UNIT 1

An overview of Business intelligence, Analytics & Decision support

Introduction – Meaning of Analytics-Evolution of Analytics-Need of Analytics- Business Analytics vs. Business Analytics – Categorization of Analytical Models – Data Scientist vs. Data Engineer vs. Business Analyst – Business Analytics in practice- Types of Data- Role of Business Analyst.

Introduction

The word analytics has come into the foreground in last decade or so. The increase of the internet and information technology has made analytics very relevant in the current age. Analytics is a field which combines data, information technology, statistical analysis, quantitative methods and computer-based models into one.

This all are combined to provide decision makers all the possible scenarios to make a well thought and researched decision. The computer-based model ensures that decision makers are able to see performance of decision under various scenarios.

Meaning

Business analytics (BA) is a set of disciplines and technologies for solving business problems using data analysis, statistical models and other quantitative methods. It involves an iterative, methodical exploration of an organization's data, with an emphasis on statistical analysis, to drive decision-making.

At its core, business analytics involves a combination of the following:

- identifying new patterns and relationships with data mining;
- using quantitative and statistical analysis to design business models;
- conducting A/B and multi-variable testing based on findings;
- forecasting future business needs, performance, and industry trends with predictive modelling; and
- Communicating your findings in easy-to-digest reports to colleagues, management, and customers.

Definition

- **Business analytics (BA)** refers to the skills, technologies, and practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning. Business analytics focuses on developing new insights and understanding of business performance based on data and statistical methods.
- **Business Analytics** is the process of transforming data into insights to improve business decisions. Data management, data visualization, predictive modelling, data

mining, forecasting simulation, and optimization are some of the tools used to create insights from data.

Evolution of Business Analytics

- Business analytics has been existence since very long time and has evolved with availability of newer and better technologies. It has its roots in operations research, which was extensively used during World War II.
- Operations research was an analytical way to look at data to conduct military operations. Over a period of time, this technique started getting utilized for business. Here operation's research evolved into management science. Again, basis for management science remained same as operation research in data, decision making models, etc.
- Analytics have been used in business since the management exercises were put into place by Frederick Winslow Taylor in the late 19th century.
- Henry Ford measured the time of each component in his newly established assembly line. But analytics began to command more attention in the late 1960s when computers were used in decision support systems.
- Since then, analytics have changed and formed with the development of enterprise resource planning (ERP) systems, data warehouses, and a large number of other software tools and processes.

In later years the business analytics have exploded with the introduction of computers. This change has brought analytics to a whole new level and has brought about endless possibilities. As far as analytics has come in history, and what the current field of analytics is today, many people would never think that analytics started in the early 1900s with Mr. Ford himself.

As the economies started developing and companies became more and more competitive, management science evolved into business intelligence, decision support systems and into PC software.

❖ Scope of Business Analytics

Business analytics has a wide range of application and usages. It can be used for descriptive analysis in which data is utilized to understand past and present situation. This kind of descriptive analysis is used to asses' current market position of the company and effectiveness of previous business decision.

It is used for predictive analysis, which is typical used to asses' previous business performance.

Business analytics is also used for prescriptive analysis, which is utilized to formulate optimization techniques for stronger business performance.

For example, business analytics is used to determine pricing of various products in a departmental store based past and present set of information.

❖ How business analytics works

Before any data analysis takes place, BA starts with several foundational processes:

- Determine the business goal of the analysis.
- Select an analysis methodology.
- Get business data to support the analysis, often from various systems and sources.
- Cleanse and integrate data into a single repository, such as a data warehouse or data mart.

❖ Need/Importance of Business Analytics

- **Business analytics is a methodology or tool to make a sound commercial decision**. Hence it impacts functioning of the whole organization. Therefore, business analytics can help improve profitability of the business, increase market share and revenue and provide better return to a shareholder.
- Facilitates better understanding of available primary and secondary data, which again affect operational efficiency of several departments.
- Provides a competitive advantage to companies. In this digital age flow of information is almost equal to all the players. It is how this information is utilized makes the company competitive. Business analytics combines available data with various well thought models to improve business decisions.
- Converts available data into valuable information. This information can be presented in any required format, comfortable to the decision maker.

