What Does Big Data Really Mean for Insurers?  
New Paradigms and New Analytic Opportunities  

Featuring as an example:  
*SAS®* High-Performance Analytics  

An SMA Perspective  

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Table of Contents

Big Data Meets Big Data Analytics 3
   New Era of Analytics in Insurance
   Role of High Performance Analytics
   New Paradigms and New Analytic Opportunities

Business Capabilities for Insurers 4
   Strengthening the Core: Risk-Centric Analytics
   Reorienting the Business: Customer-Centric Analytics
   Optimizing Capital and Investments: Finance-Centric Analytics

Technology Capabilities for Insurers 6
   Master Data Management
   High Performance Analytics Platform
   Analytics Center of Excellence

SAS® High-Performance Analytics 9
   Company Overview
   Breadth of Functionality

Strategy Meets Action Commentary 10
About Strategy Meets Action 10
Big Data Meets Big Data Analytics

New Era of Analytics in Insurance

The business of insurance is based on analyzing data to understand and evaluate risks. Two important insurance professions, actuarial and underwriting, emerged at the beginning of the modern insurance era in the 17th century. These both revolve around and are dependent upon the analysis of data. More recently, the information age has introduced new technologies that can be applied in data analysis, giving insurers new strategic and operational insights into their businesses.

Insurance organizations are already inundated with data, and the volumes are growing rapidly due to telematics, social media, and data from other unstructured sources. Today, Big Data technologies such as Hadoop are taking the business world by storm, introducing new approaches to rapidly analyzing large amounts of data from many sources. Big Data is often defined as the volume, variety, and velocity of data that exceeds an organization’s ability to manage and analyze it in a timely fashion. But the true value of Big Data is realized when it can be harvested for fast, fact-based decisions that lead to great business results.

We are now entering a new level of maturity in the use of analytics in insurance – an era where it is possible to leverage a wide range of data across every part of the business, not just in actuarial or underwriting circles. At the same time, competitive demands are requiring that new insights be generated much more rapidly – in some cases in real-time.

To address the extensive needs for analytics, the massive amounts of data (structured and unstructured), and to support speedy decisions, a new class of analytics has emerged – high performance analytics. The use of these advanced, high performance analytics capabilities and the potential they have to augment and enrich customer insights, financial management, risk assessment, and day-to-day operations mean that analytics is fast becoming THE competitive battleground for insurers.

Role of High Performance Analytics

The term analytics represents a broad spectrum of approaches and tools that are applied to many types of business problems. Software solutions that handle reporting, business intelligence, ad-hoc analysis, scenario planning, and predictive modeling are currently being used by many insurers. To complement these existing approaches, and leverage Big Data, a new breed of analytics – Big Data Analytics, or high performance analytics – has arrived and is making its presence known. The new high performance analytics, including Big Data, use several different technology approaches with the same goal in mind – analyzing massive amounts of both structured and unstructured data very rapidly to gain real-time insights. These technology approaches include massively parallel processing (MPP), in-database analytics, and in-memory analytics. By combining MPP techniques with in-memory analytics and a specialized hardware appliance, insurers are able to analyze terabytes and even petabytes of data at blazing speeds. Visual analytics technology adds another important new dimension to analyzing data – the ability to use advanced visualization techniques to rapidly spot patterns and trends in large data sets.
New Paradigms and New Analytic Opportunities

The rapidly evolving role of advanced and high performance analytics is not just about technology. While the newest empowering analytics technologies are quite sophisticated, the real story concerns how the resulting capabilities are beginning to transform the insurance business. The traditional management approaches and culture of insurance companies have been conservative and relatively unchanged over the past few decades. A paradigm shift is now underway, with leading insurers adopting a “management by analytics” approach to running the business. This shift, fueled by Big Data and high performance analytics, is enabling insurers to select more profitable business, implement more precise pricing, manage the risk portfolio holistically, improve fraud detection, and increase investment returns. High performance analytics is an area where a strong alignment between business and IT can create powerful new capabilities within an insurer’s organization – robust capabilities that set the stage for true differentiation.

