Analytics, Cloud, and the Insight Economy

IBM

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Analytics in the Cloud Drives the Insight Economy

By Dave Laverty

Analytics, Big Data, and Data Science are the popular, ubiquitous tech buzzwords these days, but they are more than just hype. The insight garnered from using analytics on data can spark transformation across all areas of a business — in every department of every organization in every industry.

Because of its potential to drive competitive advantage, create new business opportunities, and deliver new insights, analytics has become a CEO- or boardroom-level conversation as executives want to know how their organizations are harnessing and realizing value from data.

The growing adoption of analytics, cloud, and related technologies is giving rise to an Insight Economy, an economy that is leveraging the science of data to innovate and optimize outcomes. Insight-driven disruption is the new norm in the marketplace and is driving transformation in every industry. For example:

- The retail industry is moving from mass marketing campaigns to individually tailored promotions that predict customer desire.

- The energy and utilities industry is moving from having no ability to control demand to predictive energy conservation.

- The travel and transportation industry is moving from static traffic management to dynamic network optimization.

Organizations that take the lead in applying analytics across their business are reaping the rewards.

- For every dollar organizations spend on analytics, the ROI is just over $13. (2014 study by Nucleus Research)

- Solutions that incorporate predictive analytics are seeing a 250 percent return on their investment. (IDC Research)

- 60 percent of organizations created significant impact on revenues using data and analytics in the past three years. (2014 study by the IBM Institute for Business Value)

Analytics in the Cloud

Deploying an analytics initiative is made easier and more accessible by cloud. Cloud enables organizations to empower everyone with the insight they need to make data-savvy decisions.

An IBM Center for Applied Insights study found that, for pacesetting companies that are outperforming their competition, cloud plays a critical role in how they manage today's deluge of data. In addition, the study found that leading companies are six times more likely to use cloud for big data and analytics initiatives.

Companies are leveraging analytics on the cloud to enable all parts of the organization to collaborate with data, develop data infused and disruptive innovations and derive new value from billions of instrumented devices.

Cognitive Insight with Watson Analytics

Watson Analytics is a software-as-a-service offering that democratizes data in an organization and delivers cognitive insight quickly. Watson Analytics removes the complexity of data analysis with an interface that allows users throughout the organization, regardless of their level of analytics knowledge and sophistication, to query data using natural language. It then delivers answers as intuitive infographics. The self-service nature of Watson Analytics gets actionable information into the hands of line-of-business users faster by removing the reliance on IT for business insight.

Cloud for Collaboration

Enhanced data sharing and collaboration capabilities in the cloud will yield greater insights across industries. IBM's recently announced partnership with Box enables mobile file sharing in a secure environment through Box's content collaboration platform and IBM's secure cloud storage. Sharing data in a manner that is streamlined, secure, and compliant with data residency regulations will enable, for example, doctors to share test results with patients in a security-rich environment, retailers to deliver a more consistent brand experience by sharing materials through any device, and insurance underwriters to review inspection reports in the field, expediting the approval process.

IoT Powered by Cloud

With the rise of the Internet of Things (IoT) and the unprecedented data volumes that billions of connected devices will deliver, cloud becomes an even more essential component of a data analytics strategy. Insights from nontraditional sources of data are being infused in business processes to create new business moments, and enterprises are investing heavily in the development of apps that consolidate data from those new sources of information. Available on IBM Bluemix, the IBM Internet of Things Foundation is a fully managed, cloud-hosted service that connects smart devices to applications and analytics tools using open lightweight messaging protocols and intuitive online dashboards to manage devices and securely connect IoT data to applications for historical and real-time insight.

The massive amount of streaming IoT data will present a challenge to many organizations, but will provide valuable opportunities for organizations that are able to glean insight from it.

Intelligent products, embedded sensors that log and monitor service schedules, and aggregated data allow manufacturers to build out new services and warranty business models. In addition to embedded intelligence in smart cars, auto manufacturers are using IoT data to track and monitor rolling stock to enter new businesses such as transportation on demand. A cloud solution, combined with IBM Bluemix to quickly build analytics infused applications, can provide a competitive advantage even in the fast-moving world of powerboat racing.

Digital Innovation on Cloud

No longer content to simply derive operational and transactional insights, leading companies are using expanding sources of data and advanced analytics to inform business strategy and create entirely new business models that fuel growth by disrupting the status quo. This digital innovation is harnessing the inherent scalability and power of the cloud with more types of data from more sources than ever before, including people, places, and the IoT.

IBM is forging partnerships with leading third-party data providers, including Twitter and The Weather Company, to enrich all types of decisions and applications. Through these key data partnerships, clients can combine their business data with the streaming, global, and conversational qualities of Twitter commentary and real-time weather data to uncover unique insights that answer their toughest business questions.

For example, communications companies have developed sophisticated models to understand subscriber churn and use social listening to improve customer service. Combining social and weather data uncovered a unique link between tweets about weather-related service problems and the rate of churn. Analyzing Twitter data alongside other information such as weather and location data can help organizations anticipate churn and increase retention efforts.

Governments are leveraging IBM's cloud-based Intelligent Operations Center for Emergency Management, which integrates real-time proprietary forecast data from The Weather Company. This data provides emergency planners an extra day and a half of lead time over traditional forecast data to develop better emergency plans and response strategies, saving lives and billions of dollars in property and infrastructure losses.

Additionally, using IBM Bluemix and the available Twitter and Weather Company data services, developers can easily and quickly infuse new levels of insight and analytics into existing mobile and web applications.

Hybrid Infrastructures Accelerate Analytics, Value

A hybrid cloud architecture brings several benefits to organizations. Companies can deploy cloud software quickly and cost-effectively alongside existing on-premise applications.

Applications can be scaled up or down easily to meet requirements. And companies can respond more nimbly to urgent IT demands with fewer IT resources, providing a shorter time to value. Because of this, IDC predicts that more than 65 percent of enterprise IT organizations will commit to hybrid cloud technologies before 2016.

Many organizations are evaluating which of their data warehouse workloads can be moved to the cloud to take advantage of lower cost and greater business agility. But organizations, especially those in industries such as financial services that require greater security and data privacy, need the ability to keep data on-premise as well. This is giving rise to hybrid architectures that allow data to reside on either platform and enable organizations to do analytics on that information no matter where it resides.

Consider Morningstar, for example. The investment and financial services research firm needed a persistent data store to maintain and access financial analytical reports. Using Cloudant's schema-less architecture and horizontal scalability as part of a hybrid data management approach provides Morningstar's users with real-time access to reports and analytics from multiple systems of record, and gives Morningstar the ability to store the data without needing a schema definition. In addition, the configuration supports a high volume of user concurrency.

Successfully Deploying Analytics in the Cloud

To successfully deploy cloud-based analytics, enterprises must first understand the challenges they face and what they are trying to accomplish. Once they know what they need, they must match those needs with a solution that provides the following:

- Complete capabilities and deployment options
- Business agility security and governance
- Scalability
- Quick time to value
- Hybrid cloud support
- Industry, domain, and implementation expertise

Selecting the right partner for your cloud-based analytics deployment is crucial. Organizations should look for an experienced partner that enables them to democratize data across their organization, putting analytics in the hands of those who need the insight most, regardless of their level of technical expertise.

Through the IBM Cloud Marketplace, nearly all business users in the organization can quickly and efficiently access analytic solutions to easily discover and visualize data themselves and transform departments, processes, and operations through solutions that bring together industry expertise, third-party data and predictive analytics.

Through the cloud, IBM brings all data to bear on decisions through unique data partnerships that, combined with internal data, create deeper and more actionable insights.

In addition, the cloud accelerates the path to innovation across the organization. Developers can leverage IBM Bluemix services to build analytics-infused applications quickly, data scientists can leverage big data with speed with Spark as a Service, and business users can discover insight faster through self-service analytics on the cloud.

The right cloud partner will accelerate outcomes by leveraging industry, domain, and implementation expertise to apply proven solutions to all of your business challenges, enabling you to realize maximum value from your data, improve decision making throughout your organization, and thrive in the Insight Economy. ∎

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Dave Laverty leads marketing activities for IBM's Analytics Group. Dave is responsible for all global marketing go-to-market initiatives including market management, leadership positioning, demand creation programs, and industry solutions. Prior to leading the Analytics team, he served as Vice President, Marketing for Information Management software solutions.

Dave has more than 25 years of technology industry experience. He served as Chief Marketing Officer of Cognos for 6+ years prior to IBM's acquisition of Cognos. As a member of the global management team, he led Cognos' global go-to-market strategy, encompassing both strategy and marketing execution. Dave has also worked with a variety of technology organizations including NCR, Computervision, Surebridge, and IBM Lotus Software. He earned his degree in Business Administration from Bryant University.

Analytics, Cloud, and the Insight Economy

Chapter One:
Business User

5 Ways Cloud Improves Your Business

By Matthew Mikell

Cloud computing has been around for a few years, but its true disruptive and innovative capabilities are really just starting to be explored. In the beginning, cloud was seen only as a technology with an audience of IT departments and a focus on cost savings. Today, a glacial shift toward line-of-business influence has become more of an avalanche. Gartner research states that, "By 2017, the CMO will spend more on IT than the CIO."

Abstracting the complexity of technology with the simplicity and agility of SaaS has won over many business leaders. This shift in perception regarding cloud ownership among business leaders offers them an opportunity to blaze a new trail. But what opportunity lies before them? Here is a view of the impacts cloud analytics can have on their operations.

Make Anyone a Knowledge Worker

The consumerization of IT is often associated with the falling prices and ubiquity of cloud services. The advent of cloud computing services has lowered costs, removed barriers to deployment, and continues to churn out new "as-a-service" offerings. In parallel, analytics tools have become more intuitive, guided, and embedded into everyday business applications. The intersection of these trends enables any employee, from the factory floor to the C-suite, to leverage the latest analytics capabilities. Business leaders should recognize that users and consumers will be expecting greater self-service access to analytics.

Capitalize on Talent Across Business

Employee knowledge and innovation exists throughout the enterprise, but the ability to actually leverage these resources is inhibited by the lack of transparency, strategy, and performance measures. Businesses have an untapped wealth of talent but lack dashboards that enable them to coalesce employees around common goals. The complexity or cost of traditional software deployments leaves many employees working with isolated spreadsheets and, therefore, far from connecting the dots across lines of business. Business leaders can elevate their strategies through highly visual and widely distributed dashboards that deliver focus and alignment across the enterprise.

Leverage Insights from Partners

Businesses are made up of a complex network of strategic relationships. The more global the company, the greater the realization that they cannot go it alone. Operating as a solo

entity limits innovation, but plans for expanding collaboration around shared data are often stalled by perceived risks to corporate systems, servers, and firewalls. Vendors, consulting partners, and suppliers that make up a vital and competitive ecosystem can spur fresh insights into shared data. Pharma and health services, for example, have long embraced cloud to converge ecosystems of payers, providers, CROs, and regulators into a neutral and highly secure cloud platform. Business leaders should value these ecosystems and develop "ecosystems within ecosystems" to derive even more insight and value.

Lower the Cost of Analytics Experiments

The groundbreaking IBM study Under Cloud Cover revealed that leading organizations (called "pacesetters" in the study) gain a significant competitive advantage by using cloud. The data show that, through cloud, pacesetters are 136 percent more likely than chasers to reinvent customer relationships, and 73 percent more likely to innovate products and/ or/services rapidly. Cloud not only enables organizations to deploy analytics solutions with lower financial consequences, but also enables stronger collaboration and new features that were not available previously. Business leaders should endorse the use of the new capabilities and foster a culture that exploits the use of lower-cost analytics environments to test, fail, succeed (and repeat).

Dig Deeper into Dark Data

Reducing the risks of failure and improving analytics experimentation opens up new opportunities with dark data, the operational data that is not being used. Progressing into big data, we can expand upon the analytics sandbox to monetize dark data into something that creates new revenue streams, new value propositions, and even new markets. Consider that the United States experiences a direct economic impact of $67.7 billion per year from the demilitarization and commercial availability of GPS. Business leaders now have their opportunity to ask, "What if?" from their own data, albeit on a much smaller scale. ∎

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With over 20 years of experience in software, Matthew Mikell joined IBM to lead product marketing for big data solutions using in-memory database technology with business analytics. Previously, he was the Cloud Evangelist with Dell, providing leadership and future perspectives for cloud computing.

Matthew has worked for 15 years with analytics vendor SAS Institute various roles of product marketing while leading their launch into Small/Midsize Business, Managed Services, and Software-as-a-Service (SaaS). He lived in Germany for several years, managing SAS International GmbH channels and alliances programs spanning from Spain to Singapore. He currently resides in Cary, North Carolina.

Cognitive Insight for All with Watson Analytics

The abundance of data, the popularity and the growth of the cloud, advances in analytics, new user experience design and business models have converged. The result of this convergence is the imperative for everyone to make decisions based on facts and data. Where once organizations relied on data scientists or IT to prepare and interpret data, now marketing, sales, operations, finance and HR professionals want to get answers they need from all types of data — on their own.

According to a recent business survey conducted by the International Data Corporation and Computerworld, only a small fraction of businesses use analytics tools as part of their decision-making. Considering that analytics enables people to use refined and trusted data to discover insights, predict outcomes, visualize results, create reports, and collaborate with others, the fact that so few organizations use it indicates that it's time for revolution in analytics technology.

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> **What else is driving this revolution? The analytics skill gap, changes in the way people work and cognitive computing are among the major factors.**

The Analytics Skills Gap

Organizations that have adopted an analytics strategy are realizing significant competitive advantages. Yet, many organizations are not capitalizing on analytics. Why? The reason is twofold. First, in those organizations that use analytics, departmental experts and analysts are expected make better decisions based on data. However, they are usually not trained to manage data, build predictive models or effectively communicate the correct conclusions. They view the analytics solutions that are currently available as too complex or not user friendly to anyone but those with advanced analysis skills. Also, in many companies, even a simple analytics project is complicated and involves significant resources and effort (Figure 1).

Second, the proliferation of almost unimaginable amounts of data and the availability of the computing power to analyze this information have led to an increased interest in and a need for data scientists. However, data scientists are in short supply. According to a report from McKinsey and Company, the United States will face a shortage of 140,000 to 190,000 people with analytical expertise by 2018. As a result, companies need technology solutions that people other than data scientists can use.