For starters, business analytics is the tool your company needs to make accurate decisions. These decisions are likely to impact your entire organization as they help you to improve profitability, increase market share, and provide a greater return to potential shareholders.

While some companies are unsure what to do with large amounts of data, business analytics works to combine this data with actionable insights to improve the decisions you make as a company

Essentially, the four main ways business analytics is important, no matter the industry, are:

- Improves performance by giving your business a clear picture of what is and isn't working
- Provides faster and more accurate decisions
- Minimizes risks as it helps a business make the right choices regarding consumer behaviour, trends, and performance
- Inspires change and innovation by answering questions about the consumer.

❖ Essentials of business analytics

Business analytics has many use cases, but when it comes to commercial organizations, BA is typically used to:

- Analyze data from a variety of sources. This could be anything from cloud applications to marketing automation tools and CRM software.

- Use advanced analytics and statistics to find patterns within datasets. These patterns can help you predict trends in the future and access new insights about the consumer and their behaviour.
- Monitor KPIs and trends as they change in real-time. This makes it easy for businesses to not only have their data in one place but to also come to conclusions quickly and accurately.
- Support decisions based on the most current information. With BA providing such a vast amount of data that you can use to back up your decisions, you can be sure that you are fully informed for not one, but several different scenarios.

❖ Data for Analytics

- Business analytics uses data from three sources for construction of the business model. It uses business data such as annual reports, financial ratios, marketing research, etc. It uses the database which contains various computer files and information coming from data analysis.

Benefits of implementing BA in your organization

Apart from having applications in various arenas, following are the benefits of Business Analytics and its impact on business –

- Accurately transferring information
- Consequent improvement in efficiency
- Help portray Future Challenges
- Make Strategic decisions
- As a perfect blend of data science and analytics
- Reduction in Costs
- Improved Decisions
- Share information with a larger audience
- Ease in Sharing information with stakeholders

❖ Challenges

Moreover, any technology is subject to its own set of problems and challenges. Following are the challenges in implementing business analytics in an organization.

- Lack of technical skills in employees
- Fuss over acceptance of BA by staff
- Data Security and Maintenance
- Integrity of Data
- Delivering relevant information in the given time
- Inability to address complex issues
- Costs involved in implementing BA
- Investment of staff time in implementation of BA
- Lack of a proper strategy to implement BA

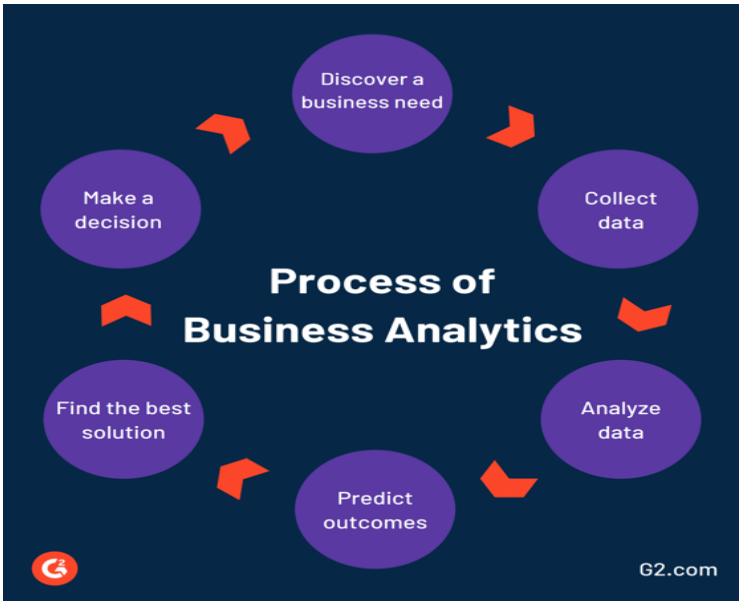
➢ Business analytics can be possible only on large volume of data. It is sometime difficult obtain large volume of data and not question its integrity.

