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**Information Management** software

## **Innovating with information on IBM System z**

*Using information as the cornerstone for innovation*

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## **Executive summary**

Organizations face a dilemma as their marketplaces evolve: new competitors, new regulations, growing costs, waning customer loyalty and other emerging factors are making it more difficult to compete.

Most companies believe that addressing these issues requires a substantial increase in innovation. They need new offerings, better methods of attracting and retaining customers and more efficient ways to run their business—and they are looking to information to be the cornerstone of that innovation.

Successful businesses understand that they must use information to drive innovation—to change the way they do business and to differentiate themselves in their market. Many companies have built data warehouses that meet these needs, but are now finding they need to move beyond the back-office warehouse to leverage information on the front lines. They need information on demand and systems that can deliver on those promises with real incremental returns.

This paper investigates the challenges of building systems that bring business intelligence to the masses, and how an integrated set of products and services from IBM can help meet that goal.

## **Innovating with information on IBM® System z™**

Today, more and more companies are using information to innovate—to change the way they do business. An increasing number of organizations recognize that enterprise information defines their customers and their business operations. Information may reveal customer buying patterns, demographics and psychographics that define customer segmentation and enable the development of targeted offerings. Enterprises use it to document and optimize key business processes. When displayed in corporate dashboards, it can give companies visibility into vital business performance metrics. Finally, information helps satisfy the growing set of compliance regulations faced by nearly every organization.

Examples are everywhere: retailers use past purchase information to offer customers targeted recommendations; manufacturers use demand planning forecasts to adjust inventory levels; police departments use information about

current crime investigations to deliver possible suspects to detectives as soon as they arrive on a crime scene. In markets around the world, businesses use enterprise information to improve customer service, optimize operations, boost employee productivity, gain regulatory compliance and manage risk.

And yet, these achievements are just a start. A recent management study shows that more than 60 percent of CEOs believe that their organizations need to do a better job of leveraging information.<sup>1</sup> They say that if they leverage their information effectively, they can create five times more value for their organization. In fact, 87 percent of the CEOs surveyed believe fundamental change is required in the next two years to drive innovation.

### **The modern data warehouse**

The engines that drive information-based innovation are data warehouses, the infrastructure of solutions and applications that store and act on corporate information throughout the enterprise. These warehouses are the repositories of the organization's operational history and the foundation for analysis of the business' key performance indicators (KPIs). Through this analysis, organizations can identify opportunities, provide a consistent and unified representation of customers and products and optimize business processes, thereby reducing costs and improving revenues.

First-generation data warehouse implementations are often limited to query and reporting, but advances in data integration, data mining, predictive analytics and recommendation and decision-making engines give next-generation data warehouses the potential to deliver much greater business value. By moving beyond simple reporting to operational business intelligence (BI), businesses can provide actionable information to decision makers when they need it most—at the moment of the decision.

While the trend to put information in the hands of decision makers has powerful momentum, successful deployments require changes in the data warehouses that make up the underlying enterprise information infrastructure. The data warehouse has to move from a back-office system to a mission-critical operational system capable of satisfying demanding, rigorous

service levels. It must deliver information into operational transactions, portals and other tools to provide the necessary information to the right place at the right time and in the right context.

While making these changes, organizations must also cope with significant growth in data volumes. The value hidden in operational data is encouraging database growth, which Forrester Research estimates to be 30–50 percent per year.<sup>2</sup> Many companies already have databases in the hundreds of terabytes and are now investing in petabyte-sized systems. This growth can overwhelm management with the time and resources required to capture, transform and load this data. Many IT organizations are seeing the time window for loading the data decrease but are being asked to provide more data for longer periods in the day. Gartner is now saying that it is time to modernize the data warehouse to meet these needs.<sup>3</sup>

### **Data warehouse deployment challenges**

While most organizations see the value in modernizing their data warehouses, many deployments are plagued by an inability to connect disparate data sources and create a unified view of information. This problem most commonly manifests itself in three ways:

#### **1. Lack of a holistic view of the organization**

Most organizations implement a variety of special-purpose systems in daily operations. Each of these systems has customers, generates revenue and is integral to company operations. However, the systems are not focused on cross-enterprise functionality. For example, if the company wants to determine customer profitability or lifetime value, there are no agreed-upon data items or definitions upon which to base that calculation. If the CEO wants to use a dashboard to understand the business as a whole, there is no way to identify the key metrics or their drivers—and understanding cash positions across the organization is difficult without new systems and special coding. In addition, if a merger or acquisition is attempted without a strong single view of the organization, blending the systems can become overwhelmingly complex.

