

**Operational Insights for
Running IT at the Speed of Business**

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Introduction

Emerging business and technology trends¹ are placing greater demands and challenges on IT operations staffs. Today's information technology must operate at the speed of business, where customers and business users expect instant response and always-on access to applications and business services. At the same time, IT is buried under mountains of data, which are amply fed by continuously flowing streams of monitoring and metric data² from networks, servers, storage, databases, mobile infrastructure, applications running in external and internal clouds, events, operation logs and more.

Despite this wealth of data, IT is not reaping the maximum value from its data because it lacks the time and tools to analyze the data properly. IT has a Big Data problem that can lead to major blind spots due to the difficulty of aggregating and analyzing data quickly – especially with massive amounts of IT data, the fact that data is kept in many disparate tools, that data is dispersed across the IT environment, and that data is in multiple formats.

Finding a solution to IT's Big Data problem is critical because the ripple effects of avoidable outages and performance issues reaches far beyond IT. It affects developers, application owners, performance analysts, business users and customers. Ultimately, the lack of visibility and insight diminishes IT's ability to deliver fast application performance, proactive outage prevention and rapid problem resolution, which touches and impacts everyone in the application service delivery chain and most importantly, the business.

IT Operational Analytics

The magnitude of these new challenges requires a major shift in IT's approach. Just as business users turned to analytics to improve business insights for more informed decisions, analytics heightens IT's ability to manage increasingly dynamic environments more efficiently. This new approach is called IT Operational Analytics and it uses analytics-based insights to help solve and resolve IT issues more quickly, proactively and effectively. The IT environment with its massive volume of data, diverse and dispersed data, and time-dependent data is full of Big Data analytics solution opportunities that can positively impact business performance. Insightful solutions that enable developers and performance analysts to accurately tune their applications for high performance, or find and fix application problems with laser-like focus, will positively affect application owners, business users and customers.

The Value of IT Analytics

A few years ago IBM demonstrated the power of analytics with Watson, IBM's computer-based Jeopardy game show "contestant". Watson triumphed over Jeopardy's best human champions in a situation that clearly favored human-based skills such as understanding variable question and response formats, language nuances, broad cultural knowledge, and understanding and responding in

¹ Trends such as Cloud, Mobility and BYOD, the Internet of Things, new business models, etc.

² According to IBM, a typical enterprise with 5,000 servers generates in excess of 1.3TB of data per day. (33GB of that data is metric data and 1TB is unstructured data.)

natural human language. Watson was an impressive technological and intellectual accomplishment for IBM.

Watson's example provides an appropriate analogy for IT analytics. On one level, IBM's sophisticated intellectual effort to create Watson using analytics and advanced technologies was an astounding story in itself. But on a more important level, Watson's Jeopardy performance surpassed expectations and accomplished its goals, which were entertaining TV viewers watching an electronic, competitive Watson win against human champions. The broader lesson from Watson is that the value delivered by analytics is in the quality and results of the outcome delivered, not in the analytics itself. In this case, analytics performed well because Watson amazed viewers with its human-like performance, while the complex and sophisticated mathematic algorithms and technologies underlying Watson's performance were essentially invisible to the viewers.

Likewise, although analytics are important underlying enablers for IT Operational Analytics, when executed effectively it is much more than the mathematics or technology – the main objective is delivering and measuring the value to IT and the business in outcomes.

IT Analytics Deliver Business Value

Most, if not all, business processes depend on technology, which raises the stakes for keeping the technology delivery chain working and performing well. Intelligently developed IT analytics solutions are potential game changers by giving IT an edge with speed, enabling IT to effectively manage the technology at the speed required for business, and sometimes ahead of the business with predictive capabilities.

As illustrated in the customer example on the right, the financial and business impact of keeping high-value business processes and customer facing applications up and running can be substantial. In these environments, IT Operational Analytics solutions that help avoid business service outages and minimize business application downtime are no longer “just IT tools” but should be considered as investments for both IT and business stakeholders.

IT Analytics' results for an IBM banking customer:

- **\$600,000** estimated savings from analytics-enabled outage avoidance (during 4-week trial)
- Predicted outages **3-5 days** in advance
- **10** major predictive incident alerts issued in advance of customer detection

*Results from a banking customer's 4-week trial with its Internet banking service.

