

WHITE PAPER

How Small and Midsize Enterprises Can Sharpen Performance with Next-Generation Business Intelligence and Analytics

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EXECUTIVE SUMMARY

Small and midsize enterprises (SMEs), which IDC defines as having fewer than 1,000 employees, have been especially challenged by the changing world economy, new competitive pressures, and the increasing pace of business in general. As the digitization of a growing number of business processes continues, many SMEs are finding a growing need to leverage customer, operational, and financial data for better decision making. Unlike large enterprises, which have extensive technology and other resources to draw on, SMEs are limited in the extent to which they can leverage the latest technology to measure current performance and uncover new insights to help improve interactions with customers or suppliers, to introduce new products or services, and to optimize operations. The latest generation of in-memory database (IMDB) technology — such as the SAP HANA platform — and applications deployed on it are providing SMEs with effective capabilities with attractive return on investment (ROI) and total cost of ownership that will improve business decision making, competitive positioning, and long-term business success.

For SMEs, there may be a sense that management tools are already satisfactory for running the business. Regular reporting mechanisms have worked in the past, and formal planning for the future is often considered an exercise in extending the trend lines from recent quarters. In truth, though, the capabilities that firms used in the past are simply inadequate for today's fast-moving business environment. Relying on monthly or quarterly sales results to gauge business success and develop plans is like driving down a dark highway using just a rearview mirror. The approach is far more risky than using headlights to judge the shifting conditions of the road ahead.

Real-time results, provided through business intelligence (BI) and analytics technology, can provide management with the kind of information needed to evaluate business health (descriptive) but also judge the value of potential alternative courses of action (predictive). The latter is far more important in the long term and is associated with the two critical attributes of the most successful companies: agility and flexibility. While the investment in business intelligence resources should be justified on the basis of performance improvements, the real value will be far greater: identifying new business opportunities that will enhance a company's long-term growth prospects. In effect, IT management should make the case for investment based on the tangible financial benefits that can be achieved in the short term, but general management should appreciate (and be excited by) the windows to new opportunities that effective BI and analytics will open.

The sections of this IDC white paper are organized around key topics to pave the way for an effective implementation of a new generation of BI and analytics solutions:

- ☒ Business Analytics Best Practices: What can we learn from others?
- ☒ Business Analytics Requirements and Pain Points: What are the "must have" capabilities and the "must avoid" pitfalls in implementation?
- ☒ In-Memory Database as a Platform for a New Generation of Analytic and Operational Applications: How is new technology making a difference?
- ☒ SAP HANA Platform: SAP in-memory computing technology use case with a discussion of both business benefits and IT benefits.
- ☒ Challenges and Opportunities: A list of categories that you will need to be aware of and potentially address.
- ☒ Recommendations: Business managers and IT managers will have different concerns, and you should make sure you understand the position of others.
- ☒ Conclusion: Information delivery can be a challenge for organizations because of the changing nature of the data, but their ability to address this challenge will be increasingly important for business success.

BUSINESS ANALYTICS BEST PRACTICES

In today's global economy, success in the form of better performance is increasingly defined by having the freedom to innovate, to provide customers with better products and services, and to act faster and with greater insight within ever-shorter decision windows in the face of uncertainty within a rapidly evolving economic system.

There is growing quantifiable evidence that organizations with higher business analytics competency outperform their less analytically oriented peers. IDC research shows that most analytically oriented organizations are 20% more likely to be among the most competitive organizations within their industry.

Today, access to information, combined with the ability to analyze and act upon that information, creates competitive advantage in commercial transactions, enables sustainable management of communities, and promotes appropriate distribution of social, healthcare, and educational services.

