

# Business Analytics; Unleashing Latent Potential

“Despite the availability of raw information such as scorecards and metrics, gut-feel is still, often, the basis for important and, sometimes critical decisions by senior executives and managers. Business Analytics applies analytical techniques to create insightful and efficient resolutions to everyday business issues which translate into effective cost savings for your corporation. This is achieved through the simultaneous provision of frameworks for decision making, improving performance, driving sustainable growth through innovation, anticipating and planning for change while managing and balancing risk. Business Analytics drives innovation and improves your business's response time to market and environmental changes.”

Dr David R. Hardoon  
Principal, Analytics  
SAS Singapore

## 1 INTRODUCTION

Society, through its multiple facets, has been engulfed with the accumulation of data for as long as information has been generated. Hordes of data include emails, documents, customer loyalty transaction, sensor and financial information, to list a few. Taking a step back to understand our fascination with data, we pose the question “What is data?”. Simply put, the term data refers to qualitative or quantitative attributes of an item or set of items, whatever they may be. Most importantly data are often viewed as the lowest level of abstraction from which *information* and then *knowledge* and ‘*intelligence*’ can be derived. Thus, our unrelenting pursuit of data is now easily explained. Data is synonymous to information which in turn is synonymous to knowledge and ‘intelligence’.

*“Knowledge is Power”*

- Sir Francis Bacon (1561 – 1626), *Religious Meditations of Heresies*, 1597

Despite the availability of raw information, gut-feel is still, often the most widely used basis for important and sometimes critical decisions by senior executives and managers. How does one currently gauge which items should be placed on the shelves of various retail or grocery shops? What is the underlying commonality amongst customers or patrons? How do business analysts go beyond the apparent and traditional features,



to better understand the customers behavioural and buying drivers? How does one answer the question of why a certain event had occurred, in a prompt and timely manner, and more importantly how does one pre-emptively get alerts to the possibility of a future event occurring?

Gut-feel entwined with domain knowledge has, and still is, an instrumental tool in driving businesses forward. Notwithstanding the abundance of information available, the goal of achieving an even better understanding of a business problem, driver, and behaviour – if left to standard practice – is simply overwhelming. Humans excel in the detection of patterns, given it is provided in bite size. For example, information on customers' credit card transactions provided in a few hundred rows and a dozen or so columns of excel would pose no challenge for the domain expert to uncover a trend. Although, given the same information, on a granular level, spanning several years – possibly thousands to millions of rows and hundreds to thousands of columns is practically impossible to digest. Thus, it is always important to emphasise that such Business Intelligence and/or Business Analytics tools and capabilities are intended to enhance the domain-knowledge rather than replace it, surfacing latent information in a digestible and succinct format.

Given all of the above, and perhaps at times the challenge of establishing a framework to sort through the deluge of data, one could dive even deeper into the realms of data by asking "Do you know what you do not know?". "Is there any insight, knowledge, information that is currently hidden within the wealth of accumulated data that would improve business processes, uncover new growth potential, etc.?". This is the birth of Business Analytics.

## 2 BUSINESS ANALYTICS

Despite the recent buzz and focus on the Business Analytics paradigm shift, there is still an on-going confusion as to the fundamental difference between Business Intelligence and Business Analytics. What is it and what is it not? How do the two terms compare? It is not uncommon to have Business Intelligence and Business Analytics assumed to refer to the same concept. There are also organisations which believe that historical trending and analysis is akin to business analytics. Therefore prior to any in-depth discussion on how Business Analytics can aid organisations to improve their decision making process – we first address the issue of terminology.

The degree of "intelligence", i.e. sophistication of technology, and the potential value returned to an organisation can be illustrated as a two-dimensional graph of analytical maturity, 'intelligence vs. business value'. We address the terminology question through an eight levels of "Intelligence through Analytics" (Illustrated in Figure 1).

### 1) Standard Reports

The first level of the analytical ladder focuses on understanding what had happened. For example, imagine reviewing a company's annual report and pinpointing the various events that had occurred. "What was sold?", "What was bought?", "What was the volume of fraudulent cases detected?" etc.

## 2) Ad-Hoc Report

Now that we had understood and captured the events what had happened, secondary questions may surface. Such as, "When did it happen?", "How many times did it occur during a particular period of time?".

## 3) Query Drilldowns – Online Analytical Processing (OLAP)

Diving deeper into the event, answering questions such as, "Where did the event happen?", "Where exactly was the problem?".

## 4) Alerts

Finally, the concluding stage of the first four levels is alerts. Given the previous three levels, we are keen to act/re-act on the uncovered information by triggering various business specific alerts. What are the actions needed when threshold is breached?

These four levels are common practice in almost all organisations as the foundation of standard business operations. The four levels are known as part of *Business Intelligence*. That is, the presentation and reporting of historical data. Furthermore, a secondary attribute of Business Intelligence system is that the user knows what they are looking and/or the basic *analysis* required to produce it. The subsequent levels are where analytical processes kick in.

