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## New Generation of Network Analytics: Network Optimization for Communications Service Providers

By Jim Wheless and Mike Gandolfo



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POWER  
TO KNOW.

As demands on today's networks grow, the ability of communications service providers to plan and manage capacity, and to deliver superior service to customers, is being severely challenged. Today's advanced analytics capabilities can support better capacity planning and traffic management as well as more effective service assurance to deliver a customer experience that retains subscribers and increases revenue.

# How analytics can help improve service quality and capacity planning

The telecommunications business faces many challenges these days, to be sure. Traditional sources of revenue are declining dramatically; the exponential growth in mobile devices has put strains on networks that were never built for such usage and loads; and traditional ways of modeling network traffic and billing for it are no longer equal to the task. These challenges are particularly intense in the current, disruptive period of convergence, when communications companies are competing across traditional industry boundaries with a broader array of companies, many of which have a stronger heritage of customer centricity and were born in the Internet era.

On the positive side, the marketplace potential of communications providers remains exciting. It is no exaggeration to say that broadband and mobile networks are the lifeblood of modern society. Revenues based on the movement of that lifeblood—that is, on network traffic—are increasingly becoming an essential component of the business model for today's communications companies.

The problem is that you can't effectively monetize the value of network traffic if you can't see into the details of the traffic to know what its value is. You can't improve and personalize the customer experience you're delivering unless you have sufficient information about the quality of experience across the broader network delivery system. And you can't direct investments properly in deploying 4G unless you can be more confident about where the revenues are or will be coming from. When it comes to driving a new era of growth in telecommunications, knowledge really is power.

This is where a new generation of networks analytics tools and solutions comes into play, helping communications providers optimize network builds and upgrades, reduce outages, improve the customer experience, and simplify network control and operations.

# Network analytics

## Improving the customer experience and optimizing network investments

Innovations and developments in the area of network analytics can be understood as driving improvements in three areas especially critical to communications service providers.

### 1. Network control and optimization

Analytics tools can improve network management by more effectively factoring in issues related to congestion, such as utilization, service consumption and routing. Perhaps more important, such tools can provide real-time insights into network traffic to determine the value of different portions of that traffic. Those capabilities can help facilities-based operators direct network changes and investments to target specific, highly profitable services and applications, helping to optimize the commercial value of available and incremental bandwidth.

### 2. Network service assurance

Newer analytics capabilities enable companies to move beyond older ways of managing service availability—approaches based on peak performance monitoring. Network analytics enables a communications provider to optimize customers' quality of experience by assessing all the relevant historical network data over a continuous timeline (by day or week, or by seasonal behaviors) to distribute bandwidth where it is most needed and to manage user experiences more effectively. Better service assurance can increase network efficiency by 10 percent or more while maintaining a high quality of experience. More broadly, analytics can use network event correlation to help communications providers understand how equipment, devices and bandwidth consumption are affecting the customer experience—helping companies take steps to improve that experience.