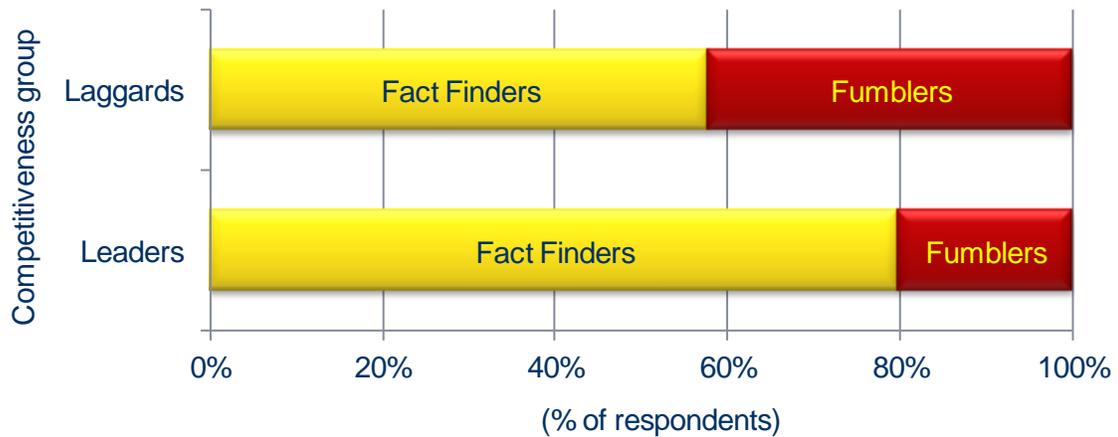
The information access, analysis, and management challenges of the intelligent economy can overwhelm SMEs that are unprepared for the emerging changes. While many will manage through the process, they will find things far more challenging than SMEs that anticipate and plan for their changing information needs. IDC defines the former group of reactive organizations as "fumblers" and the latter group as "fact finders." As described in IDC's study *Analytical Orientation and Competitiveness: The Difference Between Fact Finders and Fumblers* (IDC #223408, May 2010), "fact finders" are organizations that have the highest levels of the following characteristics:

- ☒ **Reliance on analytics**, which is defined as the degree to which the manager relies on analytics (as opposed to experience or intuition) for decision making
- ☒ **Influence on actions**, which is defined as the extent to which the output of the organization's business analytics solutions influences all employees' actions
- ☒ **Criticality to competitiveness**, which is defined as the perceived level of criticality of the business analytics solutions to the organization's competitiveness
- ☒ **Effectiveness of analysis on decision making**, which is defined as the importance of the organization's business analytics technology and processes in helping improve individual decision making or in facilitating intragroup or intergroup decision making

Our research demonstrates that, as a group, fact finders are more competitive within their industries (see Figure 1).

FIGURE 1

Analytical Orientation of Leaders Versus Laggards



Source: IDC, 2012

80% of leaders (most competitive organizations in their industry) are fact finders (have a higher level of analytical orientation), while only 58% of laggards (least competitive organizations) are fact finders (see Figure 2). In other words, organizations that are more competitive within their industries have higher levels of analytical orientation.

While being a fact finder does not ensure success, competitive differentiation — based on the application of analytics for ad hoc analysis, discovery, or planning processes and embedded into other business applications — will continue to make a difference for many SMEs.

BUSINESS ANALYTICS REQUIREMENTS AND PAIN POINTS

Executives, managers, and other decision makers at SMEs want the most relevant, timely, and accurate information to enable better decision making. Over 40% of SMEs plan to make BI and analytics technology available to more executives as well as power users, including managers and analysts.

SMEs want the right tools that will provide this information to them. Forty percent of SMEs rank BI and analytics as a high or very high priority investment for their organizations. Additionally, more SMEs increasingly consider BI and analytics tools mission critical. Sixty percent of SMEs state that if their BI and analytics solution were out of service by up to one day, it would have a material negative impact on business operations.¹

Yet, adoption of BI, analytics, and data warehousing technology among SMEs is relatively low. Only 10% of SMEs state that there is widespread reliance on BI and analytics on a daily or ongoing basis.² Only 13% say they have a relational data warehouse today.¹

What is keeping SMEs from embracing the latest tools? From one recent IDC survey, the top three areas that SMEs would most like to see improved in their BI and analytics solutions are flexibility in accessing, analyzing, and manipulating data; intuitiveness of the user interface; and frequency of data updates.¹ From another survey, the top three areas that SMEs would most like to see improved in their BI and analytics solutions are data visualization, ability to do scenario evaluation or what-if analysis, and generally faster response time to queries.² In each case, the message is clear — users want more flexibility, self-service, and real-time access to information. Having increasingly become accustomed to real-time access to relevant information in their personal lives, employees expect the same in their workplaces. Decision makers at SMEs expect to have access to information at decision time, which may mean access via a mobile device or embedded in operational applications. Speedy decision making based on real-time information presented in a clear and compelling way can help drive company success.

