

WHITE PAPER

The Business Value of Having the Right Data at the Right Time: Best Practices in Business Analytics for the Telecommunications Industry

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IDC OPINION

The art and science of creating and sustaining competitive advantage through business analytics is gaining momentum. The telecommunications industry is one in which traditional data warehousing deployments have existed for years. However, market forces, including mergers and acquisitions, the changing competitive landscape, and the increasing pace of innovation, are forcing companies to actively enhance their existing business analytics IT architectures to optimize the use of data to improve operational performance.

One of the key trends in the market is the availability of more data for both strategic and operational analytics and reporting to support decision making at all levels of an organization. As telecommunications companies look to optimize existing business processes to maximize revenue, decrease costs, and grow profits, those with the most relevant information are able to more quickly and more accurately make decisions about current trends and predict future events to get ready to capitalize on opportunities or mitigate risks. Access to the right level of data granularity at the right time with data warehousing solutions that provide optimal scalability and availability forms the core of any business analytics system.

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IN THIS WHITE PAPER

This IDC white paper examines the challenges faced by the telecommunications industry in managing data for the purposes of decision support and recommends action items to be considered as part of overcoming these challenges. Analysis and opinions expressed in this white paper are based on IDC's quantitative survey research and qualitative interviews and discussions with both end users and IT suppliers of the telecommunications companies. The companies interviewed included both United States- and Europe-based major telecommunications service providers with landline, mobile, commercial, and retail offerings.

SITUATION OVERVIEW

The business world is abuzz with the great potential of management by analytics. Business intelligence and data warehousing — historically topics for a narrow segment of the IT community — are entering the mainstream through articles in the *Harvard Business Review*, *The Wall Street Journal*, and other business publications. Business schools are launching courses on business analytics, and conferences worldwide are full of attendees who want to hear about best practices in the use of business analytics technology, including those for accessing, transforming, analyzing, modeling, and delivering information.

The telecommunications industry is no exception to these trends. Some of the world's largest data warehouses can be found in telecommunications companies. The volume of data available for analysis is both a challenge and an opportunity. Transactional data, call detail records, network utilization information, call center records, and many other sources present telecommunications companies with the opportunity to improve their decisions across business functions. However, the amount of data and the frequency of its availability pose IT challenges as business decision makers' expectations have changed toward on-demand access to the most granular level of information.

The Business Imperative

The business analytics market continues to be driven by the need for improved performance management and compliance. The fundamental goal of business analytics technology is to empower all stakeholders with the right information at the right time using the right technology. The objective is to enable better decision making across all business functions, including revenue or profit improvement, cost containment, innovation, and risk mitigation. While the overall goals of companies coalesce around these high-level objectives, the key analytic processes differ by industry.

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Some of the frequently mentioned key analytic processes within the telecommunications industry include:

- Preventing revenue loss due to customer churn
- Increasing revenue through cross-selling/upselling
- Decreasing the cost of customer service and support
- Preventing fraud and mistakes in the cross-carrier billing process
- Optimizing network management

Over the years, portions of the telecommunications industry have embraced business analytics technology, and companies within the industry are sometimes highlighted as leading users of such technology. However, the telecommunications industry is also at the forefront of being challenged by the current business and technology demand drivers such as mergers and acquisitions, changing business models, and rapid new product introduction cycles, as well as increasing volumes of data and growing numbers of decision makers with access to business analytics technology.

Technology Demand Drivers

IDC defines the business analytics technology market as consisting of tools and applications for tracking, storing, analyzing, modeling, and delivering information in support of decision-making processes. The market is composed of two primary segments: data warehouse platform and performance management tools (query, reporting, analysis, data mining, statistics) and applications (prepackaged analytic applications), which are both deployed on respective server and storage technology.