Many of these problems can be traced back to a lack of consistency. With no agreement on data terms and definitions, the same question can produce multiple answers. Calculating revenue, costs and liabilities requires consistent business rules and terms to allow the data to be understood in context, enabling fact-based decision making. For example, one organization in a retail operation might define “sales revenue” as the proceeds of the daily transactions, while another organization might define “sales revenue” as the proceeds of the daily transactions less any returns.

Achieving a holistic view of the organization requires building an enterprise data model. This is a model of the unified business across all operational system silos, as well as a glossary of terms and definitions that define the business and its processes. Building a data warehouse without an enterprise model is like building a house without a set of building plans: the results can be very expensive and may produce endless iterations and modifications to accommodate new functionality.

## **2. Lack of a single view of the customer**

Businesses often have multiple relationships with their customers. However, information about those relationships is buried in the disparate operational systems that support each line of business, limiting visibility. In addition, the data about each of these relationships may vary when the individual occurs in multiple systems.

Without a single view of the customer, companies cannot determine a customer’s value to the organization as a whole or take advantage of processes, such as single-customer statements, that can radically reduce production and mailing costs. Customer retention and cross-selling are also more difficult without a unified view—how do you identify the profitable customers early and attract them?

The most effective way to accomplish this is to gain a real understanding of these customers, their relationships and their behaviors. Many organizations are beginning to develop a forecasted Lifetime Value of the customer, anticipating future earning power based upon current profile. This is called individualizing the customer—fully understanding the customer as an individual rather than one of many nondescript relationships.

To individualize customers, the organization must gain control of the information it already collects about each customer. By capturing this information into a single repository and supplying a fully consolidated view to customer contact applications, organizations can change customer perceptions and develop strong and lasting relationships. Organizing, capturing and delivering this information is part of what the industry refers to as creating a “single version of the truth.” When delivered to the operational systems, this becomes the first step of managing master data.

### **3. Poor data quality**

Many surveys cite lack of data quality as one of the top reasons why a data warehousing project fails to meet its objectives. Data quality issues in integration projects can be frustrating, as it can be difficult to understand why data that works well in a given operational system can be so flawed as to be unusable in an enterprise-wide project.

There are three reasons for this flawed data:

- *The data is focused on a specific task.*
- *The data is good enough to meet the needs of the operational system.*
- *The context of data creation is different than actual data use.*

When data is captured in an operational system, it is acquired for a specific purpose. Many application databases contain additional fields with extra information that could be valuable to the business, but these fields are not used in everyday processes. Therefore, this data is not monitored and managed as closely as the data required to drive the application, and often contains values that are unexplainable, inaccurate or arbitrary. In addition, fields may be reused for special issues, resulting in completely foreign information entering a field.

Even if the data is good enough to meet the need of that particular application, it may not be good enough for use on a broad basis. For example, a customer’s name and address record may be good enough for the postal service to deliver a statement, but not good enough to easily merge the multiple records of the same customer from different business units to understand customer profitability.

To help ensure their warehouses contain trusted data, organizations must analyze and profile the source data to the warehouse, standardizing the terms and semantically blending the data into a format that can be consumed by the required tools and applications. In addition, the process must leave a trail of information that documents where the data originated and what transformations occurred to the data.

The issue of trusted data is not a static one. The U.S. Postal Service states that over 40 million Americans move annually, which means that an average of one-sixth of an organization's customer base changes addresses each year.<sup>4</sup> This results in significant annual losses to U.S. businesses from postage, printing and staff overhead associated with bad customer data. To deal with the ongoing data churn, organizations need an automated system to manage and clean the data continuously.