Yet, self-service capabilities for BI and analytics users at SMEs lag behind those of large enterprises, and 20% of SMEs provide no self-service functionality to their business users. It is a reasonable assumption that this stems from substandard system performance, which requires IT to keep full control of the technology and to focus on prebuilding rigid user interfaces and data models, which, in turn, have lengthy internal development cycles, to address any new user requirements.² Only a quarter of SMEs agree that the speed of their IT department's response to BI and analytics requests meets end-user expectations.³

SMEs, like their larger counterparts, increasingly need to deal with a broader set of data sources and types. The spectrum of data that SMEs report capturing besides transactional data includes text from non-social networking sources (e.g., email, forms, surveys), chatter from social networks, GIS data, Web logs, machine-generated data from sensors, audio, and video. While some data types, especially audio and video, require highly specialized transformation software to make the data usable by analytic tools, it is increasingly a requirement for business analytics solutions to be able to integrate data of multiple types and structures. Data integration is the second most frequently cited BI and analytics challenge for SMEs, trailing only the cost of the technology.

IT tools and their functionality are a key part of the issue, but so is staffing. Most SMEs do not have the dedicated experts in business analytics software to design and develop a data warehouse, data marts, multidimensional cubes, and a variety of end-user interfaces ranging from reports and dashboards to business process and industry-specific analytic applications. Insufficient specialized IT skills are the third most frequently cited BI and analytics challenge among SMEs.¹

Often, business analysis and decision making are done using managed data structures such as data marts or analytic cubes, which, in turn, are fed from data in an enterprise data warehouse or operational data sources of various kinds. Building or refreshing these structures takes time and staff resources and usually must be scheduled in advance. The problem is that business issues can arise suddenly and requirements can change quickly, and a system too slow to react to business changes can derail the achievement of business goals.

Many managers and analysts resort to getting subsets of data in one way or another and often build their own spreadsheets rather than rely on IT to build the structures they need. As a result, they sometimes base key decisions on data that is ill-formed, incomplete, and often inconsistent. Access to more granular data available through in-memory technology makes it possible to drive focused decisions and take actions quickly.

IDC research shows that at the height of the recession, every technology investment made by SMEs had to have an almost immediate payback. SMEs still need a compelling financial return on technology investments, but that need is now paired with another key requirement — the ability to support long-term success. Technology must be effective, of course, but it also must be compatible with a company's technology direction and goals moving forward. An increasing number of SMEs are looking at three- to five-year time horizons when making critical technology purchasing decisions, including those for BI and analytics technology. This means that today's technology evaluations should consider BI, analytics, and database options that are expected to lead the market in the near future. One of these key technologies is the IMDB, in addition to the applications built on it.

IN-MEMORY DATABASE AS A PLATFORM FOR A NEW GENERATION OF ANALYTIC AND OPERATIONAL APPLICATIONS

In-Memory Technology Defined

Disk-based systems require long-running batch jobs for data movement as well as time and effort to load the data onto disk volumes. But suppose there were no disk volumes. Suppose the data could be moved at the speed of the processors and internal network and laid out dynamically in memory for rapid analysis. That is the idea behind in-memory database systems. This approach greatly accelerates both the preparation of analytic data and the access to that data.

Because data can be loaded and adjusted in greater volumes and accessed more quickly with in-memory technology than with disk-based technology, it becomes possible to manage more data at a more granular level. This results in greater precision and the ability to drive focused decisions and business actions quickly.

In-Memory Technology Market Outlook

IMDB is an important dimension of the database management system (DBMS) landscape and will become more important in the coming years. The shift in computing economics that makes processors and memory abundant will compel every DBMS vendor to move in this direction in the future. It is likely that as solid state memory (SSM) drops in price, main memory will be seen as the primary "home" of a database, solid state memory will be seen as the overflow area, and disks will be relegated to recovery functions only. IMDB is becoming regarded as an inevitable stage in the evolution of database management.

In-Memory Technology Market Drivers

To be leaders and to compete at the highest level in today's intelligent economy, organizations of all sizes need to have a platform that enables top performance. One of the key components of such a platform is in-memory technology.

