Information and Analytics: Enabling Business Optimization

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Information Is the Key to Business Transformation

Studies of the best performing companies show that firms that use business analytics to drive an evidence-based management strategy outperform their peers. Good data is the basis of sound information delivered through business analytics—allowing for better, faster decisions and actions, optimized processes and more predictable outcomes. Priorities may change as the economy and competitive conditions shift; some firms focus on cutting costs, others on driving topline growth – but in both cases *data is what matters the most*.

Today, information has become the very stuff of which businesses are built. New strategies for finding, interpreting and using data are the basis of business processes: product and service creation, customer identification and targeting, delivery of products and services, and the management of relationships with customers, suppliers and partners. Business processes are not only automated, they are themselves now a form of information: recorded, executable, and more easily changed to optimize outcomes.

However, the volume of information has itself become a problem. Executives worldwide complain that they don't trust the information they have, that they can't get the information they know is buried somewhere in their systems, and that they are not sure those systems are capturing information that might make a difference. Businesses struggle to gather information in close to real time, to improve the present as well as they believe they understand the past.

The good news is that progress in understanding and managing information-based businesses has reached a tipping point. A new generation of information technology will remake the business landscape as profoundly as the first introduction of computer technology did in the middle of the last century. Specialization, streaming, analytics and services will help savvy businesses reach new

> *"Not being able to access data quickly means an increase in your personnel costs. You have to have analysts individually go through records and that takes a lot more time. It also delays things; if reports aren't ready on time to apply for certifications in say, diabetes, that can be very costly."*
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> *- Don Spencer, Associate Director of Medical Informatics, University of South Carolina Health Care System*

levels of insight. An information-led transformation will harness these elements into a forward-looking ability to imagine the future more concretely and deliver it more rapidly. In this paper, we examine the portfolio of offerings IBM has constructed to help its customers gain competitive advantage from their data by creating an information agenda, building an information platform and applying business analytics.

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Information Strategy

Information strategies have long been wedded tightly to specific business processes. Although some companies attempted to take a longer view and build a broader perspective on information usage and exploitation, this was relatively rare – and success was rarer still. Most remained focused on short term ROI. "Abstract" questions surrounding the use of information took a back seat to optimizing a supply chain or processing transactions.

> *"When you talk to a lot of people, business intelligence seems to be the realm of large corporations, Fortune 5000 to 1000 corporations, which is not the case. I want everybody to know that even if you are a small to medium sized business you can implement a successful business intelligence solution."*
> *- Nihad Aytaman, Elie Tahari*

Today's challenges require a higher level view. As more sources of input, both internal and external, become available, they can be leveraged to tackle higher order questions: can we model the impact of weather on predicted sales by region, and optimize resupply based on that information? Can we identify potential fraud in the transaction stream by comparing predicted behavior based on history to actual activity taking place in real time? Is it possible to improve medical outcomes by comparing lab results to fresh data from large ongoing studies?

These opportunities and even richer ones await, but they cannot be achieved without an information strategy designed to identify what information is most critical to the business and ensure that it is available, trusted and managed. Organizations typically focus on internally sourced data. This data may be of poor quality, and may exist in multiple copies - defined, interpreted and managed differently by separate "owning" organizations. All but the most current data is typically retained in archived forms that are relatively inaccessible to typical business intelligence tools and programming. An information strategy that takes a holistic view across organization, ownership and time is required. It should assure trust, and actively seek new useful information sources and the tactics to leverage them. This strategy is the indispensable foundation that empowers analytics – and analytics are the vehicle that leading organizations use to effect information-based transformation.

The IT organization's leadership role in identifying these opportunities is critical. IBM customer Patricia Graham, CIO at CenterPoint Energy, describes an example of the synergies that can emerge from IT as new sources and methods are deployed:

"We realized we had a lot of usage data. We could look for voltage anomalies, which mean we have a tree limb hitting a wire repeatedly. Historically we would wait for that tree limb to break the wire before we would send a crew out, and it would take hours to replace. With the meter information we are gathering and the algorithms we have written, we can get out and cut the tree limb down instead of replacing the wire, thereby preventing an outage rather than waiting for that to happen. The business analytic side of this is enormous and it's not something that the operations guys really thought about - but now they do."

