</td>
<td>Production Mission critical, low latency</td>
<td>“Good enough” production, Pre-production Some latency can be tolerated</td>
<td>Service level agreement (SLA) backed production Some latency can be tolerated</td>
</tr>
<tr>
<td>Data: Location</td>
<td>On premises</td>
<td>Cloud resident, supplied by partners, Transferred from on premises</td>
<td>Cloud resident, supplied by partners, Transferred from on premises</td>
</tr>
<tr>
<td>Data: Volume</td>
<td>Large</td>
<td>Smaller</td>
<td>Smaller</td>
</tr>
<tr>
<td>Data: Privacy</td>
<td>Governed by regulations</td>
<td>Governed by regulations with mitigation measures</td>
<td>Governed by regulations with mitigation measures</td>
</tr>
<tr>
<td>Data: Persistency</td>
<td>Retention policy managed in house</td>
<td>Options available from vendor</td>
<td>Managed by vendor</td>
</tr>
</tbody>
</table>

*Figure 6: Cloud-based analytic deployment considerations*
Using cloud-based analytics to develop disruptive business models

Traditional value chains are being transformed and disrupted using a combination of cloud computing and advanced analytics, resulting in shifts in how and by whom value is created, delivered and captured. Using the dynamically scalable nature of the cloud, along with new ways of analyzing data in motion, businesses can engage with customers and suppliers in new ways to improve operational efficiency, generate additional revenue streams and open new channels.

Dramatically improving an organization’s responsiveness to business events and providing opportunities for them to invent new ways of doing business are available to those willing to invest in analytic technologies delivered on dynamically scalable infrastructures. By harvesting the insights gained from new data sources (for example, streaming media) and using them to sense and respond to rapidly changing events, businesses can gain a tremendous advantage over their competitors. But how do companies embrace analytics and the cloud to reshape their business models? IBM has observed three organizational archetypes (Figure 7), each representing increasing levels of business empowerment, to help organizations assess their current competitive positioning and provide them with a strategic framework for advancement:

- **Optimizers** use the cloud and customer information to incrementally enhance their customer value propositions or attract adjacent customer segments, while improving their organization’s efficiency.
- **Innovators** use cloud and analytical models to significantly extend customer value propositions, resulting in new revenue streams, transforming their role in their industries or entering an adjacent market or industry space.
- **Disruptors** take advantage of advanced technology and analytics to invent radically different value propositions. They are able to identify new customer needs and gain competitive advantage by creating a new, or disrupting an existing, industry or market.

For each organizational archetype, a Cloud Analytics Enablement Framework has been developed that incorporates three critical attributes to help an organization assess where they are currently positioned relative to their competition and help them triangulate on the strategic decisions required to outperform them:

- **Business sophistication** refers to the value chain and technology programs used to create exceptional products and services, building customer loyalty, and to create lasting brand awareness while improving quality of service.
- **Analytics service adoption** denotes the usage of predictive and prescriptive software that improves outcomes with customers and suppliers through the use of event models, statistics, sophisticated optimization algorithms and business rules. An important element of analytics service adoption is data scope, which describes the breadth and depth of input used to gain the best possible insights. This wide spectrum includes the traditional data warehouse, big data and emerging external data hubs.
- **Cloud service adoption** is the ability to incorporate flexible pay-as-you-go infrastructure, middleware and federated services that scale on demand with business requirements.
Figure 7: The Cloud Enablement Framework is used to help organizations objectively assess their cloud analytics capabilities. Depicted are examples of how a marketing organization could rank itself based on the three attributes of customer collaboration (yellow), analytics service adoption (green) and cloud service adoption (pink).
Cloud analytics sophistication: Characteristics of optimizers, innovators and disruptors

To help organizations assess their cloud analytics capabilities, IBM has identified key attributes that optimizers, innovators and disruptors may use to distinguish themselves. In general, optimizers rely on cloud analytics to guide their future strategies especially in the areas of marketing and business operations. Innovators rely on analytics to guide their decision-making in day-to-day operations across multiple business units. Disruptors use innovative techniques and breakthrough approaches and technologies to gain competitive advantage.