The Way People Work

The way people work has changed dramatically. Today's workforce, for the most part, consists of "do-it-yourselfers" who are short on time. They want to make quality decisions and draw compelling conclusions without training or without relying on numerous experts and multiple disconnected tools. They expect to be able to access tools and data anytime and anywhere.

Today's workforce uses software and applications to do things that once might have been done by an assistant or an expert. They feel pressured to quickly find answers on their own and self-service software helps them address that pressure. The fact that most workers use self-service tools to accomplish their tasks is a benefit to the organization as a whole, but it increases IT concerns about the quality and governance of data.
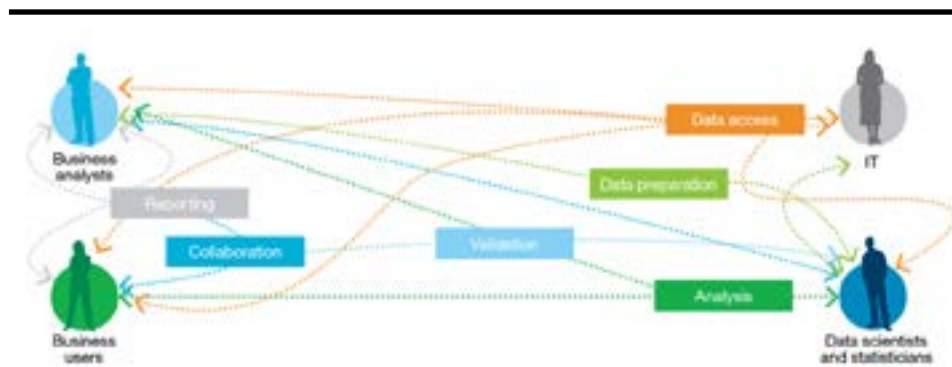

Figure 1. An analytics project today is rarely straightforward

Cognitive Computing

Cognitive computing is forging a new partnership between humans and computers that enhances, scales and accelerates human expertise. It has created a new era of computing that is destined to have a profound impact on how work gets done. Cognitive computing processes natural language so people can interact with computers in their own language. It also "learns," which means that the more it is used, the more it fine tunes its interactions and results. The result is expert assistance in a fraction of the time it now takes. Far from replacing human thinking, cognitive computing extends human intelligence and frees people to think more creatively.

The first cognitive computing system was IBM® Watson™, which debuted in a televised Jeopardy! challenge where it bested the show's two greatest champions. The challenge for Watson was to answer questions posed in every nuance of natural language, such as puns, synonyms and homonyms, slang and jargon. Watson was not connected to the Internet for the match. It only knew what it had amassed through years of persistent interaction and learning from a large set of unstructured knowledge. Using machine learning, statistical

analysis and natural language processing to find and understand the clues in the questions, Watson compared possible answers by ranking its confidence in their accuracy, and responded, all in about three seconds.

Newer generations of Watson are currently being trained in oncology diagnosis for healthcare professionals, and in customer service as a support representative. IBM Research continues to push the boundaries of Watson by developing new interfaces that will allow humans and computers to interact more naturally.

Setting Powerful Analytics Free: An IBM Mission

IBM is well aware of the analytics skills gap and the changes in the way people work. With Watson, IBM has been at the forefront of cognitive computing. As a result, IBM realized that cognitive computing could be put to work to address the problems of the analytics skills gap and the need for almost instantaneous data analysis. By enabling almost anyone to go to the web, log on, type a question in their normal language and get results quickly, the barriers to powerful analytics would be all but eliminated, essentially setting analytics free.

Therefore, IBM decided to take the data navigation in Watson Explorer and combine it with speech processing, linguistic techniques, dictionary services, a semantic annotator and concept detection to create a custom-trained system for business analytics. IBM then added the ability to generate a hypothesis based on systems of metadata from the sets of data that the system loads or has been connected to. Instead of the usual way that Watson takes in data, however, IBM wanted people to be able to drag and drop their data and have a meaningful experience without additional training.

The goal was a system that processes information more like a human than a computer. By understanding natural language, putting big data to work and learning from interaction and use, the system would enable organizations and individuals to more fully understand the data that surrounds them, and use that data to make better decisions. The goal was to put powerful analytics in the hands of everyone. The result? IBM Watson Analytics.

Hello, Watson Analytics

Watson Analytics is a breakthrough, web-based service (Figure 2) that business professionals of any industry and skill level can use to instantly access and use powerful predictive and visual analytic tools. Watson Analytics removes the complexity from analytics so it is easier to find answers and insights. People can ask questions and get answers in words they understand.

Behind the scenes, Watson Analytics provides a powerful set of data access and refinement services. Many analytics tools simply use the data provided to them, and it is often not accurate, complete or relevant. By contrast, Watson features built-in refinement and access

capabilities that range from importing and joining data sets to more advanced data services. Such advanced services include:

• Matching data and determining data quality

• Finding relevant data and receiving recommendations for related data

• Masking confidential information
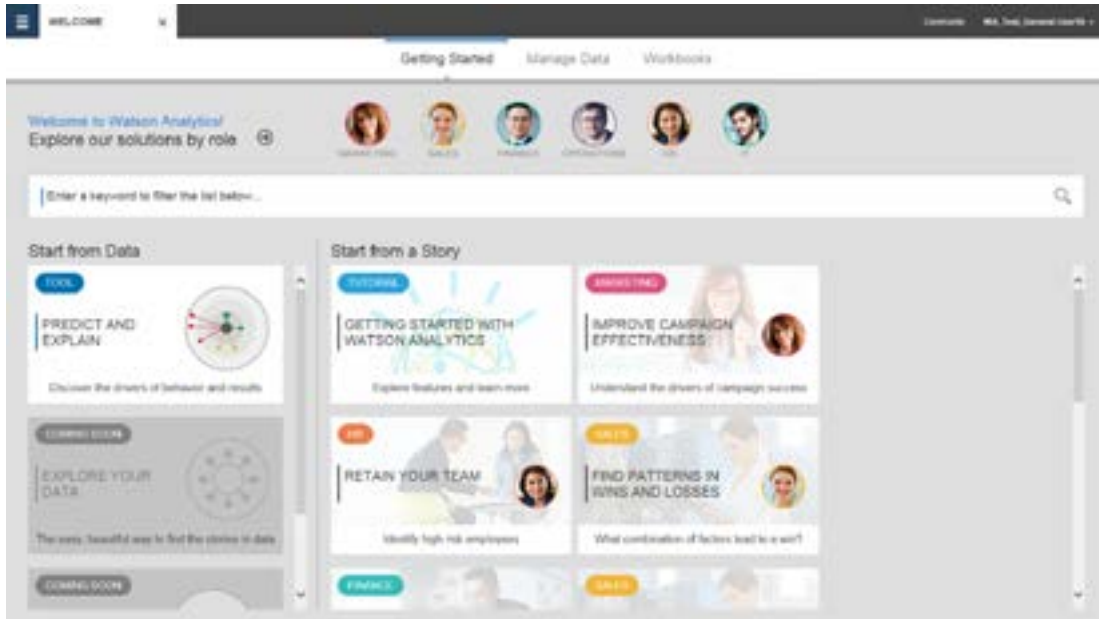
Figure 2: The Watson Analytics landing page

The result is information fit for its specific analytical purpose combined with a highly visual, interactive cloud-based analytics service (Figure 3). Almost everyone can see patterns, pursue ideas and use the insight gained to improve all types of decisions.

IBM Breaks More Ground

IBM could have stopped at developing the capabilities of Watson Analytics and still have set the analytics world on its end. However, another barrier to many great software solutions, and not just analytics software, is cost. Budget constraints, mandates to lower costs, freezes on capital and software investments and other economic factors can hinder the adoption of new technology. In a world where significant numbers of free apps are downloaded onto smartphones and tablets, offering an expensive software solution that requires a substantial number of resources and a great deal of time to implement is a bit old-fashioned.

Figure 3: A highly visual, interactive cloud-based service that is easier to understand

Because IBM Watson itself is a 21st-century supercomputer, should not an analytics solution that bears that name also be a 21st-century application? The answer to that question is yes. So, IBM decided to offer Watson Analytics in a cloud-based freemium version, which means people can register to use it and get started almost right away. No one should have to wait for their analytics — not when an analytics solution can do so much for you.

What Can Watson Analytics Do For You?

The Watson brand stands for a special kind of software, with a number of attributes. Watson Analytics is no different. It understands and engages you. It learns and improves over time. It helps you discover, establishes trust (Figure 4), has an endless capacity for insight and operates as fast as you need it to.

Watson Analytics Understands and Engages You

Watson Analytics speaks the language of your business. Simply type in what you would like to see and Watson Analytics produces comprehensive results that explain why things happened and what's likely to happen, all in the familiar terms of your business. Predictive analytics uncovers the most relevant facts and unforeseen patterns and relationships. This sparks the right questions to ask and directs your attention to the parts of your business that matter most.
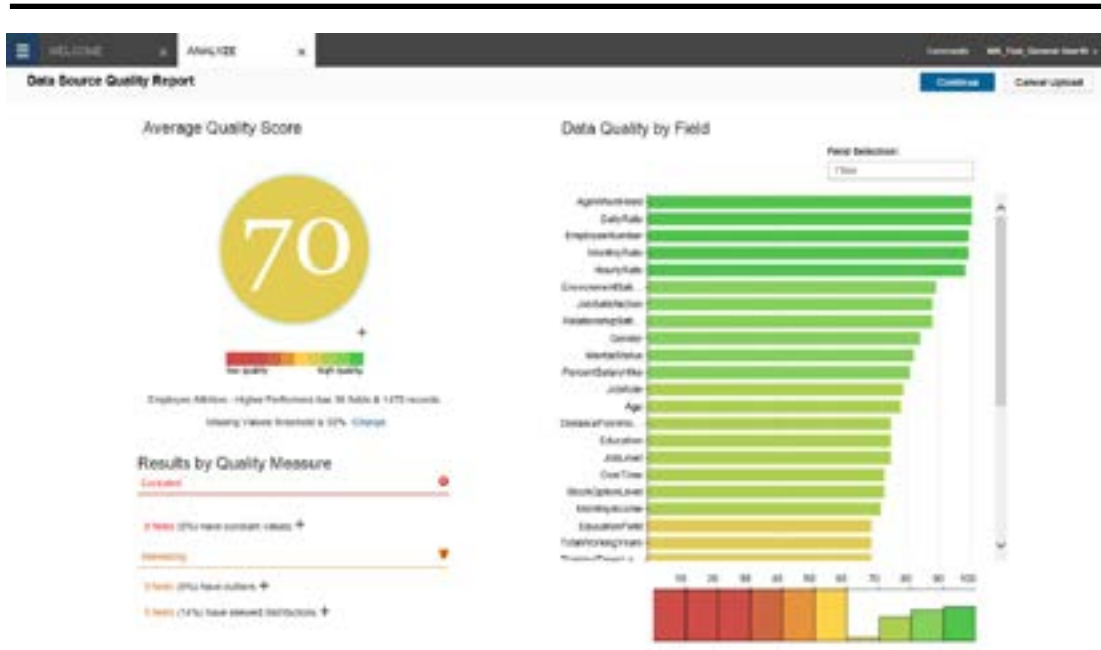
Figure 4: A data quality score helps establish trust in your data

Five things you should know about Watson Analytics

If you only remember 5 things about Watson Analytics, remember these.

1. Watson Analytics, for the first time, puts powerful predictive analytics in your hands, without the complexity of traditional analytics tools.

2. While preparing data, Watson Analytics automates predictive analysis and visual storytelling, giving you quick, reliable, visual insights for better business decisions.

3. Watson Analytics is designed for all types of business professionals — sellers, marketers, financial, HR and C-level — in addition to data scientists and analysts.

4. You can easily interact with Watson Analytics by asking questions and receiving answers in regular, everyday language.

5. Because it is a cloud-based service, you can easily access Watson Analytics, with a freemium version available.

Watson Helps You Discover with an Almost Endless Capacity for Insight — Fast

Watson Analytics jumpstarts your analysis so you don't have to wait for answers. It immediately starts you off with a visual story that illustrates what you need to know. A full range of analytical techniques — reporting and dashboards, predictive analytics, cognitive analytics, visualization and collaboration — are right at your fingertips in a single webbased workspace.

Conclusion: See, Pursue and Improve

Designed to address the analytics skill gap and changes in the way the people work, Watson Analytics helps almost anyone in business — from sales reps on the road to company CEOs — see patterns, pursue ideas and improve all types of decisions. IBM has eliminated the barrier between the answers you seek, the analytics you want and the data in the form you need. The combination of Watson-fueled analytics to magnify human cognition, the vast potential of big data, and cloud-scale delivery to PCs, smart phones and other devices is transformational.

Learn More

To learn more about Watson Analytics, go to: ibm.com/analytics/watson-analytics/. ■

View this report on IBM.com here.

Watson Analytics: Guided and Automated Data Insights

By Forsyth Alexander

IBM Watson Analytics, the revolutionary cloud service that you can use for free, is making waves, and people have been taking note. Maybe you're wondering if it's a solution you can use. If so, I have good news. Watson Analytics was specifically designed to help people in all parts of a business or organization benefit from the power of business analytics.

With Watson Analytics, advanced analysis that has previously been limited to highly skilled analysts such as statisticians, data miners and data scientists is now available to most people who need it. No matter where you are in your organization, you can use Watson Analytics to discover insights, answer questions and take action. Here are some examples.

(If you haven't already signed up for Watson Analytics, you can do so here for free.)

Sales

Identifying leads and closing deals to increase revenue can be less challenging with Watson Analytics. Use it to predict with confidence which deals have the highest chance of closing. You simply upload your data, click a few tabs, and see what your pipeline data is telling you about your wins and losses. As a result, you can be more confident about identifying deals most likely to close and focusing sales efforts on them rather than on those that will show a low rate of return on your efforts. Watson Analytics also enables you to target customers most at risk of leaving. You start with a spreadsheet of raw data and in moments, your data is interpreted and presented to you in a language you understand. You have a course of action based on that information and can work to keep customers.