Breakthrough thinking like this can be accelerated when an information strategy has been deployed to lay the structural, technical and organizational groundwork. Information strategy development begins with an understanding of the assets involved: what data exists? Who owns it, secures it, and assures its stewardship? Next, organizations must create and manage the infrastructure that provides the performance, flexibility and reliability needed as a basis for building out a rich set of analytics competencies, predictive models, and similar tools. But few firms have the luxury of proceeding sequentially through stages; transformation must occur while businesses continue to operate. The information infrastructure that exists and the analytics that are already in use are a starting point and continuous improvement of both while driving transformation is a formidable challenge.

IBM's approach to this challenge has been to guide organizations through three key elements: linking an **information agenda** to a trusted, optimized **information platform**, and applying **Business Analytics** solutions. These elements form a continuous circular flow – all evolve continuously, and all can proceed at the same time.

The Information Agenda: A Basis for Acceleration

At first blush, the notion of a general strategy for information seems specialist-focused, abstract, and removed from day-to-day business concerns. In the past, this perceived remove doomed many efforts to unify the information assets and contributed to the divide between "IT" and "the business." Accordingly, strategists must begin with a mandate to align the use of information to the organization's business strategy. That begins with a top level view: what industry sector the organization is in, and what business processes are critical. The information needs, opportunities and practices of an industry are typically quite specific and must be factored into any planning and design process. Similarly, there are commonalities in certain business processes that must inform the information strategies designed to support them. The intersection of these two points of view creates a useful starting point for information strategy.

Acknowledging these two dimensions not only makes the resulting strategy richer and more useful, it provides a vehicle for internal collaboration between technologists and business leaders as they define and refine the model for their own use. The collaboration process drives buy-in and ultimate acceptance of the resulting plans. In IBM's offerings, models developed through multiple engagements with leading companies in similar industries, tackling similar business process requirements, afford a rich source of ideas to streamline and accelerate these definitional processes. Teams can more rapidly identify what information (both conventional data and other internal and

external content) is most important to the organization.

It is not necessary to have defined all information in the organization at this stage, but rather to have specified that which is critical to the identified strategic business processes. Which elements are prerequisites, and which are most important? This definition makes prioritization explicit, and defines how work may proceed in parallel on certain projects. Identifying how and when specific information should be made available drives an understanding of which projects form a critical path and must be staged sequentially.

Attention now turns to identifying and prioritizing the projects that deliver an immediate return and thus are more easily sold internally. Securing senior support and funding for the core projects at this stage ensures later success. For example, tying key master data management (MDM) work to compliance requirements may help secure the support of the CFO. Completing that project may become the foundation for developing a more comprehensive rationalization strategy across the affected data sources or applications that are identified as being out of synch. Executive sponsorship, in turn, drives the team's ability to define the management processes and governance practices required to sustain the plan, and obtain the authority to enforce it.

IBM has created an array of offerings to drive information agenda projects for its customers, based on

- IP embedded in industry and business process models, maturity models, assessment tools and checklists
- Software to assist in many of the above tasks
- Services to advise, guide, and/or execute information agenda projects

With the information agenda effort underway, the organization has additional information to support efforts to create and deploy an information infrastructure that meets both immediate and future needs – an information platform. These two activities need not be sequential; they may occur in parallel. But their synergy should be recognized – "platform" does not mean hardware and software alone, and the evolution of the information platform depends as much on agenda changes as it does on hardware and software innovation.

The Information Platform – A Holistic View

Software for "managing information" does not exist in splendid, academic isolation; it embraces existing hardware and software systems, knits them together, and provides leverage by relating them to one another for the purposes of the identified user. Innovations in information technology continually change both hardware and software landscapes. In the last decade, system platform architecture (processors, memory and interconnect) and data storage have advanced dramatically. As a vendor of both hardware and software, IBM is well positioned to incorporate these changes into the ongoing development of an organization's information platform.

One direct result of the $6B-plus investment IBM has made in systems-level research in

the past few years has been its creation of workload-optimized systems. These are specifically designed for the unique demands of analytical workloads, leveraging the new possibilities enabled by technology innovation. IBM has embraced the notion that special purpose systems can be better fit to purpose than generalized ones. New offerings, such as the Smart Analytics System, are "pre-integrated" with relevant software, designed for ease of installation and maintenance, and can be deployed rapidly for agility and rapid return on investment.

