

IBM Institute for Business Value

Business analytics and optimization for the intelligent enterprise



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IBM Global Business Services, through the IBM Institute for Business Value, develops fact-based strategic insights for senior executives around critical public and private sector issues. This executive report is based on an in-depth study by the Institute's research team. It is part of an ongoing commitment by IBM Global Business Services to provide analysis and viewpoints that help companies realize business value. You may contact the authors or send an e-mail to iibv@us.ibm.com for more information.

By Steve LaValle

It's easy to understand why business leaders regard their experience and intuition as inadequate tools for optimizing their enterprises. In addition to all the new information being created every nanosecond, permanent and far-reaching changes are being shaped by multiple global forces that include a new economic environment, along with the familiar forces of a shrinking and flattening world. Routines persist but everything is just so different and very little feels familiar.

Based on our survey of 225 business leaders worldwide, we found that enterprises are operating with bigger blind spots and that they are making important decisions without access to the right information. They recognize that new analytics, coupled with advanced business process management capabilities, signal a major opportunity to close gaps and create new business advantage. Those who have the vision to apply new approaches are building intelligent enterprises and will be ready to outperform their peers.

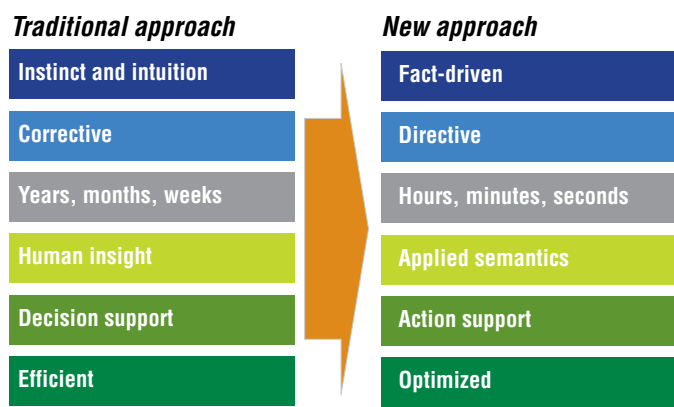
Introduction

Like coastal cities seeking shelter from successive onslaughts of blizzards and floods, today's enterprises are striving to come to terms with their own extreme conditions. Their challenge is information – how it is acquired, managed and interpreted to drive business value. Business leaders considering how they will weather the storms are questioning whether traditional techniques will continue to work.

In an environment that has little resemblance to the past, old ways of decision making and management are breaking down. Today's leaders sense an inflection point, an opportunity to revisit their use of information, or analytics, and fundamentally alter the way in which they conduct business. While advanced analytic methods have been available for some time, today's tools and techniques provide superior insight and predictability to support management decision making and actions. Complex algorithms, previously the domain of academics, are now being used to solve formerly intractable business challenges.

Almost unimaginable just a few years ago is the fact that transistors are now being produced at a rate of one billion for every individual on earth. In sending signals from both people and objects, these transistor-based “instruments” are able to provide unprecedented levels of insight – for those organizations that can successfully analyze the data. That’s a high bar to pass. How is it possible for organizations to make sense of information with virtually quantum-level granularity – and cosmic-level ubiquity?

For the intelligent enterprise, the new reality is this: personal experience and insight are no longer sufficient. New analytics capabilities are needed to make better decisions, and, over time, these experiences will even inform and hone our gut, or instinctive, responses. Making analytics core to our thinking is the only way we can really get smarter, and doing so is an imperative not an option. The information explosion has permanently changed the way we experience the world: everyone – and everything – is leaving real-time data tracks. Intelligence is now increasingly embedded in objects, and individuals have become market segments of one.



The new approach represents a significant extension of current capabilities, not a replacement.

Figure 1. Intelligent enterprises will adopt new ways of working.

Tackling information complexity

In our recent past, businesses have leveraged new technologies such as enterprise resource planning (ERP) and customer relationship management (CRM) as redefining moments, propelling them to greater efficiencies and sales volumes. Today, it is the advances in business process and information management that drive the new step changes that will empower businesses and their people.

