



The SAS® Enterprise Intelligence Platform:
SAS® Analytic Intelligence

Analytic insights for more confident decision making

SAS 9

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Executive summary

Business intelligence is about asking simple questions of the past, and it can answer questions such as, “What happened?” and “At a basic level of understanding, why?” Analytic intelligence is about anticipating the future with the potential to answer much more complex questions, including “How are today’s decisions likely to affect us tomorrow?” and “What will be the best courses of action as we move forward?”

SAS Analytic Intelligence is a versatile, integrated suite of software that provides answers to complex questions with efficiency and certainty. Capabilities include predictive and descriptive modeling, forecasting, optimization, simulation, experimental design and more. Point-and-click interfaces with data mining, text mining and visualization tools are part of the SAS Analytic Intelligence suite.

SAS Analytic Intelligence leverages your existing data and infrastructure to empower effective decision making. Best-in-class modeling capabilities support very complex analyses, yet the results can be shared with non-statistical users through open integration with SAS and third-party business intelligence applications such as Microsoft Office.

SAS Analytic intelligence delivers the industry’s widest portfolio of algorithms, mathematical data manipulation and modeling capabilities. These capabilities can be applied to an almost infinite number of business problems. Your quantitative specialists and business users can take advantage of integrated, highly targeted capabilities tailored for your specific IT environment and industry, rather than compromising with a set of poorly coordinated tools.

SAS Analytic Intelligence is an element of the SAS Enterprise Intelligence Platform, an integrated platform that delivers enterprise intelligence while extending the value of existing hardware and software infrastructures. For many, the challenge to producing high-quality analytical results is getting to enterprise data and cleansing it to improve the quality. With the integration of the SAS Enterprise Intelligence Platform, the time required to complete these tasks is significantly reduced and your analyses will produce accurate results.

Read on for a discussion of key challenges IT executives face in the quest to add value to their organizations under the constraints of disjointed architectures and tight budgets. Find out how SAS Analytic Intelligence and the SAS Enterprise Intelligence Platform help you overcome those challenges on many levels.

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Key challenges to delivering true analytics

Technology innovations that spawned dramatic economic gains in the last decade also created an entirely new economic model, for better and for worse. For example, the Internet brought a wealth of sales and communication opportunities but at the same time, it compressed and complicated analysis and decision-making cycles, introduced new competitive pressures and ratcheted up baseline expectations for performance and speed in all areas of business. Such an evolving business climate punishes companies that continue to believe in traditional timelines, conventional cost/revenue targets and established ways of doing business.

Today's executives and managers are asking:

- How can we better anticipate the future so we can act proactively instead reactively?
- How can we create enterprisewide intelligence when each division and department uses its own specialized tools?
- How can we share predictive insights with users whose statistical knowledge and information requirements are quite different?
- How can we assess the future impacts of 'what-if' scenarios when our decision support systems are focused more on hindsight than insight?"

These questions are not new. What's new is the pressure to quickly uncover the right answers in an increasingly complex business environment — one in which interdependent factors have been tracked in incompatible systems and controlled by groups that collaborate only in limited ways. In trying to generate the insights that are required for success and profitability, organizations face a number of significant challenges:

Functional areas operate in their own isolated worlds.

Traditionally, the various user communities of an organization — such as R&D, manufacturing, marketing, human resources and finance — have conducted their analytic activities in isolated silos, each supported by distinct, disconnected systems. However, in light of escalating pressures for regulatory compliance, governance, accountability and agile corporate strategies, an enterprise perspective has become essential. Yet, IT is finding it difficult to extend modeling and simulation applications across functional areas. It is equally difficult to integrate these solutions tightly into mainstream IT where appropriate.

Complicating this challenge is the need to ensure that platforms, architectures and process flows intended to promote tighter integration of modeling applications and collaboration among functional areas do not impede the performance of operational systems. For example, it makes sense to write back scores for cross-selling into the corporate customer database for use by other applications. Yet, such tasks must not interfere with the core transactional and operational functions of the system.