SAP HANA PLATFORM

The SAP HANA platform is specifically designed to support both operational applications and analytic applications. It makes possible instant analysis of structured and unstructured data and the embedding of analytics into operational applications. The SAP HANA appliance software enables organizations to analyze their business operations using detailed operational data in real time, while business is happening. Operational data is captured in memory and made available for instant analysis, eliminating the typical lag time between when data is captured in business applications and analysis of that data from reporting systems. It provides insight into business operations directly from the production database. This in-memory computing technology combines SAP software with hardware from the company's strategic hardware partners. Of note is that 16% of SMEs have a data warehouse appliance and 21% of SMEs are planning to invest in one over the next 12 months.²

Technology such as SAP HANA represents a completely different way of managing data warehouse data. Rather than the data being mapped to relational tables stored on disk, the data is kept in column-wise memory structures. Rather than searching for data by looking up index entries and using indirect references to find the disk pages where the data resides, SAP HANA jumps around the memory structure, scanning columns and following memory pointers, to quickly assemble the desired data. The result is that queries will run at a significantly faster rate compared with their disk-based relational database equivalents, yet the process of modeling and reporting data remains just as straightforward to the user.

Use Cases for SMEs with SAP HANA

In-memory computing technology can be applied to any decision type, in any line of business, and in any industry. Typical workloads range from operational reporting and performance management to ad hoc data exploration and dynamic planning.

In addition to providing functionality for querying and performing n-dimensional analysis of operational data, SAP HANA includes functionality that can enable unstructured content analysis, predictive analytics, data exploration, data visualization, and dynamic planning and forecasting.

SMEs cite planning as the process that would be most improved if relevant planning applications ran on in-memory computing technology such as SAP HANA. The ability to iterate through more scenarios within a given time window and change planning variables and see results in real time is enabled by the processing power of in-memory computing. Sales, operations, and marketing planning are the top three business areas in which such benefits will resonate with business users.³

The top specific applications that would benefit the most from in-memory computing include financial analytics (planning, consolidation, and close), pricing analytics and optimization, and customer service analytics.³ However, as previously mentioned, most applications across business processes can benefit from the features and functionality of SAP HANA.

SAP offers several licensing options for the SAP HANA platform. A company might choose one of the following options, depending on its IT landscape and specific use cases:

- ☒ **SAP HANA, Edge edition:** For midsize companies looking to accelerate access to their operational and strategic information assets
- ☒ **SAP HANA edition for SAP NetWeaver Business Warehouse (SAP NetWeaver BW):** For companies that use SAP NetWeaver BW as their data warehouse
- ☒ **Limited editions for applications and accelerators:** For organizations that are using SAP HANA with various SAP and partner-built applications
- ☒ **SAP HANA, Platform edition:** Suitable for companies that want a real-time platform that combines high-volume transactions with analytics to create custom applications
- ☒ **SAP HANA, Enterprise edition:** Suitable for companies that have larger data volume challenges

Business and IT Benefits to Using SAP HANA

Primary drivers that lead organizations to invest in in-memory technology are simplicity, cost, performance, and faster access to more granular and complete information at decision time.

Among SMEs, the most frequently mentioned business benefit of in-memory computing capabilities is reduction in analysis turnaround time. Other benefits represent a mix of business process improvements and productivity or efficiency gains. Other frequently mentioned benefits include reduction in time spent by business staff on data preparation, cleansing, and aggregation; improved planning accuracy; and an increase in the frequency of reevaluation of analytic models, plans, and forecasts.³

Similarly, the IT benefits of in-memory computing can provide important cost savings and better IT staff allocation. The top two IT benefits are less time spent on creating data aggregations and less time spent on database administration. Both issues point to key shortcomings of existing methods of information management and analysis that require strategies to address performance limitations of disk-based systems.³

Both business benefits and IT benefits are important. Although IT benefits are more immediately tangible than business benefits, IT benefits have a limit. For example, there's only so much you can save by moving database administrators (DBAs) to technology consolidation or reduction projects and user support rather than storage tuning. In the end, the business benefits derived from better customer interactions, more optimized operations, or better, risk-adjusted financial management will increase organizational value. In many respects, the "cost savings" associated with IT benefits are limited and can be considered "defense"; that is, let's minimize what we are spending. In contrast, the improved decision making associated with business benefits can be considered "offense." These benefits relate to revenue-generating opportunities, being able to act before a competitor or take advantage of a situation before circumstances change. In theory, there is no limit to this upside potential.