IT Operational Analytics Deliver Value to IT

IT Operational Analytics enhance IT staff insight and provide relevant contextual diagnostic information, enabling IT staffs to avoid outages or dramatically reduce problem resolution time by hours. IT Analytics provide valuable assistance to IT staffs by filtering through massive volumes of data and presenting the most relevant information, automatically aggregating disparate and dispersed data, delivering data at real-time speeds, or analyzing and monitoring the relationships between thousands of metrics to find the cause of problems.

Big Data tasks are what computers do best – faster and better than humanly possible and, in some cases, doing what is humanly impossible. By gleaning operational intelligence, insights and predictive alerts from massive amounts of IT data, IT Operational Analytics can help transform IT from a reactive group to well-informed proactive operations.

In addition, diagnostic approaches captured in analytics tools can be reused. Relevant expert advice can also be embedded in context, allowing regular operational users to handle recurring issues that previously required application experts to perform. In turn, this enables application experts to focus their attention on more difficult issues.

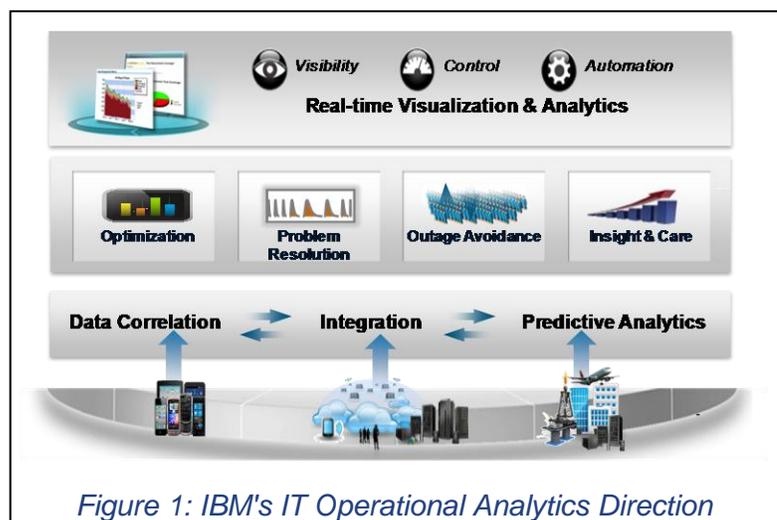
IBM Strengths – Why IBM?

IT Operational Analytics is not one “killer” product that solves all of IT’s problems. The IT environment consists of many processes, tasks, responsibilities and problems to solve. The term “analytics” is a general industry term describing a broad array of mathematical and Big Data processing and analysis technologies/techniques that can be applied to solve problems. One key aspect of IT Operational Analytics is understanding the IT environment well enough to identify specific IT use cases where analytics will excel. But just as important is selecting the right combination of analytics techniques suited for a particular purpose.³

As an emerging industry trend, IT Operational Analytics plays into IBM’s sweet spot. IBM has been building and assembling Big Data and business analytics capabilities for many years, which primarily focused on business environments. IBM’s \$16 billion dollar investment in analytics attests to the deep and broad array of analytics capabilities amassed by IBM. And now, IBM is leveraging its extensive Big Data and business analytics expertise and technologies, coupled with its deep IT expertise to solve and assist with a variety of Big Data issues in IT environments. The convergence of IBM’s large cache of intellectual property in Big Data, analytics and IT targeted at solving IT operational issues puts IBM in a competitive position that few vendors can match.

IT Operational Analytics Strategy and Vision

IBM’s IT Operational Analytics strategy is a natural extension of IBM’s broader Big Data and Business Analytics strategies. Building upon its deep and broad arsenal of Big Data and analytics technologies and expertise, IBM’s IT Operational Analytics strategy is more advanced and established than would be expected for an emerging initiative.



³ For example, using natural language processing to filter through event messages (unstructured data) for aggregating event messages that could be related to the situation. Or using multivariate analysis to find correlated metrics.

As illustrated in Figure 1, IBM's vision for IT Operational Analytics leverages and applies its technologies in data correlation, integration and predictive analytics into solutions aimed at IT optimization, problem isolation, outage avoidance, and insight and care. This vision shows IBM's level of commitment to IT Operational Analytics and signals IBM's intention to bring the full weight of its Big Data and business analytics assets to solve issues across the breadth of IT activities. Its goals are, as stated by IBM, "to pursue a wide range of analytics initiatives" to "proactively mitigate risk, attain insights to optimize actions, and reduce cost of ownership across Business, IT Operations, Asset Management, and more."