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- ☒ **More data.** According to IDC's recent survey of 750 respondents, 40% of data warehouses are over 1TB in total size, with 18% of organizations expecting their largest data warehouse to at least double in size during the next year. The largest percentage of respondents (37%) expect a 25% to 50% growth rate for their data warehouse. This trend has stayed consistent in IDC surveys over the past five years and does not show signs of a slowdown.
- ☒ **More data types.** As awareness of the potential of business analytics solutions to influence performance increases, the need to combine structured transactional data with various other forms of unstructured, semistructured, and rich media information becomes more acute. It is common for data warehouses in telecommunications companies to aggregate and analyze data from multiple sources, including customer interaction data from call centers; click-stream data from Web sites; call detail records (CDRs); billing information from consumers, commercial customers, and retail and channel partners; financial data from general ledgers; supply chain-related data from purchasing and inventory systems; and human resources data from engineering/technical, call center, and broader corporate staff.
- ☒ **More users.** Traditionally, business analytics tools have been deployed to address the needs of business and quantitative analysts in various departments, with less attention paid to managers and supervisors, line-of-business staff, and stakeholders external to an organization. To achieve pervasive business intelligence, organizations will have to rethink their approaches to technology deployment by taking into account users' expectations for information access and interactivity on the Web and by embedding business analytics functionality into other applications.
- ☒ **Shorter decision cycles.** Compounding the complexity of providing end users with the most relevant information is the increased demand among employees for more rapid access to the data. As decision cycles shrink, telecommunications companies are looking for near-real-time information to be delivered to their decision makers. Already, 13% of organizations indicate that they refresh their data warehouses in real time. While the use of real-time refreshes is still relatively low, daily loads from transactional to analytics systems increasingly are becoming the norm.

Current Shortcomings and Challenges

Seemingly contradictory to the previously mentioned trend of more data is one of the current shortcomings of many business analytics systems — not enough data! That's a statement you'd be hard-pressed to find in articles, books, or conversations in the business analytics market. Market research points to the increasing volume of data from operational systems being available to support decision-making processes. Not only is traditional structured transactional data volume increasing, but companies are also beginning to leverage various forms of semistructured and unstructured text and rich media (audio, video, images). This trend is especially evident in the telecommunications industry.

Yet many decision makers are underserved by their business analytics technology. Only 9% of respondents to a recent IDC survey indicated that they are very confident that a majority of reporting and analysis tools deliver the relevant data to the right person at the right time (another 27% are somewhat confident). In many cases it is the lack of necessary detail that prevents analysts from creating optimized decision support models to be used by line-of-business managers and front-line staff.

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To compensate for the lack of necessary data granularity, companies resort to various methods, including statistical sampling, modeling, estimating, resorting to "gut feel" decisions, narrowing the scope of projects, or simply forgoing certain projects and incurring the risk of substandard decisions being made across the organization.

However, as the author Aldous Huxley wrote, "Facts do not cease to exist because they are ignored." Increasingly, research shows that companies can gain competitive advantage through superior business analytics solutions and processes as well as having the right mix of staff to be able to take advantage of such decision support infrastructure.

Some of the specific technical challenges include:

- ☒ Long data warehouse/mart load times. In some cases in which data is loaded on a weekly basis, companies are "running out of the weekend" to complete extraction, transformation, and loading (ETL) routines. The issue is exacerbated with 24-hour daily load windows.
- ☒ Unacceptable query response times to information consumers such as line-of-business managers or other employees who require ad hoc analysis functionality, even if it is controlled through such methods as prebuilt OLAP cubes or parameterized reports.
- ☒ Long query times for analysts whose job is to create analytical models for their internal constituents in marketing, sales, customer service, and other business lines. Complicated queries on large data volumes often take hours to complete, resulting in delays to delivering information at the right time.

The parallel business challenges that act as bottlenecks include:

- ☒ The inability of IT to react in a timely manner to new business end-user requests is largely due to the complexity and cost of data warehouse technology installations and lengthy deployment times and limited IT maintenance resources for certain types of traditional data warehouse and business intelligence projects.
- ☒ A typical data warehousing process includes the following steps: define, design, develop, test, deploy. In this approach, IT staff gathers end-user requirements, designs the data warehouse schema, develops ETL routines and all the data warehouse objects, tests the new system, and then deploys the system for use by business users. The time frame from requirements definition to deployment varies, but it can often stretch into months. Upon receiving access to the data warehouse, business users begin to query it for answers to their daily questions by conducting analysis using business intelligence tools. As some of their questions are addressed, new questions arise. At the same time, various business events occur (e.g., reorganizations, product hierarchy changes, mergers) that change the types of views and information that end users require.