Marketing

If you're in marketing, Watson Analytics can help you prioritize leads, increase conversions and plan campaigns. You simply upload your data, click a few tabs and you can start to see what your data is telling you about your test markets, sales, promotions and campaigns. Watson Analytics target leads and prospects with a higher likelihood of becoming a sale. You can also discover the attributes of your most profitable customers and predict how customers might respond to a campaign. Before long, you'll be designing campaigns for a new product that you know will have a high degree of success. Because your decisions are data-driven, you can be more confident that your marketing efforts are moving in the right direction.

Finance

Determining the factors most likely driving revenue or loss, identifying profitability patterns and understanding accounts receivable trends are among the capabilities that Watson Analytics offers finance. For accounts receivable, you can analyze who is most likely to pay and why. You can use sales pipeline analysis to forecast revenue and customer data analysis to determine the effect of customer retention and loss on revenue and profits. You can start with data and in moments get a list of possible influencers of delayed payments or revenue losses. With just a few clicks, you can have ideas for improving payments such as paperless billing for habitually late customers and reexamining the billing cycle for customers with high invoice amounts. If you have loss data you need to understand, guided data exploration and analysis show you interesting insights found in your data. You can view these insights as visualizations that you can interact with, share with others (even those who don't have Watson Analytics) or both.

Human Resources

Watson Analytics can help you with employee attrition and retention analysis. Uncover the factors that lead to employee attrition and use them to predict who is at risk, intervene and take appropriate action. You can upload your data, create a workbook and indicate attrition as a target for understanding which factors are most likely to affect it. Watson Analytics processes your data automatically and presents you with visualizations that indicate how other fields statistically relate to that target. For example, is overtime a strong predictor of whether an employee has stayed or left? How might job role and performance evaluation relate to employees who have left? Watson Analytics can also take insights that might seem obvious — people who work extra hours and aren't rewarded and people in commission-based positions tend to leave — and quantifies them in reliable ways. This quantification enables more targeted actions and better decisions about how to keep valuable employees.

Information Technology

Handling technical support and maintaining applications and systems efficiently and effectively is an ongoing IT challenge. With Watson Analytics, if you're experiencing helpdesk bottlenecks, you can study open and close rates and average response times, so you can better understand what causes high priority tickets and use this information to determine how to allocate resources to resolve tickets faster. If you have a question about which applications need additional computing resources or whether any hardware is showing signs of premature failure, you can upload data you've compiled on these issues and spot trends and patterns that can help you know the steps to take next. Watson Analytics will also intelligently suggest analysis based on the data at hand, letting you focus on the business of IT rather than complex analytics.

Operations

Watson Analytics can help you with demand planning, so that you have the right amount of product on hand at the right time and you can scale up or down as customer whims dictate. If you are experiencing a supply chain bottleneck or quality issue, with Watson Analytics, you can select a specific outcome and then see the factors that have had the strongest influence on that outcome so you can better understand the cause and make better decisions for the future. If customer complaints increase shortly after increasing production with seasonal employees, for example, you can implement new training procedures for temporary workers. If warranty repairs are on the rise related to a particular part, you can intervene with the supplier to address the problem at its source instead of issuing a recall six months down the road.

Only the Beginning

These summaries by business roles are just a taste of how Watson Analytics can help people all over an organization answer questions, make decisions and take action. To see firsthand how Watson Analytics can help you wherever you are in your business, experience it for free today. You can also check out our interactive infographic here. ∎

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Forsyth Alexander is an IBM information developer and content strategist who specializes in writing about Watson Analytics, business intelligence and predictive analytics software topics. She has 10 years of experience in digital content creation and marketing at IBM, along with 25 years of experience as a writer and editor on tech and IT topics.

How to Enable Analytics Ecosystems with BI in the Cloud

By Matthew Mikell

Collaboration is vital to the success of any business. The importance of internal collaboration to achieving business goals is well known. But awareness of the value of external collaboration is growing and has led to the creation and evolution of ecosystems. These cooperative arrangements can help businesses ascend to new levels of differentiation. An ecosystem can involve any number of interdependent enterprises and relationships, and there can be ecosystems within ecosystems. While complexity exists in the number and function of the participants, the data and value captured from ecosystems can be significant. According to an IBM global C-suite study, to create a new age of innovation, more than half of CxOs expect to open up their enterprises and bring down barriers to extend collaboration both inside and outside of their organizations.

In a macro-environment, healthcare providers, payers, and government agencies might pull together into an analytics ecosystem to investigate global outbreaks. In a micro-environment, an employee might uncover accounting fraud but lack the capability to widely share his/her findings and collaborate on a new process for detection and further investigation. Traditional supply chain partnerships, for example, in the past might have required interaction only upon inventories, deliveries, and product specifications. But in today's new era, fostering analytics ecosystems and creating better outcomes has been brought on by increasing volumes of information (sensor data), expanding global trade (e-commerce), and the speed of customer engagement (social media).

Barriers to Collaboration

Anytime an organization deals with an outside entity, the issue of data security is a primary concern. And, indeed, we find most businesses failing their ecosystems with unsecured and unverified spreadsheets being pushed around the globe.

In addition to security concerns, another barrier that makes meaningful collaboration a challenge is operating with a globalized network. With its time zones, devices, and data types, it might seem impossible to connect participants and collect vast amounts of new data for analytic insights. Couple that with a diversity of participant systems, employee skill sets, and traditional software deployments or policies, and a new age of analytics ecosystems seems even more unlikely.

However, with the advent of cloud computing technologies, and specifically business intelligence delivered as a service, there are now options to get around these traditional barriers and become more analytically enabled and ecosystem-centric. Cloud enables meaningful and productive ecosystem collaboration in the following ways:

Consistency and security for building the right connections. There is much to be said for centralizing data and delivering a single version of the truth, no matter the participant. All too often, business meetings begin with participants debating whose version of data is accurate. Getting a complex ecosystem moving in the right direction relies heavily on connected and governed data. Once the data is in place, all participants are likely to feel that their contributions and ongoing collaboration are more secure with a cloud provider in a neutral platform.

Empower self-service among participants. The delivery of static reports is a practice of the past. The future requires that analytic insights come from participants who are allowed to tap into data freely, ask different questions, and challenge current synergies. The freedom to scale inexpensively, test assumptions, fail, and test again are key benefits of cloud.

Agility and intertwining ecosystems. Participants and ecosystems can and should evolve as they engage with each other and discover new advantages or dependencies. At any time, participant businesses might contribute 10 or 100 resources to the ecosystem and thereby increase their users, presence, and economic outcomes. Furthermore, as connectivity between participants evolves, business intelligence on cloud has the flexibility to measure new partner arrangements and goals easily through simple dashboards and scorecards.

To learn more, you can download a copy of The new age of ecosystems produced by the IBM Institute of Business Value. ∎

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With over 20 years of experience in software, Matthew Mikell joined IBM to lead product marketing for big data solutions using in-memory database technology with business analytics. Previously, he was the Cloud Evangelist with Dell, providing leadership and future perspectives for cloud computing.

Matthew has worked for 15 years with analytics vendor SAS Institute various roles of product marketing while leading their launch into Small/Midsize Business, Managed Services, and Software-as-a-Service (SaaS). He lived in Germany for several years, managing SAS International GmbH channels and alliances programs spanning from Spain to Singapore. He currently resides in Cary, North Carolina.

Case Study: Benco Dental

Sparking Innovative Thinking Around Sales and Pricing to Better Understand Customer Buying Behavior

Overview

The need
Like many of its competitors, Benco Dental had developed a pricing model based on volume discounts. But did this pricing strategy actually motivate customers to place larger orders?

The solution
Benco Dental's marketing analysis team turned to IBM® Watson™ Analytics to find out whether the industry's received wisdom around pricing strategies was really paying off.

The benefit
Within 30 minutes, Benco Dental was able to uncover and answer key questions, debunk industry myths about volume discounts, and start a data-driven debate about more efficient pricing models.

Solution components

Software
IBM® Watson™ Analytics

Pricing strategies can often feel like an arms race: your competitor offers a special deal, an incentive or a discount, and you have to either match it, or go one better. But does this approach really work? Does a given pricing strategy actually motivate your customers to place more orders, purchase higher volumes, or choose higher-value items?

The marketing analysis team at Benco Dental, the largest privately owned dental supply company in the United States, was pondering this very question when it visited the IBM Insight conference.

Don Trybulski, Marketing Analyst at Benco Dental, tells the story: "Our volume discounts and tiered pricing model had been in the back of our minds for some time — we knew we should revisit them, but we just hadn't thought about the best way to do it. Then we saw a demo of IBM Watson Analytics, and it just clicked: it was exactly the right kind of tool for this kind of problem."

Benco Dental saw an opportunity to test the industry's conventional wisdom about volume discount models — and to take the first steps on a journey to a richer discussion about pricing strategies, and a more data-driven approach to marketing decision-making.

Instant Insight Into Detailed Historical Data

Benco knew that the answers lay in its order records — a rich treasury of detailed historical information on sales, pricing and customer behavior, stretching back several years, and comprising several million rows of data.

Mark Kolanowski, Manager of Marketing Analysis, comments: "To make a start on the problem, we didn't need the whole dataset, so we just uploaded a small data sample into Watson Analytics and analyzed it for free — with no up-front investment and no subscription costs.

"It's a great opportunity that helped us decide whether Watson Analytics was the right approach, without making a financial commitment. And the results were so good that we've now subscribed to the Personal edition, which will give us the ability to analyze much larger amounts of data — even our whole order management dataset, if we choose."

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> We're really just getting started with Watson Analytics — it's like a Swiss Army knife, there are so many projects we could use it for. The time to value is so short that we really see it becoming a key tool for us, with intuitive visualization and natural language processing capabilities that we simply haven't seen before
>
> -Don Trybulski, Marketing Analyst, Benco Dental

Exploring Data and Uncovering the Right Questions

Don Trybulski describes the project itself: "When I started, even though I had never used Watson Analytics before, it took me about five minutes to explore the data and realize the key questions that I needed to ask. And after about another 25 minutes, I already had the answer to the first of those questions. I'm not a statistician by training, I come from the IT side — but Watson Analytics made it easy to look at the data in new ways and see what was significant.

"I was able to isolate the main factors I wanted to analyze — the net price per item, and the quantity per order — from other potential influencing factors, such as loyalty programs and one-time special offers. Then I quickly built decision trees that allowed me to predict certain aspects of customer behavior."

Overturning Conventional Wisdom About Pricing

"We currently have a 'quantity break' in our pricing model — if you order one to three items, you pay the full price, whereas if you order four or more, you get a discount," Trybulski explains. "The conventional wisdom is that a quantity break becomes more effective as the net cost of the items gets lower. A customer probably won't order four handpieces; but they might buy four boxes of disposable gloves, because they don't cost too much, and they'll probably use them eventually anyway.

"However, Watson Analytics showed us that this expected behavior is simply not reflected in the sales data. Even for lower-value items, a high percentage of customers will order three items instead of taking advantage of the quantity break at four. That's potentially a revolutionary insight that could help us redefine our pricing strategy going forward."

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> We've gone from a strategy based on gut feeling and following what the rest of the industry does, to an approach where our decisions will be based on hard, measurable, objective data.
>
> -Mark Kolanowski, Manager of Marketing Analysis, Benco Dental

Analysis and Presentation in a Single Step

Unlike a traditional analytics platform, where data scientists perform analyses first, and then decide how best to present the results to decision-makers, IBM Watson Analytics shortcuts the process.

"Analysis and presentation are really just one seamless process," says Kolanowski. "This visual way of exploring data is a much faster method of communicating results that everyone can intuitively understand — not just professional statisticians."

Robust, Reliable, Repeatable Results

A second advantage is the robust, unbiased and repeatable methodology provided by Watson Analytics.

"Typically, if you give one data scientist a problem today, and then ask another to run the same analysis a year later, you'll get two slightly different approaches," says Kolanowski. "With Watson Analytics, we know that we can run exactly the same analysis on next year's data, so we'll have a truly consistent comparison.

He concludes: "If we make some tweaks to our volume discount model this year, we will be able to measure the impact next year. So we've gone from a strategy based on gut feeling and following what the rest of the industry does, to an approach where our decisions will be based on hard, measurable, objective data. And that's going to be priceless in terms of creating pricing that delivers the best value to our customers."

About IBM Analytics

IBM Analytics offers one of the world's deepest and broadest analytics platform, domain and industry solutions that deliver new value to businesses, governments and individuals. For more information about how IBM Analytics helps to transform industries and

professions with data, visit ibm.com/analytics. Follow us on Twitter at @IBMAnalytics, on our blog at ibmbigdatahub.com and join the conversation #IBMAnalytics. ∎

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Benco Dental is the largest privately owned, full-service distributor of dental supplies,dental equipment, dental consulting and equipment services in the United States. Founded in 1930, the company today employs 1,500 people at 50 regional showrooms and five distribution centers — and supplies a catalog of 100,000 products to more than 30,000 dental professionals across the country.

To learn more about Benco Dental, please visit www.benco.com.

View this case study on IBM.com here.

Case Study: Comdata

Improving Fuel Purchase Decisions and Customer Satisfaction with a Cutting-Edge Mobile Application

Overview

The need
To help clients reduce fleet fueling costs, Comdata recognized the need to give truck drivers instant access to location-aware advice on the optimal fuel and rest locations along their routes.

The solution
Comdata worked with IBM Business Partner, PointSource, to build a location-aware mobile app in just twelve weeks. The solution uses IBM® Cloudant® Dedicated Cluster database-as-a-service, hosted on SoftLayer®.

The benefit
The new app enables drivers to choose the best fueling locations and other discounts in real time, based on optimal routes, timing, prices and user preferences, helping to reduce fleet operating costs.

Solution components

Software
IBM® Cloudant® Dedicated Cluster – Cloudant Geospatial

IBM MobileFirst™ Platform

Services
SoftLayer®

IBM Business Partner
PointSource

Comdata provides innovative electronic payment solutions across industries, helping companies to manage spending and streamline operations. Comdata pioneered electronic payments for the trucking industry, providing comprehensive controls and insightful data for managing fuel and other fleet expenses.

Providing 24-Hour Guidance

Comdata gives fleet operators tools to analyze their fuel expenses and highlight opportunities to cut costs. However, with over 45 years of industry experience, the company knew that the best way of promoting efficient spend would be to put real-time decision support information directly to the hands of drivers.