Using the attributes outlined in the table in Figure 8, companies can determine where and how they might want to change their business processes and adopt cloud analytics to leapfrog the competition. It should be noted that the table is an example of cloud analytics sophistication from the viewpoint of a marketing organization and for illustration purposes, we have substituted customer intimacy in place of the broader business sophistication attribute.

Each of the three major attributes (business sophistication, analytics service adoption and cloud service adoption) will most likely not evolve at the same rate because of business priorities and level of investment. Whether businesses choose to become optimizers, innovators or disruptors, successful organizations will leverage cloud analytics as a key point of differentiation in driving business value and success.

Cloud analytic trends: The emergence of data hubs on the cloud

As business analytics delivers more value, the complexity of the underlying models and the size of the data needed to be analyzed also grows, requiring more computation power, faster processing times and specialized algorithms. Improving decision making throughout demand and supply chains requires blending predictive analytics that forecast customer behavior with reactive analytics to help influence customer decisions.

In addition to the increasing amount of computational and processing power required to support business analytics, the underlying interrelationships between data elements, hidden patterns and digital complexity of the data are also increasing. Currently, we move and transform data from one analysis to another, enriching it as it moves. According to “The Digital Universe Decade—Are You Ready?” from International Data Corporation and published in May 2010, the amount of digital information created and replicated will grow to 44 times what it is today by 2020. The majority of that data will be unstructured and much of it will be digital media. The study goes on to say that large parts of the data will be cloud-based and there will be huge challenges in its collection, management, analysis and integration.
### Sample Characteristics of Optimizers, Innovators and Disruptors for Marketing Organizations

<table>
<thead>
<tr>
<th></th>
<th>Optimizer</th>
<th>Innovator</th>
<th>Disruptor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer Intimacy</strong></td>
<td>Customer relationship management – Performs basic sales, service and marketing functions</td>
<td>Customer lifetime value – Implements CRM decisions based on long-term contribution margin</td>
<td>Next best action – Presents useful customers choices based on probability of success and margin to help meet financial goals</td>
</tr>
<tr>
<td>Value drivers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology sophistication</td>
<td>Single channel (independent) automation of key CRM functions</td>
<td>Multi-channel (integrated) marketing and customer service for web, mobile and smart device platforms</td>
<td>Omnichannel collaboration – Mines data from physical and online channels and correlates external data to optimize customer value</td>
</tr>
<tr>
<td><strong>Analytics Service Adoption</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skills*</td>
<td>• Analysts work in business units</td>
<td>Combines line of business with centralized units that provide advanced analytical skills</td>
<td>Find and use specialized talent from ecosystem when it is unavailable in house, while promoting innovation (for example, new patents)</td>
</tr>
<tr>
<td>Data scope</td>
<td>• Data is in siloed data warehouse</td>
<td>Elements of big data in play:</td>
<td>• Enterprise information architecture.*</td>
</tr>
<tr>
<td></td>
<td>• Elements of big data in play:</td>
<td>• Variety: Some unstructured data</td>
<td>• Governance in place to include external data and improve data quality based on learning.*</td>
</tr>
<tr>
<td></td>
<td>- Volume: Extensive use of transaction data</td>
<td>• Velocity: Real-time data</td>
<td>• Full use of big data:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Volume: Enterprise integrated data warehouse in place</td>
<td>- Variety: Text, image, in-store, digital</td>
</tr>
<tr>
<td>Analytics progression</td>
<td>Align and act:</td>
<td>Align, anticipate, act</td>
<td>Transform and learn</td>
</tr>
<tr>
<td></td>
<td>• Dashboards on progress</td>
<td>• Predictive models used to determine customer lifetime value and behaviors</td>
<td>• Prediction services woven into customer direct sales processes to influence customer transactions</td>
</tr>
<tr>
<td></td>
<td>• Full suite of business intelligence (BI) tools adopted</td>
<td>• BI tools integrated into business workflows</td>
<td>• Models learn from buy/sell activity</td>
</tr>
<tr>
<td><strong>Cloud Service Adoption</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platform standards</td>
<td>Significant use of IaaS, data warehouse and ERP/CRM platforms</td>
<td>Business units share a common cloud-based analytical service platform</td>
<td>• Adopts hybrid cloud platform to access data hubs, specialized applications and appliances</td>
</tr>
<tr>
<td>Process harmonization</td>
<td>Adopts industry standards on top of virtualized infrastructure</td>
<td>Adopts solutions for specific analytic workloads like predictive and unstructured data analysis</td>
<td>Utilizes specialized services from federated cloud ecosystems</td>
</tr>
</tbody>
</table>
In traditional transaction processing or data warehousing systems, the volumes of the data are orders of magnitude smaller. Data marts that aggregate and preprocess information are created according to schedules. Summarized data can then be analyzed and moved to where the analysis is done. Although this paradigm will continue to be used for some analytics and continue to provide the backbone for many types of business processes, a different model that is centered on data hubs (Figure 9) will emerge. In a hub, patterns in the data will be constantly discovered and monitored, while new data will be enriched as it arrives. Hubs will also provide close coordination and feedback between real-time analysis enabled by stream computing and deep analysis through large-scale parallel processing.