IT is not the only one to blame in this scenario. It is often business that is reluctant to fund additional projects requiring IT involvement due to poor past experiences. This creates a catch-22 in which business is unwilling to fund an IT project, while IT is unwilling to start a project without full business buy-in and sponsorship.

There is often also an inability of business users to clearly define their requirements to IT because of frequently changing business context. This "built-in" fluidity further frustrates the process. Many users, especially analysts, want and need a flexible business analytics environment that enables them to ask ad hoc queries that by definition they can't anticipate in advance. Often, IT optimizes data warehouses and business intelligence systems for certain query workloads and focuses on a subset of data to complete a project. This tactic results in artificial barriers to fulfilling ad hoc analytic requirements and a full data set. Recent IDC research shows that:

- ☒ 23% of organizations indicated that faster implementation of requested changes by end users will lead to wider adoption of business analytics solutions.
- ☒ 67% of organizations indicated that drill down and drill through functionality are the most important features of their business analytics solutions, suggesting strong demand for interactivity with the data and a need for a deep level of data granularity. In turn, this would require improved price/performance characteristics of data warehouse management systems to support such analytic use cases.

67% of organizations indicated that drill down and drill through functionality are the most important features of their business analytics solutions.

While the demands of end users continue to grow as shown by the previously mentioned research, many data warehousing support groups continue to struggle because of legacy practices that introduce inefficiencies into the data warehouse development and maintenance process or because of a lack of appropriate business analytics technology.

These challenges and shortcomings affect more than just the typical analysts focused on customer segmentation, pricing, profitability, or other analytics-intensive business processes. Front-line employees such as call center operators and retail clerks are just as affected because their role is to execute the corporate strategy through interaction with customers on a daily basis. Discounting, upselling, and customer retention decisions of these employees should be guided by decision support solutions developed by the analysts and IT.

ESSENTIAL GUIDANCE: AN ACTION PLAN

Aristotle Onassis, the well-known Greek shipping magnate, said that "the secret of business is to know something that nobody else knows." In the context of business analytics, it is often the ability to harness the detailed data for both descriptive and predictive analytics that separates winners from losers. Just as access to production methods and capital were the sources of competitive advantage in the broad economic cycles of the past, today that competitive advantage is likely to come increasingly from access to better information.

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The following recommendations should be considered as part of a broader enterprise strategy for business analytics.

Identify Analytics Projects with Clear Impact on Business Goals

Although this may sound obvious, there are still cases where business analytics projects are driven exclusively by IT departments. Some of these projects result in high-quality technology implementations. However, without a direct link to business goals, such projects lose ongoing funding. Companies need to identify and define specific decision processes that can be optimized not simply for the sake of better decision making, where "better" is usually undefined, but where such efforts can have a clear and quantifiable impact on achieving business goals. Some of the decision processes being improved with business analytics technology within telecommunications companies include, but are not limited to, the following:

- Customer relationship management
 - Customer transaction and behavior analysis and segmentation
 - Customer value scoring
 - Account detail reporting to B2B customers
 - Tracking subscriber additions
 - Optimizing the account activation process
 - Measuring the impact of product changes, marketing campaigns, and advertising effectiveness
 - Identifying upsell and cross-sell offers to customers across multiple channels, including Web portal, call center, and retail outlets

- Financial management
 - Profit and loss (P&L) analysis and activity-based costing
 - Revenue assurance and billing analytics with B2B counterparts and channel partners including compensation management
 - Credit and collections management
- Operations, engineering, and channel management
 - New plan rate analysis, evaluating pricing and discounting strategies
 - Fraud detection (customer, employee, channel)
 - Performance evaluation of the technical and call center staff
 - Network monitoring and utilization management
 - Inventory tracking
- HR
 - Compensation planning (bonuses and commissions)
 - Union relationship management (e.g., employee union affiliation)

Quantifiable financial benefits from each of these decision processes exist and can be replicated by any telecommunications company. They include the following:

- Recovering revenue from channel partners due to improved visibility into the billing process
- Preventing customer churn and subsequent higher costs of new customer acquisition through better insights into customer behavior by analyzing usage and payment patterns of individuals and groups
- Automating decisions, such as evaluating credit scores and product inventory levels, to improve the efficiency of the new customer activation process
- Renegotiating more favorable contracts with commercial customers by comparing initial contracts with actual usage patterns

Identify Performance Metrics

Once the decision processes have been identified, the primary success factor for any business analytics project is to agree on initial performance metrics (i.e., what to track and measure). Just as organizations need to select decision processes with the highest impact on business operations, they also need to ensure that their performance metrics are actionable. Most decision makers are already overwhelmed by the amount of information coming their way every day. An excessive number of performance metrics will only worsen this situation. As Albert Einstein said, "Not everything that can be counted counts, and not everything that counts can be counted."

Organizations need to ensure that their performance metrics are actionable.

Performance metrics should include descriptive metrics that look at historical trends, predictive metrics that help anticipate future events (favorable or unfavorable), and prescriptive metrics that help guide front-line decision makers as they interact in the field with customers or equipment.

While much of the focus in the telecommunications industry has been on CRM-related analytics, other examples from the industry include the following:

- ☒ Predictive analytics to anticipate and prevent network failures
- ☒ Fraud detection at the customer, employee, and channel partner levels, which is becoming a more frequently deployed project
- ☒ Using the data warehouse to more accurately predict inventory levels (e.g., to ensure handsets reach customers on a timely basis)
- ☒ Revenue assurance effort such as billing to CDR reconciliation
- ☒ Monitoring and comparing of costs between actual usage trends and initial agreements (with commercial customers) to evaluate whether the contracts are undervalued
- ☒ Costing models for products/services and customers (commercial and retail) to enable accurate profitability analysis

This latter point is becoming increasingly important as telecommunications companies focus on customer and product line profitability management. A recently publicized decision by a top-tier mobile operator to discontinue service to several hundred retail customers who were "abusing" the customer service call center with dozens of daily calls highlights the need to analyze more than just top-line numbers.

Identify Users and Their Specific Analytics Needs

There is no such thing as a single enterprisewide business analytics solution that will address the needs of all levels of decision makers at all times. The needs of executives, managers, analysts, line-of-business staff, and external parties such as channel partners, suppliers, and government agencies differ. While an organization needs to have an overall business analytics vision and architecture, deployment of various technology components will happen incrementally and they will interact with each other through various methods, including SOA and a range of data integration techniques.

Some management users will require static reports; others will need exception-based dashboards. Analysts will require the deepest level of data granularity, advanced analytics tools, and access to the most scalable data warehouse servers. Line-of-business staff who do not have the time or skills to perform in-depth data analysis will require embedded analytics in the form of alerts and prescriptive workflows based on the prior in-depth analytic work of dedicated analysts to be embedded in operational applications with which they interact on a daily basis.

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Identify Frequencies of Data Capture and Delivery

Traditional data warehousing projects have focused almost exclusively on batch data loads at fixed intervals. However, the operational decision-making needs of some user groups have pushed business analytics systems to evolve to also include near-real-time data monitoring. The spectrum of data capture frequency and information delivery frequency must be evaluated for each user group and decision process.

A few examples from major telecommunications companies include the following:

- New service-level agreements (SLAs) that require 24 x 7 system availability for online reporting to customers and partners
- P&L reports that must be available by 7:00 a.m. every morning
- Sales reports that must be available by 12:00 p.m. EST of every day

In some cases, there is a difference between data capture and information delivery frequencies. For example, at one telecommunications company interviewed for this paper, data was loaded into a data warehouse incrementally throughout the day due to its high volume (i.e., a daily batch load would have taken more than 24 hours). However, information was delivered out of the data warehouse on a daily basis. The information availability must match the decision-making processes of end users. In sales and business line management, this may mean daily reports or updates to dashboards. An example is the creation of daily sales reports for commission payments to retail store channel partners. These are "mission-critical" systems because they deal with compensation. In customer service operations, this may mean live updates to customer profiles.

When deciding on data capture and information delivery frequencies, companies should consider what service-level agreements they have in place with both external and internal users and what changes to such SLAs are expected in the foreseeable future. If existing business analytics technology can't support such SLAs, enhancements will be required to all or parts of the IT architecture.