### **The IBM solution: Information On Demand**

Addressing these three challenges—and the demands of real-time data access and user consolidation—requires a robust integrated warehouse architecture. Information On Demand is the IBM approach to delivering the right information at the right time and in the right context to drive business responsiveness and innovation.

For years, IT organizations have focused on automating the business, but with today's business pressures they are now moving to optimize business processes to reduce cost and drive competitive differentiation. Information On Demand creates an end-to-end information framework that includes industry-leading components to enable better business outcomes. Figure 1 illustrates how the various capabilities combine to provide a unified information solution that integrates, reconciles, manages and analyzes data and content—regardless of the type, volume or complexity. Data can be structured or unstructured and come from various source systems, and the information can be delivered quickly and in context to users, applications and business processes.

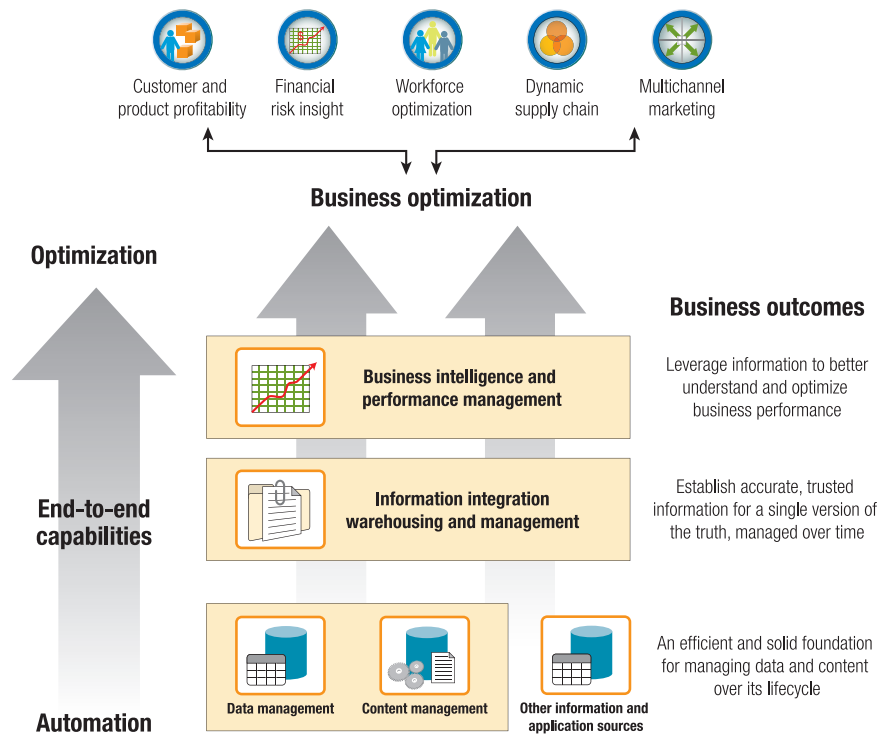


Figure 1: The IBM Information On Demand architecture provides a foundation for integrating, reconciling, managing and analyzing data and content to support enhanced business performance and better business outcomes.

The IBM solution includes a foundation built on IBM DB2® for powerful information management and IBM FileNet® offerings for content management. On top of this foundation, IBM adds the analytics of IBM InfoSphere™ Warehouse; the data profiling, cleansing and integration capabilities of IBM InfoSphere Information Server; the unified master data management of InfoSphere Master Data Management Server; and a solid



blueprint for success as defined by IBM Industry Data Models. The final layer is completed with IBM Cognos performance management and tooling applications. This unique multilayer solution provides a comprehensive approach to identifying, managing and leveraging information to optimize the business and promote innovation.

### **Building Information On Demand**

Information On Demand is not a random collection of technologies, but a combination of automation and best practices designed to enable a management-mandated implementation of business goals and objectives. Many companies have failed in their pursuit of innovation with the misguided thought that the problem could be addressed with the hottest new technologies. The reality is that information systems must support the strategic objectives of the organization. They can provide insight into opportunities and provide information to aid in achieving them and the ability to measure the progress made in attaining those objectives. Aligning infrastructure with the goals, objectives and initiatives of the organization can make the difference between success and failure.

