Success in an era of unprecedented volatility

Sensing patterns to make smarter decisions

IBM

Successful organisations will be the ones that see the value in information and realise this value. Ones which spot patterns and anomalies and act on them. Ones which look forward not back to define strategy. Ones which seek, model and adapt.

Our world is changing in ways that are increasingly difficult to predict. People, businesses and economies are ever more connected and inter-dependent. The speed with which information flows through these systems of systems fuels both the pace of change and the unpredictability of outcomes.

Information is exploding in this increasingly digital world – not just volume, but the nature of the data too.

The opening up of public policy, huge advances in information and communications technology, proliferation of video and mobile telecommunications and 'internet of things' have brought about unprecedented access to information.

- Just as there was too much data – now there's too much information.
- Information is not shared (trust, technology, language).
- Information is often conflicting.
- Lack of recognition of new sources of information (e.g., people, process, the collective).
- No recognition of patterns across different types of information (people, processes, data).

Gartner

And yet, despite all of this new information at our disposal, we seem to be living with levels of uncertainty and risk that have not been seen in some time, if ever before. It seems to us that less and less of this available information is being applied effectively, perhaps simply because there is so much to manage or perhaps because, as the saying goes, the wood cannot be seen for the trees.

So, important decisions are being made based on gut instinct, rather than fact. Or they are made following rules and protocols developed for an earlier, simpler world.

- 1 in 3 Business leaders frequently make major decisions with incomplete information or information they don't trust.
- 1 in 2 Business leaders don't have sufficient information from across their organisations to do their jobs.
- And 3 in 5 organisations don't share critical information with partners and suppliers for mutual benefit.
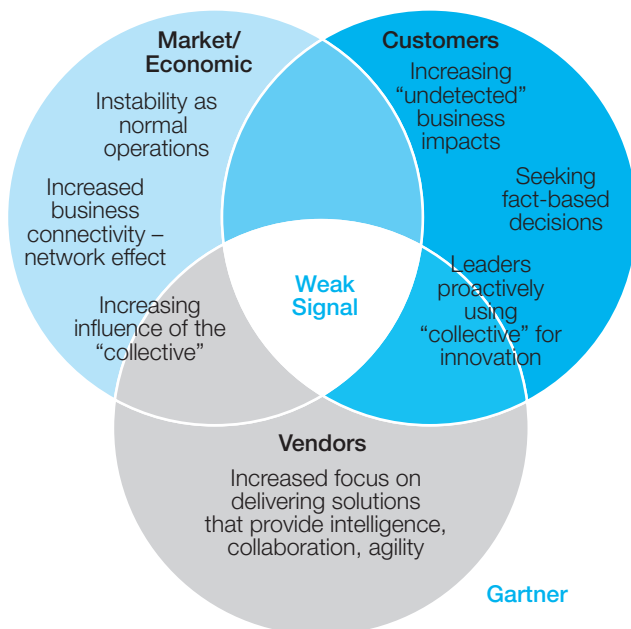
IBM Study 2009

But not all businesses are stuck in this trap, having both too much information to manage and too little information that is able to provide real insight and inform better decisions.

At the end of 2008, Gartner observed a dynamic occurring across several of its constituents. The recession was forcing the realisation that instability rather than stability is the norm. In addition, hyper-connectivity between global businesses meant that change in one business could affect another in an opposite area of the globe. As a result, customers began to increase their contingency planning efforts in critical areas, and business leaders sought new ways to make decisions. The CIO focus shifted to business intelligence, collaboration tools and applications that enabled rapid change.

It's not about knowing more. Nor is constant change anything new. What is new is the "network effect", the increased business connectivity that speeds the impact of change.

Change is a constant – not a variable

Market/Economic
Instability as normal operations

Increased business connectivity – network effect

Increasing influence of the "collective"

Customers
Increasing "undetected" business impacts

Seeking fact-based decisions

Leaders proactively using "collective" for innovation

Weak Signal

Vendors
Increased focus on delivering solutions that provide intelligence, collaboration, agility

Gartner

Companies that thrive in this new environment will be those that identify critical areas of business operations or strategy, see what's coming that might affect those areas, create multiple alternative scenarios, and adapt their strategies accordingly to prevent risk and create opportunity.

So, we find ourselves with more information than ever before and the need to rapidly extract meaning from this vast amount of data that is exploding in volume, granularity, frequency, complexity and diversity.

Seeing the value in information
Information proliferation is driving inefficiencies throughout the enterprise, wasting time and money.

But, there is a better way. Information silos can be broken down and systems connected to create a single view of the truth. Business and IT can be aligned to deliver actionable information to everyone — not just business analysts, financial staff and executives – helping them to find the value in information.