Planners of information systems must embrace heterogeneity as the future, even if they rely on a small number of suppliers. Diverse systems architectures are already the norm, resulting from organizational silos, mergers and acquisitions and prior projects designed to leverage innovations in systems technology. Most organizations already have many opportunities to gain value from integrating existing information assets.

The single customer view is often a catalyst for this insight. IBM customer Don Edwards, Assistant Agency Director for Alameda County, California, cites the county's Social Services Integrated Reporting System as an example. It integrates programs for Welfare, Child Welfare, Adult and Aging, Welfare to Work and Employment Services, and probation and Adoptions, enhancing value by delivering services effectively, keeping people from falling out of the system and preventing silos from becoming barriers:

"It's five systems that look like one so I can see the client in a single view across programs. I can see a child in foster care, I can see that child emancipate and become an adult, but still needs food stamps or other welfare systems. But that person may decide that they want to work in our Adult and Aging Department as an in-home support services provider to help the elderly or disabled. Perhaps that child crossed over into probation and had services required over there. I can see this entire lifecycle or this client in one single view."

Adopting this more modular deployment approach enables significant information management leverage. A rich software portfolio is a key advantage and is a necessary enabler in the information platform. Many product categories play a role in efforts like Alameda County's; they include enterprise content management, master data management (MDM), data integration and data warehousing, and effective data profiling, quality and lineage tools to ensure trusted information underlies the newly integrated systems.

Hardware is also a part of the information platform design in an increasingly integrated fashion. Handing off some availability and deduplication functions to smarter storage platforms is an example of this synergy. Removing the need to build these functions into applications or database software directly streamlines the information supply chain, removing the need to build it multiple times, to different specifications, for different owners, in different languages, and requiring multiple maintenance strategies. IBM's development and acquisition of these technologies in its own

We have enabled a number of IBM pillars of technology: WebSphere products, Tivoli Maximo, DB2. We run on System p as well as BladeCenter hardware. To help us put all of this in place we have engaged with Global Business Services and Global Technology Services, partnering with both IT and our operations groups."
- Patricia Graham, CIO CenterPoint Energy

portfolio is significant; it reflects a conviction that such solutions should not be left to post-deployment remediation with other vendors, but integrated into the customers' system design and planning.

IBM has also participated, and often led in, the development of better ways to persist data in DBMSs, leverage unstructured stored data in other formats, incorporate non-persisted data usages like streaming, add new discovery metaphors (UI and collaboration) and move advanced analytics closer to the data. It has created, acquired, and continues to integrate a portfolio of software assets that facilitate the broad view of information management discussed above. Transformation projects may involve the need to add data in motion involving non-traditional data types such as streaming instrument feeds or well-known ones such as Financial Information eXchange (FIX) feeds that will be used for complex real time analytics. Content management systems extend the reach of strategists to social media for sentiment analysis, or across stored email archives for compliance and privacy projects.

From the perspective of the information platform, this continued innovation creates even more urgency around the development of information infrastructure offerings to ensure high-performing and cost effective information availability, security, retention and compliance. From storage "up the stack" through multiple layers of software infrastructure, IBM offers a collection of maturity models, assessment tools, and roadmaps as it does for the Information Agenda. Its product portfolio includes storage management, archiving, security encryption, data integration, DBMS, data warehousing, master data management, enterprise content management, and business intelligence tools that are among the best in class in their categories.

> *"The end result of our Business Intelligence Initiative was that we were able to capture EDI data, selling information from our department store customers as well as our own internal stores. We calculate sell-through percentages, which tell our managers what's selling on the floor and how well it's doing. With standardization across the enterprise, access to accurate, timely information and being able to see patterns, we have achieved business agility and efficiencies across the enterprise much faster."*
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> *- Nihad Aytaman, Elie Tahari*

The payoff from defining an information agenda and building an effective information platform comes when the organization turns its attention to analytics. Business analytics empower strategists to drive an evidence-based approach to management, where decisions are soundly based and can be accelerated to gain maximum benefit.

Analytics Drive Business Optimization

Business analytics enable the fundamental shift to a different way of making intelligent decisions: evidence-based. As noted above, this demands trusted data, derived from every possible source, governed and secured, with assured quality and known

provenance, with a clear organization consensus about its meaning. The information agenda helps to ensure this is in place. It bears repeating: *data is what matters the most.* Nothing happens without it.