Tom Pierce, Comdata Vice President Fleet IT, explains: "We wanted to help drivers make better fueling decisions, by giving them a real-time tool to plan the best place for their next stop."

The aim was to create a next-generation application that would combine fleet telematics and GPS information with Comdata's rich repository of data on fuel merchants, complete with real-time

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> When you need to build an app fast, minimizing the number of technologies can really help, as Tom Pierce, Vice President Fleet IT at Comdata, explains: "We expected to need a separate geo-spatial tool, but the built-in capabilities of the IBM Cloudant platform gave us all we needed, which streamlined the app development process considerably."

prices, 24 hours a day. The natural choice was a mobile app that could run on the drivers' own devices, giving them the ability, when stopped, to review the best future fueling options based on their route and predicted journey time.

"We knew that the app would depend very heavily on location services, and we wanted to take advantage of an existing geo-spatial toolset so that we could move forward quickly," says Pierce. "The business was keen to get the app completed as soon as possible."

High-Speed Launch

For speed and mobile application deployment, Comdata chose IBM MobileFirst™ as its development platform, and selected IBM Business Partner, PointSource, to manage the development and design. "The PointSource team matched our aggressive commitment to rapid delivery — it was a great partnership," says Pierce. "We knew we needed a NoSQL database that would scale easily, because we anticipated rapid take-up of the app. That brought us to IBM Cloudant — which had the added advantage of offering mature and sophisticated geo-spatial capabilities."

IBM MobileFirst provided an open, comprehensive platform to build, test, run and manage Comdata's new mobile app, improving time-to-market and enhancing mobile application governance and security.

Selecting IBM Cloudant Dedicated Cluster gave Comdata a flexible, scalable, fully managed database in the cloud, backed by an expert technical team. Comdata deployed the IBM Cloudant solution on SoftLayer® cloud infrastructure. "Choosing SoftLayer, an IBM Company, meant we had all the major elements — cloud and software — from IBM, so we felt well positioned for success. As the IBM Cloudant team was so familiar with SoftLayer, we felt confident that they would get the best performance from it." says Pierce.

Using the SoftLayer platform also meant that Comdata avoided the capital cost and delay of deploying its own infrastructure, simplifying the investment and accelerating time-to-value. Pierce adds: "With SoftLayer, we don't need to think about keeping the physical infrastructure running, so we can focus completely on building a great mobile app for the business.

Using the IBM technologies, Comdata and PointSource successfully delivered the first version of its mobile application software within just twelve weeks. "Our business sponsors

were delighted to see the app come together as quickly as it did," says Pierce. "The IBM Cloudant technical team played a big part, helping us quickly get up to speed with the platform."

Keeping Customers in the Know

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> With IBM Cloudant Dedicated Cluster, we were able to create our fuel-management mobile app within an aggressive twelve-week timeline.
>
> -Tom Pierce,
> Vice President Fleet IT, Comdata

Using the new Comdata app, truck drivers can decide where to stop for the best-value fuel, based on their current position, route and timetable. The prices shown are personalized to each driver, automatically including discounts negotiated by their company, as well as personal preferences. Pierce says: "We can lead drivers to the location where their company will get the best price. Cloudant has an impressive built-in capability to analyze routes and location geometry, and the inclusion of the fourth dimension — time — means that the app will not direct drivers to fuel stops that will be closed by the time they reach them."

The IBM Cloudant database-as-a-service appraoch was a major contributor to Comdata's short time-to-market for the app. "We didn't have to think about creating or modifying database schemas — we simply loaded our data," says Pierce. "Today, we have no database management overhead, so we can focus on building out new functionality. We also benefit from the easy scalability of the Cloudant Dedicated Cluster and SoftLayer services.

Developing and running apps on SoftLayer means we don't have to go through the usual proceurement and on-site installation procedures to scale — we can quickly scale the capacity up and down as needed, and that's a great advantage with a new app, when you don't know precisely how much usage you'll see. We must maintain high quality of service as we scale, with no downtime, because this is a business-to-business environment. We can do that with Cloudant."

For More Information

To learn more about IBM Cloudant solutions, contact your IBM representative or IBM Business Partner, or visit us at: ibm.com/software/data/cloudant/.

To learn more about IBM MobileFirst Solutions, visit: ibm.com/mobilefirst/in/en/.

To learn more about Comdata, visit: www.comdata.com.

To learn more about PointSource, visit: www.pointsource.com. ∎

View this case study on IBM.com here.

Case Study: First Data Hellas

Dramatically Improve the Accuracy of Budgeting and Billing with IBM and Incube

When the conditions in which your business operates change, the need to re-align complex core financial processes such as budgeting and billing can become a drag on your operations, and costs can easily creep upwards.

Overview

The need
Changing conditions in the Greek banking industry were piling pressure on First Data Hellas' manual budgeting and billing processes. How could the company cope with the rapid pace of change without letting costs spiral?

The solution
Working with IBM Business Partner Incube, First Data Hellas replaced its spreadsheets with an advanced financial performance management solution that automates forecasting, invoicing and reporting.

The benefit
Budgeting and billing processes are much faster and more accurate. The flexible IBM solution sharpens the firm's ability to cope with market changes, while keeping costs firmly under control.

Solution components

Software
Incube Financial Management

IBM® Cognos® Business Intelligence

IBM Cognos TM1®

IBM Cloudant™

SoftLayer®

IBM Business Partner
Incube

Services
IBM Application Specific Licensing

The key is to become more flexible, as First Data Hellas discovered. To respond more effectively to the ongoing evolution of the Greek banking sector, the company decided to transform its financial management processes and automate many previously manual processes by adopting an advanced analytics and performance management solution from IBM. As a result, forecasting and invoicing are now faster, and the company is much better equipped to handle rapid change.

Supporting Clients' Ever-Changing Needs

Payment processing company First Data Hellas offers a broad range of services to support many types of commerce, and invoices clients for these services on a monthly basis.

In the past, the company managed the invoicing process manually. The finance team had to gather information from a huge set of data feeds, and calculate the billing figures for each client in spreadsheets. With just three employees responsible for collecting and checking data from

hundreds of spreadsheets, the risk of making a mistake and sending out an incorrect invoice was growing too high.

The onset of increased turbulence on the Greek financial market exacerbated the problem, as many of the banks that First Data Hellas serves began to undergo mergers. Suddenly, the company's client base was in a constant state of flux.

Line Olsen, Finance Manager at First Data Hellas explains: "On top of the demand for monthly billing, we had to update the spreadsheets whenever our clients underwent structural changes. As this began to occur more and more often, our existing way of working became less and less practical. Our reliance on spreadsheets threatened our ability to invoice promptly and accurately — a key factor in providing top-quality customer service."

First Data Hellas is also under pressure to provide budget, forecast and operational expenditure figures to the group's global headquarters promptly after the end of each month. These financial planning processes were also performed in spreadsheets, and the finance team faced similar challenges in terms of keeping the figures up-to-date. The company began looking for a solution that could address its needs in both areas of the business.

Deploying a Powerful Analytics and Performance Management Solution

First Data Hellas found out that the corporation's Polish subsidiary had overcome similar challenges by teaming up with IBM Business Partner Incube, and implementing the Incube Financial Management enterprise performance management solution. The Greek subsidiary decided to follow suit.

Incube and IBM partnered through IBM's Application Specific Licensing Program, which allows Business Partners to infuse their applications with IBM technology to reduce development costs, leverage the IBM brand, and go to market faster. Incube's expertise in the finance industry and experienced engineers were the ideal mix to bring a finance-focused, value-add solution to market.

Krzysztof Kowal, owner of Incube, comments: "We found the IBM ASL program was the right way to combine Incube's proprietary Qalcwise technology, the SoftLayer® cloud platform, IBM Cloudant™ database and IBM Analytics software into a coherent offering for our clients' advanced financial planning needs. By leveraging these solutions, the Incube Financial Management Solution can address any financial planning and analysis needs, which are difficult to approach with traditional OLAP technologies."

Incube Financial Management combines IBM® Cognos® Business Intelligence and IBM Cognos TM1® with Incube's own proprietary software to help companies create professional business applications without any coding whatsoever. Simply by combining data with rules and workflows, business experts can build their own analytical applications and take ownership of them, with no need for support from IT.

The solution provides First Data Hellas with a single solution for managing both budgeting and billing. Data is stored in an IBM Cloudant database, and the Incube Financial Management solution runs in the SoftLayer cloud.

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> IBM Cognos has helped us really get on top of our numbers, and our finance processes now run on time, every month.
>
> -Line Olsen, Finance Manager, First DataHellas

Fast, Accurate Billing

All billing processes are now controlled by a single system that collects data from both manual and automatic data feeds, eliminating the need for the finance team to maintain hundreds of spreadsheets. This has dramatically reduced the time, cost and complexity involved in billing, enhancing the firm's ability to adapt when its clients' requirements change.

Line Olsen remarks: "Invoicing errors are now a thing of the past. We can provide timely, accurate, hassle-free billing that raises client satisfaction and protects our reputation as a top-quality service provider."

Closing the Gap Between Budgets and Actuals

When the finance team completed its first annual budget using the new solution, it established a new, much more transparent financial planning process, which inspires the business with greater commitment to the numbers.

"Cost-center managers now see that once they prepare the budget, the figures are checked by another staff member in the same department, and then sent to the finance department for review," elaborates Line Olsen. "There is generally a better understanding of the budgeting process and the deadlines set by our corporate headquarters.

"As a result, people take greater responsibility for the numbers they submit, because they can see how the decisions made during the budget cycle will affect their own department in the year ahead.

"Feedback from staff at our corporate headquarters has been extremely positive, as they can see that we have substantially reduced the variance between forecast and actual costs. First Data Hellas now has a reputation within the global enterprise for being on top of its numbers and submitting accurate budgets on time, every time."

Previously, whenever managers wanted to gain deeper insight into operational expenditure to aid their decision-making, they sent requests to the finance team's analysts, who then needed to manually compile the reports from the spreadsheets. Now, managers can access Cognos directly and drill down into the numbers themselves. As a result, finance analysts can spend less time creating and sending out reports, and more time actually analyzing the numbers.

Line Olsen concludes: "We have finally found a solution that is popular with users at all levels of the business. Our investment in the technology is paying off by saving time for our employees, facilitating smarter business decisions and improving client satisfaction — it's good news all round.

About Incube

To learn more about Incube Financial Management and other corporate performance management and financial governance solutions from Incube, please visit www.incube.pl.

About IBM Analytics

IBM Analytics offers one of the world's deepest and broadest analytics platform, domain and industry solutions that deliver new value to businesses, governments and individuals. For more information about how IBM Analytics helps to transform industries and professions with data, visit ibm.com/analytics. Follow us on Twitter at @IBMAnalytics, on our blog at ibmbigdatahub.com and join the conversation #IBMAnalytics. ∎

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First Data Hellas is the Greek subsidiary of First Data Corporation, a global provider of electronic commerce and payment solutions for merchants, financial institutions and card issuers. Headquartered in Atlanta, Georgia, United States, First Data Corporation has operations in 35 countries, serving approximately 6.1 million merchants and generating total revenues of more than USD10.8 billion per year.

To learn more about First Data Hellas, please visit: www.firstdata.com/en_gr.

View this case study on IBM.com here.

Case Study: Grupo JB

Implement Analytics at Tourist Destination to Improve Profits and Customer Relationships

Grupo JB is the real-estate arm of the Agave Group of Mexico, which makes Jose Cuervo tequila. The group operates a destination in Tequila City, Jalisco, Mexico, called Mundo Cuervo. There, visitors from all over the world can learn about the history of tequila making.

Solution components

IBM Presence Zones — Small Format Edition

SoftLayer®

IBM® Global Business Services® — Business Consulting Services

The Opportunity

A branch of Jose Cuervo, Grupo JB runs Mundo Cuervo, a village in Mexico designed to show tourists what tequila making was like 200 years ago. Each day, tourists explore the village and visit its shops, but the only data gathered from these visits was admissions and sales figures. Having a large captive audience on a daily basis is a potential treasure trove of information for a retail company, and Grupo JB wanted to uncover the insights Mundo Cuervo held.

What Makes It Smarter

Grupo JB built an analytics solution that uses a wireless network to gather information about visitors' whereabouts via their mobile phones. The solution then identifies patterns and trends that help management develop attractive product offers, add staff to busy areas and make other proactive adjustments to traffic patterns and schedules throughout the village, which helps increase sales and brand loyalty.

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> The fact that we can gather quality information will allow us to better the overall experience of the tourists on many levels.
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> -Federico de Arteaga, director of strategic planning Hellas

Real Business Results

Completing the first phase of the implementation has been encouraging for Grupo JB. By delivering personalized marketing to visitors while they are at Mundo Cuervo, the group expects to increase sales of Jose Cuervo products

and souvenirs by 40 percent. Enrollment in the Jose Cuervo loyalty program is also on the rise, with early results showing an increase in enrollees of 20 percent every two months. And finally, Grupo JB expects to see the number of visitors to Mundo Cuervo increase as a result of making the experience modern without detracting from the village's historic feel.

For More Information

Please contact your IBM representative or IBM Business Partner. Visit us at ibm.com/gbs. To learn more about Grupo JB, visit www.cuervo.com. ■

View this case study on IBM.com here.

Analytics, Cloud, and the Insight Economy

Chapter Two:
Data Scientist

The Next Wave of Intelligent Applications Powered by Apache Spark

Brandon MacKenzie and Joel Horwitz

Life revolves around prediction — for example, the route you take to get to work, whether to go on a second date, or whether or not to keep reading this sentence are all forms of prediction. Predicating our future is very much tied to progress. We use it to help us plan our lives so we can increase our likelihood of success.

However, human judgment is intrinsically fallible. There is so much data out there today that no one can possibly process it all. For example, many companies have the data that can tell them how their customers actually feel, and when and why those customers might switch to a competitor. The problem is that most companies do not know what they don't know.

There is hope from a field called machine learning. Machine learning is changing not only how we interact with machines, but how we relate to the world around us. During the past

decade, machine learning has given us self-driving cars, speech recognition, effective web search and a vastly improved understanding of the human genome.