Where is this value? It comes from layers of sight:
Hindsight: lets us understand what has happened and why – through performance reporting and analytics on historic performance data.

Insight: lets us uncover patterns which inform what might happen again – through forensic analysis and data mining.

Foresight: lets us simulate and model patterns to understand how to make things happen and predict what will happen – through simulation, modelling and predictive analytics.

Line-of-sight: lets us understand what is happening and react to anomalies – through real-time condition based monitoring and management, predictive maintenance, stream computing to detect deviation from expected patterns, real-time device actuation and embedded rules-based process control.

- 30% of people's time is spent searching for relevant information.
- 85% of information is unstructured.
- Up to 50% of design time is spent on copy management.
- 17% of IT budgets today are spent on storage hardware, software and personnel.
- 40% of IT budgets may be spent on integration between various systems and data sources.
- And disk storage capacity has grown dramatically in the past decade, as companies have to invest heavily in storage to stay on top of a growing mass of different forms of content.

IBM Study 2009

Realising the value in information

What is needed is simultaneous and inter-linked analysis, monitoring, thinking and action.

It is about looking for what happened in the past and what might happen in the future and what is happening now. It is about analysing information and making decisions in real time and linking this – often through automation – to action fast enough for the decision still to be valid.

It is about visualisation and software optimisation to simplify and make sense of complex information relationships.

It is about looking for value in "360 degree" information, combining different types of information from multiple sources to ask and answer different questions:

- instrumented condition information from equipment, devices, processes and people.

- structured business information about transactions, processes, finances, commercial relationships, products, suppliers and prices.

- web information in all its forms... text, voice, video, images.

It is about deploying new techniques such as semantic modelling and entity analytics to organise and understand data, mining text to uncover hidden patterns and threads of meaning and looking at streams of real-time data or the images embedded in videos in the way we used to interrogate simple structured databases.

Timing is all important

The mere delivery of new intelligence or sophisticated analysis will not be enough to benefit the business. Delivering insight fast enough for relevant action to be taken is critical.

Smart Energy

Stream Computing: IBM is working with power generators to monitor the operational state of their wind turbines. Over 400 data points are monitored in real time from sensors on the equipment. This is analysed in real time in a remote control centre to optimise power output, predict and address maintenance requirements before failures and keep operations safe in adverse weather.

Using "stream computing" for real time analysis of environmental sensors in a variety of marine ecology and wave energy projects, information is brought together and visualised enabling innovative collaboration between the various stakeholders in the Galway Bay ecosystem. The technologies developed on this project are being adapted for cities and for river basins in the UK.

There are two keys here – **speed to insight** is the first and **speed to action** the second. The delivery of the insight and the decisions it drives must be embedded in the strategic and operational processes of the organisation.

Sometimes this means the use of sophisticated optimisations and rules processing software such as IBM's ILOG tools.

Frequently it means providing simple, easy to grasp, visual information so the people making the decisions can think, decide and act at the speed with which more automated solutions sense and respond.

But at the leading edge there is another step to take.

From Sense and Respond to Seek, Model, and Adapt

Adapting strategies and the business operating framework on the basis of delivered insight and doing so continuously is the new leading edge. What Gartner call "Pattern-Based Strategy" – finding patterns and formulating and testing new business and operating strategies against these – is key to success in this world.

Business and IT leaders must actively seek, model and adapt to patterns in order to operate in a world that is changing ever more rapidly and fraught with exceptions to "normal" business strategy and operations. The "sense and respond" models of the past are inadequate in a business environment that is continually changing, one in which the "rules of the game" are in constant flux.

Pattern-seeking

- Competencies, activities, technologies and resources that expose signals.

- Identification of patterns that will have a positive or negative impact on strategy or operations.

- Focusing on those areas of vulnerability or risk and innovation/opportunity for your business.

- Looking inside and outside the organisation.

- Exploiting collective knowledge with creative activities and exploiting collective activities as an unexplored source of patterns.

There are many companies that focus on one or more of the areas of this seek-model-adapt cycle – but very few that see these three as interconnected for the purpose of creating competitive advantage.

Once new patterns are detected or created, business and IT leaders must use a collaborative process for simulating the potential significance, impact and timing of them on the organisation's strategy and business operations. The purpose of modeling is to determine which patterns represent great potential or risk to the organisation by qualifying and quantifying the impact. But identifying a leading indicator of change and qualifying its potential impact are meaningless without the ability to adapt to the new pattern – and the line-of-sight to assess and re-adapt based on actual outcomes.

Decisions on the future based on patterns and models of the future

Smart Cities
NYPD: IBM worked with the New York Police Department (NYPD) to create the New York City Real Time Crime Centre (RTCC) that could bring together information buried in filing cabinets, on index cards and in handwritten notes. Today, the RTCC stitches together more than 120 million New York City criminal complaints, 31 million national crime records and 33 billion public records... just to name a few.