➢ Business analytics depends on sufficient volumes of high-quality data.

- The difficulty in ensuring data quality is integrating and reconciling data across different systems, and then deciding what subsets of data to make available.

- Previously, analytics was considered a type of after-the-fact method of forecasting consumer behaviour by examining the number of units sold in the last quarter or the last year. This type of data warehousing required a lot more storage space than it did speed.

- Now business analytics is becoming a tool that can influence the outcome of customer interactions. When a specific customer type is considering a purchase, an analytics-enabled enterprise can modify the sales pitch to appeal to that consumer. This means the storage space for all that data must react extremely fast to provide the necessary data in real-time.



❖ Application

Business analytics has a wide range of application from customer relationship management, financial management, and marketing, supply-chain management, human-resource management, pricing and even in sports through team game strategies.

In healthcare, business analysis can be used to operate and manage clinical information systems. It can transform medical data from a bewildering array of analytical methods into useful information. Data analysis can also be used to generate contemporary reporting systems which include the patient's latest key indicators, historical trends and reference values.

- **Decision analytics**: supports human decisions with visual analytics that the user models to reflect reasoning.
- **Descriptive analytics:** gains insight from historical data with reporting, scorecards, clustering etc.
- **Predictive analytics**: employs predictive modelling using statistical and machine learning techniques

- **Prescriptive analytics:** recommends decisions using optimization, simulation, etc.

- Behavioural analytics
- Cohort analysis
- Competitor analysis
- Cyber analytics
- Enterprise optimization
- Financial services analytics
- Fraud analytics
- Health care analytics
- Key Performance Indicators (KPI's)
- Marketing analytics
- Pricing analytics
- Retail sales analytics
- Risk & Credit analytics
- Supply chain analytics
- Talent analytics
- Telecommunications
- Transportation analytics
- Customer Journey Analytics
- Market Basket Analysis

❖ **Business Analysis vs. Business Analytics**

The aim of business analytics is data and reporting—examining past business performance and forecasting future business performance. On the other hand, the business analysis focuses on functions and processes—determining business requirements and suggesting solutions.

- ***Business Analysis: Definition and Activities***

Business analysis is the practice of assisting firms in resolving their technical difficulties by understanding, defining, and solving those issues.

The activities that are carried out while performing Business Analysis:

- **Company analysis**: Business analysis aims at figuring out the requirements of a firm in general and its strategic direction and determining the initiatives that will enable the business to address those strategic goals.
- **Requirements planning and management**: It focuses on planning the requirements of the development process, identifying what the top priority is for execution, and managing the changes.
- **Requirements elicitation**: It outlines techniques for collecting needs from relevant members of the project team.
- **Requirements analysis and documentation**: It explains how to establish and define the needs in detail to allow them to be effectively carried out by the team.

- **Requirements communication**: Business analysis explains methods to help stakeholders have a shared understanding of the needs and how they will be carried out.
- **Solution assessment and validation**: It also explains how a business analyst can execute a suggested solution, how to support the execution of a solution, and how to evaluate possible flaws in the implementation.

Business analysis is performed by Functional Analysts, Systems Analysts, Business Analysts, and Business Requirements Analysts.

➢ ***Business Analytics: Definition and Its Applications***

Business analytics is also known as data analytics. It is a process of collecting, evaluating, and drawing valuable outcomes from the enormous amount of data available. Business analytics is widely used in the following applications:

- Finance
- Marketing
- HR
- CRM
- Manufacturing
- Banking and Credit Cards

Business analytics is performed by Data Scientists and Data Analysts.