As data volumes grow in the hubs and multiple processes need to simultaneously access it, new analytic methods will move into the hub and conduct complex new operations on both static and in-motion information. The sheer volume of data and the expertise required to create hub-based analytics with dynamic data analysis, pattern matching and parallel processing is truly daunting. Clouds can be used to hold the vast amounts of data and to provide the specialized computing systems to support this analysis. What is arguably more important is that cloud hubs provide a common platform where data providers, data consumers and analytics providers can mutually benefit by leveraging their respective services and enriched data quality.

Hubs are already proving useful in a number of environments, such as in an operational risk exchange, which is a consortium of 60 member firms sharing information and analysis for their mutual benefit. The ORX Global Loss Database contains 236,526 operational risk loss events, each event over EUR20,000 in value, to a total value of EUR102,000,000,000. No individual member can accumulate sufficient information on their own to get an accurate picture of the risk landscape. Nonetheless, these firms need to have an accurate picture in order to minimize their losses from operational risk and also to satisfy regulations.

Figure 9: Ecosystems of data and analytics on a cloud hub
In the consumer products industry, demand signal repositories are now at the center of hubs of information and analytics. These repositories gather point-of-sale data, immediately update demand information and augment that information with analytic predictions, simulations and next best actions. Because of the massive amounts of data and the need for fast analysis, specialized hardware and analytics appliances, such as IBM Netezza® data warehouse appliances, can be used to deliver consolidated information about consumption patterns quickly. Advanced analytics can be delivered into a hub using cloud applications such as those provided by IBM DemandTec®, which provides a network of cloud applications and insights to more than 500 retailers and consumer products companies, enabling common solutions to transact, interact, and collaborate on core merchandising and marketing activities.

A number of clouds are emerging in medicine to provide uniform electronic health records and to support research into causes of diseases and possible cures. IBM has worked with Harvard Medical School to create an internal research cloud. Commenting on that collaboration, Dr. Marcos Athanasoulis, Director of Information Technology at Harvard Medical School says, “High performance computing is just at the center of discovery today and it’s personally gratifying for me that we are enabling researchers to one day find the cure for cancer, to continue the discovery and genomics and proteomics and that the impact of our work here can actually make a big difference on alleviating human suffering caused by disease.” He goes on to say, “One of the things we’re actually looking at is how do you start to move the computation towards the data rather than the data towards the computation?”