## 5) Statistical Analysis

In this level we aim to go beyond the realm of 'what' and 'where', to dive into the hidden gems of the data to understand *why*, the event had happened. Such knowledge is the foundation of understanding how to identify, prevent, exploit, and so forth.

## 6) Forecasting

Until this stage we had focused entirely on deriving insight from historical data, one of the key elements of analytics is the capability of statistical forecasting. Will this observed trend continue and for how long? Furthermore, this stage is analogous to driving a car – one needs to have a front windscreen in order to know what is likely to happen.

## 7) Predictive Modelling

This stage is focused on uncovering the unknown from the data at hand to surface new insights that may not have been previously known, also to provide the foundation for predicting future events, "What will happen next?" and "Why will it happen?", such as the likelihood of events occurring.

## 8) Optimisation

The cherry on top of the pie, optimisation or also referred to as Operation Research (OR), combines all the previous levels to optimise business processes/objectives given operational and other constraints. How to maximise profit, minimise cost? How to optimally allocate resources?

These four final levels construe *Business Analytics*, the uncovering of insights from historical data and the projections into future, using analytical processes in alignment to business requirements. To place the full eight levels into a more relatable context, assume the case of customer complaints. The type of questions and insights generated at each of the stages could be the following:

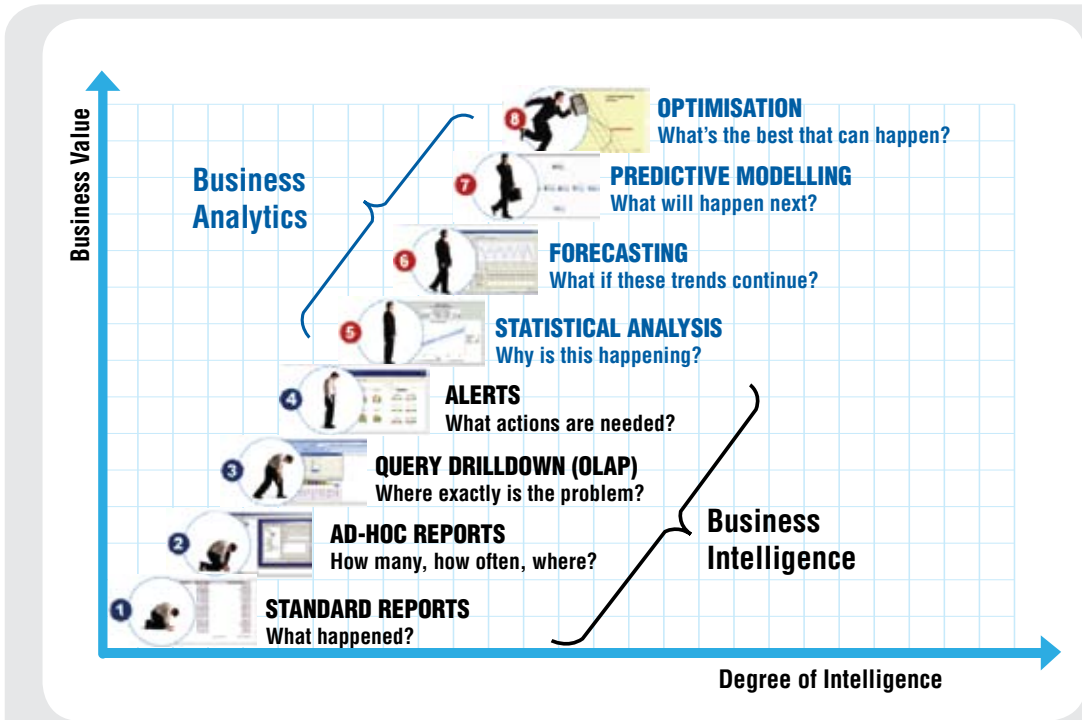


Figure 1: 'Intelligence Through Analytics' - The eight levels of analytics from Business Intelligence to Business Analytics (Source: SAS Eight Levels of Analytics)

- 1) **Standard Report:**  
How many complaints by product and/or channel (phone call, email, forum, etc.)?
- 2) **Ad-Hoc Report:**  
Compare complaint volume of the brand concerned with another brand.
- 3) **Query Drilldown:**  
Which channel is causing us the greatest problem?
- 4) **Alerts:**  
Highlight variance against targets and or budget.

#### 5) Statistical Analysis:

What are the most significant factors causing complaints?

#### 6) Forecasting:

What will be the level of complaints in the coming fourth quarter?

#### 7) Predictive Modelling:

Which complaints from which customer segments are most likely to escalate?

#### 8) Optimisation:

What is the best deployment of available resources to maximise complaint resolution?