Our modern information environment is unlike any preceding it. Information is voluminous, its velocity is extreme and its formats are widely varied. It comes structured and unstructured – in GPS logs, blogs, videos, podcasts and tweets. Coming from within and from outside the enterprise, information arrives on a daily, hourly and real-time basis. Sources include the Internet, automated processes and sensor-equipped objects. This combination of volume, speed and diversity makes using information well (or even using it at all) an increasingly daunting task.

As if volume, velocity and variety weren't enough, greater granularity makes information even harder to fathom. For example, individuals can now be identified by GPS position and genotype. And in the world of intelligent objects, it's not only containers and pallets that are tagged for traceability – medicine bottles, poultry, melons and wine bottles are adding deeper levels of detail to the information ecosystem.

One in two business leaders do not have sufficient information from across their organization to do their jobs.

Technology and instrumentation for smarter connections are abundantly available, and at a relatively low cost. But to turn this information into new intelligent action, organizations need extraordinary powers of analysis – applied broadly and consistently. With information put into context, and with business process management acumen, leaders can now work on issues that matter. But that requires a sea change in how leaders make strategic decisions and how they run their organizations.

The intelligent enterprise will have ready access to precise, relevant information, from all sources. Information will be analyzed, contextualized and shaped for right-now decision making – and right-timed action. New levels of intelligence will inform and enable organizations to empower all employees, especially those closest to customers and suppliers, to make decisions. Considering that today's largely hierarchical enterprises are accustomed to equating information with control, they will need to get substantially better at sharing information with partners across the hall, down the street and around the globe.

New opportunities for intelligent enterprises

Today's automobile drivers look over their shoulders for a quick traffic check when changing lanes. They use mirrors to avoid accidents, but mirrors don't eliminate blind spots, or find the best route ahead. Now, flash forward, and imagine a generation of drivers trained on smart automobiles that identify and track every other vehicle or object in range, calculating velocity and direction, road and weather conditions, all in real time. In terms of guiding and optimizing the enterprise with smarter analytics, we're already at that inflection point.

Organizations have a great deal of work ahead in addressing the impact of their information gaps. More than one-third of business leaders say they have significant challenges in extracting relevant information and using it to quantify risk and predict possible outcomes (see Figure 2).

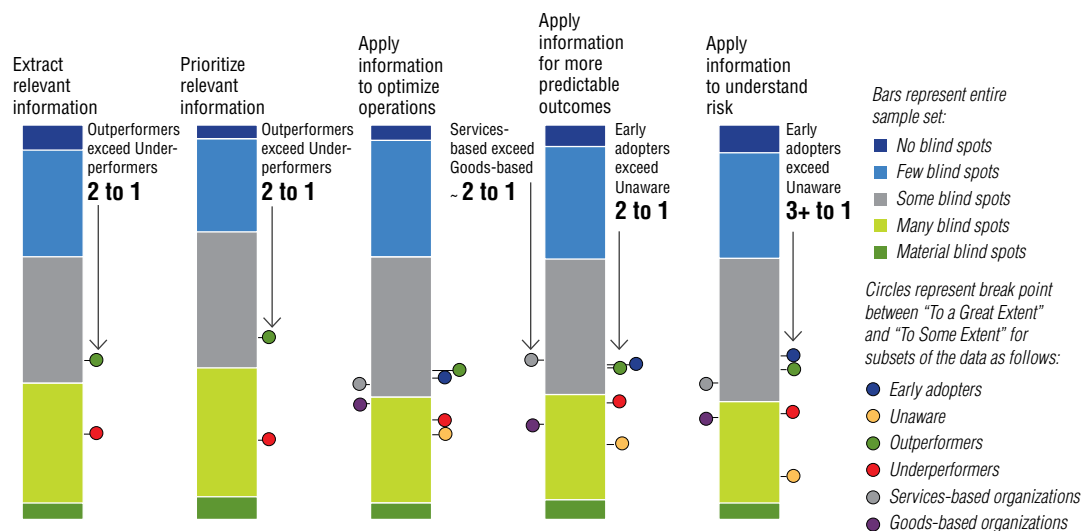
It's instructive to compare how organizations perceive and close gaps related to information-based business opportunities. Comparing early adopters – those with analytic programs well underway – to organizations that say information improvement is not a priority, we find that early adopters are more than three times as skilled at using information to understand risk, and twice as skilled in using it to predict outcomes.