CHALLENGES AND OPPORTUNITIES

The opportunities to employ in-memory technology are not without challenges. Several potential issues, whether perceived or real, need to be overcome by organizations looking to deploy in-memory computing technology, including the Edge edition of SAP HANA. Established IT practices have led potential adopters of in-memory technology to have common misconceptions about the technology that they cite as challenges to deployment. They include:

- ☒ **Cost of the technology itself.** Two out of five survey respondents (41%) expect the cost of the in-memory technology to be a challenge for their organization, making this the most frequently cited challenge. Higher cost of memory versus disk during initial deployment needs to be considered in the context of total cost of ownership. Customers of in-memory technology report needing fewer database administrators, smaller datacenter footprints, less shelfware, and lower maintenance costs. Additionally, the downstream business benefits of using in-memory technology need to be taken into account when evaluating ROI. This is especially critical for SMEs, which are invariably constrained by both IT budgets and IT staff.
- ☒ **Multisource and multistructured data integration.** The next most frequently cited challenges, after the cost of the technology itself, are integration of data from various sources and integration of data of various types. Integration of data from various sources has always been a challenge using traditional data warehousing techniques. While IMDB doesn't make this problem disappear, it can make it easier to relate more data with fewer aggregations requiring up-front planning in anticipation of the queries users might pose. This efficiency gain in the data integration and preparation process is critical for SMEs that need to optimally leverage their limited human IT resources. Rather than spending time building data cubes, staff can focus on higher value-added tasks.

- ☒ **Scalability to handle large data sets and Big Data use cases.** There is no requirement to have very large data sets in order to benefit from in-memory computing. In fact, most uses for IMDBs today don't involve petabytes of data, and 60% of the overall IT and business managers of SMEs are not even aware of the term *Big Data*. Nevertheless, IMDBs can handle relatively large data sets if enough memory is allocated for the overall solution, which may involve servers with shared memory pools.¹

- ☒ **User access and security management.** Most IT managers would expect an enterprise-ready system to manage user access and security with de facto industry-standard integrations, and IMDB technologies support this functionality. However, our research revealed that real-time access to data could lead to misuse. Someone could run a report at a point in time and that data would vary from someone running the same report a few minutes later, leading to different conclusions. There is some loss of control when information is made widely available, but it is an issue of policy and user education, not a technology shortcoming. IT will need to delineate the difference between real-time analysis and time-stamped, compliant production or operational reports. Taking on this consultative and training role may be outside the comfort zone of many SME IT groups, yet it provides additional value and can underscore IT's strategic role to the rest of the organization, especially senior management.

- ☒ **Backup, recovery, and availability.** A common misconception regarding IMDB is that it lacks the atomicity, consistency, isolation, and durability (ACID) properties of a transactional database. This is not true. Most IMDB implementations used for transaction processing still have transaction logs for error recovery and can stream the logs to physically persistent storage. They also commonly replicate their memory contents to other servers to provide high-availability functionality through failover support.

- ☒ **Existing investments.** IT has built data warehouses and data marts across the organization, and they cost money and time. Building around, or in support of, these existing investments to take advantage of real-time access or rapid analysis where a business process could benefit from it will enable those investments to be valuable data sources, retain their current purpose, and be enhanced by IMDB where needed. This opportunity to complement existing technology with new technology is especially important for SMEs that may not be able to afford to have parallel teams supporting two or more technologies for a similar use case. An incremental approach will be especially appealing to SMEs looking for lower-risk options by enhancing existing solutions.

RECOMMENDATIONS

The first recommendation for any organization, regardless of its size, is to develop a BI and analytics strategy that encompasses evaluations of decision-making processes; decision makers' needs; and data, technology, and staffing requirements. The lack of such a strategy is especially apparent in the SME segment of the market, where only 20% of organizations have a stated business analytics strategy.¹

More operational recommendations for both business managers and IT managers are discussed in this section.