Cloud analytic trends: New approaches in data platforms

The emergence of data hubs and their associated analytic models and methods requires gathering data of many types, over many time scales, from both external and internal data sources. Figure 10 depicts characteristics of next-generation cloud data analytics platforms that hubs, public ecosystem data service providers and private cloud prediction services must use. Cloud analytic platforms of the future go well beyond traditional data warehouses and simple projection services. Next generation platforms must be able to:

- Ingest (pre-process) multiple data types, structure data, identify insights, then store those insights in a structured data warehouse.
- Combine structured and unstructured data stored in traditional data warehouses and unstructured distributed file systems.
- Share data and insights back and forth with traditional data warehouse environments.
- Support new business models through services that sense changes in continuously fed data, store insights gained for later deep analysis and respond to business users with meaningful actions.

An example of multi-layered sense-and-respond cloud analytic networks in the financial services industry could include fund operations staff, fund managers and financial product planners, each of whom need to perform different actions over different time frames:
Fund operations staff may require real-time buy and sell recommendations and actions (for example, in micro seconds) based on the correlation of rapidly changing events such as natural disasters, localized business losses (such as plant outage) or the just-released financial performance of a company.

Fund managers may want sense-and-respond networks that look at data over shorter time scales such as weeks or months and recommend new asset mixes based on the performance of individual companies in a financial portfolio.

Product planners may require a long term view of data (for example, years) to simulate how different investments products perform in the market relative to their peers and predict how new products (for example, commodities ETFs) perform under a wide array of economic data changes rippling through many fiscal periods.

Hybrid clouds uniquely provide the kind of services that hubs, ecosystems and specialized predictive models require by securing data behind a company firewall, utilizing high-speed appliances available in private deployments and simultaneously leveraging the rich information sources and services provided through public channels.

Figure 10: Comparisons of traditional and new approaches in next-generation cloud analytics platforms
Cloud analytic trends: Technologies to support optimizers, innovators and disruptors

Companies that aspire to be market leaders will need to invest in creating a culture that promotes the adoption of new business processes, developing and hiring different skills and implementing leading-edge technologies. New business processes will require new skills and people that are adept at using analytics to enable fact-based decision-making. Leading-edge technologies will include the use of scalable low-cost service-based architectures combined with new analytic techniques. Shown in Figure 11 are a few of the new and emerging technologies that disruptive companies are adopting:

- **Omnichannel listening** is the ability to tune in and filter hyper-digitized data sources, which create and disseminate large volumes of information every hour, into a preprocessed (for example, tagged and sorted) set of rich data with high business value.

- **Complex event processing (CEP)** creates situational knowledge that can be acted upon from distributed message-based systems, databases and applications in real time or near real time. CEP can provide an organization with the capability to define, manage and predict events, situations, exceptional conditions, opportunities and threats in complex, heterogeneous networks.

- **Next best action** is the ability to determine the set of possible decisions, organized by probability, that an individual or business will most likely make. Decision paths are determined by highly advanced algorithms, business rule engines and statistical analysis techniques to determine solution alternatives and improve and learn from past experiences, as well as responses to actions taken.

- **Cloud computing** provides on demand and highly scalable infrastructure and platform services that serve as a foundation for calculating the next best action.

IBM’s vision for cloud analytics

IBM’s vision for cloud-based analytics is shown in Figure 12, which depicts a layered approach with multiple entry points, providing a complete portfolio of analytic services, business solutions and leading-edge innovations to deliver competitive advantage. The guiding principle is centered on the data: its location, volume and sensitivity. The question will not be whether private or public clouds are best. The answer will be a combination of private and public clouds leading us to a hybrid cloud platform.

The cloud infrastructure layer provides specialized hardware required to perform complex analytical functions in a timely manner. Built upon the cloud infrastructure are the core analytical software engines used to extract insights from the massive amounts of data that are being collected. These analytical engines rely on data from internal and external data sources while creating sophisticated predictive models that integrate information about constrained resources and available actions to help define business policies.