➢ ***Business Analysis vs. Business Analytics***

Most people believe that business analysis and analytics are the same, but they are not! The primary differences between business analysis and business analytics:

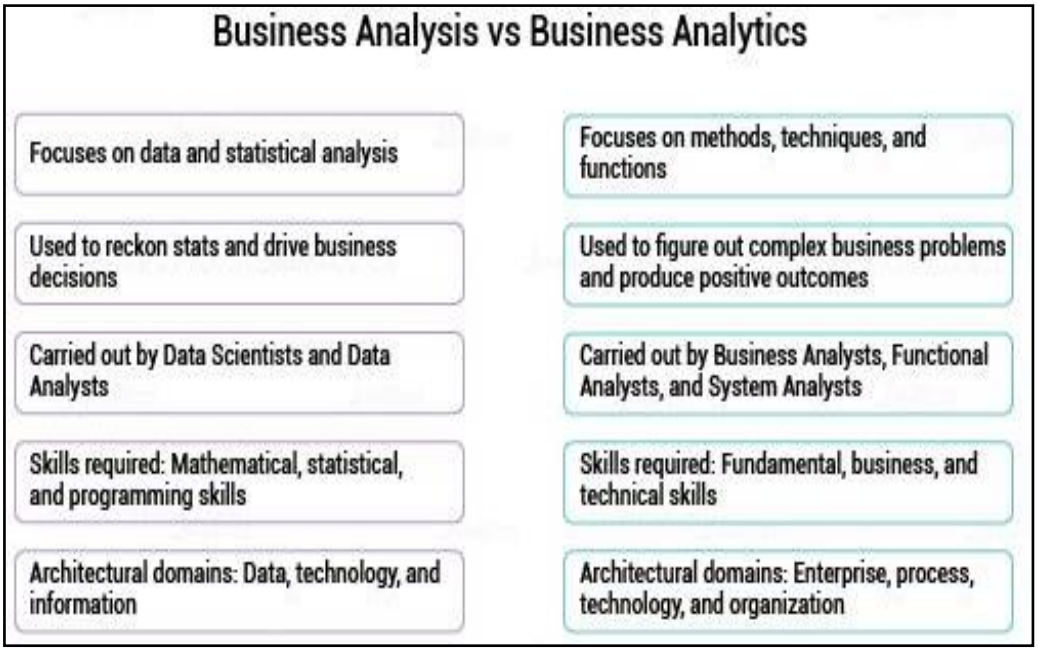
Business Analysis

- It mainly aims at the methods and determining the business needs.
- It is employed to figure out the organizational needs and possible problems to have productive outcomes.
- Here, the tasks are carried out by Functional Analysts, Systems Analysts, and Business Analysts.
- Business, functional, and domain skills are needed to perform business analysis.
- The architectural domains for business analysis include enterprise architecture, process architecture, technology architecture, and organization architecture.

Business Analytics

- It aims at data and reporting.
- It is widely practiced to reckon further stats and make decisions to bring improvements in the business.
- Here, the tasks are carried out by Data Scientists and Data Analysts.

- Mathematical, statistical, and programming skills are needed for executing business analytics.
- The architectural domains for business analytics include data architecture, technology architecture, and information architecture.



➢ ***Business Analysis vs. Analytics: Similarities Explained***

Business analysis and business analytics have some commonalities. They both:

- Examine and enhance businesses
- Determine solutions to issues
- Establish things based on the requirements

Business analysis is a practice of identifying business requirements and figuring out solutions to specific business problems. This has a heavy overlap with the analysis of business needs to function normally and to enhance how they function. Sometimes, the solutions include a system's development feature. It can also incorporate business change, process enhancement or strategic planning, and policy improvement.

On the contrary, business analytics is all about the group of tools, techniques, and skills that help the investigation of previous business performance. It also aids to gain insights into future performance. In general, business analytics aims mostly at data and statistical analysis.