### **Adopting the Information Agenda**

IBM has developed a new strategy, planning and implementation approach designed to help companies realize their vision of turning information into innovation. The IBM Information Agenda serves as both strategic and tactical roadmap, bringing together the people, processes and technology necessary to transform increasing volumes of information into a trusted business asset.

The Information Agenda is built on a solid approach that integrates strategy, information governance and enterprise information infrastructure with an inclusive implementation plan. Its goal is to transform the organization and unlock the business value of information across data and content silos, driven by an organization's business strategy and operating framework. The Information Agenda enables organizations to deliver trusted, enterprise and dynamic information to optimize business performance.

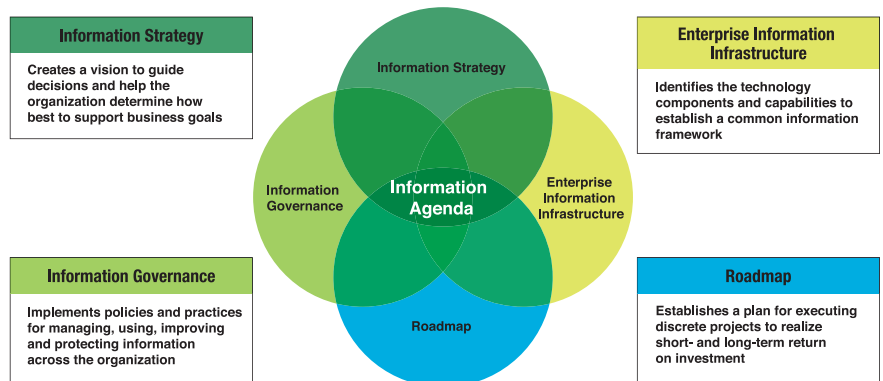


Figure 2: The IBM Information Agenda framework brings together strategic and tactical components to form a single enterprise plan.

The five steps of this process (see Figure 2) take a company from concept to implementation in an organized approach:

**1. Identify the corporate objectives and initiatives for innovation and differentiation**

The corporate goals, objectives and initiatives make up the strategy identified by senior management that outlines the organization's direction. They are intended to maximize the organization's inherent strengths and opportunities compared to its competitors. It is generally a multiyear plan that is revisited each year.

**2. Build an information strategy to support the corporate objectives and initiatives**

The information strategy establishes the principles that will guide the organization's efforts to create and exploit information to support the organization's goals, objectives and initiatives. It provides an end-to-end vision for all components of the Information Agenda, and is driven by an organization's business strategy and operating framework.

**3. Implement policies and practices for managing the information**

Information, like any other corporate asset, needs to be managed.

Information governance provides governing policies and processes for management to enhance the quality, availability and integrity of a company's information by fostering cross-organizational collaboration and policymaking.

**4. Develop a roadmap for executing iterative projects that return tangible results**

The information roadmap identifies the sequence, objectives and value of each subsequent implementation. The roadmap can help the CIO set expectations and identify the sources of any needed funding.

**5. Build an information infrastructure that provides trusted, enterprise and dynamic data**

Establishing a common information framework enables companies to transform data and deliver it across the enterprise. The infrastructure is built by applying best practices, expertise and advanced technology and applications to achieve business optimization and provide users with a better understanding of the data.

**Delivering Information On Demand**

An enterprise can contain many types of data: operational data from the systems that run the business; trusted data that has been cleansed and processed to ensure accuracy; enterprise data that represents a corporation-wide view of the organization; and dynamic data that is updated to provide users with the most current data as information changes. Delivering Information On Demand requires an infrastructure to transform the operational data into trusted data, organize the trusted data into enterprise data and deliver the enterprise data as dynamic data to decision makers.

Figure 3 shows this migration using standard tooling.