For example, at one telecommunications company, line-of-business and IT staff worked together to evaluate how often pricing changes were being made and how often the company would like to make them. The resulting decisions influenced a change in the IT components being deployed by IT to support pricing-related analytics functionality.

IDC surveys show that the top approach for evaluating the value of business analytics solutions is through user surveys (40%), followed by monitoring usage levels (34%) and ROI analysis (29%). Companies that quantify such benefits are often reluctant to grant permission to share such information in publicly available white papers — itself a sign of the value of such projects.

When deciding on data capture and information delivery frequencies, companies should consider what service-level agreements they have in place with both external and internal users.

Identify Data Needs

When identifying data needs to support selected decision processes and relevant key performance metrics, companies should evaluate not only specific data sources and types but also data retention requirements.

Data warehouses and data marts that constitute part of the overall business analytics solution should integrate granular-level data from multiple sources. This does not mean that subject-specific data marts with a single source system should not exist, but today's trends show that even these data marts combine data from multiple operational systems.

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Several telecommunications companies reported that a typical data warehouse will source data from the following operational systems: billing, general ledger, purchasing, HR, call center/customer service, and click-stream data from Web sites.

Another major source is CDRs that often add up to tens or even hundreds of terabytes of data. IDC found that some telecommunications companies maintain a three-month rolling retention rate of CDR data for operational business analytics and longer time frames of a few years for certain aggregates. The retention policies are influenced by both business policy and technology constraints of existing data warehousing systems. CDRs are required not only for operational performance management but also for compliance management as inputs to managing the taxation process. In other examples, IDC found that billing data was retained for 13 months rolling.

The preceding data retention practices represent an example of a typical top-tier telecommunications carrier company. These practices differ among companies and depend primarily on the business policies. However, technology also plays an important role. All telecommunications companies we spoke with already had data warehouses, which was expected. However, several mentioned that pursuing add-on projects that require incremental increases in data management capacity or separate data marts for subject specific analytic functions can be costly if traditional data warehousing tools are being considered.

In identifying data needs, companies should:

- Evaluate whether the necessary level of data granularity is available
- Evaluate whether data exists to perform such analytic functions as scenario planning and forecasting in addition to historical performance trends or snapshots
- Evaluate whether existing data retention policies are sufficient to support both performance management and compliance needs
- Leverage data retention policies for business intelligence and compliance where possible

Identify IT Requirements

In identifying IT requirements to collect, manage, and analyze information for and make information available to decision makers, companies face one of the long-standing arguments in the business analytics market: whether to use a central enterprise data warehouse (EDW) or distributed data marts. Interviews with telecommunications companies clearly show that a balance between the two extremes is the order of the day. While most large telecommunications companies have an EDW, they all will have subject-specific data marts with single or multiple operational source systems.

The data warehouse management component forms the core of the overall business analytics system with key requirements for the following:

- ☒ **Scalability.** As data volumes grow and business analytics impact more of the daily operational performance management across multiple lines of business, data warehouse scalability has become more important. General-purpose RDBMSs used for data warehousing can address some decision support needs when relatively simple queries from a large number of users are being handled, but even in this scenario, the general-purpose RDBMSs are often challenged when processing large amounts of data. However, for complex analysis on large data sets, dedicated data warehouse appliances to date have presented better price/performance characteristics. In a late 2006 study, IDC found that 18% of telecommunications companies surveyed already had a data warehouse appliance with another 22% interested in evaluating one within the next 12 months. The top 2 benefits of such appliances are expected to be lower ongoing maintenance costs and better performance over general-purpose RDBMSs. Some newer data warehouse platform systems offer the option of leveraging the general-purpose RDBMSs and existing infrastructure while improving the performance characteristics of the overall solution.
- ☒ **Availability.** As business analytics systems have become mission critical, the availability requirements for certain analytic functions have increased over the past several years. In one example, at a telecommunications company, upper management complained when a data warehouse was down for three hours. The IT manager at this company said, "To us [IT department] this was a one in a million occurrence, but to business it was critical."