Traditionally, various user communities have conducted their analytic activities in isolated silos, each supported by distinct, disconnected systems but an enterprise perspective has become essential.

Sometimes you need a rear-view mirror; sometimes you need headlights.

Business intelligence is about asking simple questions of the past — like a rear-view mirror for seeing where you've been. Analytic intelligence is about anticipating the future and determining best courses of action. Whereas business intelligence is about query and reporting against fixed data to deliver limited analysis about past events, analytic intelligence is about calculating the significance of the data to deliver informed inferences about the future and the best action plans to get there.

Analytic intelligence is about anticipating the future and determining best courses of action.

Despite the claims of many vendors, typical business intelligence tools just are not capable of providing true analytics. IT organizations that rely on such tools simply cannot provide the meaningful insights needed to better plan for the future in such critical areas as customer relationship management, revenue forecasting, quality improvement and process optimization. This means that many decisions are based on gut instinct, intuition and extrapolation.

Point solutions are missing the point.

To cover gaps in business intelligence architectures, IT groups have implemented isolated analytic solutions for discrete functional areas. This patchwork strategy has created issues of its own. How do you get separate analytics systems to communicate? How do you get them to share data and metadata? Interoperability standards are not well developed in the area of analytics, sometimes even among solutions from a single vendor. The requirement for custom interfaces between analytic 'islands' causes time delays, erodes data quality and can even force the acquisition of more hardware to duplicate data. The trickle-down effects are seen in higher cost of ownership, longer model building and deployment cycles, and questionable data integrity and model results. These are high costs.

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It's difficult to communicate in different languages.

Most business processes, such as customer relationship management, rely on the contributions of both analytical and business users — with different skill sets and perspectives. Collaboration between these user groups is essential but has been hampered by the incompatibility of their views of enterprise data and interoperability limitations among the systems they use.

Users are looking to IT to offer that link where analytical users can share modeling results with colleagues who simply need to see or produce reports, yet do not need or want to explore the analytical foundations of those summary insights. When that common ground for information sharing is lacking, IT sees higher cost of ownership and longer business cycle times, and compromises to the quality, applicability and relevance of the information these users exchange — ultimately handing an edge to the competition.

When a common ground for information sharing is lacking, IT sees higher cost of ownership and longer business cycle times, as well as compromises to the quality and relevance of information.

Traditional relational databases are strained trying to serve up analytics.

The emergence of analytics and business intelligence applications strains traditional relational database management systems (RDBMS), which were not designed to access and distill large amounts of data into meaningful information, distinguish significant patterns from random chance or identify the best courses of action. They also were not designed to produce the summarized, historical reports that modern business intelligence applications demand, nor to support the intensive simulation and modeling requirements where the dynamic analysis of “what if” scenarios must be addressed. Attempting to scale past a few analytic users can often cause the downfall of previously reliable systems. So how can IT deliver the benefits of analytics to more people without having to add more systems?

Relational databases were not designed to produce the summarized, historical reports that modern BI applications demand, nor to support intensive simulation and modeling tasks where the dynamic analysis of “what if” scenarios is required.

Redefining the way enterprise intelligence is created and shared

The technology issues of today combine to make it difficult for IT to plan and maintain a strategy for cost-effectively providing intelligence in support of current and new business initiatives.

- How do you design architectures and process flows to tightly integrate modeling with operational information without affecting the performance of operational systems?
- Can one unified solution meet the diverse analytic requirements of all types of users, enabling them to share modeling results along with the tested models themselves while being open to business intelligence tools?
- What is the best way to model scenarios in complex contexts such as customer relationship management, revenue forecasting, quality improvement and process optimization — contexts in which most business intelligence applications fall short?

What IT needs is a solution that:

- Melds specialized intelligence applications and tools into a cohesive enterprisewide foundation.
- Transforms functional silos of data and modeling logic into a unified companywide knowledge base.
- Empowers ‘power’ users to perform analytics drawing on cleansed information from across functional areas.
- Enables information to be shared with business intelligence tools and many different types of users in a form that is meaningful to them.