There are those who would argue that Business Analytics is merely a part of Business Intelligence, and this is indeed quite plausible as the analytical capability sits as a layer (hidden at most times) between Data Management and Reporting. Although as numerous Business Intelligence systems do not include the analytics layer, it is therefore simpler to keep the two concepts distinct, especially as 'reports' are not Business Analytics, but an outcome of the application of the latter. Secondly, the boundaries between the different layers are thinning – given the recent advancement in technological abilities to 'push'/'embed' analytical processing into the database, or surface them directly within dashboard and interactive portals. The anchor that differentiates Business Intelligence and Business Analytics, is the latter's ability to accommodate any, if not all, of the levels 5 to 8 in Figure 1.

Therefore, expecting a Business Intelligence system to go beyond the realm of 'What if, How and Where else' is akin to running around in a circle expecting to find a corner.

*"Insanity: Doing the same thing over and over again and expecting different results."*

– Albert Einstein (1879 – 1955)

To lead organisations in today's challenging economic climate, one needs fact-based answers to drive a business forward and stay ahead of competitors and continuously improve the way in which work is done. We need to understand 'why', and have foresight as to what is going to and what is likely to happen next.

### 3 ADOPTION

Most organisations still rely on spreadsheets as the most commonly used tool for some form of analysis, with dashboards/KPIs and forecasting as secondary and third in use. In fact, currently most organisations mainly use analytical tools at their most fundamental level.

The adoption of Business Analytics tools usually begins with the identification of a business challenge to be addressed or a potential business benefit that can be achieved. These two core instigators are traditionally followed with an internal assessment of readiness, setup and required skillset.



Despite common perception, Business Analytics tools do not require statisticians or PhD holders to man and operate. Although they do require individuals who are analytically inclined – there is a growing requirement to have right analytical talent in the right place. The increase in adoption of Business Analytics tools is mirrored by the increase in demand for analytical talent, where the current demand far exceeds the supply. In the Bloomberg Businessweek Research Service report, it was mentioned that “Nearly half of survey respondents say their organisations place a premium on workers with analytical skills”, while continuing to state that the “Inability to use analytics to make decisions and lack of appropriate analytical talent are two of the main issues inhibiting companies in their Business Analytics initiatives”.

Organisations have varied entry points for their Business Analytics as well as Business Intelligence, journey. The application of business analytics could be driven by an individual, a departmental or enterprise wide requirement. There is no one-size-fits-all formula, and thus no definitive right or wrong stance. The exponential growth of information demands, data volumes and audience populations show a growing need for an organisation wide business analytic adoption to achieve the maximum business outcome. As the demand increases so does the imperative for a sound strategy that meets short-term needs and provides the foundation to meet an organisation's long-term vision.

#### 4 CONCLUSION

Organisations aim to optimise processes and improve existing operations and decision making, desiring to go beyond the realm of static reporting of historical data. The limitation of static reporting of historical data can be remedied through the interjection of Business Analytics by, for example, the uncovering of insights from historical data and the forecast of future events using analytical processes aligned with business requirements. Business Analytics is usually a bespoke process as no two business problems are identical.

While roadblocks and challenges are to be expected in the analytical journey, Business Analytics is fundamentally constrained by two factors – technology and imagination. With appropriate choice of technology to enable the analytical journey, organisations have successfully reduced their risk, grown their revenue, realised greater profits, and detected fraudulent transactions. Imagination or even mindset is irrefutably the more elusive constraint to address. Business Analytics' true potential can be elegantly summarised with the one line elevator pitch, “Do you know what you do not know?”. To conclude this introductory piece with an entertaining quote, it is apt to note that Mark Twain said a century ago:

*“Most people use statistics the way a drunkard uses a lamp post, more for support than illumination.”*  
– Mark Twain (1835 – 1910)

Research conducted by Bloomberg Businessweek suggests that “The more an organisation relies on analytics in the decision-making process, the more effective it will be”.

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## BIOGRAPHY OF AUTHOR



**Dr David R. Hardoon**

Principal, Analytics

SAS Singapore

Dr David R. Hardoon is the Principal of Analytics at SAS Singapore. He is the in-house Analytics subject matter expert and Business Analytics evangelist. He has established expertise in developing and applying computational analytical models for business knowledge discovery and analysis through his involvement in a number of research projects aimed at developing new principles, methods, and prototypes for the next generation of interfaces to data. He has completed extensive research in, but not limited to, these fields; data mining, information retrieval, knowledge discovery, pattern recognition and machine learning. These have been applied across a wide cross-disciplinary scope including problems/applications in music, medical analysis, retail, time sequence analysis, aerospace, taxonomy, content based information retrieval, vision and finance. His findings have been published in international conferences and journals.

David received a B.Sc. in Computer Science and Artificial Intelligence from Royal Holloway, University of London and a Ph.D. in Computer Science in the field of Machine Learning from the University of Southampton. He is currently an Adjunct Assistant Professor at the School of Computing, National University of Singapore and a Honorary Senior Research Associate at the Centre for Computational Statistics & Machine Learning, University College London. David regularly tutors, advises and provided consulting support in Analytics and Business Analytics.

More can be found on <[www.davidroihardoon.com](http://www.davidroihardoon.com)>.