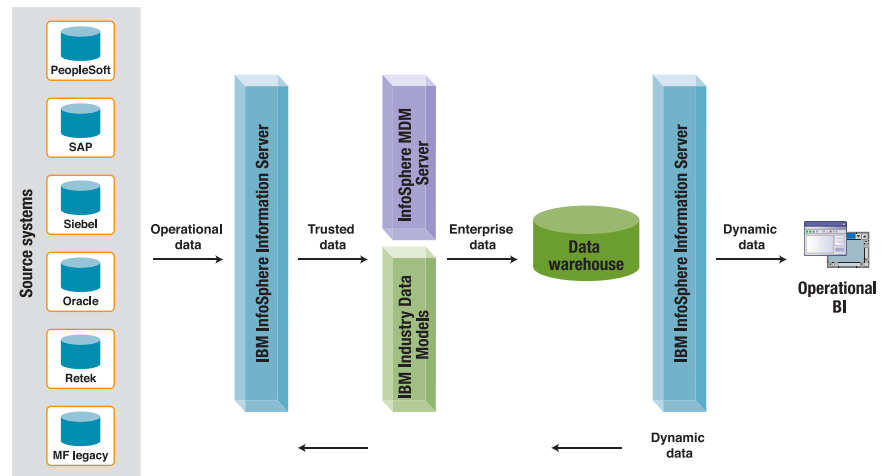


Figure 3: Operational data can be transformed into dynamic, actionable information through the IBM Information On Demand approach.

### Business performance management and analytics drive innovation

Business performance management (BPM) and analytics are key components of the IBM Information On Demand approach. Both help organizations use integrated, enterprise and dynamic data to its best advantage by optimizing performance and providing a thorough understanding of corporate information stores.

#### BPM helps maximize performance

According to the BPM Standards Group, BPM is a “set of integrated, closed-loop management and analytic processes, supported by technology, that address financial as well as operational activities. BPM is an enabler for businesses in defining strategic goals, and then measuring and managing performance against those goals.”<sup>5</sup>

Core BPM processes include financial and operational planning; consolidation and reporting; modeling; and analysis and monitoring of KPIs linked to organizational strategy. Each of these seeks to optimize the business with information. IBM Cognos offers a whole-product approach for this part of the optimization process: performance management software.

Performance management helps your company utilize historic data to define goals and use current information to map attainment of milestones along the paths to those goals. Prebuilt Cognos solutions maximize the effectiveness of performance management initiatives, helping organizations establish goals and then providing the scorecards, dashboards and financial consolidation features to monitor and manage against those objectives.

#### **Turn operational data into trusted data**

Information can only support innovation and right-time decisions if users have confidence in its accuracy. While many organizations have data warehouses, many fail to have trusted, integrated data—that is, their data provides inconsistent answers to business questions or has wrong or missing values, or the end user does not understand the definition of the data or the source of the data and its lineage. If data has been properly analyzed, cleansed and transformed and has an audit trail of metadata, the user gains the necessary confidence to act boldly and take decisive action based on that data. A well-conceived enterprise data integration strategy delivers a clean and trusted source of data upon which new and existing data warehouse applications can rely.

#### ***Trusted, integrated data helps IT align with business initiatives***

*New competition from a startup business was significantly affecting a video rental chain's margins. At the same time, the chain's IT organization was under pressure to get more value from its IT investments with fewer staff. The company's current information system was delivering inconsistent answers, and its existing tooling had limited capabilities and required a lot of maintenance and constant firefighting.*

*The IT staff needed to deliver correct, timely information to their business users to help them make fact-based strategic decisions to address the new threat. Using IBM InfoSphere Information Server technology, they re-engineered the company's data integration strategy to focus on reuse, standards and quality. They were able to provide integrated data easily and more economically through automation and reuse. The integrated data also enabled the staff to align IT with business initiatives and provide unprecedented marketing intelligence into historic and future customer behavior. The video rental chain was able to outmaneuver its competition by using trusted data to change its policies and leverage stores that the new competitor could not match.*

The ability to understand information in business terms, the business rules that govern it and its source or data lineage is key in establishing information confidence. Figure 4 illustrates how IBM InfoSphere Business Glossary, metadata and IBM InfoSphere Business Glossary Anywhere can be used together to provide information confidence within any report or application.