Machine learning is defined as systems that can learn from data. Data is the teacher. Rather than explicitly programming a computer to do something, you provide a machine learning algorithm with examples from which a machine can learn a particular model. These examples are commonly referred to as training samples. The learning algorithm runs through these training samples to build model coefficients, much like a person builds muscle memory of what to do in certain situations.

Different machine learning algorithms learn at different rates and, like humans, can sometimes benefit from extra effort. However, many machine learning algorithms consume a lot of compute resources and require a long time to learn — they are computationally intensive. When machine learning algorithms are given more resources and opportunities to learn on larger, more comprehensive data sets, they become better at making predictions.

So far, the most innovative applications of machine learning have been owned by a select few. The barrier to entry for developing and productizing machine learning has been too high for most corporations. Most companies simply do not have the correct skill set or the necessary technology. However, the next big wave in this field is all about democratizing machine learning from a few to many. It's about enabling everyone to build smarter applications that can serve and interact with our world.

IBM is committed to making Apache Spark™ the engine that will power this next wave of machine learning. Apache Spark is an open source project — it's not a product. Simply put, it is an application framework for doing highly iterative analysis that scales to large volumes of data. Apache Spark provides a platform to bring application developers, data scientists and data engineers together in a unified environment that is easy to use. It is an open source in-memory compute engine powering a stack of high-level tools including Spark SQL, MLlib for machine learning, GraphX and Spark Streaming. You can combine these libraries seamlessly in the same application (see Figure 1).
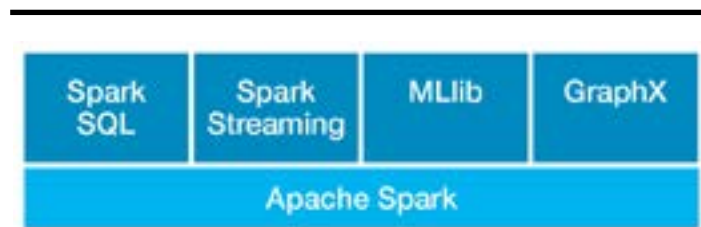

Figure 1. Apache Spark stack

The Apache Spark core engine and application programming interface (API) are major improvements over earlier processing frameworks for distributed computing, such as MPI and MapReduce. The Spark high-level API is much easier to use than those previous lower-level options and its in-memory computer engine is built from the ground up for lightning-fast distributed computation. The engine is well-suited to iterative algorithms such as machine learning. With Spark, these algorithms can execute up to 100 times faster than on MapReduce.

Through its powerful engine and tooling, Apache Spark significantly lowers the barrier to entry for building analytics applications. It reduces the time and complexity around developing analytic workflows. As applications get smarter and more customized through interactions with data, devices and people, previously untapped opportunities become available. We can take on what might have been seen as unsolvable problems by using all of the information that surrounds us and bringing insight to our fingertips when it's needed most.

Over the next five years, machine learning applications will lead to new breakthroughs that will amplify human abilities, assist us in making good choices, look out for us, and help us navigate our world in interesting new ways. Here are some examples of how you can get started with Apache Spark right now to build your own intelligent analytics applications.

Natural language processing: The most expressive and insightful interactions you have with your customers are captured in unstructured form. During conversations, customers often leak the information you need to provide them with a personalized, interactive experience. Far too often, companies capture important information about what their customers think and feel, only to let that information remain unused.

Natural language processing techniques, such as Spark MLlib *term frequency-inverse document frequency* (TF-IDF), can turn an unstructured body of text into information you can use to teach a machine learning algorithm. TF-IDF is the type of technique you often find in search engines. With Spark MLlib, you can bake natural language processing directly into your applications so that you can proactively manage customer interactions.

Prescriptive analytics: You can go further with prescriptive analytics, which predicts not only that something will happen, but the reason why it is going to happen and what you should do about it. For example, you can use machine learning to determine which attributes have the most predictive power in forecasting customer actions (that is, attribute importance). When you know why customers act the way they do, you can intervene in a personalized way through systems of engagement. In short, machine learning can enable you to offer a tailored next best action when it's needed most.

Intelligence of an army: As smart and as powerful as a single person may be, a group of specialists can more effectively work together to win a battle. Machine learning is no different. Spark MLlib has support for machine learning techniques called ensembles. With ensembles, many different models collaborate to make better predictions. This technique is well-suited for the massively parallel horsepower of Apache Spark.

Real-time machine learning: With Apache Spark, you can develop and deploy applications that can actually learn in real time. Spark Streaming and MLlib can work together to make your applications more adaptive on the fly. For example, the MLlib streaming K-means implementation is a technique that learns dynamically, which is useful when patterns in the data change over time. This method enables your applications to focus on what's important in the moment.

Automating automation: Machine learning applications need automation and optimization. Automating machine learning is an area where Apache Spark really shines. For example, with Spark you can automatically determine the best way to train your learning algorithm, a technique commonly referred to as hyperparameter tuning. The Spark community is leading the way in this area — and IBM is excited to help accelerate the charge by contributing its expertise in automation and optimization to Apache Spark.

The problem is that the human mind cannot possibly process all of the insight flowing from big data. Machine learning is the answer to this problem, through its capacity to augment our decision making in the moment to deliver transformative business outcomes. We are already seeing machine learning powered by Apache Spark changing the face of innovation at IBM. We want to bring the rest of the world along with us.

For More Information

Learn how to create machine learning models yourself with our free training materials at BigDataUniversity.com, or head over to the Spark Technology Center at http://www.spark.tc to find out more about this technology. ■

Brandon MacKenzie is the Data Science on Hadoop leader on IBM's Worldwide Technical Sales team for Analytics Platform. Brandon is an expert on statistical processing in Hadoop and HPC environments. He earned his master's degree from The University of Edinburgh.

Joel Horwitz is the Worldwide Director of Portfolio Marketing for the IBM Analytics Platform. He graduated from the University of Washington in Seattle with a Masters in Nanotechnology (focus in Molecular Electronics). He also earned an International MBA in Product Marketing and Financial Management from the University of Pittsburgh.

View this report on IBM.com here.

Fueling the Insight Economy with Apache Spark

Introduction: Welcome to the Insight Economy

Big data is fueling a new economy — one based on insight. The large volume and variety of data available today offers the possibility of seeing things in new ways.

This insight economy is a free market open to all. If you can harness the power of big data, you can monetize data into valuable insights: identify emerging opportunities, improve the customer experience, enhance operational efficiencies, reduce risks and more.

If insight is the basis of a new economy, algorithms are the economic engine that capture deeper insights and fuel business processes, human interactions and embedded systems. They extract value from a wide range of data, from the machine data streaming in from the Internet of Things and sensors, to customer data collected from mobile and social applications. With the right algorithms, you can create intelligent applications that use machine learning to improve data discovery and enhance analytic precision.

These new and deeper insights are disrupting how organizations compete and generate new business models.

To succeed, you must go beyond simply storing and managing big data and Hadoop expertise. Value comes from data-driven insights, not data alone. You need to produce value from raw data resources, analyzing all types of data so you can identify trends, model possible scenarios and predict future results. You must deliver actionable insights rapidly in time to make effective decisions so anyone — not just data scientists — can apply deep intelligence to every enterprise application.

Creating Value with Apache Spark

Building algorithms is not easy. The in-demand data scientists who are tasked with that work need to streamline algorithm development. They require tools that reduce the need for complex coding and deep Apache Hadoop expertise.

How can you create the valuable insights that are the currency for the new economy while controlling complexity? Apache® Spark™ might be the answer.

Apache Spark is an open source enginebuilt specifically for data science. It helps simplify algorithm development and accelerate analytics results. With Spark, you can better extract value from big data, conducting deeper analyses and delivering results faster, all while reducing the time and effort required for coding.
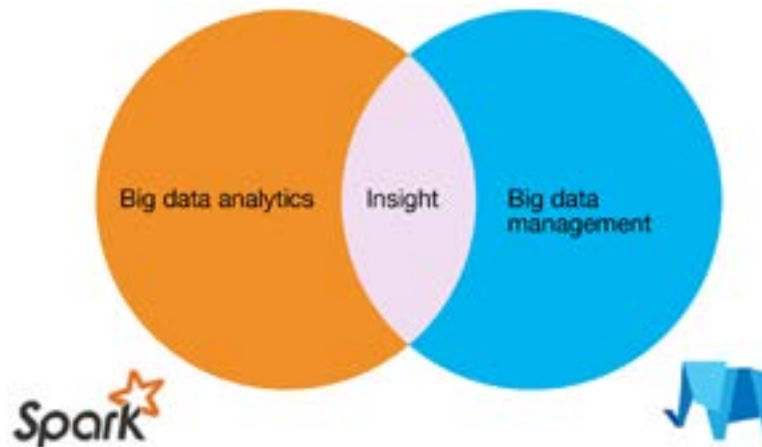
Figure 1. Spark extends Hadoop, bringing together big data management with big data analytics to deliver new insights

Spark enables you to:

- **Extend Hadoop.** Spark complements Hadoop. While Hadoop is designed to manage big data, Spark is designed for analytics. Integrating Hadoop and Spark solutions enables you to generate new insights from big data (see Figure 1).

- **Streamline development.** Developers and data scientists can use their existing expertise with programming languages such as Scala, Python and SQL to speed time to market. With Spark, there's no need to learn new languages.

- **Simplify data access.** Spark removes data access complexity, providing seamless access to enterprise data with familiar tools. Built-in machine learning and graph algorithm libraries make it easy to enable interactive queries and deliver fast responses.

- **Develop a wide range of algorithms.** Spark lets you develop and deploy all workloads — including machine learning, iterative and batch — faster.

- **Accelerate analytics results.** Spark uses an in-memory approach for processing data to deliver results quickly.

Since it was first created in 2009, Spark has become one of the most active open source projects, with more than 400 contributors. Given the advantages of Spark, it should be no surprise that it's quickly gaining popularity among data scientists, developers and line-of business executives.

Seeing Spark in Action

How is Spark driving the insight economy forward? Organizations in numerous industries are using Spark to analyze large volumes of data and deliver real-time insights while simplifying software development.

Optimizing Marketing Promotions

Spark can help retailers transform huge collections of customer data into insights that inform marketing campaigns and targeted promotions. They can also use Spark to create algorithms for finetuning marketing efforts in progress. Using Spark's machine-learning capabilities, data scientists can produce algorithms that automatically adjust the amount of offered discounts or the timing of communications based on success rates so far.

Improving Telecom Performance

Telecom and content providers can use Spark to deliver the highest-quality service to customers. Data scientists can create algorithms that analyze real-time performance data and make network adjustments to help ensure customers have consistent, high-quality voice or video quality.

Forging New Frontiers in Science

From mapping genomes to modeling air turbulence, scientific experiments today generate massive data volumes. Building algorithms with Spark helps research groups produce results fast so they can fine-tune experiments and explore more permutations without extending the duration of projects. By simplifying programming, Spark helps researchers stay focused on science and avoid complex programming.

Industry	Use cases
Telecommunications	Call data record processing, social analysis, churn prediction, geomapping
Transportation	Intelligent traffic management, automotive telematics
Energy and utilities	Smart grid monitoring
Health and life sciences	ICU monitoring, remote healthcare monitoring
Law enforcement, defense and cybersecurity	Real-time surveillance, situational awareness, cybersecurity detection
Finance	Market data analysis, customer service
Fraud prevention	Multiparty fraud, real-time fraud detection
Manufacturing	Predictive maintenance
Insurance	Telematics, fraud detection, cargo protection, call center optimization

Spurring Apache Spark Innovation

IBM views Apache Spark as a critical technology for addressing key challenges and delivering the benefits of intelligencebased, in-time action. As a result, IBM is making significant investments to support the growth of the core Spark project and its community, to help develop the skills of the next-generation data practitioner and to facilitate IBM solutions by incorporating Spark.

IBM is also committed to advancing the use of Spark so that a growing community of Spark-savvy data scientists and data analysts can quickly transform today's problems into tomorrow's solutions. IBM believes that transformation is essential to business and is committed to helping data scientists realize the benefits associated with those transformations.

Building Community

For more than 40 years, IBM has demonstrated a strong commitment to the open source community, making instrumental contributions to Linux, Hadoop and other open source projects. IBM is a founding member of the Open Data Platform (ODP) Initiative, an association formed to facilitate collaboration, innovation and standardization for big data technologies.

IBM has also been a key member of the Apache Spark community since the beginning. IBM is one of four founding members of AMPLab, the organization based at the University of California, Berkeley that created Apache Spark. AMPLab hosts training programs and will offer new courses developed by IBM and AMPLab faculty. In the online world, IBM is launching a digital community for Spark and has created a Spark social badge for showcasing Spark expertise on social media.

Fostering Innovation

IBM is opening the first Spark Technology Center, which will help foster development of the core technology, serve as a business incubator and help promote Spark in the technology industry. The Spark Technology Center is located at the San Francisco campus of Galvanize, an organization dedicated to enabling new growth opportunities through industry-focused education. Each Galvanize campus brings together industry partners, individual data scientists, academic researchers, students and others all under one roof. The purpose of the Spark Technology Center is to create and promote open and free educational assets for enabling Spark adoption and sharing best practices, as well as evangelize Spark technology and its business potential.

Cultivating Partnerships

IBM is partnering with organizations to help scale Spark for a global audience. For example, IBM has partnered with Databricks, an organization dedicated to extracting value from big

data, founded by the creators of Apache Spark. Together, IBM and Databricks will offer best-of-breed training, create innovation labs and produce a reference architecture to speed time to value.

Unifying Analytics on and Around Spark

IBM is incorporating Spark into its big data and analytics solutions, such as IBM® BigInsights® for Apache Hadoop and the IBM Bluemix™ cloud platform. Other IBM solutions also complement Spark. For example, IBM Streams improves on Spark's built-in streaming capabilities, enabling streaming analytics for cybersecurity, financial trading and other applications that require extremely low latency.

Get Started

IBM analytics solutions are ready-made for incorporating new technologies into existing architectures and delivering rapid business benefits. These flexible solutions can take advantage of whatever Spark-based innovations lie ahead as more and more data scientists around the globe create solutions using Spark.