Additionally, outperformers are twice as skilled as underperformers at extracting and prioritizing relevant information.¹ They are three times better at applying information for more predictable outcomes, which gives them the opportunity to better anticipate, navigate and handle contingencies.

We also found that those who perform on par tend to be generally satisfied or willing to make do with the information capabilities they already have – except for their notable focus on using information to improve sales and marketing. Outperformers, on the other hand, see value in making improvements across the full range of functional areas – and they want to do more with information overall (see Figure 3). These “information omnivores” are poised to innovate and deeply change their industries based on their ever-growing insights and ability to see the future more clearly.

As might be expected, underperformers perceive more gaps than their on-par peers. Interestingly, the underperforming enterprise is more fragmented than either of the other groups,

To what extent do you feel that your organization is operating with major “blind spots” – gaps or lack of trust in information – in regard to the following areas?



Notes: Early adopters have programs well underway to take advantage of new analytics for business advantage and Unaware declare having "not thought about the opportunity"; Out- and underperformance is relative to peers; Services-based industries: financial, professional services, entertainment, media, publishing, telecommunication, education, government, transportation. Goods-based industries: technology, manufacturing, energy, pharmaceuticals, automotive, consumer goods, retail, agriculture, real estate, chemicals and aerospace/defense.

Figure 2. There is lots of room for improvement across the board with some big differences in the details.

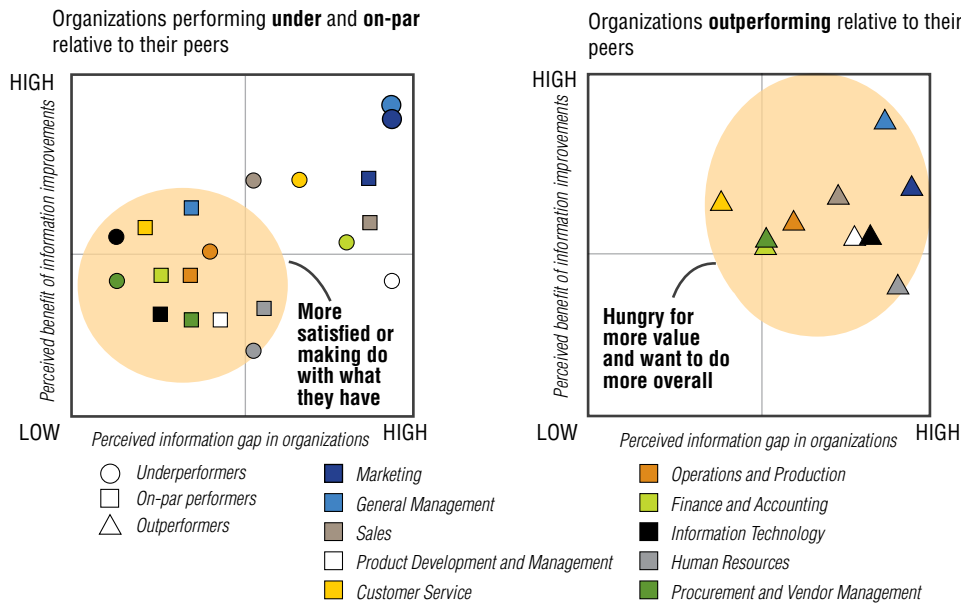


Figure 3. Enterprisewide, outperformers recognize the value of information improvements and are hungry for more.

with a strong emphasis on marketing, management and sales, and much less interest in support functions. Of all groups, on-par performers appear to be the most at risk of being left behind. Seeing no compelling reason to do things differently, they appear to be enjoying a sense of security that may very well be misplaced. While a few functional leaders may be seeking change, these enterprises are failing to perceive benefits of an end-to-end analytics strategy. As underperformers begin pulling ahead, mid-level performers may very well find themselves becoming the new underperformers.

Information gaps experienced by services and goods-based companies provide another point of comparison. Despite widespread awareness of supply chain information needs in goods-based organizations, it is the services-based ones that stand out in their ability to access information and apply predictive analytics. They even surpass the outperformer subset in those categories as well. It may be that service companies enjoy information benefits from products that are inherently digital. However, as goods become instrumented and connected with electronic tags and sensors, product-based companies will gain comparable opportunities to optimize and create advantage through analytics.