The core aspects of IBM's IT Operational Analytics approach are its SmartCloud Analytics Capabilities, Patterns of Expertise and Actionable Advice. IT Operational Analytics like any analytics initiative begins with its technologies and capabilities, which IBM calls its SmartCloud Analytics Capabilities.

SmartCloud Analytics Capabilities

IBM's SmartCloud Analytics Capabilities are at the core of its IT Operational Analytics approach (see [Error! Reference source not found.Figure 2](#)), which includes a broad complement of capabilities. Before analyzing data, you must have access to the data. The capabilities include data integration capabilities that facilitate access to massive volumes of IT performance and health

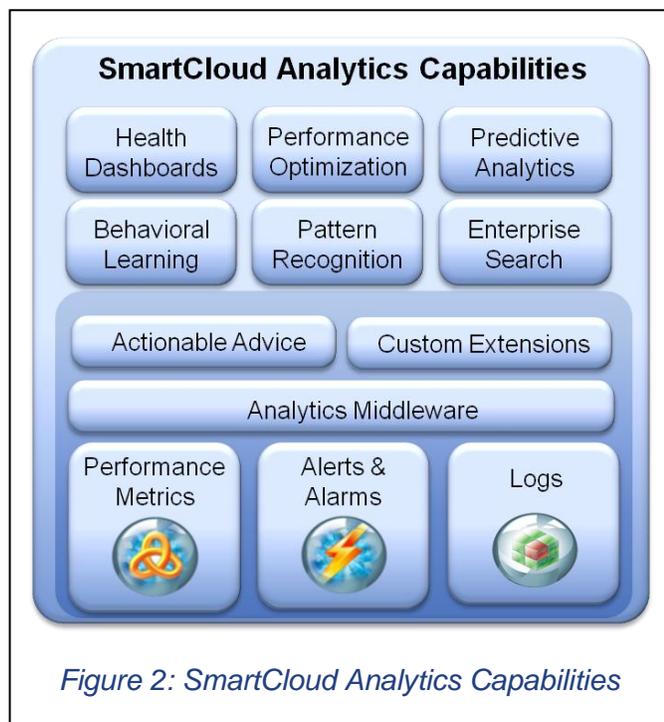


Figure 2: SmartCloud Analytics Capabilities

metrics, logs and alerts/alarms. In addition, the capabilities aggregate a variety of data types, as well as data from IBM and non-IBM sources.

These capabilities also provide optimization tools, capabilities to rapidly search through unstructured data (such as logs, support documents, etc.), intuitive user interfaces, and automated actions. Community extensions are also included, which will be described below in the Patterns of Expertise section.

Behavioral learning capabilities are important because solutions can self-learn normal IT environment behaviors in order to identify abnormal behavior. Self-learning solutions are more adaptable and realistic than traditional thresholding approaches as IT environments

become more dynamic.

Finally, the biggest advantage of the SmartCloud Analytics Capabilities is the ability to pass information back and forth between IT tools and solutions for maximum impact. As IBM's IT

Operational Analytics strategy evolves, analytics will permeate across IT, maximizing visibility and insights.

It is important to note that although its IT Operational Analytics strategic vision is broad and full of rich capabilities, IBM will be delivering a set of easy-to-use, modular solutions that allow clients to select the solutions that fit their specific needs. A core part of IBM's vision is understanding the need for easy-to-use solutions designed for IT staffs, who are not analytics experts. The advanced analytics technologies that are operating "under the hood" of these solutions will be virtually invisible to users. But what users will see are richer and valuable IT operational insights, made possible by analytics.

Patterns of Expertise

One of the goals of IBM's IT Operational Analytics is helping customers move from being reactive businesses to becoming proactive businesses. IBM's approach uses patterns of expertise, which leverage and build on IBM's expertise in its solutions for outage avoidance, boosting end-user experience, minimizing service impacting events, and proactively finding root causes.

The potential for patterns that capture and codify expertise is intriguing. This expertise could be captured and shared from large enterprise environments, service providers, cloud providers and other experts. If IBM executes this well, expertise that is currently not documented but exists as "tribal knowledge" could be captured, propagated and reused more broadly.

