

# FACTFILE: GCE PROFESSIONAL BUSINESS SERVICES

## UNIT A2 1: TECHNOLOGY AND DATA



### Learning Outcomes

#### Student should be able to:

- demonstrate knowledge and understanding of the use of big data in a business;
- evaluate the use of big data analytics (BDA) to support and influence decision making e.g. KPIs;
- understand, analyse and evaluate a range of data storage systems:
  - on-premises internal such as hard drives and external drives;
  - data centres; and
  - cloud storage including hosted solutions.
- compare and evaluate the storage capacity, cost and speed of access and retrieval of a range of storage systems.



### Big Data

The term Big Data (BD) is defined and contextualised below to show how it can be used.

#### Definition

*'the large volume of data – both structured and unstructured – that inundates a business on a day-to-day basis..... data that is so large, fast or complex that it's difficult or impossible to process using traditional methods.'* SAS (2020a)

#### Context

BD has grown exponentially since 2001 (Laney, 2001; Sivarajah et al., 2017; Statista, 2020) due to expanding e-commerce activities, social media and the capacity of businesses to store data internally (Computer, external hard drive) and externally (Cloud). The size, structure and resources of a business significantly influence whether it uses BD. The bigger a business's customer base, the more likely its need for more volume, velocity, and variety of data.

Organisations collect, store, access and analyse BD (McKinsey, 2015; PWC, 2020; SAS,) with software programmes (SAS, 2020b) like artificial intelligence (AI) to do the following:

- process structured and unstructured data;
- identify new trends and deliver personalised content to customers;
- enhance forecasting capability to make better strategic and operational decisions;
- optimise operational processes and systems;
- improve resource allocation;
- engage in predictive maintenance;
- develop new product and services and optimise pricing strategies.

These actions can enable businesses to reduce costs, improve delivery speed of a service or product, increase sales and revenue or improve profitability.

Businesses face the challenge and opportunity of dealing with the volume, velocity and variety

of data. Desouza and Smith (2014) note that BD is affected by viscosity, volatility, variability and veracity (SAS, 2020). Swoyer (2012) offers a further “V” - value. These eight “V”s are explained in Table One.

Table One: Eight “V”s of big data

Feature of big data	Definition
Volume	amount of structured and unstructured data produced and collected
Velocity	speed at which data is analysed within a specified timeframe
Variety	diverse nature of the data (format) that is collected
Viscosity	level of resistance to the flow of data
Variability	unpredictable rate of flow and different types of data
Veracity	reliability of the data collected
Volatility	length of time that data remains valid and how long it should be stored
Value	benefit(s) derived by the business from the analysis of data

Source: Mulholland (2020)

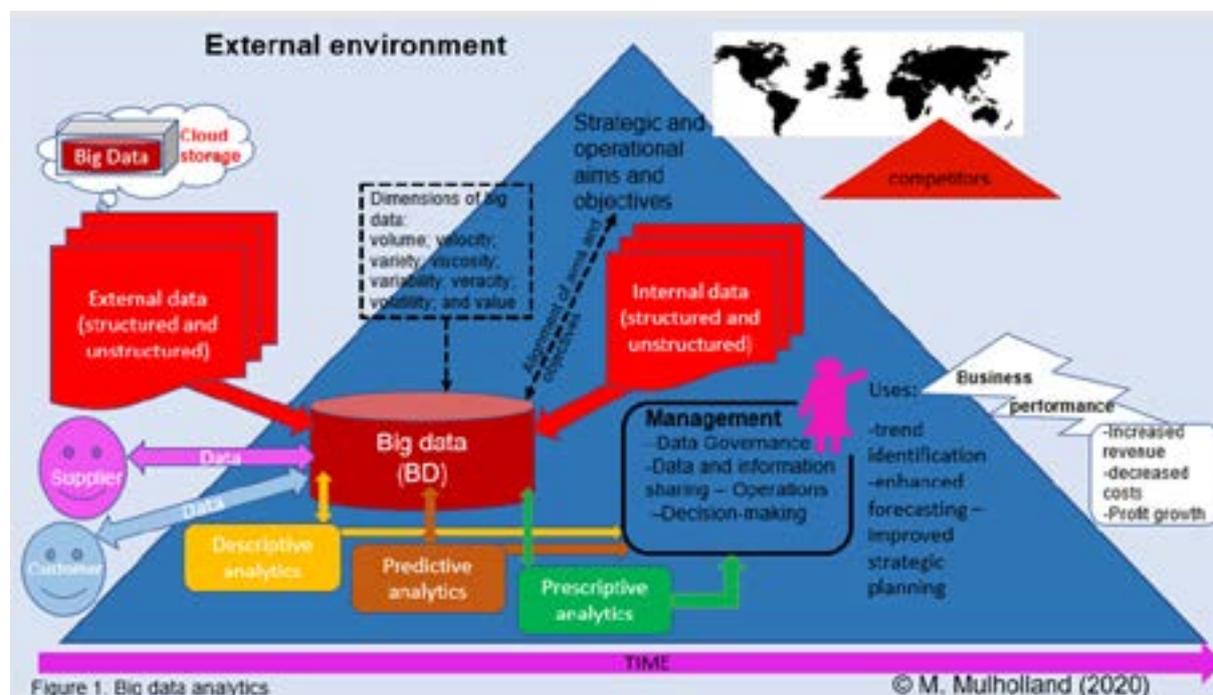


Figure 1. illustrates BD in context where external e.g. customers and suppliers and internal e.g. departments data (structured and unstructured) are integrated e.g. structured data can be in a tabular configuration whereas unstructured data could be formatted as videos or pictures (Blazquez and Domenech, 2018); note: that the quality of data will be influenced by the eight ‘V’s.