With today's information explosion, everyone – and everything – is leaving real-time data tracks.

Interdependence and optimization

By embracing advanced analytics across the enterprise, intelligent enterprises will optimize three interdependent business dimensions:

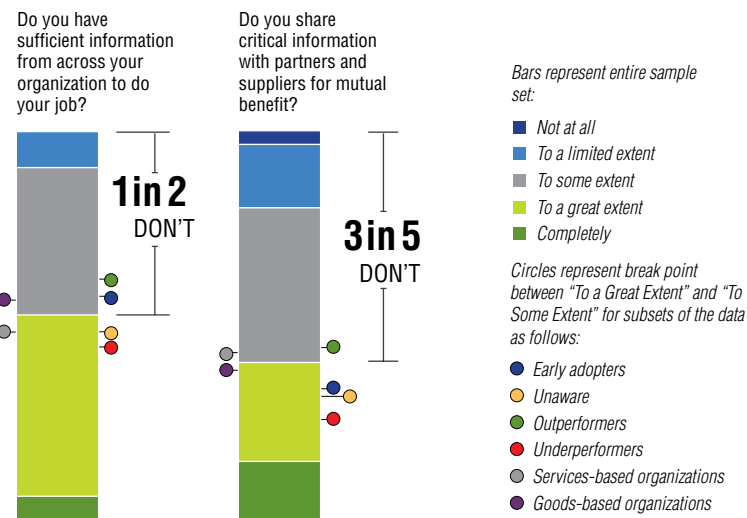
- *Intelligent profitable growth*: Intelligent enterprises have more opportunities for growing customers, improving relationships, identifying new markets and developing new products and services.
- *Cost take-out and efficiency*: Intelligent enterprises optimize the allocation and deployment of resources and capital to create more efficiency and manage costs in a way that aligns to their business strategies and objectives.
- *Proactive risk management*: Intelligent enterprises have less vulnerability and greater certainty in outcomes as a

result of their enhanced ability to predict and identify risk events, coupled with their ability to prepare and respond to them.

Each of these dimensions is a critical part of optimization – the impact of a decision or action along any one of them will have repercussions for the others.

The characteristics of the intelligent enterprise

Based on our global research, extensive client project experience and discussions with business leaders, we have distilled the essential characteristics that describe an enterprise ready to exploit advanced analytics and optimized performance.



Notes: Early adopters have programs well underway to take advantage of new analytics for business advantage and Unaware declare having "not thought about the opportunity"; Out- and underperformance is self assessment relative to peers; Services-based industries: financial, professional services, entertainment, media, publishing, telecommunication, education, government, transportation. Goods-based industries: technology, manufacturing, energy, pharmaceuticals, automotive, consumer goods, retail, agriculture, real estate, chemicals and aerospace/defense.

Figure 4. One in two organizations neither connect the dots internally nor share much with external partners and suppliers.

The intelligent enterprise is...

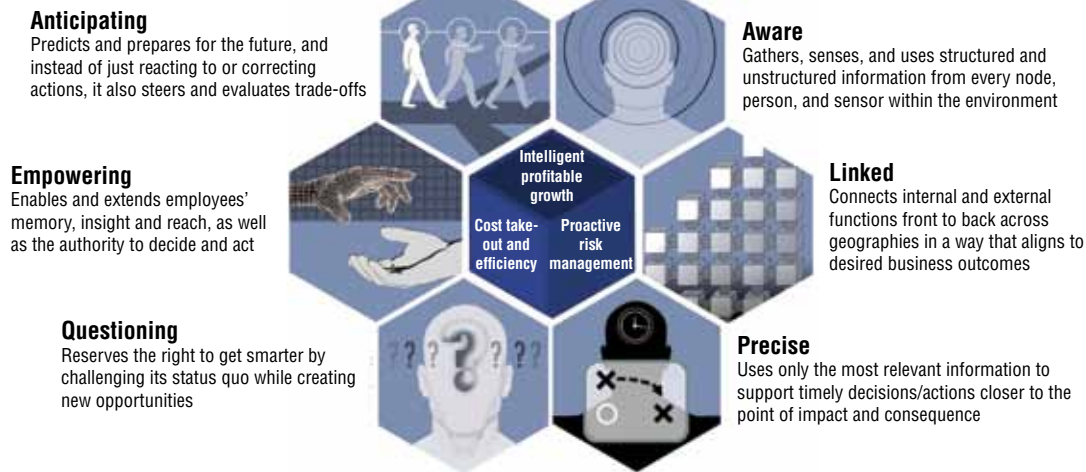


Figure 5. The intelligent enterprise.