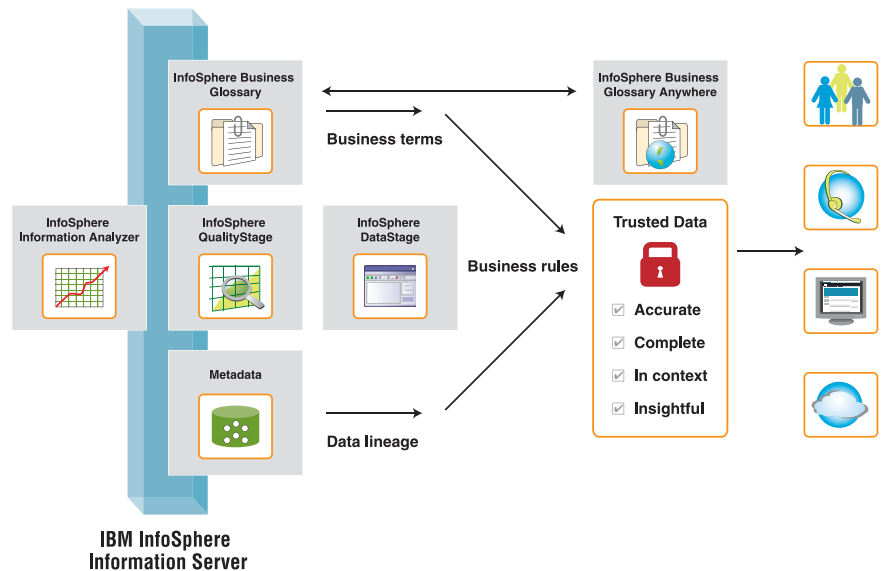


Figure 4: The components of IBM InfoSphere Information Server, including InfoSphere DataStage® and InfoSphere QualityStage®, work together to provide users with accurate, trusted data.

### Organize trusted data into enterprise data

Databases require a model, a type of blueprint, to identify where and how to store data. In addition, data from the operational systems must be redefined in enterprise-wide terms. This provides queries, dashboards, reports and other applications with a holistic viewpoint of the entire organization and a single view of the customer. It enables visibility into costs and revenue streams that determine profitability and new opportunities and facilitates compliance through enterprise-level reporting.

The model defines the data and the technical and business definitions for a successful data warehouse. It can be purchased as one of the IBM Industry Data Models or built using tools such as Rational® Data Architect. While an enterprise model describes all of an organization's data, it is not necessary to populate (load) all the data at one time. Data is only populated to the model sections to address the initiatives required to meet the organization's goals of the moment. The model becomes the roadmap for subsequent projects, enabling each new project to build upon the success of the prior project.

Master data management (MDM) pushes the concept of enterprise data another step forward. By identifying and blending of all the data around topics such as customers and products, MDM can organize information and make it available to the operational systems. This provides a holistic representation of the customer and/or products to each operational application, enabling them to individualize the customer and better manage the products.

***Using enterprise data to boost data accuracy***

*A leading North American consumer bank is facing a requirement to meet government-mandated reporting regulations. The bank needs to act quickly, but it does not have the data in a format that enables it to comply. Rapid growth through acquisitions has made integration even more difficult, and costs are rising due to multiple redundant data centers. Cross-bank financial reporting has deteriorated to manual reporting, and there is an immediate need to consolidate financial data and gain a holistic view of all customers.*

*Using the IBM Banking Data Warehouse Model (BDW) and InfoSphere Master Data Management Server as focal points for information consolidation and data governance across its 30 systems, the bank quickly defines the data for consolidation and reporting. IBM InfoSphere Information Server and IBM Banking Integration Models enable the bank to build and synchronize its MDM and BDW, creating a single view of customers across the bank with accurate data for satisfying Basel II and management reporting requirements. Enterprise data provides the bank with consistent data definitions across all applications and reporting systems.*

### Distribute enterprise data as dynamic data

Many organizations are beginning to view their data warehouse as an incredible information asset that is not being leveraged to its fullest extent. It is not enough to have the right information—that information needs to be available to the decision maker at the time of the decision. This delivery of dynamic data helps companies differentiate themselves by enabling employees to provide an answer at the point of contact with customers. It can also provide information to suppliers to help optimize the supply chain and can be used by customers to extend their purchases and relationships.