Ready to see how Apache Spark can help you profit in the insight economy? Check out these resources:

ibm.com/spark

Solution brief: IBM InfoSphere Streams: An open platform

TDWI Best Practices Report: Hadoop for the Enterprise ■

View this report on IBM.com here.

Make Better Decisions with the Predictive Power of SPSS

By Scott Etkin

With the growing awareness of the benefits that predictive analytics can provide, many organizations are wondering how to bring the power of prognostication to their business. What factors are most important for businesses to consider when determining the appropriate predictive analytics solution for their needs? What features should organizations look for in a predictive analytics solution?

IBM SPSS Modeler is a data mining and text analytics software application that can scale from desktop installations through to larger deployments that are integrated within operational systems. Its visual, drag-and-drop interface allows data analysts as well as line-of-business users to leverage statistical and data mining algorithms to build predictive models and create sophisticated data visualizations, all without doing any programming.

Jane Hendricks, IBM's Worldwide Technical Marketing Lead for Predictive Analytics, spoke with Data Informed about predictive analytics as well as how SPSS Modeler democratizes data access and insight across an organization, and various ways organizations are using it to improve operations and be more effective.

Data Informed: Please describe SPSS technology. What is it?

Jane Hendricks: IBM SPSS is an integrated set of products for advanced analytics spanning ad-hoc statistical analysis, predictive modeling, data mining, text analytics, entity analytics, optimization, real-time scoring, machine learning, and more. The products can be used by business users, data scientists, and developers in a collaborative way to inject predictive intelligence into strategic, tactical, and operational decisions that are made by people and systems for virtually any business process.

The name SPSS originally stood for Statistical Package for the Social Sciences. This was a reflection of the original market for the product. Now, of course, the predictive insights it provides are popular across all industries.

DI: What differentiates SPSS technology from other analytics solutions on the market?

Hendricks: I would say there are four key differentiators. One is the ease with which SPSS can be embedded into business processes. That integrated deployment capability amplifies the value of predictive insight beyond a single report.

Also, the technology makes access to predictive analytics easy for business users. It's accessible for a non-expert with guidance and automation, speeding time to value for the novice and expert alike.

Another differentiator is SPSS' power to drive business transformation. SPSS delivers deep capabilities spanning data wrangling and manipulation, deep statistical analysis, data mining, machine learning, ensemble modeling, simulation, text analytics, entity analytics, and more to cover the widest set of enterprise use cases.

Finally, there's openness and extensibility. SPSS embraces big data and open-source technologies, such as R, Python, SPARK, Hadoop, and cloud to support flexibility in usage and users.

DI: What are some of the ways that organizations are applying this technology to their business, and what kinds of results are they seeing?

Hendricks: SPSS is being applied to a wide spectrum of use cases by a variety of organizations. For example, Brammer Group, a European supplier of industrial repair and maintenance parts, used SPSS Modeler to streamline inventory by creating stock profiles based on customers' buying patterns. The company now is able to predict more efficiently what stock is needed and has reduced its inventory by $49 million US.

But it's not just businesses that are using SPSS. The Florida Department of Juvenile Justice uses IBM SPSS Modeler and SPSS Statistics to analyze delinquency at every level, from statewide overviews down to the level of individual programs and even individual children. The SPSS solutions measure the effectiveness of individual intervention programs by analyzing patterns of subsequent reoffending. This helps the department prioritize funding for programs that are working and make decisions based on data instead of "gut feel." For example, the data revealed that delinquency rates actually fall during school vacations. This insight, which might seem counterintuitive, enables the department to deploy resources more effectively at other times of the year. The insights they uncovered helped guide changes in the law, and the department has reported a 34 percent reduction in school-based delinquency.

Even here at IBM, we are using SPSS Modeler to optimize our own operations. Our facility in Bromont, Quebec, assembles CPU modules that power servers in banks, hospitals, and other organizations. They are using SPSS Modeler to improve the QA process by identifying failure patterns. This allows them to resolve problems more quickly, reduce lab costs associated with product testing, and limit interruptions to production flows. One thing they learned was that controlling humidity at one specific point on the production line will improve product quality, resulting in an ROI of 160 percent.

DI: You mentioned that SPSS can be deployed in the cloud. What are the advantages of deploying SPSS in the cloud?

Hendricks: SPSS can be deployed on-prem, on cloud, or as a hybrid. One advantage of a cloud environment is fast deployment without the need to install software locally, relieving the burden on IT. In addition, with cloud, there's subscription pricing, which eliminates the need for a large upfront software investment. And, of course, with cloud, you get a hosted environment with software, security, and technical infrastructure all managed by IBM. One of the key benefits of our technology is that it is supported by the breadth and depth of other IBM capabilities that are transforming industries and professions with data. ■

Scott Etkin is the managing editor of Data Informed. Follow him on Twitter @Scott_WIS.

Case Study: SilverHook Powerboats

IBM Software Enables Real-Time Data Collection and Analysis in the Cloud to Improve Decision Making

Overview

The need
Nigel Hook, president of SilverHook Powerboats, wanted to use sensor data collected from racing boats to improve the decision-making abilities and safety of racers and to enhance the fan experience.

The solution
Using IBM Internet of Things Foundation (IoT Foundation) to stream data directly to the cloud, Hook's team was able to quickly build an application on the IBM® Bluemix™ platform to analyze and deliver insights in a useful format to racers and fans.

The benefit
With IBM technology, the team completed a prototype in 40 percent less time, delivering a comprehensive analytics solution with data visualization in just three months.

Solution components

Software
IBM® Bluemix™

IBM Internet of Things Foundation

Powerboat racing is Nigel Hook's passion. Not only is he the cofounder and president of SilverHook Powerboats, but he also pilots the 48-foot 77 Lucas Oil SilverHook racing powerboat. Working in both capacities, Hook became very familiar with the challenges facing the sport. He knew that racers relied on telemetry data from their boats to make strategy and safety decisions, but that it was difficult for them to keep track of the enormous amount of information they received. Hook also saw that fans struggled to follow the progress of a race out on the ocean, reducing their engagement. "We wanted to capture and deliver the race to the consumer, but there were challenges with camera equipment in this environment," he said.

Struggling to Make Use of Telemetry Data

Sensors on Hook's racing boat provided over eighty sources of data, but there wasn't a way to

collect, distill and deliver insights in a useful format. "We've got telemetry data from the boat, but it was just going to one person," he explained. "We wanted to use IBM technology, the Internet of Things, to get all the team's data into the cloud, then use predictive analytics to look for what's important." Hook's intention to debut a solution at the World Powerboat Championship, only a few months away, imposed a tight deadline on the project.

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> With IBM Bluemix, the team was able to build an application faster than ever before, pulling data into the cloud and distilling it down to important insights. "It changes the paradigm in a lot of different areas if we can develop this type of technology at this speed. It gives other projects a benchmark to live up to," said Nigel Hook, president of SilverHook Powerboats.

Collecting and Analyzing Data in the Cloud

Hook leveraged the capabilities of his other company, DataSkill, Inc., as well as the IBM jStart® team and partner company Virtual Eye, a division of Animation Research Ltd., to harness the development speed and scalability of IBM Bluemix. The three groups used IoT Foundation to stream data from the vast array of sensors and GPS trackers directly into the IBM cloud. They then extracted important insights from the flood of data using analytic tools within Bluemix. Virtual Eye, a world leading provider of 3-D sports graphics for television, Internet and mobile devices, used the data to develop a rich visualization, delivering technical information and alerts to the racing team and a real-time representation of the race to fans.

Faster Time to Application Delivery

Because Bluemix provides a scalable cloud infrastructure to rapidly develop, monitor and deploy new applications without time consuming on-premises management, jStart and DataSkill engineers were able to deliver results much faster than before. "There was a 40 percent improvement in development time. That not only translates into financial savings, but also makes this a new opportunity, because it probably wouldn't be possible if it were going to cost more," Hook said. With IoT Foundation simplifying connectivity to the devices, Virtual Eye completed the visualization in just three weeks.

Racers can now get real-time insights during the race, improving their decision making and competitiveness. "Nigel's the CEO of that boat. He's sitting there and we're delivering him, in real time, the data that helps him make decisions fast," said Ian Taylor, chief executive officer (CEO) of Virtual Eye. Having access to the data also improves the safety of the racers out on the open ocean, Hook explained, "The more time I can spend on where the competition is, what the sea conditions are and how to push the edge instead of looking at all the gauges

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IBM has been developing great technology around Bluemix to speed up the development of applications. We can deploy faster, and we also have all these new capabilities. When you combine the two, you've got a whole different ballgame.

-Nigel Hook, president,
SilverHook Powerboats

is a huge safety improvement." Racers can monitor equipment more easily and identify failures that would otherwise go undetected.

Virtual Eye's 3-D visualization of the data also provides a new, exciting fan experience. Fans can now see what's going on in the race as it happens, including boat locations, speed, and leaderboards. As a result, Hook has high hopes for the future of powerboat racing. "It provides all this information and entertainment to the families, which is what we've been missing all these years," he said. "Once people understand what's going on in this sport, I think that could really transform it, bring more fans, more sponsors, and make it more professional." The team also sees applications for the solution in other industries. "Let's start delivering to a CEO the same level of data in real time so he's able to manage his ship, as it were, as well as Nigel can now manage his," said Taylor.

For More Information

To learn more about IBM Bluemix, please contact your IBM marketing representative or IBM Business Partner, or visit the following website: ibm.com/bluemix. ∎

<div style="background:red;color:white;text-align:center;">

View this case study on IBM.com here.

</div>

Analytics, Cloud, and the Insight Economy

Chapter Three:
IT Leader

All Roads Lead to Hybrid Cloud

Creating a Foundation for an Integrated IT Service Delivery Strategy

By Dan Anders, Simon Bennett, Don Beville, Mikael Brändemar, Bob Freese

The Shift to Hybrid Cloud

Organizations are discovering that the decision to move to the cloud is not as simple as "go" or "no go." More often, the decision involves using the best combination of resources to achieve their strategic objectives — in other words, a hybrid approach. In a December 2013 Gartner Data Center Conference Poll, IT organizations (N = 70), 74 percent will pursue an internal hybrid IT strategy by 2015.[1]

According to IDC, "For an entire IT operation the hybrid structure will be the glue that makes it work. Hybrid will bring all cloud and non-cloud services together, and will enable an organization genuinely to manage its IT operations as a service."[2] IDC also states that hybrid is the ultimate destination for most enterprise infrastructure environments.[3]

Simply put, everything you need to deliver your IT services will no longer be found in one place. As a result, connecting, accessing and securing data from siloed services are critical requirements. In one study, 76 percent of respondents expect to be able to migrate applications and data across inhouse data centers and multiple cloud providers.[4]

Hybrid is the future approach for integrated IT service delivery. It is not "optional" or "nice to have" but instead represents the environment in which all organizations will operate. **Thus, it is critical to understand the implications of hybrid and to devise a strategy to facilitate its successful implementation.**

What Exactly is Hybrid Cloud?

At IBM, we define hybrid cloud as the secure consumption and integration of services from two or more sources, including private cloud, public cloud or traditional IT. Hybrid cloud can deliver value in three critical areas:

- **Integration of applications, data and services.** A hybrid cloud creates the transparency needed to see and connect data and applications across infrastructures. For example, a hybrid cloud approach can foster integration between systems of record, often housed on traditional IT or a private cloud, and systems of engagement, which are increasingly hosted on a public cloud.

- **Composition, orchestration and management of workloads.** An agile, competitive business is increasingly a composable business — one in which processes, applications, services and data become building blocks that are assembled and re-assembled in the cloud to find new ways to rapidly innovate and engage with customers. A hybrid cloud enhances developer productivity so applications can be integrated, composed and delivered.

- **Portability of data and applications.** In a hybrid environment, developers can rapidly connect and compose data and services for enterprise, web and mobile applications. This gives you the opportunity to act fast: Perhaps you need to make an application available in a new country, or move from a development and test environment to production, or move from primary capacity to scale-out capacity.

For example, you may consider strategic investments in targeted cloud and mobile services, yet you also want to utilize your legacy applications as much as possible. A hybrid cloud allows access to data, applications and services where they are most optimally placed — whether on public cloud, private cloud or in-house on existing infrastructure.

As shown in Figure 1, IBM believes the true value of the hybrid cloud lies not just in rapid solutioning of divergent IT services, but also in the integration of IT services that deliver the composite applications of the future.

A Hybrid Cloud Integrates the IT Services that Deliver Composite Applications
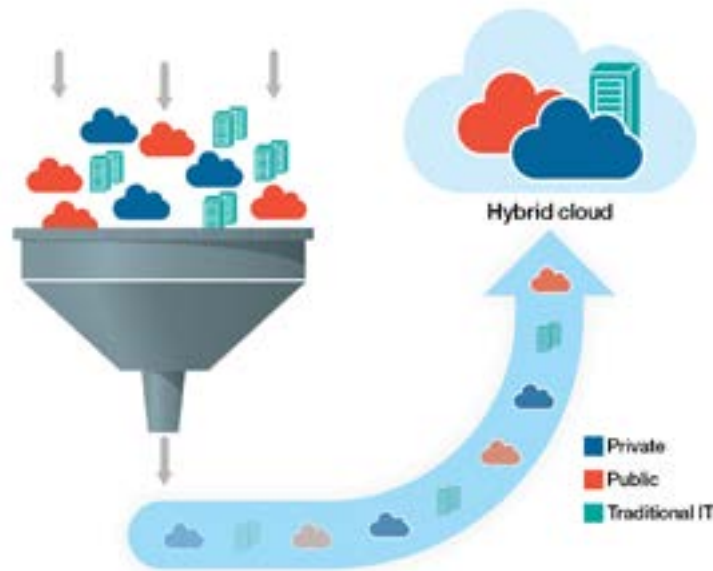

Figure 1. The true value of the hybrid cloud lies in the integration of IT services that deliver the composite applications of the future.

Integration: The Key to a True Hybrid Environment

Given the unprecedented pressure to meet accelerating and dynamic requirements, organizations often resort to "rapid response" mode. To handle this velocity of change, they sometimes adopt uncoordinated technical solutions with disparate interfaces and

disjointed management processes. In effect, organizations often create an unplanned hybrid environment by default, one that uses an assortment of service providers for uncoordinated purposes. Such a scenario can also serve to suboptimize future environments.