Aware

The intelligent enterprise is aware, meaning that it gathers, senses and uses structured and unstructured information from every node, person and sensor within the environment.

- What if an investor could mine every broker's e-communication, each consumer's public Facebook post, and multiple companies' annual reports at the same instant?
- What if your city's ability to read satellite images, to capture historic traffic data and to sense moving vehicles meant it could predict and prevent traffic jams in real time?

The intelligent enterprise will stimulate its employees and partners to be in very close touch with the world 24/365.

Today's enterprise	What if the intelligent enterprise could
Collects data from its own transactional systems and internally generated data	Collect and analyze data from anywhere, including external sources, new instrument data, and unstructured and societal data
Processes some large databases in batches to create snapshots of the past	Process incredible quantities of data at incredible new speeds as needed
Interprets information differently by different people and different departments – with limited levels of detail	Have “one version of the truth” across the enterprise – with appropriate granularity
Keeps large just-in-case stores of information that are not interpretable, not understandable and ultimately not usable	Gain insights from previously unquantifiable and unusable data



Linked

The intelligent enterprise connects internal and external functions front to back across geographies, departments, business units and teams in a way that aligns to desired business outcomes. It is

able to bring disparate groups together to share and leverage information for mutual benefit.

- What if an oil rig could constantly “speak” to its production supervisors in the control room... which is connected to the supply chain planning systems... which are connected to the oil markets... which are connected to the pump? Each change in the actual petroleum supply could inform the entire value chain.
- What if retailers used loyalty card information to identify shoppers while still in the store, and inform them of new meat and poultry products that meet their personal requirements for humane husbandry practices?

The intelligent enterprise will link its talent to each other and with the outside world to allow complete access to all available information and ideas.

Today's enterprise	What if the intelligent enterprise could
Collaborates in small local groups, but work is constantly “thrown over the wall” to other departments down the line	Mobilize federation of experts to work together both within the enterprise as well as collaborate with external entities for mutual advantage
Has expertise and accesses wisdom based upon who people know and who is close by	Generate a new type of collective wisdom from larger and more sophisticated crowds of experts
Uses information for the job at hand without attention to its use for related activities	Keep information more relevant and use it beyond its spot application, having implications both up and down the value chain (e.g., the flow from suppliers to customers)
Finds it too difficult to work across boundaries	Connect people, systems and external entities so they could “speak” to each other seamlessly



Precise

The intelligent enterprise uses only the most relevant information to support timely decisions and actions closer to the point of impact and consequence. Information is delivered contextually, providing the ability to act swiftly in powerful and meaningful ways.

- What if repairmen servicing thousands of different types of intelligent grids had the instrumentation to sense breakdowns and inefficiencies? They would be automatically alerted and deployed based on their skill, location and availability and fed all the metrics, history and solutions they need. Schematics are beamed to screens on their wireless devices. Then their actions and data are added to the collective repair history of the entire grid.
- What if a large fleet owner could know the exact maintenance requirements of vehicles based on their unique history, thereby keeping them all on the road longer without impacting safety? And at the same time, it was able to use real-time GPS information, past and present, to consolidate maintenance resources, locations and equipment without reducing service levels?

The intelligent enterprise will reallocate mental bandwidth so people can focus on service, innovation and future improvement.