Delivering dynamic data to the decision maker at the right time requires timely data. Is last night's data good enough, or must it be current up to the moment? Change data capture, replication and federation services are an effective way to ensure the data is at the appropriate level of currency.

IBM InfoSphere Information Server supports these three options, as well as a Service Oriented Architecture (SOA) approach, for delivering dynamic data (see Figure 5). Whether the application uses a direct transaction query or an SOA service call, it can deliver right-time information to the decision maker.

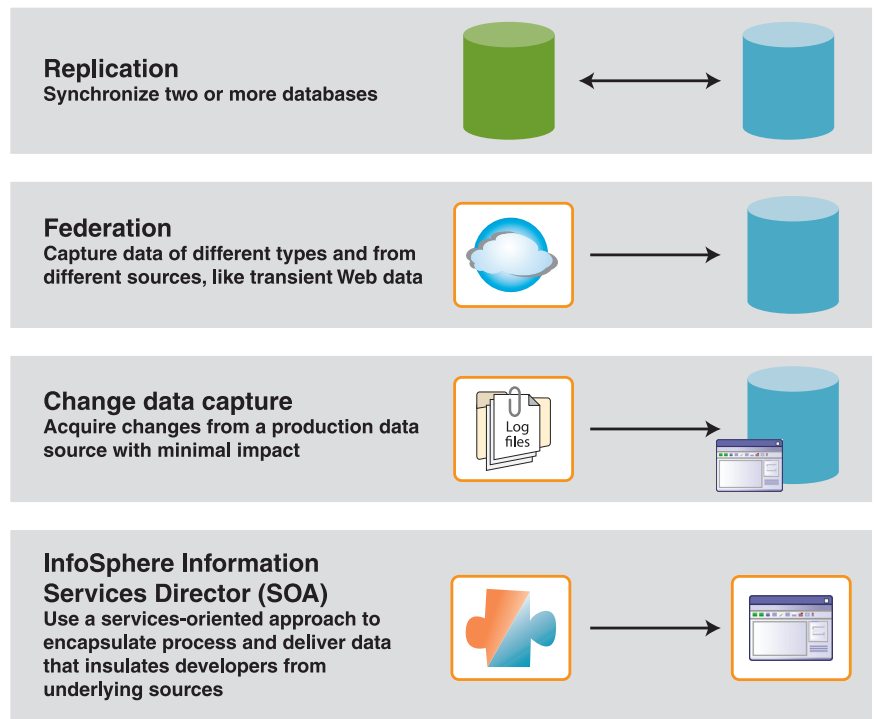


Figure 5: IBM InfoSphere Information Server supports several methods of delivering timely, dynamic data.



SOA componentizes applications into processes and services. These services can be rapidly joined together into composite applications to meet changing business requirements. InfoSphere Information Services Director is a wizard that enables you to develop SOA information services to deliver the information used to empower the people and support the dynamic processes that drive business optimization. With just a few clicks, a user can encapsulate IBM InfoSphere Information Server functions such as cleanse or transform; provide data via an SQL statement; call another service; or create a combination of any of these, providing an easy approach to quickly deploy robust, business-changing services. With the ability to understand, cleanse, transform and deliver integrated, enterprise data—and deliver all of this functionality as a service—SOA information services can provide integrated, enterprise and dynamic data directly to the application.