IBM also pre-packages expertise and intelligence in specialized Insight Packs. The Insight Packs use specific patterns of expertise (for example, things that experts know intuitively because of their experience and knowledge with a particular technology) to help predict or resolve IT issues. Insight Packs open the door for IBM's business partners and broader community to extend IBM's IT Operational Analytics by building Insight Packs embedded with their own expertise.

Actionable Advice

IBM then completes the circle with actionable advice. Operational insight, no matter how brilliant, that is not acted upon is useless and without value. IBM's strategy begins with using analytics to provide rich contextual information that helps IT staffs diagnose issues – by aggregating situation-relevant information into one view. But having all of the information at your fingertips does not mean you will know what to do with it. With this in mind, IBM's vision goes a step further by providing expert advice and guidance on the next steps to take, or suggestions on what could be causing a problem.

The advantages of capturing expert advice and presenting it within the context of the situation at hand are twofold. First, IT administrators who are not experts can learn from the expert advice, as well as being enabled to handle some tasks that previously were handed off to experts. By handling issues immediately instead of it sitting in an expert's queue, issues are resolved more quickly and

efficiently. Second, IT operational staffs benefit from the collective expertise of their own experts, as well as IBM and IBM partner experts⁴.

Automating actions is also available for customers to use. IBM takes a risk-centric approach to automation. They provide customers the option of automating actions, which customers can choose to use for low risk situations and tasks. But for slightly higher risk tasks, IBM provides expert advice that could enable lower level staff to perform selected recurring tasks, which partly relieves their experts' workload.

IBM intends to deliver IT analytics solutions that are designed and pre-packaged with intelligence and actionable insights “for use by the common IT man/woman” – in other words, designed for ease-of-operational-use and it does not require a PhD to use it.

And in the future, IBM will work towards delivering and enhancing this expertise on an ongoing basis through a cloud service.

SmartCloud Analytics Solutions

IBM SmartCloud Analytics is a family of analytics solutions focused on IT Operational issues. These solutions are designed to provide easy-to-use analytics assistance, and are intelligently pre-packaged with targeted analytics and self-learning capabilities, as well as actionable situation-relevant advice.

IBM newly released SmartCloud Analytics - Log Analysis⁵ is the first solution in the IBM SmartCloud Analytics family. IBM's Predictive Analytics capabilities will be coming in the near future.

Root Cause Diagnostics: Log Analysis

Ask IT subject matter experts how they find the cause of IT problems, and they describe a triage process using performance and system health data, event data, and logs. Logs are valuable because they contain a wealth of detailed data for diagnostic purposes but they are also problematic because logs are:

- in many different formats, including textual form (unstructured data), making it difficult to collect and search
- disparate and dispersed across many tools
- filled with hundreds or thousands of entries, which are time consuming to search through

*IBM SmartCloud Analytics: Healthcare Customer**

- *Went from spending **hours** collecting log files manually from disparate tools, to automatically collecting data in **minutes**.*
- *Now they can do **time-based correlation analysis** across all logs.*
- ***Reduced time to determine root cause** by leveraging event, performance and log data*
- *Diagnostic knowledge is captured, saved and **reusable***

** Customer used IBM Log Analysis solution*

⁴ IBM and IBM Partner expertise are delivered as specialized Insight Packs.

⁵ More product details can be found at: <http://www-01.ibm.com/software/tivoli/products/log-analysis>

Log Analysis is a diagnostic analytic solution that assists IT staffs by automatically collecting dispersed unstructured data⁶, and uses advanced text analytics to pull out situation-relevant information from large volumes of unstructured data such as logs, product documentation and support documents. The situation-relevant information is displayed in an actionable dashboard that provides IT staffs with valuable situation-relevant contextual information that is used to triage and diagnose the cause of an IT problem.

The Log Analysis dashboard is a flexible, interactive IT diagnostic analytics workbench that assists IT staffs in searching and analyzing unstructured data more efficiently. For example, IT administrators can use Log Analysis to find the 12 log entries that are relevant to a situation they are diagnosing, instead of wasting time searching manually through hundreds or thousands of irrelevant log entries just to find the 12 relevant ones. This could save many hours of IT staff time.

As noted above, IBM also offers Insight Packs, which are pre-built analysis expertise for specific use cases. Insight Packs are available for WebSphere Application Server and DB2, with more packs expected in the future.