To achieve a truly integrated enterprise IT environment and manage to the new hybrid reality, IBM recommends investing time up front in three areas, as explored in this section and shown in Figure 2:

- Architect the hybrid cloud framework

- Optimize service quality and customer relationships through a service portfolio management approach

- Assess key governance and organizational considerations for a hybrid cloud environment

Architect the Hybrid Cloud Framework

When establishing an integrated IT architecture, organizations often create hybrid infrastructure and platform foundations, and then migrate applications, starting with those that are considered lower risk. Most have a mix of cloud and traditional IT deployments today, and their transformation to an interconnected hybrid model will include integration, optimization and management. The evaluation of workloads, including functional and nonfunctional requirements, should be the basis for any architectural framework, including hybrid.
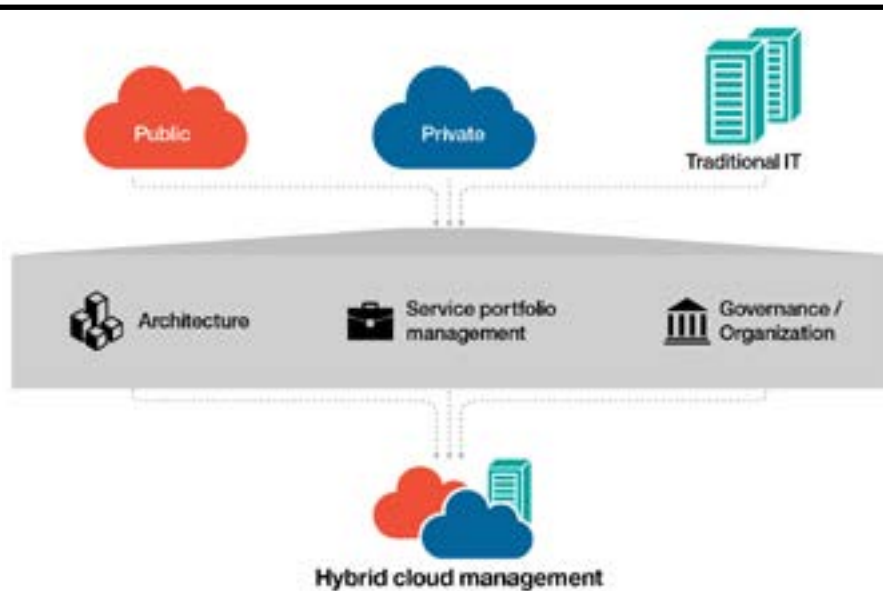

Figure 2. Devoting up-front time to strategies around architecture, service portfolio management and governance helps you achieve a truly integrated hybrid cloud environment.

Visualizing Architectural Patterns Through Hybrid Cloud Scenarios

When considering technical requirements of dozens and potentially hundreds of workloads, it's helpful to establish categories based upon workload characteristics. You can then group your workloads into a smaller number of scenarios. From there, you can categorize your scenarios into a meaningful collection like the seven hybrid scenarios depicted in Figure 3.

These seven hybrid scenarios can serve as a starting point, allowing you to validate your workload-driven use cases and to finalize the portfolio of scenarios that your hybrid design must accommodate. Then, the scenarios can aid in visualizing architectural patterns.

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> A key implication is that a separate architecture is not necessarily required to address each scenario. Rather, a reduced number of architectural patterns could be designed to express the capabilities, qualities and components required for the full set of scenarios. An integrated hybrid architecture should contain a set of patterns that collectively addresses a broad spectrum of scenarios and requirements.

From an architectural perspective, hybrid does not represent an entirely new set of requirements compared to those in legacy cloud implementations. Therefore, a flexible baseline cloud architecture can be updated and adapted to address the multiple scenarios of hybrid.
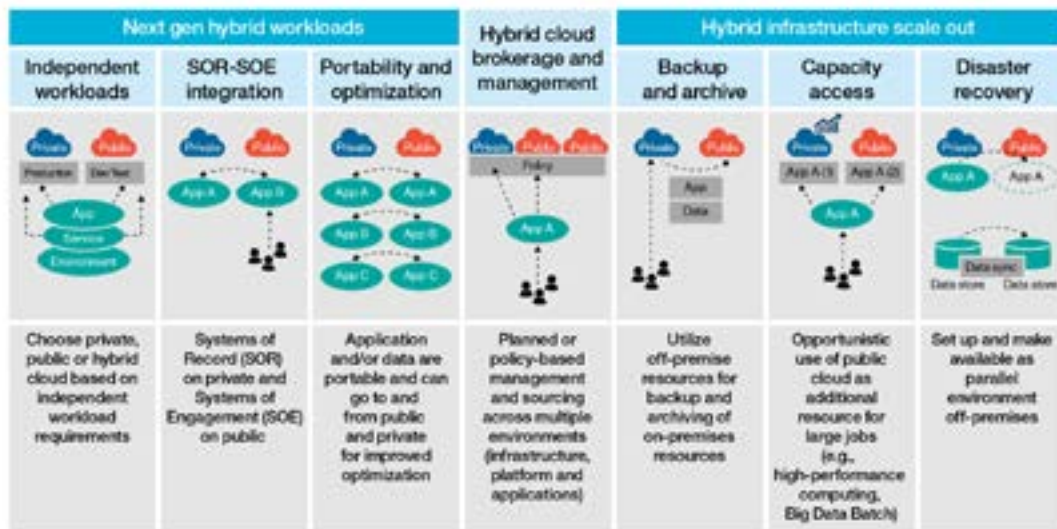

Figure 3. These seven typical hybrid cloud scenarios help you validate your workload-driven use cases and finalize the scenarios that your hybrid design must accommodate.

Hybrid Architecture Perspectives and Considerations

When addressing a hybrid architecture, you can follow one of two approaches. The first involves setting up and managing the hybrid environment yourself. The second uses an environment that has been set up by another individual or organization. For either approach, you will need to consider business, infrastructure, service provider and solution angles, as shown in Figure 4.

Other considerations around hybrid architecture range from general factors to factors specific to an individual workload. General considerations include:

- Building a core cloud platform that allows workload (service) integration

- Integrating public services and applications with on-premises service management processes

- Deploying workloads in the hybrid environment

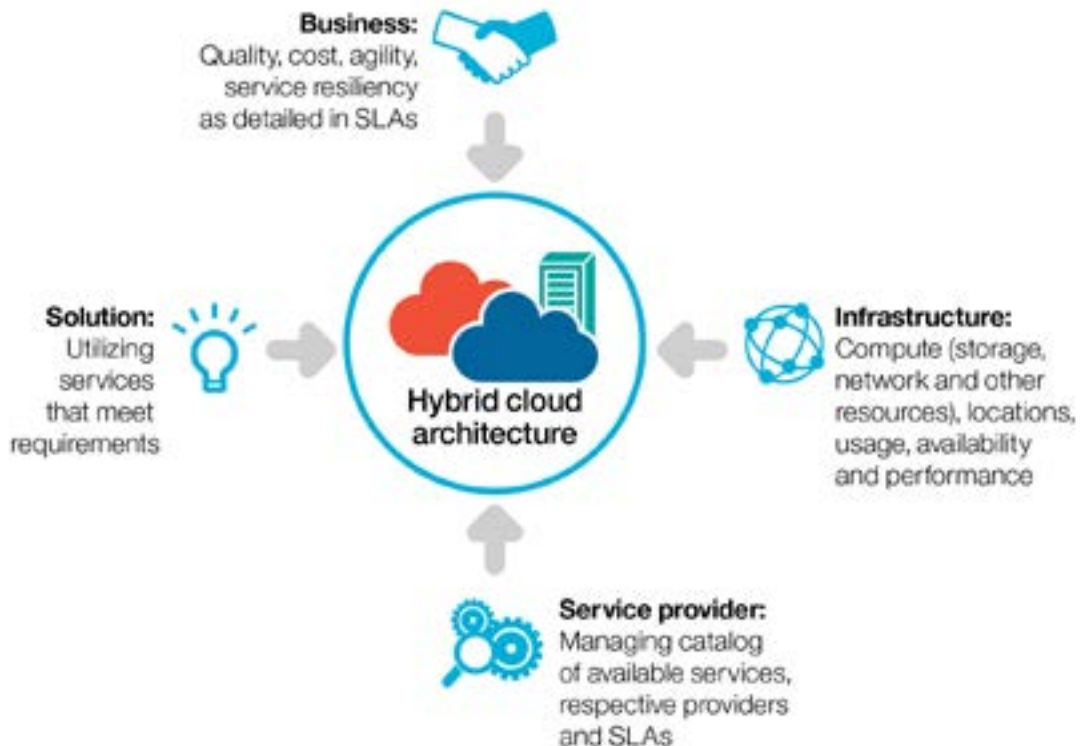- Identifying approaches and tools that provide clients with a consumption-based chargeback model

Figure 4. A successful hybrid cloud architecture considers business, infrastructure, service provider and solution factors.

Factors specific to an individual workload could encompass:

- Motivation for running the workload in a hybrid environment

- Security, compliance or regulatory restrictions on a given workload that would prevent it from being placed in a public or hybrid cloud environment

- Transactional dependencies within the workload or across others that could be unacceptably impacted by added network access and latency

- The ability of prospective cloud providers to standardize and support the IT infrastructure beneath the workload

- The ability of a workload to take advantage of multiple cloud platforms or burst to multiple hosting locations

When considering these topics, a cloud reference architecture that is reflective of hybrid scenarios, use cases and capabilities is a key resource. For example, IBM's Cloud Computing Reference Architecture (CCRA) can be extended to address specific hybrid considerations by adding an architectural pattern for hybrid adoption. This hybrid adoption pattern will support the usage scenarios in Figure 3 and promote understanding of the capabilities required, decisions needed and implementation options available.

Optimize Service Quality and Customer Relationships Through a Service Portfolio Management Approach

A hybrid cloud approach typically encompasses a wide range of choices including service providers, delivery configurations and billing models. It is designed with the flexibility to change and integrate environments, data storage and services as needed.

Correspondingly, many services are becoming modularized and are easier to "plug and play." Development and test environments, storage, security and intrusion detection are often delivered from cloud service providers (CSPs) rather than a traditional IT department. CSPs also deliver innovative services such as GPS positioning, mapping, biometrics, imaging and analytics. The challenge is deciding which services can facilitate strategic, profitable outcomes, without owning the costs and risks.

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> The most attractive hybrid services will be composite services, created from integrated connections to a traditional IT environment and to one or more external CSPs. IT service providers can no longer afford to focus only on technology and their internal organization. They must tightly monitor service quality and manage the relationship with their customers. A service portfolio management approach, as shown in Figure 5, helps to achieve these objectives.

Allocating Investment Resources Through Service Portfolio Management

If you work in an established organization, your portfolio may include traditional IT services, and the portfolio management process will determine if and when services migrate to the cloud. If you are a new business or a start-up, your company was most likely "born on the cloud." You may already compose new services from currently available services offered by external CSPs.

- Current service delivery quality
- Service differentiation
- Availability of skills to build this service
- Service standardization
- Service usage fluctuation
- Security requirements

Is this service a candidate for hybrid cloud?

Which services to provide?

Managing your service portfolio

- Industry trends
- Competitive landscape
- Needs of cloud users
- Identification of services that are more quickly and profitably delivered
- Service potential to meet end goals and business drivers

- Assessing motivations for customers to buy services
- Creating added value so customers buy services from you
- Determining pricing or chargeback models
- Evaluating strengths, weaknesses, priorities, risks
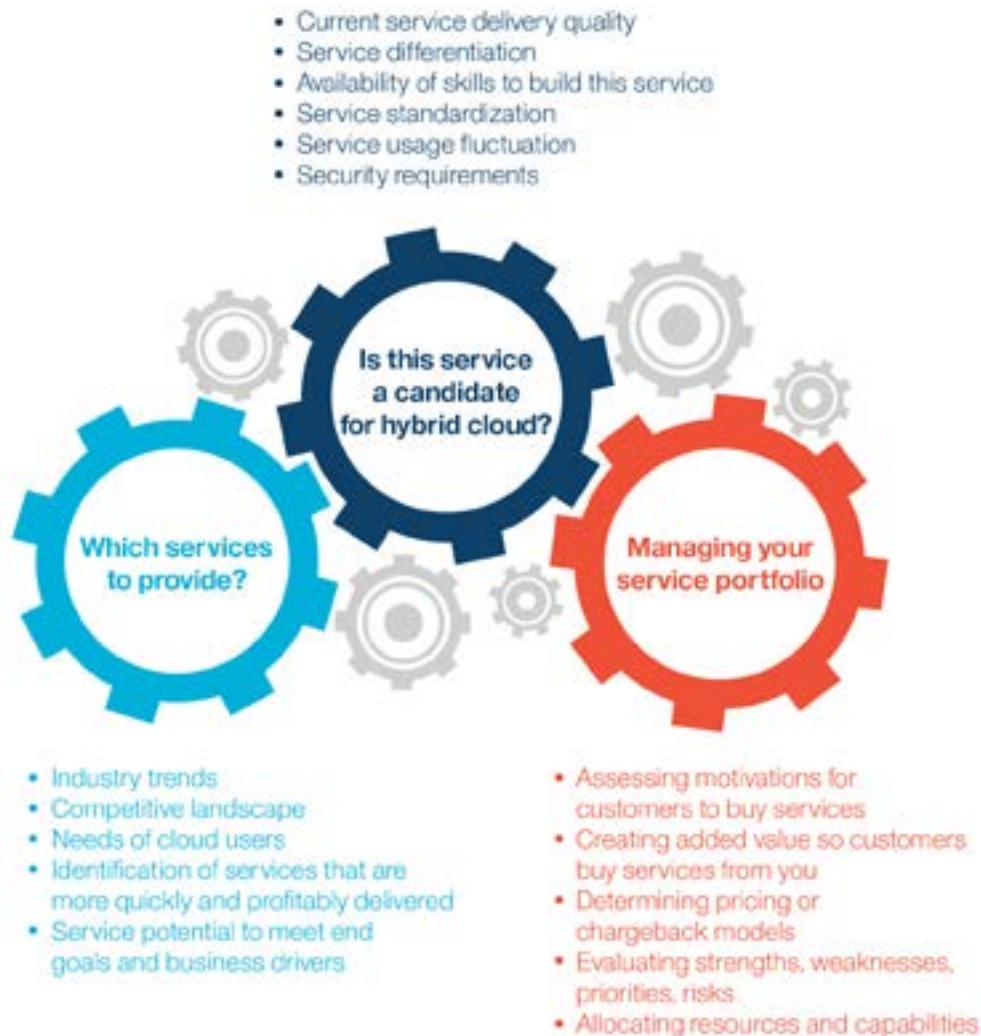- Allocating resources and capabilities

Figure 5. Successful service portfolio management also considers which services to provide and the suitability of a candidate for hybrid cloud.