Optimize your existing infrastructure with the integrated SAS Enterprise Intelligence Platform

SAS has developed an integrated platform for delivering enterprise intelligence. This platform, which we call the SAS Enterprise Intelligence Platform, optimally integrates individual technology components within your existing infrastructure into a single, unified system. The result is an information flow that transcends organizational silos, diverse computing platforms and niche tools — and delivers access to the insights that drive value for your organization.

The SAS Enterprise Intelligence Platform extends the value of your existing systems while setting the stage for new levels of enterprisewide intelligence not previously possible. In the process, you'll jump-start the evolution of the IT organization from cost center to strategic partner.

Components of the SAS Enterprise Intelligence Platform

The SAS Enterprise Intelligence Platform allows you to optimally configure the technology components within your architecture to deliver intelligence throughout the organization at the lowest total cost of ownership and with the fastest time to intelligence.

- **SAS Data Integration** provides prebuilt, high-performance capabilities for data connectivity, data quality, ETL (extract, transform and load), data migration, data synchronization and data federation.
- **SAS Scalable Intelligence Server** is a dedicated solution that efficiently stores and disseminates information for business intelligence and analytic requirements, offering relational and OLAP storage options from the same foundational inputs.
- **SAS Analytic Intelligence** is an integrated environment for predictive and descriptive modeling, forecasting, optimization, simulation, experimental design and more. SAS Analytic Intelligence leverages existing data and infrastructure to support effective decision making and integration into business intelligence environments.
- **SAS Business Intelligence** delivers a set of BI capabilities that enable different types of users to surface meaningful intelligence from consistent, companywide data.

As part of an integrated platform, all components and services are managed from a single point, reducing the administrative effort for maintenance of applications, users and security. Data consistency is assured because metadata is stored in a single metadata repository and is shared across all SAS technologies and solutions. Supporting a wide range of open standards, the SAS Enterprise Intelligence Platform has been designed to facilitate integration with existing IT infrastructures.

When integrated into a single, cohesive technology platform, these components help you optimize your current intelligence environment and better align IT with the strategic objectives of the organization.

SAS Analytic Intelligence

Creating analytics for competitive advantage



SAS Analytic Intelligence provides best-in-class modeling capabilities to support complex analyses, while sharing the results with business users through open integration with business intelligence applications. SAS delivers the industry's widest portfolio of algorithms, mathematical data manipulation and modeling capabilities. Capabilities include predictive and descriptive modeling, forecasting, optimization, simulation, experimental design and more. These capabilities can be applied to a large number of business problems, enabling users to choose a targeted capability rather than compromising by force-fitting lesser, poorly coordinated tools.

As the analytical environment of choice for many of the Fortune 500, SAS Analytic Intelligence scales to solve complex business problems, reveal opportunities and drive intelligent decision making for individual business units.

SAS Analytic Intelligence lets you transform questions into models that can be tested and validated, providing solid, measurable answers that distill insight from data. This new information empowers the enterprise to respond better and act more knowledgeably and effectively. As the analytical environment of choice for many of the Fortune 500, SAS Analytic Intelligence scales to solve complex business problems, reveal opportunities and drive intelligent decision making for individual business units and consolidated organizational knowledge.

A range of client interfaces and visualization techniques enable non-technical users, analysts and statisticians to interact easily with their data and model business scenarios. Because you don't need custom interfaces among SAS analytic modules or between analytic and business intelligence modules, SAS minimizes cost of ownership, provides consistent performance to end users, reduces IT overhead for maintenance and minimizes training requirements.

Capabilities of SAS Analytic Intelligence

Predictive modeling provides insights as to which customers you should keep, why others are leaving and which new customers will be most profitable. You can also project the level of customer loyalty that must be maintained for long-term profitability. You gain competitive advantage by understanding preferences so you can respond more effectively to needs and expectations. And, you can determine which factors affect demand and which factors impact market erosion or growth. Identify which products and services cannibalize or complement each other. SAS predictive modeling and optimization capabilities help you set optimal pricing policies, understand which promotions are most effective and address numerous other organizational needs, including fraud detection, failure analysis, predictive maintenance, risk management and more.