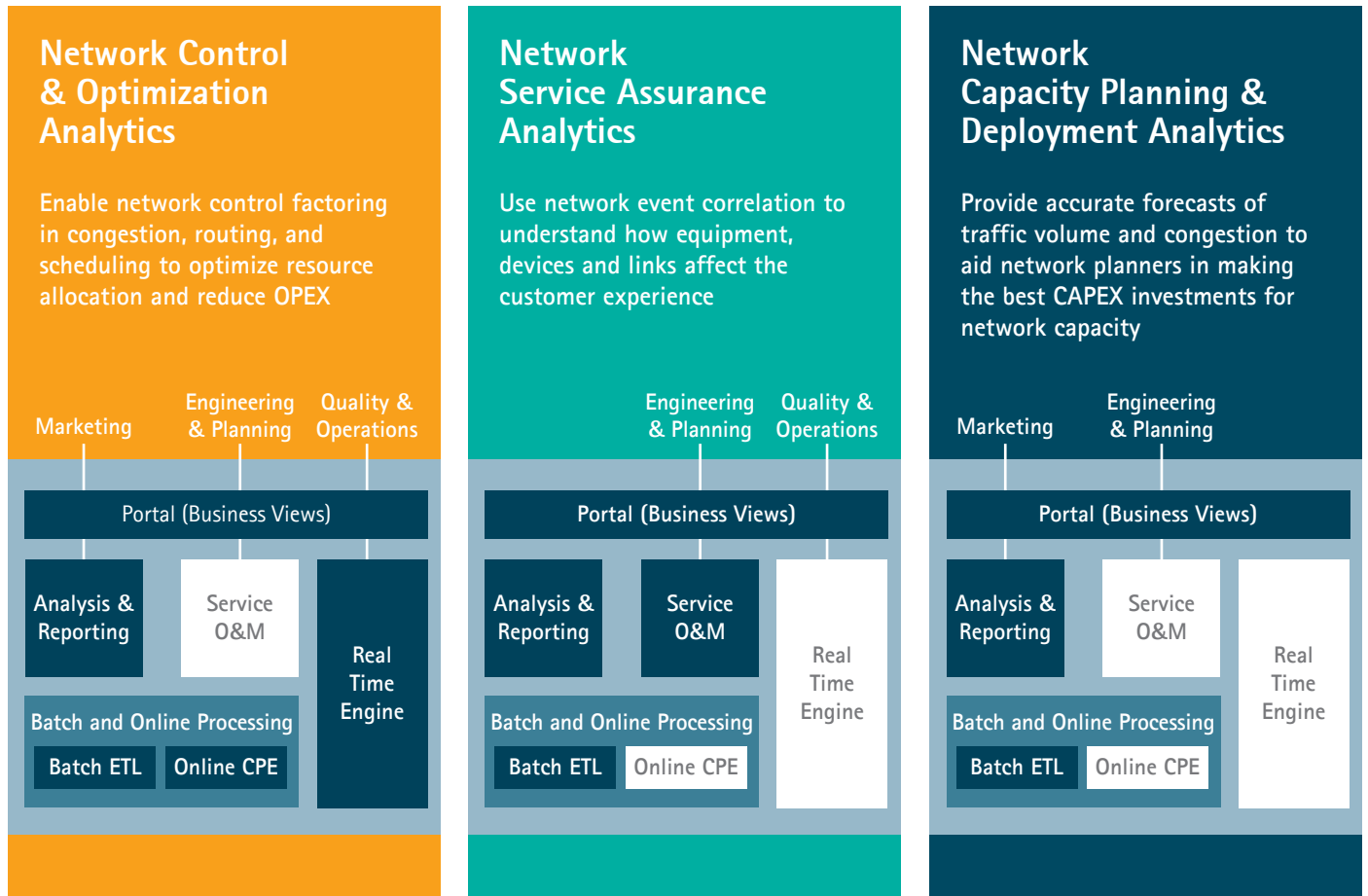
### 3. Network capacity planning and deployment

Network analytics tools can transcend the limitations of traditional traffic forecasting approaches such as minutes of use and data volumes. Newer statistical models integrate simulation techniques and can link demands for a certain quality of service to network specifications for each cell in a defined geography. By anticipating network bottlenecks in a more granular way and with better accuracy, communications providers can plan network expansions properly and with more precision—something that can improve the provision and utilization of capital expenses by five percent or more.

Part of an overall "journey to analytics ROI," these capabilities help strengthen the alignment of network capabilities to a communications provider's overall business, increasing revenues, reducing expenses and potentially improving network ROI by up to 15 percent.

The following sections look at these three important areas of network analytics in more detail.

Today's advanced network analytics solutions can help communications service providers dramatically improve their capabilities in network optimization, service assurance and capacity planning.



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# Network control and optimization

## Moving beyond "all you can eat"

Traffic volumes across today's networks have increased dramatically in recent years, and will continue to do so, but many communications service providers are not fully capable of charging customers based on the value of the data going through those pipes because they have no real-time capabilities to analyze traffic at a sufficiently granular level. Companies know that "all you can eat" data plans are no longer tenable if they are to drive a new era of growth, but they need help moving to a new billing model based on the ability to identify the value of particular parts of their network traffic.