Sophisticated analytics and search capabilities make connections across multiple databases. Information can be visualized in seconds on a two-story video wall: a photo of a suspect appears with details – tattoos, past offences, addresses with maps – quickly filling in. Critical data can be relayed instantly to officers at the scene. What once took days now takes minutes.

For too long, both public- and private-sector enterprises have relied almost exclusively on lagging indicators for management decision making. But, the risk and uncertainty that surrounds global economic conditions requires indicators that provide visibility into future outcomes as well as those that tell an organisation what has already happened. For example, whilst quarterly financial results only indicate how well the business performed last quarter, the health of the supply chain might be more predictive of how it will perform in current and future quarters.

Organisations need to define new leading and very leading indicators (i.e. weak signals) of business performance and risk indicators that will form the foundation for transparency and provide the basis for pattern detection.

Real-time adaption to anomalies
As the world recovers from the global financial crisis, both private sector firms and government agencies are under assault by fraudsters and opportunistic citizens. Investigators often do not have sufficient tools to adequately address this significant problem.

The ability to spot anomalies and raise alerts in real time by continuously scanning the digital environment will not only help businesses to detect fraud and take relevant action but will also alert managers to risks as they develop, providing a window of opportunity to intervene before they develop into full blown problems.

Smart Insurance
IBM's Fraud and Abuse Management Solution (FAMS) is helping a health and life insurance provider address the full spectrum of fraud and abuse management – prevention, detection, investigation and settlement, identifying nearly $1million of questionable claims in the first month of a trial phase itself.

Smart Banking

Analysing Operational Risk: The Operational Riskdata eXchange Association (ORX) is a consortium of 51 leading financial institutions serving 18 countries. ORX has been collecting operational loss data from banks around the world since 2002. Sophisticated analytics yield new insight that lets ORX member banks benchmark their performance relative to their peers, help them understand their exposure to a variety of operational risks, perform 'what-if' scenarios and allocate the right resources to address compliance needs based on the outcomes.

The seek, model, and adapt cycle

New Intelligence gives you more than a window into your current operations. It provides a likely view of what is just around the corner and even further down the road. Analytics and reporting tools slice and dice data, crystallising trends, patterns and anomalies that yield invaluable business insights to help you drive smarter decision-making

But achieving proficiencies in information integration, visualisation and the application of sophisticated algorithms to derive insight, while fundamental, still only covers the seek and model aspects of the cycle.

We see the critical part of this cycle in using this insight to make better decisions and embedding this decision making in business process, either through people or increasingly through rules and process automation.

Finally, to sustain the value realised from information, the cycle needs to be repeated continuously and be linked with the instrumentation and interconnection of sensors, systems and devices at the front. With the automatic actuation and control of the same intelligent "things" at the end to deliver real and sustainable benefits – of course, with real-time line-of-sight control and adaption.

Smart Healthcare

Predicting changes in the tiniest patients: Solution A first-of-a-kind research project to help doctors detect subtle changes in the condition of critically ill premature babies.

Using IBM's advanced "stream computing" software a group of internationally recognized researchers, led by Dr. Carolyn McGregor, a associate professor and Canada Research Chair in Health Informatics are working toward greatly enhancing the decision-making capabilities of doctors.

The software ingests a constant stream of biomedical data, such as heart rate and respiration, along with environmental data gathered from advanced sensors and more traditional monitoring equipment on and around the babies.

The researchers will also use the software to apply findings from Dr. McGregor's body of research to help make "sense" of the data and, in near-real-time, feed back the resulting analysis to health-care professionals so they can predict potential changes in an infant's condition with greater accuracy and intervene more quickly.

Smart Analytics are helping healthcare payers to identify providers that may be submitting fraudulent claims and potentially engaging in abusive or wasteful practices.

New Intelligence – Applying analytics for success, today

Fortunately, we are crossing a new threshold in our ability to manage pervasive information, analyse it to gain insight, predict risks and opportunities, and drive faster, smarter decisions and actions.

Smart Transport

DHL turns to IBM to deliver intelligent insight: To improve Operations and Customer Profitability, together with IBM and its partner Infratab, DHL, a unit of Deutsche Post World Net, developed an advanced temperature tracking solution that combines sophisticated sensing and RFID technology to enable real-time monitoring of temperature-sensitive shipments while in transit.

The new intelligence system from IBM allows DHL to:
• Analyse more than 30 million customer records in just seconds vs. hours.

• Drastically reduce its system maintenance costs.