It is important that the aims and objectives set for BD are aligned with the strategic and operational aims and objectives of the business. BD analytics ((Grossman and Siegel, 2014; McKinsey, 2016a)

may occur in the form of descriptive analytics, predictive analytics, and prescriptive analytics which provide Management (marketing, finance, human resources, operations, and information technology) with insights into their business and operating environment. Embedded analytics can offer automation, integration, and AI capabilities.

This data can be analysed in individual and combined ways including real-time, near real-time, and batch. Insights from the analysis can generate results about trend identification, enhanced forecasting, and optimal pricing of products and services. With these insights management can

make more informed strategic and operational decisions with the aim of increased revenues and profit.

Management also need to engage in data governance (Grossman and Siegel, 2014) to ensure that the data is secure and complies with data policies and external regulations. Systems, processes and competent employees need to be in place to ensure the data can be collected, stored, accessed, and analysed. Management should decide what information will be shared with the respective stakeholders.

## Evaluating the use of big data analytics (BDA)

### Context

The use of big data analytics to support and influence decision making (PWC, 2016) will depend on the strategy, structure (scale and scope), systems, processes, employees, resources and external environment (PESTLE) that the business operates within. Clearly management require the availability of timely and relevant information from their data supply chain to make informed decisions that will create value for their business. In addition, the type of decision has to be considered in terms of whether it is regular, infrequent, routine, complex, minor or significant. Many routine and regular decisions can now be made through data analytics linked to automated responses, such as the restocking of a vending machine (DHL, 2018; Nass, 2017; Trotter, 2017).

However, strategic decisions by management (Gartner, 2017) that are complex, infrequent and have a significant impact on a business, may require BD analysis (Marr, 2018; McKinsey, 2016a; Stanford University, 2018). At an operational level, departments encompassing marketing (McKinsey, 2016a), human resources (CIPD, 2020), operations (INSIGHTSANALYTICS, 2019) such as vehicle maintenance, and finance (Gartner, 2020) can utilize BD to design and implement their strategies and plans. BD can also help businesses to meet their key performance indicators (KPIs) including gross and net profit margin, return on investments, customer satisfaction and retention rates, and employee turnover rates (Jackson, 2020; NAO, 2011)).

The strengths to a business in using BD for supporting and influencing decision making are being able to:

- better understand market conditions and developing trends
- better understand the customer
- undertake more effective investment decisions
- improve products and services
- enhance the effective use of data
- create new revenue flows
- more effectively and efficiently manage governance, risk, and compliance,
- better detect and prevent fraud
- greater participation of stakeholders in decision making

The weaknesses of a business in using BD for supporting and influencing decision making are:

- too many stakeholders (departments and groups) do not want to share their data
- too few employees with the competences to analyse the data effectively
- can take too long to analyse the data
- unstructured data is too difficult to analyse
- senior management team do not regard BD as strategically important
- significant cost of storing and analysing large volumes of data.

In conclusion, businesses have to decide what value BD adds to their business. If a business knows its weaknesses it can take action to remedy the areas of concern, assuming that it is cost effective to do so. BD can be most beneficial in relation to routine, repetitive and low risk decision making. However, high risk and cost decision making will, most likely, lie with the senior management team although they can avail of the insights offered through data analysis.

## Data storage systems: capacity, cost and speed of access and retrieval

The evaluation of data storage systems is, in part, dependent on the operating environment of the business, the data needs of the business, and the resources of the business. Table One, 'Evaluation of data storage systems', contains an assessment of storage systems in relation to capacity, cost, speed of access and retrieval.

Table One Evaluation of data storage systems

Storage system	Capacity	Cost	Speed of access and retrieval
On-premises • hard drives  • external drives	Storage capacity (SC) on hard-drives usually suit individual users. SC is small compared with data centres and cloud storage. The SC on external drives usually suits individual users. The SC is very small compared with data centres and cloud storage.	Dependent upon the make and specifications attributed to the desktop or laptop. Normally a one-off cost and, over the longer term, is much lower than data centres and cloud storage. Cost of an external-drive is dependent upon manufacturer's specifications.	Dependent on users location in relation to the availability of a laptop or desktop and if user has passwords to retrieve data from the hard drive / USB drive.
• data centres	SC is large compared with data stored on hard and external drives. SC in data centres is usually suitable for multiple users.	Dependent upon data needs of the business. The bigger (structure and scope) the business, the more likely the data needs will be greater. Cost of a data centre will be much larger than hard drives /external drives.	Dependent on: 1. Users location in relation to the availability of a laptop or desktop; 2. Business' infrastructure (systems and protocols) and the specifications of the hardware and software of the laptop or desktop being used to retrieve data.
• cloud storage	SC is huge compared with data stored on hard and external drives. SC in the cloud can be suitable for individual and multiple users.	Dependent upon the data needs of the business or individual. The bigger (structure and scope) the business, the more likely the data needs will be greater. Cost of a data centre will be much larger than hard drives /external drives.	Dependent on; 1. Users location in relation to the availability of a laptop or desktop; 2. Business' infrastructure (e.g. quality of internet connection); hardware spec and software used to retrieve data.

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