From a technical perspective, this means that many companies' network dimensioning capabilities are deficient in how they support today's distinctive data traffic environment. When networks carried mostly voice traffic, using counters was the way companies performed network dimensioning. It was relatively simple given the generally one-to-one relationship between resource and service. All you had to do was measure a single-threaded service on a fixed point-to-point communication channel. You could even set it up in a common spreadsheet software program and readily track your network load.

In today's traffic environment, what's needed is continuous dimensioning down to the cell, managing to particular quality-of-experience targets for each Internet Protocol (IP) multimedia service.

Consider the experience of a large network operator and service provider in the Asia Pacific region. The company had multiple networks including fixed, wireless and broadband. With such a complex network environment it was difficult to integrate data to get proper visibility and manage traffic while keeping costs in line. It could only react to problems after they occurred because it did not have the ability to anticipate performance issues.

A network analytics capability established by the provider has now created a unique network management environment capturing utilization and other performance data across more than 93 multi-standard and multi-technology products supporting the OSS infrastructure. Traffic data is available in near-real-time for assessing the performance of critical network management processes. The provider can monitor congestion spots and re-route traffic for maximum throughput.



## Driving greater business value from new network analytics approaches

Across multiple capabilities—from forecasting to dimensioning to budgeting and planning—network analytics delivers more robust and accurate information to communications service providers compared to their legacy approach helping them realize greater business value.

	Legacy Approach	Network Analytics Approach
<b>Traffic Forecasting</b>	<ul style="list-style-type: none"> <li>• Singular forecasting based on minutes of use / data volumes (Erlang theory)</li> <li>• Threshold-based planning</li> </ul>	<ul style="list-style-type: none"> <li>• Per-cell statistical model</li> <li>• Forecast joins network load, device, application and use behavior</li> </ul>
<b>Network Dimensioning</b>	<ul style="list-style-type: none"> <li>• Independent service</li> <li>• Voice: Erlang / peak-based</li> <li>• Data resources dimensioned based on best-effort assumption</li> </ul>	<ul style="list-style-type: none"> <li>• Per-cell dimensioning</li> <li>• Continuous dimensioning</li> <li>• Managing to quality-of-experience targets for each IP multimedia service</li> </ul>
<b>Operational and Capital Expense Management</b>	<ul style="list-style-type: none"> <li>• Broad-based expenditure estimates                             <ul style="list-style-type: none"> <li>- Average load per cell</li> <li>- Average minutes of use</li> </ul> </li> <li>• Disparate, manual processes</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated analysis (voice, data, cost, etc.)</li> <li>• Centered on quality of experience: Service, value, budget estimation per cell</li> </ul>
<b>Network Utilization Value</b>	<ul style="list-style-type: none"> <li>• Macro two-dimensional                             <ul style="list-style-type: none"> <li>- Per minute</li> <li>- Per byte</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Detailed and multi-dimensional                             <ul style="list-style-type: none"> <li>- Per minute/ event / byte / service</li> <li>- Per geography/ customer segment</li> <li>- Per time of day / type of day</li> </ul> </li> </ul>
<b>Return-on-Investment Optimization</b>	<ul style="list-style-type: none"> <li>• Budget allocation based on available capacity for congested cells</li> </ul>	<ul style="list-style-type: none"> <li>• Clustering and prioritizing capacity and quality upgrades to improve ROI</li> </ul>

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# Network service assurance

## Optimizing the quality of experience and providing timely customer insights

For many communications service providers, the exponential growth in network elements, service platforms and connected devices means that the expanding variety and volume of network data services are overwhelming the company's ability to provide high-quality service assurance—a situation that can damage customer relationships. With data services taking an ever-increasing share of the utilization of the network, companies need to be able to proactively monitor network performance and provide real-time correlation or root-cause analysis to help isolate faults.

Today's network analytics solutions enable providers to correlate network issues to service quality and service impacts. They can more readily understand how equipment, devices and links enhance the customer experience through network event correlation.

Real-time service modeling enables immediate geographical views of service status, with drill-down functionalities integrating all network components in the service model. Real-time feedback can also allow for the sourcing and integration of customer profiles based on location, service usage and socio-demographic information, and can trigger appropriate corrective action.