Hybrid cloud dramatically increases your ability to create, deploy and integrate new services quickly — allowing your organization to keep pace with shifting economic and competitive conditions. A hybrid model also empowers you to iterate on existing services, which

require frequent updates to remain competitive and attractive to customers. Allocating investments through service portfolio management is a critical task for business managers — effective prioritization is essential.

Creating a High-Performance Service Strategy Through Service Portfolio Management

A high-performance service strategy enables you, as your organization's service provider, to consistently outperform competing alternatives over time, across business cycles, industry disruptions and leadership shifts. This positions your organization for both current and future success. A service strategy depends on service portfolio management to facilitate sound investment decisions. It takes a quantifiable approach by comparing the customer-expected outcomes with the investment required to build and deliver the service. A go-forward decision only happens with a demonstrable return on investment.

Deciding which services to provide to your customers will be influenced by many factors, including:

- Industry trends
- Competitive landscape
- Needs of consumers (users)
- Identification of services that can be delivered more easily, quickly and profitably
- Service potential to meet end goals and business drivers

Assessing the competitive landscape from a business perspective, not just an IT perspective, increases the odds for successful implementations — and satisfied customers. For additional insights, see the IBM white paper, "Designing your Cloud Decision Framework".

Your service portfolio is the set of services managed by your organization, some of which will be provided by external CSPs. It is used to manage the lifecycle of all services, including service pipeline, service catalog and retired services. Service portfolio management is an ongoing process to assess the "business value" of competing services and make decisions regarding investment resource allocation. It clarifies strategic issues such as:

- Motivations for customers to buy these services — and to buy them from you
- Pricing or chargeback models
- Strengths and weaknesses, priorities and risks
- Allocation of resources and capabilities

The service catalog is a database or structured document with information about all "live" services, including those available for deployment. The importance of the service catalog increases in the hybrid cloud world. For composite services, the catalog will be a vital tool to maintain operational visibility and control.

Assess Key Governance and Organizational Considerations for a Hybrid Environment

Boundaries around IT component lacement are increasingly blurred. While IT can fully control infrastructure assets in data centers or office locations, many assets will be housed in virtual machines or containers owned by third parties. The asset is often invisible and can only be seen as an API or provisioned service — placing them beyond IT's traditional span of control. At the same time, management of end-to-end business processes grows ever more complex, and a hybrid environment requires an evolving mix of IT skills.

Consider the challenges in managing this process: a legacy system of record (in the data center) updated from a system of engagement (in the cloud) and a reporting function delivered as Software as a Service (SaaS). Under these circumstances, how can IT manage availability, performance and capacity, among other requirements? Coping with the challenges of an integrated environment will require a new governance and organizational approach, as shown in Figure 6.
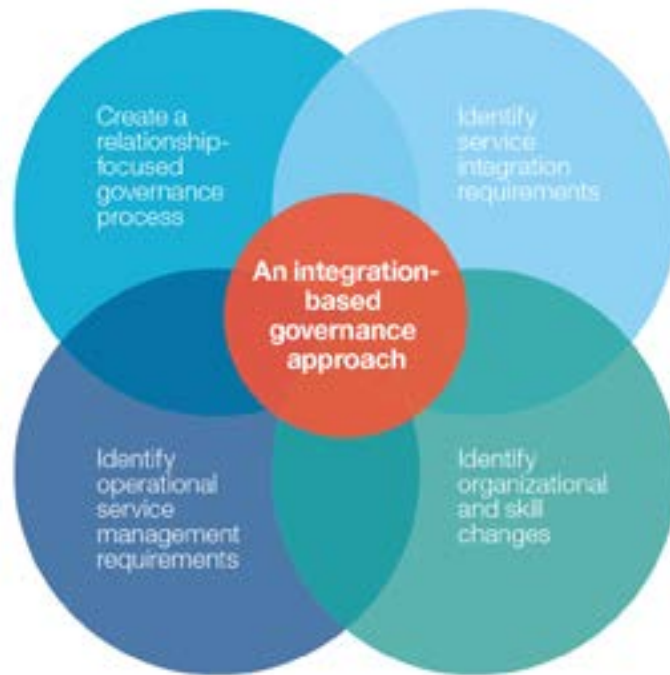

Figure 6. An integration-based governance approach spans relationship considerations, service integration requirements, organizational and skill challenges, and operational service management requirements.

Create a Relationship-Focused Governance Process

Establishing a communications procedure between your IT department and the users of any given cloud service is an essential first step. By introducing a hybrid cloud model and customization restrictions, the IT function changes dramatically. It evolves from an IT Infrastructure Library (ITIL)-type focus to a relationship-led interaction with the CSPs who control ITIL processes on a daily basis. A relationship management role acts as a bridge between the CSP and service users, and helps maintain realistic expectations.

Consider these issues as you establish your governance process:

- Establishment of a common process governance framework
- CSP compliance with overall policies and guidelines to plan and control the IT service supply
- Single focal designations for each CSP and their participation in governance activities
- Data security
- Full understanding and compliance with regulatory requirements

You'll also need to extend supplier service level agreements (SLAs) from single SLAs to collaborative end-to-end delivery targets. The scope of a supplier's engagement needs to correspond to the complexity and demands of the relationship. Keep in mind that contracts define the structure, not the substance of the relationship. Finally, contracts and SLAs must reflect shared goals.

Identify Service Integration Requirements

Typical service integration approaches based around an ITIL process can be difficult to implement and maintain. A CSP uses its own methods and tools, and processes like change management may not follow your organization's approach.

Before you commit to specific service levels, consider the following criteria:

- CSP process roles and responsibilities should be transparent and available for individual clients
- CSPs should collaborate on end-to-end process improvement
- Level of interaction you expect with CSPs
- Differences in CSP services depending on the various flavors of "as a service," including Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and SaaS — often collectively referred to as Everything as a Service (XaaS)

Identify Operational Service Management Requirements

End-to-end service management requires a suite of tools that can support operational processes from disparate sources, as well as information collection and reconciliation. When

examining the information aspect of service management, you will need to understand:

- CSP monitoring events that should be forwarded to clients
- Ability to outsource capacity management responsibility to CSPs
- Integration of reporting across all service providers

When evaluating service management tools, consider:

- Transparency of CSP service management tooling
- Requirements for data interface with other providers, including the service integrator
- IT service management tooling provided as XaaS
- Impact for the single view configuration management database (CMDB) if still applicable

Any implementation should be phased and closely linked to your new operating model. Failure to address integration effectively may cause costly downstream effects.

Identify Required Organizational and Skill Changes

Multisourced environments are a reality. Larger companies have complex IT environments and no single supplier to deliver all services. While each company will have its own sourcing vision, IT landscapes are typically complex and span multiple vendors.

Breaking down IT silos and moving toward an integrated solution can heavily impact your organizational model and associated skills. In fact, more than half of enterprise IT teams will need to create new cloud management roles by the end of 2016.[5]

IBM's point of view is that the service integrator role is indispensable. We work with a standardized SOA reference model for service integration, a model that accommodates new roles and responsibilities and transitions other activities and services to external sources. Our experience with global clients is that multidisciplinary skills become essential. In fact, we are rolling out this model for IBM's own growing hybrid environment.

Hybrid Cloud: The Standard Approach for Integrated IT Service Delivery

Hybrid cloud has evolved to become the standard approach for integrated IT service delivery. Creating a strategy that addresses the ramifications of hybrid and facilitates its successful implementation is critical. In fact, analysts say that through 2017, as public cloud adoption grows, hybrid cloud scenarios will increase the need for management and security services that extend on-premises environments to public cloud services. [6]

 To achieve this integration and manage to the new hybrid reality, you will need a systematic approach to architecting your hybrid cloud framework. Additionally, you should use service portfolio management to optimize service quality and customer relationships.

And, you'll need to adopt an integrated governance strategy that includes relationship considerations, organizational and skill requirements, operational service management, and service integration.

Once implemented, hybrid cloud offers many benefits, including the ability to compose, orchestrate and manage workloads, and exploit the portability of data and applications. **At IBM, we believe the true value of the hybrid cloud lies not just in rapid solutioning of divergent IT services, but also in the integration of IT services that deliver the composite applications of the future.**

Why IBM?

Whether it is envisioning the opportunities that hybrid cloud can offer your business, analyzing your gaps, building your hybrid cloud implementation roadmap or prioritizing what workloads you put on the cloud and how they will perform, IBM can help. We can also assist you with any or all of the following:

- Determine a service portfolio management approach for your organization

- Make strategic systematic decisions regarding those services

- Define your architectural requirements and decisions

- Build your business case

- Design your conceptual and operational cloud

- Define the management framework and governance model

We have a unique cloud adoption framework, a portfolio of cloud workload analysis tools, and intellectual capital developed through more than 9,000 client engagements.

According to IDC, clients highlighted IBM as the strongest in providing functional and industry insights and competence, and using resources globally.[7] Synergy Research ranked IBM as the number one hybrid cloud provider for the enterprise.[8] With indepth consulting and implementation expertise and a wide portfolio of cloud services, IBM helps you take the next step with strategy, design, implementation and migration services. We have firsthand experience with cloud-enabled transformations and have implemented clouds internally for significant cost and efficiency savings. Our assessment services and accelerators can jumpstart and expedite business value.

To learn more about our cloud advisory services, contact your IBM representative and ask about briefings that may be scheduled in your area. You can also refer to our cloud advisory services data sheet.

For More Information

To learn more about IBM Cloud, please contact your IBM representative or visit the following website(s): ibm.com/cloudcomputing. ■

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View this report on IBM.com here.

Case Study: Jibes

Anticipates a 30-Percent Jump in Revenue from Cloud-Based Analytics

Overview

The need
Jibes wanted a fast way to show clients the value of predictive analytics, while minimizing upfront investments and time to value.

The solution
The company uses two cloud services, IBM® Bluemix™ and IBM DataWorks™, to collaborate with clients while building analytics applications, and cleansing and managing the required data.

The benefit
Clients can test analytics strategies with minimal investment, gain more control and reduce time to insight by up to 75 percent, from days to hours; Jibes anticipates a 30 percent increase in revenue.

Solution components

Software
IBM® Bluemix™

IBM DataWorks™

Every company has data — more of it than ever. How can that data be turned into insights about customers that increase revenue? That's a challenge faced by Ivo-Paul Tummers, CEO of Jibes, an IBM Business Partner based in the Netherlands. "We work with retail, financial, and manufacturing companies to manage data and maximize its use as a strategic asset," Tummers says. Now he has a faster way to win new clients and guide them to greater value.

Light, Fast Start

"What we did traditionally is sell an analytics project and deploy a technology platform powered by IBM on the premises to start it," Tummers says. Clients were cautious about investing and reluctant to wait for results, he adds. They needed insights as fast as possible, and the ability to lower inventories quickly.

Turn On, Explore, Discover

"The world is changing, and now we can plug a client into the cloud instead of requiring them to buy a software stack before we engage," says Tummers.

Jibes sits with customers and uses IBM Bluemix, an open-standards, cloud-based platform for building, managing, designing and running apps of all types, such as big data, web and mobile. Jibes consultants and customers use Bluemix to build and test an app together, exploring analytics approaches to see what is promising and what is not." Customers don't want to understand the plumbing," Tummers, explains. "They need the solution to be intuitive, which Bluemix is. Customers want to compile their applications themselves

nowadays." Customers also want to cleanse their own data, at least initially, Tummers adds, and he has them use IBM DataWorks, a cloud-based data refinery. It includes APIs that load and classify data and cleanse addresses. "If the master data is not correct, the analytics won't have any value," says Tummers. One large Jibes customer needed to deduplicate, match and cleanse an information landscape that could serve its 40 operational companies in 35 countries. DataWorks was exactly the right fit, says Tummers. "It was understandable, affordable and manageable, and we successfully engaged them directly with it." Bluemix and DataWorks are easy and inexpensive, and customers feel they are trustworthy because they come from IBM, Tummers adds. "Once a project suc-ceeds in the cloud, customers understand that they need to invest and deploy a traditional stack on premises, using software such as IBM InfoSphere," he says.

Raising Revenue

"As customers use Bluemix, they start smiling, because time to market and time to insight dramatically decrease by as much as 75 percent, from days to hours," Tummers notes. "The customer discovers the value on their own instead of us having to push something which they don't want or don't understand. Wins will be easier. We anticipate a 30 percent rise in revenues."

For More Information

To learn more about IBM Bluemix or IBM DataWorks, please contact your IBM representative or IBM Business Partner, or visit the following websites: ibm.com/bluemix and ibm.com/makedatawork. ∎

View this case study on IBM.com here.

Case Study: Datacom

Deliver a High-Performance Retail Analytics Platform with a Scalable SoftLayer Bare Metal Server Infrastructure

Overview

Business Challenge
To deliver its point-of-sale (POS) analytics solution to a large supermarket chain, Datacom Corp. needed a highly scalable cloud hosting solution that would offer managed services and reliable recovery capabilities.

Solution
Although Datacom had used Amazon Web Services cloud technology previously, the company determined that the SoftLayer cloud platform offered greater performance and scalability. The organization provisioned bare metal server and virtual server infrastructure in the SoftLayer Singapore and Washington D.C. data centers to host its analytics offering.

Solution components

Services
SoftLayer®

Scales for Growth

with easily extendable cloud resources to deploy on demand

Keeps Costs Low

with flexible, usage-based SoftLayer® hosting technology

Supports Availability

with fault-tolerant infrastructure hosted across data center locations ■

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We've had several experiences of cloud service delivery so far, but SoftLayer is the best in terms of cost-effectiveness and support.

-Masanobu Jinushi, research and development manager

View this case study on IBM.com here.

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