Cloud computing platforms will address emerging business challenges, including the rapid analysis of vast amounts of data and incorporating next best action choices in business processes and customer interactions. Embedding analytics in business processes often requires developing proprietary algorithms and methods of data enrichment combined with mining publicly available data sources using commercially available services. For example, fraud detection solutions can be built using public and enriched private data sources to detect new risk patterns. Results are then applied to an individual company's transactions to detect fraud affecting their customers, similar to the way the operational risk exchange uses combined data to discover new elements of risk. Hybrid cloud platforms provide the right blend of security, optimized workload performance and access to diverse data sources to manage sophisticated analytics solutions.
Figure 11: How analytics are now being realized through the dynamically scalable and low cost processing power afforded by cloud computing and a) streaming software that can listen for real-time events which impact a business, b) complex event processing software that looks for correlations between disparate data sources and c) next best action software, which can present customers and businesses with choices that align to their needs.
Expert integrated systems that are optimized for cloud-based computing, such as the recently announced IBM PureSystems™ family, will accelerate the deployment of analytics in cloud environments by merging hardware, software, and data enrichment on virtualized systems. Expert application patterns will be introduced as a part of these systems to allow organizations to easily install and configure applications that will automatically take advantage of highly available virtual environments that automatically provide elastic scalability to make it easier to manage seasonal spikes and specialized workloads.

Figure 12: Hybrid cloud platforms provide the right blend of security and optimized workload performance to support complex business processes enabled by analytic services.
Getting Started

Whether or not a cloud-based analytic solution is best for your organization depends on the types of decisions you are trying to make and the answers or insights you are looking for.

Consider the following questions as you are working to develop your strategy:

• What are the key business questions you are trying to answer?
  – What is the value of getting answers to these questions?
  – What actions could you drive more effectively if you had the answers?
    ◦ Focus on the biggest and highest value opportunities.
    ◦ Consider cloud computing solutions as a way to decrease the time to value.

• What is the nature of the information needed to get the answers to these questions? Is that information available? What is the size and format of that information? Is it sensitive? Do you have a significant amount of sensitive data for the analytic project?
  – Consider using IBM SmartCloud™ Foundation to accelerate and simplify the operation of the on-premises deployment.

• What is your overall information strategy?
  – If you aren’t sure, consider getting help developing your information agenda.

• How analytically mature is your organization?
  – If you aren’t sure, take the Analytics Quotient quiz at ibm.com/software/analytics/aq/

• Who needs access to these answers and insights?

• Are you under a tight timeline to launch your priority business initiatives? Do you have the technical and analytics skills and tools needed to answer the questions?
  – You may want to consider a SaaS offering from IBM SmartCloud Business Solutions to get you started.

• Do you have the computing and data center capacity to handle your analytic requirements? Will your computing requirements be static and predictable or will they be variable with peaks and valleys? Do you have the skills to manage the analytic platform and infrastructure?
  – Consider hosting your analytic applications in a hosted cloud environment from IBM SmartCloud Business Solutions

• Do you want to accelerate your project team progress? Do you want your project team to focus more on value-added work the priority business initiatives?
  – Consider using IBM SmartCloud Managed Cloud services to help you accelerate and reduce the costs of projects.
Removing possible barriers to adoption

As mentioned earlier, cloud computing offers significant benefits to an enterprise when applied to analytics. Unfortunately, customers are cautious on the adoption of cloud-based analytic services because of several perceived barriers. In this section, we highlight six of the key barriers to adoption and strategies that enterprises can implement to overcome the barriers (see Figure 13):

1. **Security** remains one of the key areas of concern for large enterprises wanting to adopt a cloud-based analytics platform that is hosted outside their own firewalls because the cost of security failure could quickly exceed the benefits of cloud computing. Eighty percent of enterprises consider security the number 1 barrier to cloud adoption. Enterprises are interested in moving analytics services to a cloud-based infrastructure should seek assurances that the cloud service providers have the processes in place that would guarantee security of enterprise data, both physically and logically.