Today's enterprise	What if the intelligent enterprise could
Uses content and structured information transactionally, i.e., for its primary purpose and then discards or archives	Manage and analyze vast stores of content, including prose, e-mail, voice, SMS, images and video
Has users who must seek out information based on the immediate need	Prepare data and automate analysis to ensure the quality and timeliness of information
Does not give employees the information they need when they need it	Deliver information in ways that are useful to the context of the situation being handled
Delivers volumes of data separately and rarely in context of the situation or parceled together into actionable packages	Deliver just the right amount of quantitative data, definitions, knowledge bases, unstructured data and expert networks to meet the decision-maker's need at the right moment



Questioning

The intelligent enterprise challenges the status quo while creating new opportunities. Assignments are rarely taken at face value, but instead reveal

opportunity: *How can this be done faster, at a lower cost, and with higher quality? How can we make this customer happier? How can we make this safer?*

- What if an auto manufacturer could monitor driving behavior via dashboard-embedded computers – and analyze the patterns it discerned to understand what new features would be most appreciated?
- What if a procurement specialist could initiate comparative audits of suppliers' environmental practices when sensing that their proposals are "too good to be true"... and then, based on audit results, provide new guidelines for responsible pricing levels in specific geographic regions?

Mastering the job at hand will no longer be the endpoint, but the means for informing *tomorrow's* work day.

Today's enterprise	What if the intelligent enterprise could
Focuses on getting today's job done	Get the job done today with enough extra employee bandwidth to think about and improve tomorrow
Views innovation as a discrete function of R&D or product managers	Put all knowledge workers on a path to innovate and improve
Views questioning and exploration as a luxury and encourages it only when there is time	Include questioning and exploration as part of people's jobs and reward them for doing it
Makes its decisions and moves on with little interest in whether expectations are met	Evaluate outcomes relative to expectations, tracking and understanding exceptions both good and bad



Empowering

The intelligent enterprise enables and extends employees' memory, insight and reach, as well as the authority to decide and act. As automation takes care of more and more routine decision making, employees are trusted with the authority to make higher-value decisions and act on them.

- What if a service agent knew how to, and was able to, go above and beyond the norm to delight a top customer who had two bad experiences in the last week?
- What if large, multidisciplinary teams of sales people could close the next big multimillion dollar deal in hours instead of months because they can reconfigure complicated schedules of prices and resources over years of contract length?

Empowering employees and automated agents requires a shift in culture from one of constant oversight to one of trust and enablement.

Today's enterprise	What if the intelligent enterprise could
Piles more work on employees, adding headcount to meet demands	Automate and orchestrate routine tasks in order to focus people on new, unsolved issues and opportunities
Takes decisions "up and down the flagpole" to be vetted and approved by layers upon layers of management	Delegate decision making to the best agents for the situation whether they are employees, workflows, bots or customers, requiring less managerial and administrative oversight as employees solve issues immediately and locally
Aligns incentives to how much someone works or what they produce	Align incentives to smart results while also considering how the results were achieved
Hunts, searches and compiles information, but "guesstimates" answers when it's too hard to get the facts	Give people access to user-friendly, fact-based tools available over the channels and devices of their own choosing



Anticipating

The intelligent enterprise predicts and prepares for the future. Instead of just reacting to or correcting actions, it also steers and evaluates trade-offs. The future is modeled and simulated based on a rich history of past events and external insights.

- What if an international trade operation could orchestrate and dynamically reroute shipments based on its ability to model and predict global weather patterns?
- What if human resource managers had the insight and capability to hire and train entire workforces in enough time to meet sudden waves of demand, but not a second earlier?

Because of its ability to anticipate possible paths, the intelligent enterprise knows what to do when new situations present themselves.

The six characteristics we found are just the starting point for building an advanced analytics strategy. Each organization is unique. Each has its own industry and stakeholder requirements. Determining the right mix and the most compelling vision is the first and most important step for driving organizations toward optimization.