Recommendations for Business Managers

SAP HANA can be applied to solve many business problems. When weighing whether the technology is appropriate for improving specific business processes, consider the following:

- ☒ Identify decision-making processes and decision makers and question whether they are supported by relevant, timely information. Often, a service level could be maintained at lower risk or cost or improved for competitive differentiation if analysis related to decisions impacting that service level is performed faster or with better accuracy. Adding an IMDB technology at this decision point is more likely to lead to business improvements.
- ☒ Examine where real-time data access is a necessity but not available today. If the barrier is technology related, then an IMDB technology is applicable. Real-time access to data can improve the speed and accuracy of decision making, which, in turn, can enable improved business processes for addressing customer needs in real time or managing supplier relationships in real time. In addition, access to real-time data can help uncover ways of innovating a process, a product, or a service that was not feasible before. Both of these benefits have significant potential to improve SME operations.
- ☒ Examine a process where people perform analysis less frequently than actual changes within a process occur and IMDB can solve this problem. For example, inventory management is often done based on latent aggregation of supply and demand data. However, when decisions can be made based on actual inventory flows during a day, then there could be reductions in out-of-stock events or early warnings of supplier performance degradation.

Recommendations for IT Managers

The emergence of in-memory DBMS as a dominant form will not happen all at once. IT managers should consider how they might evolve their IT systems in such a way as to exploit IMDB technology both now and in the future. The SAP HANA platform's current columnar approach is well suited to the analytic workload, and as SAP HANA evolves, it will also support operational workloads.

- ☒ Not all data is created equal. Some data is seldom accessed and may be maintained on disk because it is nonvolatile and disk is cheap. Some data is accessed a bit more frequently and may be kept in solid state memory (also

called flash memory). Dynamic, online data will increasingly need to be held in memory all the time. IT managers should consider how much of each they have — and are likely to have going forward — and plan accordingly.

- ☒ Business issues can arise suddenly, requirements can change quickly, and a system that requires a batch unload from a disk-based database, followed by construction of a disk-based cube or loading of a disk-based data mart, requires a lot of time. Consider in-memory DBMS as a tool that will enable decision makers to respond to business changes in real time.
- ☒ The new economics of computing, which derive from large memory models, 64-bit addressability, fast processors, and cheap memory, make it possible to design databases that are far faster and more scalable than was possible when the only option was to base data management on spinning disks. Consider in-memory DBMS technology as a means to reduce your company's operational IT costs associated with storage.
- ☒ A fundamental barrier to scalability for a disk-based database is the bottleneck represented by the storage system. DBAs spend an enormous amount of their time rebuilding indexes, unloading and reloading data, and reallocating data across storage volumes to minimize I/O time. Many SMEs may not have the expert DBAs to perform these tasks, or if they do have expert DBAs, these tasks result in a backlog of more high-value tasks that DBAs could be performing.

CONCLUSION

In-memory database technology has emerged as a key means of boosting performance and scalability and containing storage costs. This technology has evolved from use only for caching, or for extremely high-speed data systems, to much more mainstream IT applications. Today, most systems have multiple processors and multiple cores per processor. Enterprise servers typically use 64-bit memory addressing and are stocked with multiple gigabytes of main memory. This means that the economics of computing have swung in favor of in-memory databases for many workloads.

Today's reality for most SMEs is represented by data that is increasing in volume and complexity. Business competitiveness requires the ability to access this data at a granular level and on a very timely basis. Increasingly, business users at SMEs require self-service BI and analytics functionality that gives them access to this granular and timely data through their preferred data visualization and reporting tools. For SMEs, the "how" of information delivery can be just as important as the "what" of information delivery.

In-memory computing is essential to meeting both requirements, and SAP HANA is a clear example of that technology at work today. It not only provides an in-memory data processing engine but also serves as a platform for integration with end user-facing BI tools, such as SAP BusinessObjects Visual Intelligence software and SAP BusinessObjects Explorer software. Consider the data management and analysis platform as well as the BI and analytics tools that it supports when making a technology selection.

SOURCES

1. IDC's *Vertical IT and Communications Survey*, May 2012 (n = 1,062 SMEs)
2. *IDC and Computerworld Business Intelligence and Analytics Survey*, February 2012 (n = 82 SMEs)
3. IDC's SAP HANA Edge Market Assessment, August 2011 (n = 282 SMEs)

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