The information platform is the informational nervous system, tuned to gather data wherever it's needed and filter it through the organization's strategy-driven evaluative processes to ensure the facts needed are always available. But it's more than that: the platform provides the processing power to serve up real-time streaming data, combine it with historical data as needed, and analyze it in ever-changing, increasingly sophisticated ways. There was a time when reporting was the state of the art – just being able to deliver an organized presentation of what happened in the business yesterday, last month, or last quarter was a great leap forward. Some organizations still focus on this simple delivery of history, in new visualizations, with portal technology and mobile devices, as if this were sufficient. But it is not.

In the latter years of the 20th century, there was a great focus on "what-if": simple scenario building that substituted possible values in standard models of how the business works. It was coupled with improvements in online analytical processing: ways to "drill down" into pre-designed summary reports to see what drove the results. These two steps forward allowed more sophisticated "business intelligence," but they fell far short of statistical techniques long in use for rich modeling of outcomes. Comparing "what is" or "what was" to what "should have been" depends on a rich understanding of statistical techniques, a normative model of how the business ought to be.

Today's business analytics offer benefits these older approaches could only grope towards. They can function as the "brain" of the nervous system that the information platform provides, moving from data gathering and interpretation to model building, real-time comparison of current reality to predicted and hoped-for outcomes. Most important, they also serve as the basis for action: sometimes automated, sometimes requiring human intervention, but always goal-directed, aimed at improving results and moving the business forward.

The skills needed to realize this vision are not widespread; most organizations have local pockets of business "power users" who know both the business and some of the requisite technology, but few have a real center of excellence for advance analytic techniques. Those that do often isolate those scientists, by design or by accident, from the everyday practical realities of the business. IBM's Business Analytics and Optimization (BAO) team focuses directly on this problem; it performs fundamental research into decision-making algorithms, including the development of advanced mathematical methods and capabilities. Its staff, a collection of over 4,000 researchers in statistics and operations, focuses on developing predictive analytics to improve business decisions, often in direct engagements with IBM customers. The team partners with IBM's services organization to leverage engagement-based industry and business process models, leveraging them to create specifically focused, applied business analytics.

Putting these pieces together is more than defining a strategy, more than implementing a technology roadmap, more than a solution installation. It's a journey that involves maturity assessment, skills acquisition, cultural change, and a clear vision. To get there, organizations need help with planning, prioritizing, and executing on their chosen projects together with a framework that leverages those efforts and makes them part of a

broader initiative to sustain transformation as a continuous process. IBM has built its practice teams to help its customers achieve this transformation.

Don Spencer, Associate Director of Medical Informatics at University of North Carolina Health Care System, chose IBM for its technical expertise, skill in project management, and experience in data governance. The latter aspects of the engagement, he says, were even more critical than the technical ones:

The business processes come from multiple sources and for us to optimize that we really had to work together not only with our clinicians but our hospital administrators to make sure the data flows are right, show the improvement of our organization and particularly to our payers. The extra time it takes to get the data out of the system was really delaying some of those proposals and their preparation. We can go through a project proposal now if somebody knows what they want in an afternoon whereas it would take a month before. And that means for us getting more project proposals out, doing research faster and ultimately contributing not just to information but new knowledge.

"With the information agenda from IBM, we can get information from the complete global organization together and based on that, we streamline the organizations, we make better products, we have more information about the performing of the products in the store, and we make the right decisions in a complete supply chain."

- Anton Langeler, Global IT Director, the O'Neill Organization

Spencer's experience illustrates a key change an analytics culture brings about: decisions are made where and when they are needed most, by the people who are close to the issues and have the most at stake. Ideas about a "total view of best customers" ultimately mean more in the hands of a banker advising her clients than they do to an information architect, because the banker can create value with them. That immediacy is the very stuff of which transformations are made. Delivering it depends on the right data, a capable platform, and a rich set of analytics in the hands of people who can do something with them. The result is information that makes a difference, and it can have transformational implications for a business. Organizations that build the systems to power that transformation will drive past those that do not at an accelerating rate as the use of advanced, predictive analytics changes the way business is done.