Today's enterprise	What if the intelligent enterprise could
Uses personal experience and informed guess-work to make decisions	Build simulations and models to understand future implications for alternatives based on facts, not just instinct
Uses historical data for "post-mortem" reporting and tracking	See opportunities and threats as they are happening and even beforehand
Recognizes events based upon the noise they make and responds on an ad-hoc basis	Track events in real time, applying sophisticated rules, enabling automation and speed of response
Manages performance and risk separately with all future variance and chance managed reactively	Be informed about opportunity and risk, and know what to do tactically about events well before action is needed



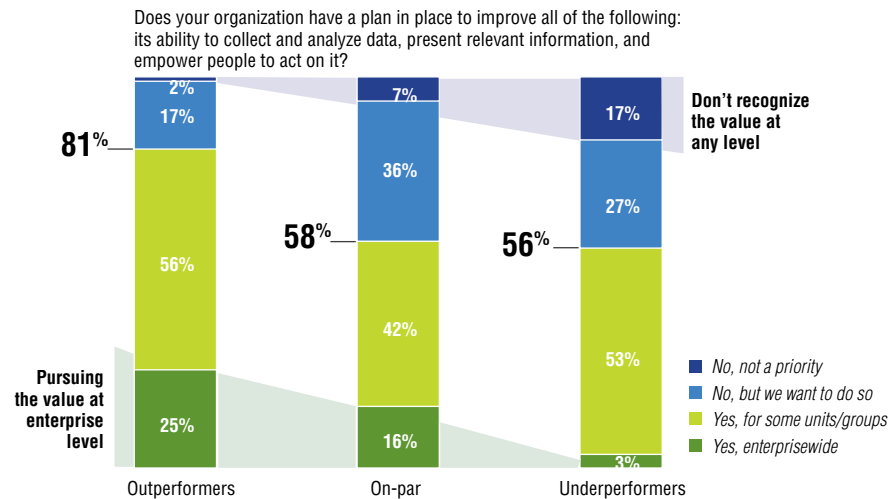
Figure 6. Most organizations recognize the opportunity for analytics, but are still very early in the adoption process.

Decision making is moving beyond “gut checks” to “fact checks.”

Getting started with advanced analytics and optimization

Business leaders, having identified significant information gaps, are poised for change. Nearly three in four say more predictive information will drive better decision making to a great extent (see Figure 6).

Enterprise leaders are getting ready to make fundamental changes in the way they work, which means moving decision making beyond “gut checks” to “fact checks.” More than four out of five outperformers are now pursuing advantage through new analytics, compared to fewer than three of five on-par and underperformers (see Figure 7). What few enterprises understand, however, is the best way to go about optimization. One in four of the outperformers already have enterprise-wide plans to collect, analyze and empower people to use information. In contrast, virtually none of the underperformers have put a plan in place, though one in four say they intend to do so in the future.



Note: Out-, on-par and underperformance is relative to peers.

Figure 7. Outperformers recognize and pursue the value from business analytics and optimization much more than on-par and underperformers.

There is still time for all enterprises to optimize and differentiate. Two out of three organizations have recognized the opportunity and begun to apply analytics for business advantage but only one in eight are well underway in this journey. However, given the unrelenting pace of global change and business challenge, we expect adoption rates for new analytics applied to business optimization to quickly accelerate.

The intelligent enterprise litmus test

For a quick way to determine whether advanced analytics can help optimize your enterprise, consider the following questions:

1. Are you able to capitalize on insights from information sources as diverse as social networks and RFID tags?
2. Is it easy and cost-effective to share timely information across your organization and with your partners for mutual advantage?
3. Is your information relevant to the task at hand, available and complete when you need it and in a form that you can readily use?
4. Do you consistently use information to look for ways to do things better, smarter and for less money, even when existing ways have worked in the past?
5. Have you equipped your employees with insights and tools to make at least twice as many decisions on their own as they did three years ago?
6. Are you able to use information to make better predictions and do you consider alternatives when making decisions and setting strategy?
7. Are you able to integrate information about your acquisitions to create an efficient, consolidated and action-oriented view of opportunities?

A “no” to any of these questions means it is time to think hard about business analytics and optimization.