Descriptive modeling helps you understand new findings, such as which customer segments are most alike or different, and what the implications are for tailoring offerings to each segment. You can also identify product affinities that distinguish which items sell well together and what the implications may be over time, over space, and across new and existing outlets, consumers and markets. Descriptive modeling and exploratory data analysis reveal insights that allow you to continually ask more of your data.

Forecasting capabilities let you accurately estimate future demand to reduce out-of-stock shortfalls and service outages, and minimize the revenue losses from those deficits. You can use forecasting to identify optimal staffing levels, configure IT systems to more effectively meet existing and pending demand, and prepare ahead for trends in interest rates, stock prices, exchange rates, manufacturing costs and more.

Resource optimization reveals the best allocation of resources given specified goals and real-world constraints. For instance, SAS optimization capabilities can identify the most effective customer/offer/channel combinations to produce peak results within known budgets and constraints, determine which procurement strategies make the economic sense, select the distribution routes with the lowest transportation costs, etc. In short, organizations can optimally allocate all resources to achieve desired outcomes more profitably and on schedule, based on overall strategic objectives.

Experimental design enables you to understand the precise factors that influence outcomes and cause-and-effect relationships. SAS experimental design capabilities enable you to accurately and efficiently quantify the effects of numerous factors on observed outcomes. SAS can help you understand which factors are causing success or failure in marketing campaigns or manufacturing processes as well as other areas, rather than simply identifying which factors are correlated with the outcome.

Key features of SAS Analytic Intelligence

- Extensible capabilities that support the most comprehensive suite of algorithms available.
- Advanced data mining of both structured and unstructured text.
- Robust statistical and optimization methods.
- A single environment that supports investigations by both novice and advanced users.
- Superior interoperability that enables intelligence execution in real time by embedding analytic results into operational applications.
- A comprehensive platform that captures analytic results within intelligent data storage structures and takes advantage of integrated data cleansing and transformation capabilities.

Components of SAS Analytic Intelligence

The unified solution includes the following components:

- **SAS Enterprise Miner**, the most powerful, flexible and widely adopted data mining solution available, simplifies and streamlines the process of data mining. With an extensive set of integrated data mining algorithms (neural networks, decision trees, regression and clustering capabilities, memory-based reasoning, time-series mining and more), business analysts, IT specialists and quantitative experts can extract underlying business knowledge from vast deposits of data and create results that can be easily integrated into operational systems.
- **SAS Text Miner** enables users to discover and extract knowledge from text documents. Turn vast volumes of textual documents into new stores of insightful and valuable information about business or research initiatives. Text mining is fully integrated with SAS data mining, so you can perform predictive modeling with unstructured text in combination with related structured data sources, all in the same SAS Analytic Intelligence environment. This text mining function supports a wide variety of potential applications, such as categorizing huge collections of call center data, blog analysis and Web mining, finding patterns in customer feedback or employee surveys, detecting emerging product issues and analyzing competitive intelligence reports or patent databases.
- **Extensive statistical capabilities** support both specialized and enterprisewide analytical needs, helping users analyze quantitative data and make informed decisions for scientific research, engineering, manufacturing, government, medical and business applications. Sample capabilities include analysis of variance, regression, categorical data analysis, multivariate analysis, survival analysis, psychometric analysis, cluster analysis, nonparametric analysis and sample survey selection. Perform customer preference studies for market research, assess the results of clinical trials, predict credit card usage patterns, model air pollution patterns or produce a sample of people to be surveyed — one versatile, customizable tool supports the gamut of statistical analysis questions across all industries.
- **Econometrics and time series analysis** tools enable users to analyze processes over time. Understand past trends, forecast the future or better understand how the business functions in context of business cycles, seasons or years. Factors that affect the business, such as economic indicators, market conditions, customer demographics and marketing activity, can be identified, quantified and included in the forecasting and econometric analysis. A broad range of modeling and simulations for business processes creates an ideal testing ground for evaluating the results of suggested policies before they are implemented.