Categorization of Analytical Models

4 Types of Business Analytics

There are mainly four types of Business Analytics, each of these types are increasingly complex. They allow us to be closer to achieving real-time and future situation insight application. Each of these types of business analytics have been discussed below.

1. **Descriptive Analytics**
2. **Diagnostic Analytics**
3. **Predictive Analytics**
4. **Prescriptive Analytics**

1. Descriptive Analytics

It summarizes an organisation's existing data to understand what has happened in the past or is happening currently. Descriptive Analytics is the simplest form of analytics as it employs data aggregation and mining techniques. It makes data more accessible to members of an organisation such as the investors, shareholders, marketing executives, and sales managers.

It can help identify strengths and weaknesses and provides an insight into customer behaviour too. This helps in forming strategies that can be developed in the area of targeted marketing.

2. Diagnostic Analytics

This type of Analytics helps shift focus from past performance to the current events and determine which factors are influencing trends. To uncover the root cause of events, techniques such as data discovery, data mining and drill-down are employed. Diagnostic analytics makes use of probabilities, and likelihoods to understand why events may occur. Techniques such as sensitivity analysis and training algorithms are employed for classification and regression.

3. Predictive Analytics

This type of Analytics is used to forecast the possibility of a future event with the help of statistical models and ML techniques. It builds on the result of descriptive analytics to devise models to extrapolate the likelihood of items. To run predictive analysis, Machine Learning experts are employed. They can achieve a higher level of accuracy than by business intelligence alone.
One of the most common applications is sentiment analysis. Here, existing data collected from social media and is used to provide a comprehensive picture of an users opinion. This data is analysed to predict their sentiment (positive, neutral or negative).

4. Prescriptive Analytics

Going a step beyond predictive analytics, it provides recommendations for the next best action to be taken. It suggests all favourable outcomes according to a specific course of action and also recommends the specific actions needed to deliver the most desired result. It mainly relies on two things, a strong feedback system and a constant iterative analysis. It learns the relation between actions and their outcomes. One common use of this type of analytics is to create recommendation systems.

Business Analytics	Questions	Tools	Outcomes	Focus
Prescriptive (Automation)	• What should I do? • Why should I do it?	• Decision modeling • Optimization • Simulation • Expert systems	• Optimization-Best possible business decisions	• Focus on decision making and efficiency
Predictive (Foresight)	• What is likely to happen? • What will happen? • Why will it happen	• Data mining • Text/media mining • Predictive modeling • Artificial Neural Networks (ANN)	• Accurate projections of the future conditions and states	• Identify past patterns to predict the future
Diagnostic (Insight)	• Why did it happen?	• Enterprise data warehouse • Data discovery • Data mining and correlations • Drill-down/roll-up	• Accurate projections of the future conditions and states	• Identify past patterns to predict the future
Descriptive (Hindsight)	• What happened? • What is happening?	• Data modeling • Business reporting • Visualization • Dashboard • Regression	• Well defined business problems or opportunities	• Uncovering patterns that offer insight

❖ Business Analytics Tools

Business Analytics tools help analysts to perform the tasks at hand and generate reports which may be easy for a layman to understand. These tools can be obtained from open source platforms, and enable business analysts to manage their insights in a comprehensive manner. They tend to be flexible and user-friendly. Various business analytics tools and techniques like.

- **Python** is very flexible and can also be used in web scripting. It is mainly applied when there is a need for integrating the data analyzed with a web application or the statistics is to be used in a database production. The I Python Notebook facilitates and makes it easy to work with Python and data. One can share notebooks with other people without necessarily telling them to install anything which reduces code organizing overhead
- **SAS** The tool has a user-friendly GUI and can churn through terabytes of data with ease. It comes with an extensive documentation and tutorial base which can help early learners get started seamlessly.
- **R** is open source software and is completely free to use making it easier for individual professionals or students starting out to learn. Graphical capabilities or data visualization is the strongest forte of R with R having access to packages like GGPlot, RGIS, Lattice, and GGVIS among others which provide superior graphical competency.
- **Tableau** is the most popular and advanced data visualization tool in the market. Story-telling and presenting data insights in a comprehensive way has become one of the trademarks of a competent business analyst Tableau is a great platform to develop customized visualizations in no time, thanks to the drop and drag features.