Log Analysis – Scenario Example:

An example is the best way to illustrate IBM's SmartCloud Analytics - Log Analysis capabilities. The following scenario demonstrates how an IT specialist would use Log Analysis to find the root cause of an application performance issue. (The example could just as easily apply to an application developer who is validating the performance of a complex distributed application.)

1. It begins with a performance problem alert for the online customer order system. The IT specialist displays the performance data for the application in the Log Analysis dashboard. He interactively selects a bar graph to display the performance data then clicks on a line graph, and finds that the line graph more clearly shows the performance spike for the application. He notes that the performance issue began at 1:14 PM, with a performance spike occurring at 1:20 PM.
2. In the Log Analysis dashboard, the IT specialist displays performance data for the underlying infrastructure, including the WebSphere application server, database server, and network, specifically requesting data between 12:30PM and 2:00 PM. He selects line graphs for each of the application components, and compares the components' performance data side-by-side with the application performance data. A performance spike in the data base server at 1:14 PM corresponds to the time when the application performance began to spike.
3. He uses the pre-built expertise from the DB2 Insight Pack, which automatically provides windows of information to help diagnose the root cause. The built-in expertise indicates that the problem could be caused either by too little memory allocated in the database server or inefficient database coding techniques.

⁶ IBM SmartCloud Analytics - Log Analysis uses IBM and non-IBM IT data sources.

4. Using the Log Analysis dashboard, he queries the database log for entries with “CUSTORDR”, the name of the application; “DB10005”, the name of the database server; “Error 1820”, and today’s date. As he prepares the query, he notices that the log has 5,213 entries. The query comes back with 6 relevant log entries.
5. A quick scan of the database log entries indicates that the problem was caused by too many database accesses for a new product line that was recently added to the application, and the root cause is likely due to an inefficient database coding technique.
6. The issue and the diagnostic data are sent to the application programming team for resolution.

SmartCloud Analytics Customer Value

We have just reviewed a sample scenario, but the real power of IT analytics can be demonstrated best in actual customer environments. Here are results from a customer that used an IBM SmartCloud Analytics solution.

IT Diagnostics Analytics: SmartCloud Analytics - Log Analysis at a Healthcare provider

A healthcare customer wanted to diagnose system problems more quickly. They had many disparate tools across their environment. Whenever they had a problem, it took hours to manually collect log files from all of their systems and bring them together so they could look at the data to find the root cause of the problem.

They implemented Log Analysis which automatically collects the data from all their tools and brings them together. In addition, Log Analysis enables them to do time-based correlation across all of their logs and monitored data, so they can spot the root cause of the problem more quickly. With Log Analysis, they reduced the time to diagnose system problems from hours to minutes.

In addition, the diagnostic knowledge they created is captured and saved, so it is reused the next time a similar incident occurs. Capturing diagnostic knowledge saves them valuable time and money.

Conclusion

The IT environment is an ideal opportunity for using analytics to disrupt and transform IT, enabling it to run at the speed of business. Analytics helps by taking today’s chaotic IT environment with too much complexity, too much data and too little insight, and transforming it by providing IT with the right information, at the right time (timely information), insight with rich context, and actionable information. That is the direction that IBM’s IT Operational Analytics appears to be headed. It uses analytics to deliver what computers do best, as a complementary fit with how IT experts work, while capturing their expertise.

IBM SmartCloud Analytics: Healthcare Customer

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IBM is taking a strategic approach to IT Operational Analytics because of its broader vision. To date, IBM's strategy is the broadest and most clearly articulated IT Operational Analytics strategy from any vendor. Although still in its early stages, IBM already delivered one solution in its SmartCloud Analytics family, with more solutions expected. As IBM SmartCloud Analytics evolves, expect analytics to also permeate through IBM's IT solutions.

With any newly emerging initiative, the market and analysts usually view it with an element of skepticism. However in this case, IBM is not new to analytics with its existing depth and expertise in Big Data and business analytics, and IBM is already delivering IT analytics solutions with customer proof points.

IT Operational Analytics has the potential to completely disrupt how IT operates, and in turn, positively impact business outcomes. And at this point, it looks like IBM is a company that can deliver a full complement of analytics from Watson, to business and to IT Operations.

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Audrey leverages her experience of over 30 years in the information technology industry, to help her clients as they navigate through the accelerating changes in the information technology industry. Over the years, she has developed experiences in various contexts (expertise in systems and application management, working with very small companies to very large corporations, industry specializations, business focus, and technical focus), which combine into unique insights into the information technology industry.