Business Capabilities for Insurers

Insurers should be actively pursuing analytics initiatives in three key areas: customer-centric, risk-centric, and finance-centric activities. Figure 1 identifies a number of important areas where analytics are already being applied by leading insurers. Many of these areas have significant potential to create an even larger business impact through the use of high performance analytics.

Figure 1. Analytics Domains and Opportunities in Insurance

Strengthening the Core: Risk-Centric Analytics

Insurers are very good at risk-centric analytics – assessing the probability and expected costs of specific exposures, illnesses, and death. Complex models for product design, pricing, underwriting, loss reserving, and CAT modeling form the basis for determining
what type of risks the company will assume and how profitable the portfolio of contracts are projected to be. Risk-centric analytics shape the core of the insurance business. New analytics capabilities create an opportunity for insurers to strengthen this core.

To illustrate the point, consider property insurance, where insurers are moving toward by-peril rating. They are leveraging external data on individual perils such as hail, wildfire, coastal storm surge, crime, and dozens of other factors. The time to build and run models to assess all the exposures for individual properties or groups of properties in a portfolio is crucial to properly evaluating and pricing specific risks. The competitive advantage will be lost if it takes weeks or months to go through this process. The ability to capitalize on high performance analytics to rapidly assess different combinations, multiple times a day, will keep an insurer a step or two ahead of the competition.

For personal auto and commercial auto/fleet, the burgeoning area of telematics provides a compelling example of how analytics are creating high business value on data collected from remote devices. In the early stages of telematics, insurers are leveraging only a tiny portion of the massive amounts of data streaming in from vehicles installed with telematics devices. Basic rating factors such as miles driven, location, and speed are being used to improve risk assessment and better match the price to the risk. The next stage will be for high performance analytics capabilities to evaluate a wide variety of data about driver behavior, vehicle performance, and location factors to gain new insights on risks and provide more vehicle safety and maintenance advice to policyholders.

**Reorienting the Business: Customer-Centric Analytics**

Insurers are relative newcomers in the use of customer analytics. Insurers have been using software tools to assist in segmenting markets, identifying prospects, measuring campaign effectiveness, and spotting cross-selling opportunities. However, there are opportunities to significantly extend the use of analytics for everything that is related to customers. Many insurers would like to reorient their business to focus on the customer, instead of focusing on products and internal operations. This requires a much deeper and more granular understanding of customer wants, needs, and behaviors – in the aggregate, as well as for individual customers. The knowledge and insights from agents, brokers, and company employees is important in understanding customers, but becoming a truly customer-centric organization requires sophisticated customer-centric analytics. In addition, insurers need to cast a wider net to gather new types of information that is relevant to customers, including information from social media sites and external data on demographics and location-based perils.

Think about how important it is to be able to retain good customers. The insight needed to spot situations where a defection or nonrenewal is probable comes from knowledge about the relationships and behavior of the customer. This knowledge is likely contained in many systems across the enterprise (CRM, policy, billing, claim systems) and stems from relationships and interactions that extend beyond the company itself. The ability to capitalize on extensive internal information and to augment that insight with external insights will position insurers to proactively address issues and retain and expand desirable business (or let unprofitable business lapse).

High performance analytics will increasingly enable insurers to make customer decisions in real-time, even as interactions are in process.
provide the right information or assistance. Contact center conversations between prospects/customers and representatives will be analyzed in real-time for key phrases, voice modulations, and questions to identify when new opportunities are presented or when intervention is required to address a problem.

**Optimizing Capital and Investments: Finance-Centric Analytics**

Efficient capital allocation and optimum investment returns are critical to an insurer’s financial performance. Insurers frequently use custom-built approaches to augment financial management, using capital asset pricing models (CAPM) to value and manage assets for least risk and maximum return. Sophisticated models are built to address areas such as asset/liability matching, investment portfolio optimization, embedded value calculations, and econometric modeling. An increasingly complex business and economic environment is pushing insurers to do more with analytics so that they can dynamically manage the business, quickly make adjustments in response to changing conditions, and react to requests from regulators.