For example, a European communications service provider is using an analytics solution to monitor service provisioning and anticipate anomalies in network traffic. The company provides its services on a distributed network throughout the entire country, which requires sophisticated analytics to monitor network traffic and service performance, anticipate evolutionary trends and prevent anomalies.

The solution enables this provider to analyze historical trends in network traffic related to client usage and monitor service provision performance. The company can anticipate the evolution of traffic in real time and can also apply forecasting models to predict the traffic anticipated during an upcoming period of time based on historical data from preceding periods. This enables them to assess the deviations compared to a safe range of expected values and enable the appropriate checks.

The ability to detect anomalies in service provisioning and proactively evaluate deviations compared to anticipated traffic is very important when it comes to network operations. According to a service manager at this European provider, "Given the complexity of the network and the branching of the distributed servers involved in the services, it is critical to gain a detailed insight of the service usage trend as well as anticipate any discontinuity due to either internal issues or to an external service provider. Analyzing usage trends helps us be prepared to quickly respond when we get generic notifications that don't tell us what the specific network problem is. We can also evaluate the impact that an effective failure, for example in a single access node, can have on national traffic volumes."

### Delivering customer insights to the sales and marketing organization

Another benefit of advanced network analytics is in using accurate customer data to generate insights that can help the sales and marketing organization target customers with more relevant offers. For example, one North American multi-play provider was challenged at the beginning of the most recent economic downturn because of stiff competition from cable operators and new IP-based entrants. The company knew that that a complete turnaround of its sales and marketing efforts was needed.



Collaborating with Accenture and SAS, the provider developed a strategy to target different customer needs with new solutions. At the time, too few customers were being actively managed; channel coverage overlapped and lead lists were inaccurate. To counter aggressive competition and achieve growth, the provider needed deeper customer insight and targeting along with better channel alignment and development.

With improved network analytics capabilities from Accenture and SAS, the provider was able to redefine the medium-business customer in less than three months by aggregating a variety of external and internal data sources into a 360-degree view of the customer across the entire portfolio.

The new approach enabled the provider to understand who its medium-business customers were well beyond their industry codes—providing a complete customer-centric view. That view could help the provider answer questions like: Where is the customer located, including its headquarters and branch offices? What is the customer's corporate structure? How many employees? How much and what type of services are in use across voice, data, IP and managed services?

Armed with this 360-degree view, the provider could statistically segment its mainstream and premium customers into micro segments, grouping various businesses in new ways to produce insights. This segmentation enabled the provider to determine the right channel treatment and solutions for each customer grouping. Today, the company can tailor solutions, bundles and offers that are sized appropriately, have the right price-to-value proposition and are serviced by the appropriate channel.



# Network capability planning

## Providing solid forecasts to optimize investments

Communications service providers are investing billions of dollars in network upgrades and build-outs as 3G and 4G networks become the norm in the industry. Yet too few such companies have the detailed information they need to guide those investments properly. Engineering-based thresholding approaches are still mostly the norm, but these approaches are not equal to the challenge of performing network planning in the current business, customer and technology environment.

Threshold-based planning was developed in a simpler era in which one could monitor network resources and issue a purchase order for a capacity upgrade in case a certain threshold was breached. What's needed instead are advanced forecasting technologies that combine granular performance data—down to the cell level—with device, application and usage data for greater precision in managing network upgrades while maintaining a satisfactory quality of experience.

The potential revenue of each cell can be estimated by mapping current congestion of the cell (an indication of its usage and therefore its importance to customers) against current costs. (See Figure 1.) By correlating the usage data with financial information, network analytics can generate insights that can help a communications provider determine how much to invest in particular cells based on maximizing revenue over cost while simultaneously complying with budget constraints.

An example of an effective forecasting solution comes from a North American multi-play provider which was challenged

to meet customers' demands for new products and services and to introduce new feature sets as quickly as possible. Although the company needed to provide that bandwidth so it could offer new products and services to customers, the question for this provider was how to gain the information it needed to properly direct its spending so that investments did not get tied up in services that did not generate sufficient revenues.

The company's existing forecasting approach was highly dependent on spreadsheets and a PC-based database, a situation that often caused non-integrated and inconsistent data to be fed into planning cycles.