- **Large-scale, automatic forecasting** tools perform high-quality forecasting in a batch environment. Built for speed, efficiency and accuracy, this software can produce millions of forecasts very quickly, which makes it ideal for use as a core part of supply chain solutions, for example. Transactional data can be accepted and made “forecast-ready” by accumulating the data into a time series format. Forecasts can then be automatically generated by selecting the models that best explain the data and then applying those models to make future projections. Forecasting results are delivered in whatever manner desired, whether fed directly to other business systems or disseminated via the Web to business users.
- **An operations research module** combines essential modeling, optimization and scheduling capabilities in an integrated and adaptable environment. This component of SAS Analytic Intelligence combines indispensable solutions for operations research analysts and project managers. A wide array of mathematical linear and nonlinear programming techniques for optimization, project/resource management, simulation and related visualization and decision analysis enables organizations to build comprehensive, detailed models of specific processes and systems. Analytics can build models of the complete enterprise and paint an accurate picture of current, future and potential performance.
- **A statistical quality control component** supports the entire quality improvement process. Understand processes, pinpoint critical problems, establish control and reduce variation, determine process capability, design experiments to improve products and processes and determine product reliability. No other software brings such a wide range of specialized capabilities to the total quality improvement effort.
- **A point-and-click analysis interface** supports dynamic exploration and analysis of data in an intuitive way. Analytical graphics and advanced statistical techniques facilitate data exploration, visualization and understanding, allowing users to easily explore data, find the best model and check model assumptions. All graphics are interactive and dynamically linked — highlighting data points in one graph highlights the same data points in all graphs. Colors and markers can be associated with data, thus providing structure and emphasis using multiple perspectives on the data.
- **Interactive matrix language (IML)** functions are provided in a powerful and flexible development environment for programmers, statisticians and researchers. Applications created with SAS/IML software can address problems ranging from simple matrix manipulations to estimation techniques, as well as the latest mathematical algorithms currently being proposed at research institutions. With an extensive set of mathematical and matrix operators, the possibilities are virtually endless.

Key benefits of SAS Analytic Intelligence

Integrate the full spectrum of information access, analysis and reporting

SAS Analytic Intelligence provides a collaborative environment that links previously isolated specialists in statistics, finance, marketing and logistics. It also provides the whole user community with access to company-standard analytical routines, cleansed information and presentation interfaces. SAS analytic clients can transparently reuse SAS analytical procedures without requiring users to need advanced skills in statistics or support from IT. Analysts and business managers can seamlessly integrate analyses of the past into accurate models and forecasts of the future. As information is collected and enriched into actionable intelligence, the content can be made readily available in the appropriate form for diverse audiences, in the manner best suited to their roles and information requirements.

Take advantage of the industry's most complete analytical offering

SAS Analytic Intelligence delivers the widest available portfolio of algorithms, mathematical data manipulation and modeling capabilities, and can be applied to a large number of business problems. With a broad range of client interfaces and visualization techniques, SAS provides role-appropriate workspaces for non-technical users, analysts and statisticians — allowing them to interact easily with their data and model business scenarios. With this breadth and depth of analytics and interface options, users can select the precise capability they need, rather than compromising with a mix of lesser, poorly coordinated tools. In addition to better quality business decisions, the organization enjoys greater productivity and lower training costs.

Deliver faster ROI on analytical solutions

SAS Analytic Intelligence delivers proven implementation methodologies to enable repeatable business processes — from fraud detection to credit scoring, from customer attrition to quality control. The Analytic Intelligence component of the SAS Enterprise Intelligence Platform delivers a set of best-practice roadmaps, supported by prebuilt, integrated data models designed and tailored for specific industries. These data models embody SAS' cumulative experience of hundreds of business cases in areas such as financial services, telecommunications, retail, pharmaceutical and manufacturing.