Consider the value of being able to combine real-time insight from the operational side of the business with extensive external information concerning insurance and economics — and then being able to view, within hours or even minutes, multiple what-if scenarios about investment directions, portfolio mix, asset/liability match, etc. The power to dynamically drive the business based on an advanced understanding of probable financial implications is becoming an imperative for insurers.

**Technology Capabilities for Insurers**

Insurers must develop three technology related capabilities in order to capitalize on high performance analytics (shown in Figure 2): master data management (process), the platform (technology), and an analytics center of excellence (people).

Figure 2: Capabilities Required for High Performance Analytics
Master Data Management

Insights from analytics are only as good as the data that is fed into the analytical models and algorithms. As analytics take center stage in the management of an insurance company, the quality, consistency, and breadth of the data become even more important. Data must be seen as the valuable corporate asset that it is, and be supported by comprehensive master data management (MDM). Good MDM consists of processes and tools to manage enterprise data, such that a high quality, consistent, and authoritative source of data exists. While MDM can be applied at the business unit level, the maximum benefit is gained when MDM is applied across the enterprise.

The components of MDM include an enterprise data architecture that is enhanced by software tools for data quality and data management, and supported by an insurance data model. In addition, a data governance model endorsed by the senior levels of the business is crucial to provide the appropriate funding and resources for MDM. The biggest challenge in this area may be having the patience to execute a sound plan. Good MDM takes time and must become woven into the fabric of the business. It should not be considered an isolated project with a defined end date. When MDM is successful, the stage is set to realize the power of high performance analytics.

High Performance Analytics Platform

The ability to rapidly analyze large volumes of both structured and unstructured data that come from a wide variety of sources demands a technology platform that is specifically designed for and dedicated to that purpose. General-purpose hardware and software systems are capable of running models against large volumes of data, but the computations often take days or even weeks to complete. And, general-purpose systems typically use only a representative sampling of the data, not the full data set. General-purpose systems can typically process tens of millions of records. But handling more than that may mean days of processing before producing a result, if it is even technically possible.

What sets specialized high performance analytics platforms apart from the general-purpose systems is the ability to ingest billions of data records (representing terabytes of data), conduct sophisticated analytics, and produce a result in hours or minutes. High performance platforms address the principal bottlenecks of general-purpose systems: processor speed and data retrieval speed (I/O). One of the primary main approaches used to eliminate these bottlenecks and improve the speed by orders of magnitude is known as in-memory processing. This technique uses dedicated hardware appliances designed to store and process very large volumes of data in high-speed random access memory (RAM). In conjunction with parallel processing, it creates an optimal situation where hundreds or thousands of processors (CPUs) are working in parallel on terabytes of data accessed rapidly from RAM.
Analytics Center of Excellence

Successfully capitalizing on the potential for high performance analytics requires more than a foundational technology platform and a strong MDM program. The third leg of the stool is an analytics center of excellence, bringing together advanced technology skills and experience from inside and outside the organization. Insurers need to acquire, develop, and partner with individuals that have deep analytics talent. Understanding how to plan, implement, and interpret the results from high performance analytics programs is the key to success – and it requires experienced people. A combination of deep industry experience with significant analytics background is needed.

Leading insurers are beginning to view data and analytics as a new functional capability area of the business, similar to human resources or IT. Chief analytics officers, data scientists, and other similar titles are starting to appear in insurance companies. New enterprise wide analytics groups are recruiting business and IT experts from across the business to staff emerging centers of excellence. The combination of a team of experts with advanced high performance analytics technologies will enable insurers to gain deeper insights into current business operations and future growth opportunities.
SAS® High-Performance Analytics

Company Overview

SAS is a market leader in business analytics software and services, and is the largest independent vendor in the business analytics market in the world. Established in 1976 with headquarters in Cary, North Carolina, SAS now has customers in 134 countries representing over 50,000 business, government, and university sites. SAS clients include 90 of the top 100 companies in the 2011 Fortune 500 Global List. A privately held company, SAS had revenues of over $2.7 billion in 2011. SAS has serviced insurance clients since its inception and has a large footprint in the insurance industry.