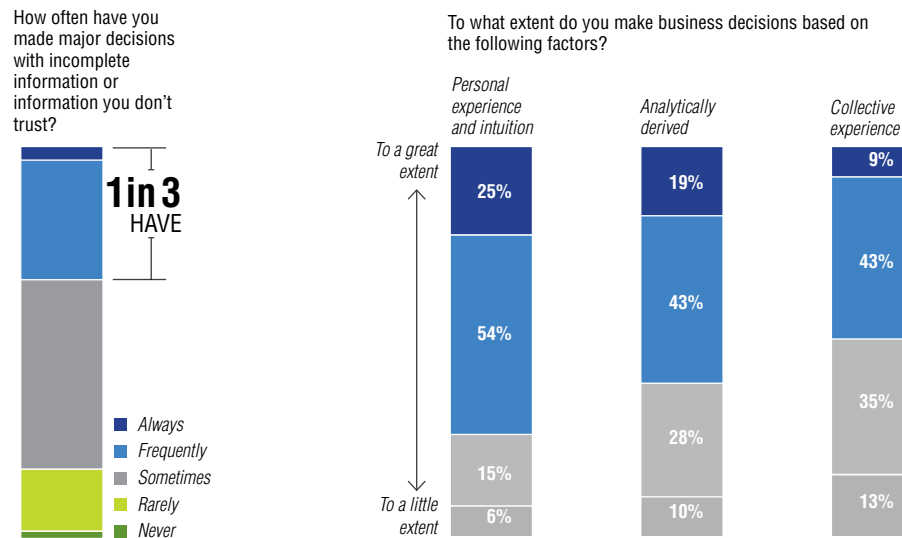


Figure 8. Lack of information forces decision makers to be most reliant on their intuition.

Conclusion

As we have discussed, information is only getting more complex. In addition to its sheer volume, its velocity is accelerating, the variety of its forms are burgeoning, and it is approaching quantum levels of granularity. A substantial portion of enterprises worldwide understand the challenge posed by this extreme information environment. More importantly, some are seizing the opportunity to use advanced information analytics, previously the domain of academic research, for business advantage. These leaders are no longer relying on intuition to fill information gaps. Instead they are combining the new analytics techniques with expertise in business process management to make decisions in an entirely

different way. They are able to extract the precise information they need – highly relevant and contextualized – and predict the most likely outcomes of key decisions and events. Given the nature of today's business environment, no enterprise can choose to leave benefits like these on the table. Only those enterprises that can skillfully adopt, integrate and deploy the benefits of enterprisewide analytics and optimization will be prepared to shape their own futures.

For more information about this study, you may contact the IBM Institute for Business Value at iibv@us.ibm.com, or visit our Web site:

ibm.com/gbs/businessanalytics

Follow-up study available

Learn more about business analytics and optimization with our newest study, “Breaking away with business analytics and optimization: New intelligence meets enterprise operations.”

About the author

Steve LaValle, an IBM services partner, is the global leader of Strategy services within the IBM Business Analytics and Optimization service line. In this role, he leads a global team of consultants and practitioners who provide advisory services across geographies and industries, focused on helping clients optimize their results through the application of insight, analytics and business process improvement. He is the principal author of “Advocacy in the Customer Focused Enterprise” and “CRM Done Right.”

Steve LaValle spent the majority of his career as a business consultant, initially for PricewaterhouseCoopers Consulting. He was one of the founding members of PwCC’s Customer Relationship Management services practice and subsequently served as the Global and Americas leader for the IBM Customer Focused Strategy practice. He graduated with a bachelor of science in Economics from the Wharton School and holds a Masters in Business Administration from Harvard Business School.

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At IBM Global Business Services, we collaborate with our clients, bringing together business insight, advanced research and technology to give them a distinct advantage in today’s rapidly changing environment. Through our integrated approach to business design and execution, we help turn strategies into action. And with expertise in 17 industries and global capabilities that span 170 countries, we can help clients anticipate change and profit from new opportunities.

Business Analytics and Optimization Services

IBM can help your organization transform its use of information through the following services:

- **Business analytics and optimization strategy** – Realize business objectives faster with less risk and at a lower cost by defining and helping to implement improvements in how information is identified and acted upon.
- **Business intelligence and business performance management** – Improve decision making with relevant, actionable and timely information.
- **Advanced analytics and optimization** – Improve operational efficiency through the use of analytics, data mining and statistical models.
- **Enterprise information management** – Achieve data integration between disparate systems to improve business processes, decision making and total business performance.
- **Enterprise content management** – Reduce processing cycle time, improve customer service and compliance, and establish agility and flexibility with the technology and processes to capture, manage, store, preserve and deliver unstructured content.

Notes

- ¹ Respondents classified themselves as outperforming, on par or underperforming their peers.



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