Even though most cloud service providers provide written SLAs for cloud usage and access, enterprises can explicitly request use of encryption technologies for all cloud-hosted data in the service level agreements. The use of encryption technologies with enterprise-owned keys to store and manage data can alleviate concerns that unauthorized physical access to the cloud infrastructure would compromise key enterprise data. Further, enterprises need to emphasize and require documented and auditable processes in services delivery from the service providers to understand the handling of enterprise data. Cloud security requires a security framework that takes into account traditional parameters (applications, databases, PCs), along with many new entry points and “virtual” parameters, such as rapidly provisioned application and infrastructure images. The industry is working toward developing standards for cloud security through efforts such as Trusted Computing Group (http://www.trustedcomputinggroup.org) and Cloud Security Alliance (https://cloudsecurityalliance.org/).

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**Figure 13**: Barriers to cloud adoption for analytic workloads and possible mitigation strategies
In addition, IBM offers a hosted application security management service that is designed to provide web application security and compliance management for organizations to secure their cloud-based application workloads and data protection and access audit capabilities such as IBM InfoSphere® Guardium® (ibm.com/software/data/optim/protect-data-privacy).

2. *Data governance*—a defined quality control discipline for assessing, managing, using, improving, monitoring, maintaining and protecting organizational information—is an important concern for enterprises who are considering adopting a cloud environment. Poor data governance often means poor business decisions and results, and greater exposure to compliance violations. Thirty-three percent of respondents in the IBM and Oliver Wyman 2008 study said they were concerned with cloud interfering with their ability to comply with regulations. Clients can mitigate data governance issues by requiring the service provider to provide an access policy and a governance structure that articulates the desired organization behavior and is compatible with enterprises. Further, methods to measure, improve and certify the data quality and integrity of data need to be enforced. In the life sciences industry, legislations such as the Sarbanes-Oxley Act mandate that businesses ensure that their purchase records are up-to-date, authorized and accurate. IBM is adopting new guidelines to provide data governance for domain-specific industry analytics. The guidelines include enhanced configuration and change management processes for virtual infrastructure; separate administrative access control for servers, networks and security infrastructure; and maintaining virtual audit logging.

3. *Interoperability* of cloud-based analytic services is another concern for enterprises. A cloud-based analytics service might offer significant economic benefit to the clients, but concerns over lack of standards can result in vendor lock-in. What if an enterprise needs to switch service providers or pull the analytic service back in house?

Clients can alleviate interoperability concerns by selecting service providers that adhere to standard interfaces and provide services offerings to move in and out of cloud. IBM is working with standards organizations such as Distributed Management Task Force (http://www.dmtf.org) to adopt standards that would make it easier for enterprises to access the cloud-based services through standardized interfaces.

4. *Application integration* involves integrating cloud-based analytics with on-premises enterprise applications and data. Poor application integration often results in the inability to fully realize the benefits of externally hosted cloud analytics services. Integration of cloud services requires the blending of data from traditional on-premises applications with public and private cloud systems.

Enterprises can alleviate the concerns by selecting service providers that support hybrid architecture for the cloud-based services. With the hybrid architecture, enterprises can logically extend their intranet to cloud-based services, enabling it to integrate, monitor and secure the access of their application to cloud-based analytics services. In the healthcare industry, service providers require integration of enterprise systems with many disparate systems to improve patient and customer experience. IBM’s hybrid cloud
solution for enterprises helps clients significantly reduce the time it takes to connect, manage and secure public and private clouds. With new integration and management capabilities, organizations of all sizes will be able to gain greater visibility, control and automation of their assets and computing environments, regardless of where they reside. IBM WebSphere® Cast Iron® Cloud Integration software can help companies rapidly connect their hybrid world of public clouds, private clouds and on-premises applications, including SaaS and enterprise resource planning applications.

5. **Data federation** in the cloud is defined as integrating disparate sources of business critical data for analysis. The challenge of disparate data is further exacerbated because information needed for analytics is stored in multiple disparate databases within the enterprise, on the cloud and in different geographic locations. Consolidating data into a single physical data store for analytics might be the best way to achieve performance; however, it is not practical due to high cost.