Breadth of Functionality

SAS High-Performance Analytics includes a portfolio of in-memory analytics offerings, built with sophisticated analytical workloads in mind to solve complex business problems. By loading data into memory on multiple computers in a distributed system, SAS High-Performance Analytics enables insurers to instantly explore and visualize data, and run analytical computations against Big Data with incredible speed. The primary offerings include:

**SAS High-Performance Analytics Server**: An in-memory offering for quickly developing analytical models – statistical and data mining, text mining, or optimization – using Big Data. It solves complex problems using complete data – not just a subset or aggregate – with hundreds or thousands of variables and millions of documents to get more accurate and timely insights and make well-informed decisions.

The ability to process models, in minutes or seconds, enables insurers to update analytical models more frequently, perform more iterations, and use complex techniques to solve more difficult questions. SAS High-Performance Analytics Server is available on commercial database appliances (EMC Greenplum or Teradata) or Hadoop.

**SAS Visual Analytics**: A high-performance, in-memory solution for exploring massive amounts of data, and executing analytic correlations on billions of rows of data, in just minutes or seconds – to solve complex problems very rapidly. Users can spot patterns, identify opportunities for further analysis, and visually convey results via web reports or the iPad®.

SAS Visual Analytics provides the options of using commodity hardware, as well as database appliances from EMC Greenplum and Teradata to support increasing demands for fast access to Big Data.

**SAS and Hadoop**: SAS has extended advanced analytics capabilities to a variety of database and data warehouse vendors, supporting commercially available offerings and open-source offerings based on Hadoop. It provides seamless and transparent data access to Hadoop as a data source, where Hive-based tables appear native to SAS. This framework provides for a richer visual and interactive Hadoop experience, making it easier to gain insights and discover trends.

For more information about the SAS High-Performance Analytics visit [www.sas.com/hpa](http://www.sas.com/hpa)
Strategy Meets Action Commentary

The age of analytics is upon us. Insurers have an opportunity to transform their businesses by using analytics to expand functional capabilities in two directions – and it’s time to take advantage of both. First, insurers should extend the application of analytics beyond the traditional, core, risk-centric areas of the business, into customer-centric and finance-centric areas for strategic leverage and operational advantage. At the same time, insurers should seek ways to further strengthen the core risk analysis by using additional advanced analytics capabilities.

Second, insurers need to be dramatically expanding the volume and variety of the data being analyzed, and increase the velocity of their analysis. Models that are currently being run against samples of data can now be unleashed against the entire dataset. Analyses previously done on structured transaction data can now be enhanced with valuable unstructured data from internal and external sources. New types of analyses can be performed – some that were previously thought to be technologically impossible.

High performance analytics makes it possible to expand analytics into new spaces using more and more data. Master data management is a good place to start. Insurers should build or upgrade their master data management capabilities and position the enterprise to capture, cleanse, organize, and use data to gain new insights. Next, a high performance analytics platform should be considered – with software and hardware solutions that provide the ability to apply Big Data techniques and increase the speed of analytics by orders of magnitude. In-memory approaches for data analysis and visualization are strong candidates for inclusion in the high performance analytics platform. Finally, insurers should establish a center of excellence for analytics. A collaborative environment with enterprise-wide reach should be created where highly skilled individuals from inside and outside the organization can work together virtually.

Insurers seeking to capitalize on the transformational new paradigms and opportunities that Big Data and high performance analytics can deliver would be wise to consider the capabilities that SAS, a global leader in analytics, is able to provide. Partnerships with Big Data appliance providers, new software capabilities to capitalize on in-memory and parallel processing approaches, and extensive experience give SAS a comprehensive solution set for this arena.

About Strategy Meets Action

Exclusively serving the insurance industry, Strategy Meets Action (SMA) blends unbiased research findings with expertise and experience to deliver business and technology insights, research, and advice to insurers and IT solution providers. By leveraging best practices from both the management consulting and research advisory disciplines, SMA’s services are actionable, business-driven, and research-based – where strategy meets action – enabling companies to achieve business success.

This SMA Perspective is a summary of SMA’s ongoing research on data and analytics in insurance. SAS has purchased distribution rights for summary results of selected research and opinion.

Additional information on SMA can be found at www.strategymeetsaction.com.