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Although the data warehouse management component forms the core of a business analytics system, it must be compatible with various data integration and end-user information access and analysis tools. Here companies need to ensure that:

- ☒ Data integration tools are capable of accessing, transforming, and loading different types of data and content from multiple sources.
- ☒ Business intelligence tools address a wide spectrum of needs ranging from production reporting and dashboarding to data mining and statistical analysis.

DATAUPIA

One of the data warehouse platform systems vendors addressing the challenges of managing ever-increasing data volumes for decision support purposes is Dataupia. Headquartered in Cambridge, Massachusetts, Dataupia was founded in 2005 by industry veteran Foster Hinshaw. The privately held and venture-funded company offers the Dataupia™ Satori Server, which combines specialty software with industry-standard server and storage hardware into a cost-effective data warehouse appliance. The appliance can be purchased in 2TB capacity units.

Dataupia Satori Server stands out for its ability to complement an existing database deployment where its optimization software not only manages query processing but also intelligently routes certain query functions to an existing DBMS while other query questions are processed on the Dataupia Satori Server. As a result, each component of the overall data warehouse platform is focused on what it does best. In effect, using the Dataupia Satori Server, organizations can turn their general-purpose symmetric multiprocessing (SMP)–based database environments into massively parallel processing (MPP) environments without removing the general-purpose RDBMS. Thus, they continue to harvest the previous investment in a general-purpose database system while benefiting from the increased processing power of the Dataupia Satori Server at a very attractive price.

OPPORTUNITIES AND CHALLENGES

Dataupia's solution seems to be well positioned to address the increasing data management demands of many telecommunications companies looking to enhance their business analytics solutions. Demand drivers clearly show that telecommunications companies will continue to deal with increasing amounts of information in the form of both structured data and unstructured content. Companies struggle with many of the existing data warehouse management technologies to gain the required performance to address the needs of decision makers. A purpose-built data warehouse appliance that can improve existing data management infrastructure for both advanced analytics and operational decision support is likely to be well received in the market.

However, Dataupia will also face challenges. As its technology becomes accepted and clients provide proof points, Dataupia will have to keep on innovating its product offering to continuously improve its price-performance characteristics in a competitive market.

FUTURE OUTLOOK

When telecommunications companies are dealing with the ad hoc query and analysis needs of analysts, the only viable method for successful deployment of such solutions is to create a self-service environment in which end-user access to quality data is controlled by IT but the analytic techniques, methods, and user interface are controlled by end users themselves. This approach can work in an environment in which IT enables business users to access a sufficient amount of data at the right time.

The traditional excuse for not using more of such systems has been the pushback from IT groups who fear being disintermediated by the technology. IT groups must overcome this perception given their existing and future high and potentially unsustainable workload requirements within the business analytics sector. The outcome of further decision process automation is not that IT staff will be eliminated due to automation. Instead, IT groups will be freed to perform higher-value-added tasks of developing new applications and enhancing existing applications to support innovation and internal process efficiencies. Greater automation must be viewed by IT as a means to show its true value to the organization.

CONCLUSION

For too long, business end users have been conditioned to expect less than what they require from business analytics systems. It is time for business users to start asking not what's probable but what's possible from IT and for IT to reevaluate its data warehousing and business intelligence experiences and embrace the latest technologies that can either incrementally or fundamentally change how IT can address business users' ongoing needs.

Information management will likely get only more complex. The techniques used today by only the most advanced online companies (think Amazon, Google, or eBay) or a handful of companies from other industries will be widespread in the market in just a few years as the pace of innovation increases. IT and business groups at telecommunications companies must come together to evaluate the benefits and value proposition of having the right technology support the ability of all decision makers to have the right information at the right time. Telecommunications companies must not only compete for customers in an environment of rapid innovation cycles, but they must also manage performance through ongoing mergers and acquisitions whose IT impact lasts for years after the actual corporate event is closed. An effective business analytics data warehouse management solution can serve a key role in gaining competitive advantage through faster, more accurate and insightful decision making.

It is time for IT to reevaluate its data warehousing and business intelligence experiences and embrace the latest technologies that can either incrementally or fundamentally change how IT can address business users' ongoing needs.

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