Python, R, SAS, Excel, and Tableau have all got their unique places when it comes to usage.

❖ Data Scientist vs. Data Engineer vs. Data Analyst

1. Data scientists use their advanced statistical skills to help improve the models the data engineers implement and to put proper statistical rigour on the data discovery and analysis the customer is asking for.

- Companies extract data to analyze and gain insights about various trends and practices. In order to do so, they employ specialized data scientists who possess knowledge of statistical tools and programming skills. Moreover, a data scientist possesses ***knowledge of machine learning algorithms***.

- However, Data Science is not a singular field. It is a quantitative field that shares its background with math, statistics and computer programming. With the help of data science, industries are qualified to make careful data-driven decisions.

- These algorithms are responsible for predicting future events. Therefore, data science can be thought of as an ocean that includes all the data operations like data extraction, data processing, data analysis and data prediction to gain necessary insights.

A Data Scientist is required to perform **responsibilities** –

- Performing data pre-processing that involves data transformation as well as data cleaning.
- Using various machine learning tools to forecast and classify patterns in the data.
- Increasing the performance and accuracy of machine learning algorithms through fine-tuning and further performance optimization.
- Understanding the requirements of the company and formulating questions that needs to be addressed.
- Using robust storytelling tools to communicate results with the team members.

For becoming a Data Scientist, you must have the following key **skills** –

- Should be proficient with Math and Statistics.
- Should be able to handle structured & unstructured information.
- In-depth knowledge of tools like R, Python and SAS.
- Well versed in various machine learning algorithms.
- Have knowledge of SQL(Structured Query Language) and NoSQL(Non Structured Query Language or not only SQL)
- Must be familiar with Big Data tools.

Some of the **tools** that are used by Data Scientist **are**

- **Web Scraping**
- **Data Analytics**
- **Machine Learning**
- **Reporting**

2. A Data Engineer *is a person who specializes in preparing data for analytical usage*. Data Engineering also involves the development of platforms and architectures for data processing.

- In other words, a data engineer develops the foundation for various data operations. A Data Engineer is responsible for designing the format for data scientists and analysts to work on.

- Data Engineers have to work with both structured and unstructured data. Therefore, they ***need expertise in SQL*** and NoSQL databases both. Data Engineers allow data scientists to carry out their data operations.

- Data Engineers have to deal with Big Data where they engage in numerous operations like data cleaning, management, transformation, data deduplication etc.

- A Data Engineer is more experienced with core programming concepts and algorithms. The **role of a data engineer** also follows closely to that of a software engineer. This is because a data engineer is assigned to develop platforms and architecture that utilize guidelines of software development.

For example, developing a cloud infrastructure to facilitate real-time analysis of data requires various development principles. Therefore, building an interface API is one of the job responsibilities of a data engineer.

Tools used by Data Engineers

Some of the **tools** that are used by Data Engineers **are** –

- ***Hadoop***
- ***Apache Spark***
- ***Kubernetes***
- ***Java***
- ***Yarn***

A Data Engineer is supposed to have the following **responsibilities –**

- Development, construction, and maintenance of data architectures.
- Conducting testing on large scale data platforms.
- Handling error logs and building robust data pipelines.
- Ability to handle raw and unstructured data.
- Provide recommendations for data improvement, quality, and efficiency of data.
- Ensure and support the data architecture utilized by data scientists and analysts.
- Development of data processes for data modelling, mining, and data production.

Following are the key **skills** required to become a data engineer –

- Knowledge of programming tools like Python and Java.
- Solid Understanding of Operating Systems.
- Ability to develop scalable ETL packages.
- Should be well versed in SQL as well as NoSQL technologies like Cassandra and MongoDB.
- He should possess knowledge of data warehouse and big data technologies like Hadoop, Hive, Pig, and Spark.
- Should possess creative and out of the box thinking.