• Provide critical business information to analysts, sales and management users across DHL Express Germany to manage resources more efficiently, predict business opportunities and react more quickly to emerging trends.

We now have the ability to measure, sense and monitor the condition of almost everything. People, systems and objects can communicate and interact with each other in entirely new ways. We can respond to changes quickly and accurately, and get better results by predicting and optimising for future events.

Instead of looking at isolated data points, or working off intuition and past experience, organisations can see a more fully rendered picture, including – and this is the critical distinction – the consequences of any business decision.

So decisions aren't just faster, they are more predictive – moving the enterprise to new and smarter business outcomes with greater speed and greater certainty.

Making Retail Smarter

GS1 UK: IBM provided analytical, consulting and technology services for the Data Crunch Project. The project was the first time that data from multiple suppliers and retailers has been synchronised in a single data platform. IBM provided software and related services to assist GS1 UK with the detailed analysis of product data provided by the participating grocery retailers and suppliers. IBM also assisted GS1 UK with the development of an industry business impact assessment which was used to develop an industry white paper.

Increased insight into data can help managers predict and respond to opportunities and threats while helping to optimize operations whilst synchronised data in a single data pool can be automatically updated with product information changes, reducing the chance of error, shrinkage and waste. The Data Crunch Project helped identify and address the significant amount of hidden cost in the supply chain from inaccurate data.

The growing impact of the analytics market

About $800 million for 2010 is Gartner's forecast for Business Intelligence, Analytics and Performance

Management software market segments in the UK with expected CAGR of 7.1% taking the market to over $1# billion by 2013. And this forecast does not include the significant increases in specific business area, supply chain, customer and employee analytics – primarily embedded in many business applications or offered as part of a package.

But to focus on the size of the investments companies are making in their vital capabilities to compete through pattern-based strategies is to miss the scale of the phenomenon.

With 3.6# million tonnes of food thrown away each year in just England and Wales – a staggering £9bn of food waste – how much would a 10% reduction in losses across the food chain be worth across entire Europe? What if the same amount of goods could be transported around with 10% fewer vehicles and if these used 30% less fuel?

Over $4 billion EMEA market for Business Intelligence, Analytics and Performance Management segments for 2010 and going over $5 billion by 2013.

Gartner 2009

With £7-8 billion being the estimated cost of road congestion to the UK economy per year, what impact would easing congestion by 10% across all major cities in Europe have, not just on the economy but also on the environment and people's health through reduced polution?

With £2.5 billion wasted in energy bills by UK companies due to inefficiencies such as leaving lights and computers on, what would a 10% increase in energy efficiency in every commercial building across the world amount to?

Imagine if financial institutions were better able to assess risk and detect changes in the patterns of trading in their markets? Or insurance companies were able to detect patterns in weather systems and anticipate extreme events enabling them to help businesses and home owners to prevent damage rather than simply handing out money to help them repair their lives and livelihoods?

Together just these few examples would be worth billions of Euros. And they are just examples of what can be done by harnessing the power of Business Analytics and Optimisation and pattern-based strategies.

About the authors

Jon Z Bentley is a Partner in IBM Global Business Services and leads the Advanced Analytics practice in UK & Ireland. He has over 24 years of experience consulting with senior management across industry. He is also the Innovation, Energy and Environment Leader and heads the Climate Change Centre of Excellence for IBM UK & Ireland. He can be contacted on **jon.z.bentley@uk.ibm.com**

Kedar Jagtap is a Managing Consultant in the Business Analytics and Optimisation service line. He has over 12 years of experience working in business intelligence and enterprise information management. He can be contacted on **kedar.jagtap@uk.ibm.com**

Executive Sponsors

Mark Salthouse – Partner, Business Analytics and Optimisation Leader UK & Ireland

Gregory Adams – Director, Information Management UK & Ireland

Contributors

We would like to extend our gratitude to **Gartner** for allowing us to use their research insights and objective opinion during the development of this paper:

Yvonne Genovese – Chief of Research, Software Vice President, Distinguished Analyst, Gartner

Stephen Prentice – Vice President and Gartner Fellow, Executive Leadership and Innovation, Gartner

We would also like to thank IBM colleagues namely **Jacqueline McCouat, Steven Manifold and Richard Whitaker** who generously shared their time and insights during the development of this paper.

The right partner for a changing world

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

Business Analytics and Optimisation

IBM can help your organisation transform and optimise its use of information through the following services:

- **Business analytics and optimisation strategy** – Realise 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 optimisation** – 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.

References

1. 'Pattern-Based Strategy' – Gartner Aug 2009.

2. 'Business Analytics and Optimisation for the Intelligent Enterprise.' IBM Institute for Business Value. April, 2009.

3. IBM internal collateral on New Intelligence.

IBM