**Dynamic data promotes innovation**

*A well-established, high-quality jewelry store chain faced a new competitor that was changing the rules and dynamics of its business model and marketplace. The competitor, a mega-retailer, had begun selling similar products with predatory pricing. The increased competition was lowering the jewelry store's retail transaction counts and threatening profits. To differentiate itself, the jewelry store decided to establish closer relationships with its customers—a capability the mega-retailer would be unable to match.*

*Accomplishing this required immediate information about the store's customers, as well as on demand access to that information. The jewelry store deployed IBM InfoSphere Information Server technology with services delivered as an SOA to synchronize central and store-level customer data warehouses. The solution, an Online Personal Assistant, allows each sales associate to proactively service and sell with thank-you notes, service reminders or birthday offers. It immediately provides the sales associate with suggestions based on customers' past purchases and jewelry that they or their family members previously considered. With the personal assistant, the sales associate is able to offer individualized help that truly recognizes the customer's family events, preferences and desires. Dynamic data gives the sales associate the right data at the right time and enables the business to innovate beyond competing on price.*

For example, a major retailer wanted to drive sales by localizing assortments based on customer buying patterns and improve its promotion effectiveness by reaching the right person with the right offer. It also wanted to increase customer loyalty by having customers feel that the store understood them as individuals and was catering to their needs. Finally, the retailer needed to improve its merchandising.

The retailer used data mining to group its customers by demographic and behavior so it could better target offers to each segment. It then profiled the segments by store and analyzed what each customer purchased on each visit. This gave the retailer the ability to uniquely tailor each store's design and merchandise based on the preferences of that location's customers.

Data mining provides data discovery and prediction algorithms, plus a unique visualization capability to better understand the results of the models and a scoring function that enables the models to be executed within an SQL statement. The scoring function of IBM Intelligent Miner, a component of IBM InfoSphere Warehouse, will accept any Predictive Model Markup Language (PMML) model to be executed immediately within an application. The included models cover segmentation, associations, sequential patterns, classification and numeric prediction.

Multidimensional analysis (online analytical processing) is another way to better understand data. The Cubing Services component of IBM InfoSphere Warehouse performs multidimensional analysis, as does IBM Cognos software. This capability enables users to compare and contrast data from multiple periods to gain insight into trends. Users can identify deviations and drill

down from summarized data into detailed data to determine the root cause, helping them determine what is driving a particular trend. For example, a retailer could trace a downward spike in men's apparel sales back to being out of a hot-selling item.

Much of today's data is lost to analysis because it is not organized in a structured way. Documents such as service logs, call center logs, insurance claims and contracts provide a great deal of information when combined with structured data and analyzed. Utilizing annotators to find relevant nouns, verbs and context, they can be analyzed or combined with structured data to better understand the entire issue. IBM Dynamic Warehousing offerings provide an effective way to manage, retrieve and analyze all of this data to support the organization's objectives and initiatives. They are designed to scale to from the modest needs of small organizations to the unique requirements of the largest companies.

### **Putting it all together with IBM Dynamic Warehousing and IBM Information Agenda**

Information is a corporate asset and a key source of corporate innovation. It is an asset that requires investment to inventory and manage, but one that can return hundreds to thousands of times the original investment. Building an information strategy that is based upon the goals, initiatives and objectives of your company is a significant step in developing your roadmap to success through information innovation.

IBM is committed to helping you create that roadmap by providing the technologies, products, services and expertise needed to execute your strategy. IBM Dynamic Warehousing capabilities have the power to energize your business initiatives, giving you an enterprise solution that helps employees leverage information to create differentiation and breakthrough business results. An Information Agenda enables your organization to deliver trusted, enterprise and dynamic information using an orchestrated combination of people, proven processes and technology.



IBM can help you build market-leading information management solutions that quickly scale to handle the most demanding business requirements while boosting line-of-business users' confidence in both data and the IT infrastructure. Whether your requirements call for a high-performance parallel database, a full-function information server, a performance management application or information provided via an SOA, IBM delivers the right information to the right person at the right time.

### For more information

To learn more about IBM dynamic warehousing solutions and the products to build them, please contact your IBM marketing representative or IBM Business Partner, or visit the following Web sites:

- [ibm.com/informationondemand](http://ibm.com/informationondemand)
- [ibm.com/software/data/ips](http://ibm.com/software/data/ips)

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