Enterprises can alleviate the concerns by insisting on the service provider implementing good data management practice, with tools and guidelines that are consistent with those of the enterprise. The advanced programming techniques for IBM InfoSphere Streams, a key component of IBM's big data platform, are designed to enable integration of data from a diverse set of sources such as sensors, cameras, news feeds, stock tickers and more, including traditional databases.

6. **Reliability and performance** are key concerns for any enterprise considering moving to a cloud-based service hosted by a third party provider because latency, quality of experience and performance issues can have an adverse effect on the overall business. Forty-eight percent of enterprises that participated in the 2008 IBM and Oliver Wyman study stated that they were concerned about the reliability of clouds. Enterprises expect that the cloud infrastructure will continue to be available at all times to support critical business capabilities.

Clients can ensure cloud reliability and performance by requiring the service provider to include the metrics and policies in the service level agreements that meet the requirements of the business critical application. IBM SmartCloud Enterprise+ is designed to provide hosted, managed private cloud infrastructure services that give enterprises the infrastructure as a service (IaaS) functionality needed to support cloud-based analytics solutions. IBM SmartCloud Enterprise+ uses the standards, processes and procedures shared by IBM strategic outsourcing and hosting services, which have been developed from years of experience and have made IBM one of the world's largest providers of managed services.

Service providers that can address and implement the strategies identified above can help overcome the barriers to adoption of cloud-based analytics services. IBM has committed itself to work with clients to deploy different technologies to mitigate concerns for adopting cloud-based analytic solutions.
IBM cloud-based analytics solutions
IBM has a number of technologies and solutions that can help organizations harness the power of analytics and cloud computing to drive their business forward.

IBM Smarter Analytics
IBM Smarter Analytics solutions take a holistic approach that turns information into insight and insight into results. The solutions help achieve information-based organizational alignment by offering an enterprise-class big data platform as part of a full information management foundation. They are also designed to use business analytics to deliver insights that shape business outcomes and to embed analytics into your processes at the point of impact, which optimizes outcomes and empowers a culture of data-driven decision making.

IBM's approach brings together the technologies that define the next generation of solutions that get smarter with every outcome (Figure 14). It includes one of the market's leading sets of services, tested solutions, use cases, accelerators and world-class research to help enable breakaway results.

A retailer increases online revenue 2500 percent with cloud-based analytics
L'OCCITANE en Provence, an international retailer of body, face and home products based in France, noticed their customers were becoming overwhelmed with promotional emails. The marketing team quickly realized the need to implement a marketing segmentation strategy that would improve the value received from email campaign dollars while not upsetting their clients. The company turned to an IBM cloud-based analytics solution that enabled them to use online customer data to send highly targeted messages through permission-based emails. Customer behavioral data is captured, analyzed and aligned with customer submitted profile data to create optimized segmentation information. Profiles are continuously built and refined as new data is collected, enabling L'OCCITANE to select segments of any size and any level of affinity and use email to direct special promotional offers to those populations.

Segmentation results are generated quickly and with ease, which is ideal for testing new offers and helping the company respond with agility to changing market conditions. The new segmentation capabilities have provided L'OCCITANE with the means to grab the attention of customers without cluttering their in-boxes or pushing them away. Online revenue has skyrocketed by nearly 2500 percent and conversion to sale by almost 1700 percent. Targeted messaging has led to a 65 percent higher open email rate and 6.5 times higher unique click rates. Increased revenue, higher sales, improved agility and better value—now that's smart.
IBM Business Analytics and Optimization (BAO) capabilities

Transform

Business Analytics and Optimization Consulting Services
BAO Strategy | Customer Analytics | Regulatory and Risk | Fraud Analytics | Financial Performance Management
Information Management Foundation | IBM Research First-of-a-kind Projects | Application Management Services

IBM Smarter Analytics Signature Solutions
Customer | Finance | Anti-Fraud, Waste & Abuse

IBM Solution Accelerators
Portfolio aligned to Industry Imperatives

Align
- Big Data Platform
- Data Warehousing
- Information Integration and Governance
- Data Management
- Enterprise Content Management
- Defensible Disposal