Extend the value of analytical solutions through integration across the enterprise

SAS Analytic Intelligence is integrated with powerful SAS Data Integration capabilities in the SAS Enterprise Intelligence Platform — and therefore can access and read all relevant source data formats and perform the necessary preprocessing to organize data efficiently for analytical processing.

SAS Analytic Intelligence and SAS Business Intelligence can also share the same SAS Scalable Intelligence Server, ensuring seamless exchange of data and metadata between applications. This dedicated, high-performance data store can be scaled to optimize the performance of processing-intensive modeling tasks.

There is no need for custom interfaces between analytics modules or between analytics and business intelligence applications. As a result, cost of ownership is lower, user services are more predictable and consistent, maintenance overhead is reduced and training requirements are minimal even as users move between tools.

Summary

The analytics architecture in today's typical organization — built around point solutions and functional silos — is not optimized for an enterprise perspective, yet this holistic view is exactly what top management now deems “mission-critical” to the organization. IT groups are challenged to deliver intelligence throughout the enterprise within the constraints of existing architectures and lean budgets.

Other vendors have introduced solutions that resolve part of the challenges, but they leave holes. For example, most provide limited analytic capabilities and do not offer prebuilt models tailored for specific industries. Many cannot run on mainframe platforms, which still hold vast data repositories for many organizations. Others rely on external applications for data cleansing, storage and data integration capabilities — shortchanging the organization of all the efficiencies and other merits of integration.

SAS Analytic Intelligence brings the whole picture together. SAS provides best-in-class modeling capabilities to support complex analyses while sharing the results with non-statistical users through open integration with business intelligence applications from SAS and third parties.

Designed to extend to meet the needs of the enterprise, SAS Analytic Intelligence is, and has for years, been the industrial-strength standard of choice across industries. This sustained market leadership ensures security in your investment now and in the future.

SAS Analytic Intelligence is, and has for years, been the industrial-strength standard of choice across industries.

SAS Analytic Intelligence builds on other components of the SAS Enterprise Intelligence Platform to deliver new levels of strategic insight:

- SAS Analytic Intelligence offers seamless transparency with powerful SAS Data Integration capabilities, which access and reads all relevant source data formats and preprocess them to be analysis-ready.
- SAS Analytic Intelligence leverages the SAS Scalable Intelligence Server, which ensures premium performance and seamless exchange of data and metadata between SAS Business Intelligence and SAS analytic applications.
- SAS Analytic Intelligence supports the emerging Predictive Modeling Markup Language (PMML) standard for exchange of analytic models, for users who want to retain existing business intelligence investments from SAS and third parties.
- Finally, you can accelerate and maximize ROI on analytic investments by taking advantage of the implementation methodologies, prebuilt data models and consulting expertise available from SAS.

From SAS, the first name in enterprise intelligence solutions

For nearly three decades, SAS has been helping customers realize the full potential of enterprise-wide intelligence. Through listening to our 40,000 customers across every industry — including 96 of the top 100 companies on the FORTUNE Global 500® — SAS has developed an integrated platform for delivering high-value enterprise intelligence.

This platform, which we call the SAS Enterprise Intelligence Platform, optimally integrates individual technology components within your existing infrastructure. SAS is the only vendor that completely integrates leading data integration, storage, analytics and traditional business intelligence applications to create intelligence from massive amounts of data.

The SAS Analytic Intelligence component provides a broad range of prebuilt and customizable processes for predictive and descriptive modeling, forecasting, mathematical optimization, simulation, experimental design and other analytic capabilities. SAS analytics enables coherent, consistent analysis of enterprise data from many disparate silos of information, and disseminates that information to quantitative and business users in the format appropriate for their roles and skills.

Let us show you how the SAS Enterprise Intelligence Platform can deliver immediate and sustainable rewards for your organization. Whatever your existing infrastructure, SAS can transform it into a foundation for enterprisewide intelligence and sustainable profitability in an increasingly uncertain world.

For more information about the SAS Enterprise Intelligence Platform and the specific SAS technologies that support it, visit us at www.sas.com.



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