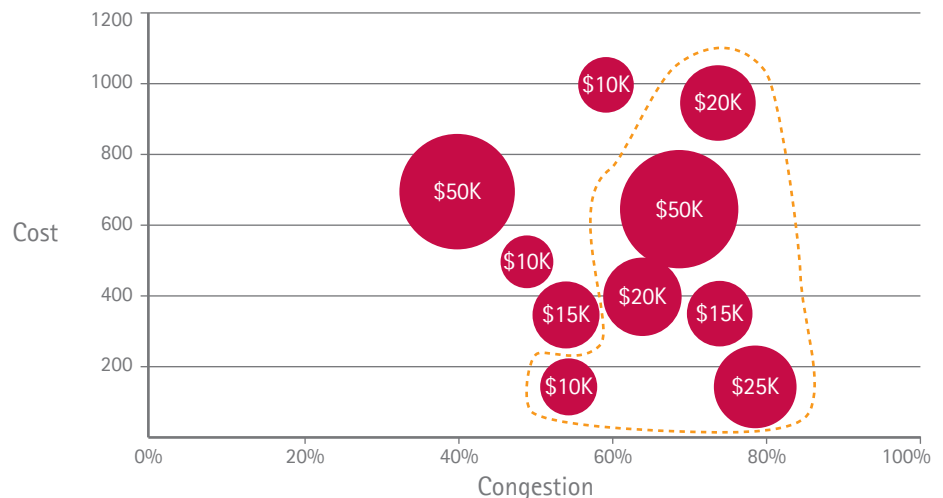
The provider's new SAS-based analytics solution is a straightforward, simpler solution that offers the statistical rigor required to do heavy-duty market analysis. Previously, the company could only factor in one or two variables in

its analysis, such as a supply-demand scenario or marketing forecast. With its new multivariable solution, the company can generate a more realistic forecast that factors in other variables including gross domestic product (GDP) indicators, technology trends, population trends, network utilization statistics and even so-called disruptive trends such as a regulatory change or a new-product announcement that can change the telecom market almost overnight. These multi-variables provide the data needed to back up forecasts and to make the right type of predictions for planning on capital and operating expenses.

This analytics solution is also enabling a concept the company calls "just-in-time investments" – the capability to invest dollars at the right place at the right time. The analytics team helps area vice presidents plan their operating and capital expenses based on network readiness in their specific areas and on order volumes, making sure that delivery times can be met.

Figure 1: Network analytics can generate insights about which cells should receive budget allocations based on maximizing revenue over cost.

### Cell Potential Revenue



Representative numbers and clustering are for illustrative purposes only.

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# Conclusion

## The analytics journey to ROI

As increasing numbers of communications service providers are discovering, network analytics is a means to transform the ability to provide cost-effective service, deliver differentiated quality to customers and plan for the next generation of networks and services.

Analytics is an important accelerator in the era of convergence and a significant growth opportunity for these companies, helping them out-innovate and out-execute an ever-expanding list of competitors.