Anticipate
- Business Intelligence
- Performance Management
- Predictive and Advanced Analytics
- Risk Analytics
- Sentiment Analytics
- Big Data Analytics
- Content Analytics
- Web and Digital Analytics
- Online Benchmark
- Spend Analytics

Act
- Decision Management
- Advanced Case Management
- Digital Marketing Optimization
- Cross-channel Selling and Marketing
- Pricing, Promotion, and Assortment Optimization
- Marketing Performance Optimization
- Organization and Workforce Transformation

Learn

Systems that learn and reason
Watson | Watson for Healthcare | Watson for Financial Services | Ready for Watson

Smarter Computing—Systems that are tuned to the task, designed for data, managed with cloud technologies

Figure 14: IBM’s capabilities are designed to support a holistic approach to Smarter Analytics
See IBM Smarter Analytics for more information.
**IBM SmartCloud**

IBM SmartCloud offers solutions designed to enable cloud computing at many different levels from IaaS to platform as a service (PaaS) and a growing number of SaaS and business-process-as-a-service solutions. IBM SmartCloud Foundation is an integrated set of cloud enablement technologies for private and hybrid clouds. These are technologies that IBM customers can use to build their own private clouds. IBM SmartCloud Services is the IBM cloud platform designed for enterprise-class service delivery with managed PaaS and IaaS on infrastructure. The IBM SmartCloud service delivery platform is built upon the very same IBM SmartCloud Foundation technologies that IBM clients are using. And IBM SmartCloud Solutions is a growing list of business and industry solutions on the cloud offered as SaaS.


**Examples of IBM cloud analytics offerings**

Figure 15 shows the cloud analytics offerings that are currently available from IBM.

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**Conclusion: Why IBM for cloud analytics**

IBM assists clients in areas as diverse as banking, communications, healthcare and government to build their own analytic clouds and manages millions of cloud-based transactions every day. IBM is unique in bringing together key cloud technologies, deep process knowledge, a broad portfolio of cloud solutions and one of the world's largest and deepest portfolios of analytics solutions. Our cloud analytics services and solutions span hardware, software, services and research and are supported by almost 9,000 business analytics and optimization consultants, 400 researchers and a network of global delivery centers.

For more information, see [ibm.com/software/analytics/cloud](http://ibm.com/software/analytics/cloud)
Figure 16: Cloud analytics offerings
About the authors

David Jensen
David L. Jensen is the CTO for Business Analytics and Mathematical Sciences in IBM Research and a Distinguished Engineer. He is responsible for designing, implementing and composing mathematical approaches to business problems. He has led a number of projects for building and deploying business analytics applications and services on cloud platforms.

Kathy Konkel
Ms. Konkel is the product marketer for IBM Business Analytics cloud offerings. A member of the IBM Business Analytics product marketing team, she has marketed business analytics solutions for more than 10 years and has more than 20 years of experience in the software industry. Her current focus includes providing solutions that link analytics to real business impact.

Ajay Mohindra
Dr. Mohindra is Research Manager at IBM T. J. Watson Research Center, Yorktown Heights, NY. His research interests include areas of distributed systems, cloud computing and outcome-based services. At IBM, he manages a team investigating and developing mechanisms to support emerging smarter applications on a cloud platform. He holds 16 patents and has published numerous papers for conferences.

Frank Naccarati
Mr. Naccarati is the Cloud Computing Industry Leader for the IBM Enterprise Initiatives organization, where he is responsible for scaling industry SaaS solutions on the IBM SmartCloud platform. He has over 25 years of experience with leading large technology transformation programs for major corporations and building mission-critical systems using the latest advanced technologies.

Edmond Sam
Mr. Sam is the Program Director, Business Analytics, Cloud Computing at IBM. A seasoned professional with broad and extensive leadership experience in business intelligence and analytics technology, he has successfully led organizations in different phases of technology adoption, helping clients realize the value of technology.