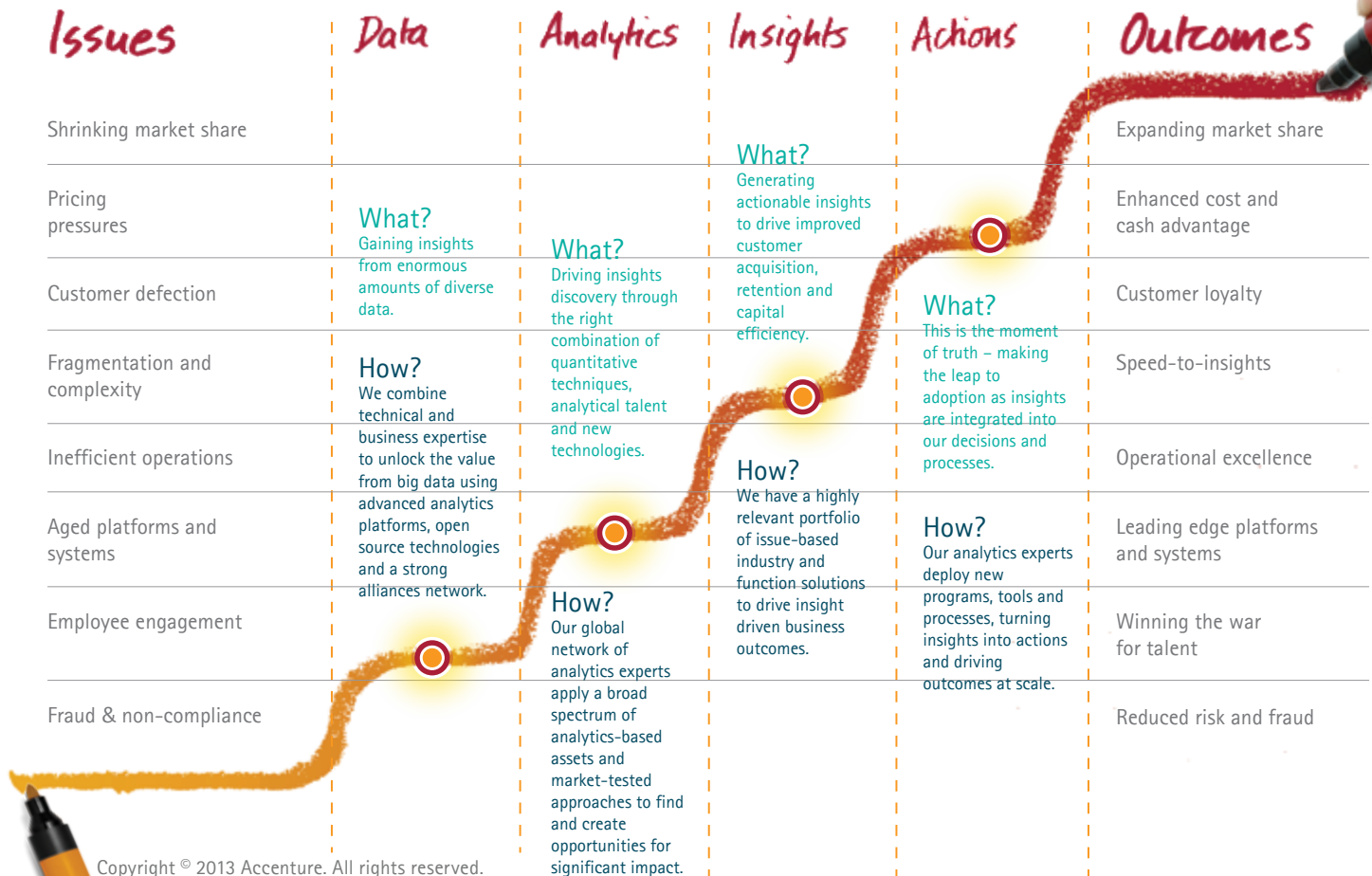
Using analytics to improve the customer experience and deliver solid returns on investment is in most cases a longer-term journey (see Figure 2), but one that can proceed rapidly as companies develop the ability to unlock the value of big data, and then apply a broad spectrum of analytics-

based assets and market-tested approaches to generate actionable insights.

As insights are integrated into decisions and processes, communications service providers gain the ability to take action faster and in the right areas. They can take proactive steps to deliver high-quality services to customers and to keep network capacity ready so they can improve customer loyalty and drive growth from the exciting communications products, services and applications being created almost every day.

Figure 2: The journey to greater ROI begins by identifying critical business issues. Analytics is then used to unlock the value of data in order to generate the insights needed to take action.

### The Analytics Journey to ROI



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## About Accenture and SAS

Working together, Accenture and SAS enable organizations to use the power of analytics to seize growth opportunities, get precise answers to complex problems, and speed innovation and decision making.

Hundreds of companies have benefited from Accenture's business analytics solutions, powered by SAS' pioneering analytics. Companies are encouraged to visit Accenture Customer Showcase and Innovation Centers worldwide to see demonstrations of SAS analytics in real-world scenarios. Our strategic alliance helps clients in all industries including financial services, high tech and the public sector anticipate disruptive market and operational events, and improve business performance at lower cost.

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