3. A **Data Analyst** is responsible for taking actionable that affect the current scope of the company. A **data engineer** is responsible for developing a platform those data analysts and data scientists work on. And, a **data scientist** is responsible for unearthing future insights from existing data and helping companies to make data-driven decisions.

- A **data analyst** does not directly participate in the decision-making process; rather, he helps indirectly through providing static insights about company performance. A **data engineer** is not responsible for decision making. And, a **data scientist** participates in the active decision-making process that affects the course of the company.

- A **data analyst** uses static modelling techniques that summarize the data through descriptive analysis. On the other hand, a **data engineer** is responsible for the development and maintenance of data pipelines. A **data scientist** uses dynamic techniques like **Machine learning to gain insights about the future**.

- Knowledge of machine learning is not important for **data analysts**. However, this is mandatory for **data scientists**. A **data engineer** need not require the knowledge of machine learning but he is required to have the knowledge of core computing concepts like programming and algorithms to build robust data systems.

- A **data analyst** only has to deal with structured data. However, both **data scientists and data engineers** deal with unstructured data as well.

- Data analyst and data scientists are both required to be proficient in data visualization. However, this is not required in the case of a **data engineer**.

- Both **data scientists and analysts** need not have knowledge of application development and working of the APIs. However, this is the most essential requirement for a **data engineer**.

A Data Analyst has following **responsibilities -**

- Analyzing the data through descriptive statistics.
- Using database query languages to retrieve and manipulate information.
- Perform data filtering, cleaning and early stage transformation.
- Communicating results with the team using data visualization.
- Work with the management team to understand business requirements.

In order to become a Data Analyst, you must possess the following **skills** –

- Should possess the strong mathematical aptitude
- Should be well versed with Excel, Oracle, and SQL.
- Possession of problem-solving attitude.
- Proficient in the communication of results to the team.
- Should have a strong suite of analytical skills.

Some of the **tools** that are used by Data Analyst **are**

- Talend :Talend is one of the most powerful data analytics tools available in the market and is developed in the eclipse graphical development environment. ...
- Qlik Sense. ...
- Apache Spark. ...
- Power BI. ...
- ThoughtSpot. ...
- RapidMiner. ...
- Tableau

Business Analyst

Business analysts use data to form business insights and recommend changes in businesses and other organizations. Business analysts can identify issues in virtually any part of an organization, including IT processes, organizational structures, or staff development.

As businesses seek to increase efficiency and reduce costs, business analytics has become an important component of their operations. Let's take a closer look at what business analysts do and what it takes to get a job in business analysis.

Business analysts identify business areas that can be improved to increase efficiency and strengthen business processes. They often work closely with others throughout the business hierarchy to communicate their findings and help implement changes.

Tasks and duties can include:

- Identifying and prioritizing the organization's functional and technical needs and requirements
- Using SQL and Excel to analyze large data sets
- Compiling charts, tables, and other elements of data visualization
- Creating financial models to support business decisions
- Understanding business strategies, goals, and requirements
- Planning enterprise architecture (the structure of a business)
- Forecasting, budgeting, and performing both variance analysis and financial analysis

Business analyst skills

The key skills business analysts need are:

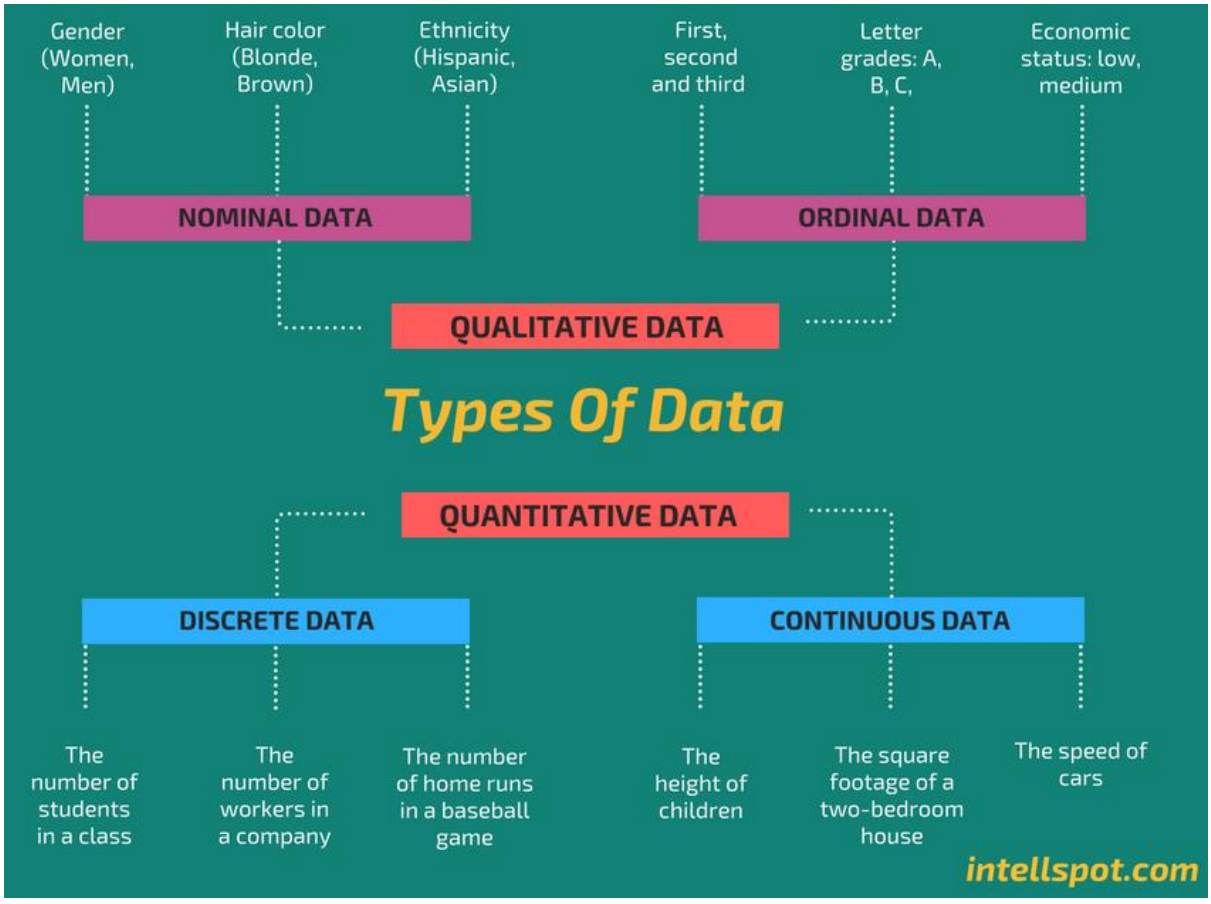
- **Technical skills:** These skills include stakeholder management, data modeling and knowledge of IT.
- **Analytical skills:** Business analysts have to analyze large amounts of data and other business processes to form ideas and fix problems.
- **Communication:** These professionals must communicate their ideas in an expressive way that is easy for the receiver to understand.
- **Problem-solving:** It is a business analyst's primary responsibility to come up with solutions to an organization's problems.
- **Research skills:** Thorough research must be conducted about new processes and software to present results that are effective.

Business analyst responsibilities

- Analyzing and evaluating the current business processes a company has and identifying areas of improvement
- Researching and reviewing up-to-date business processes and new IT advancements to make systems more modern
- Presenting ideas and findings in meetings
- Training and coaching staff members
- Creating initiatives depending on the business's requirements and needs
- Developing projects and monitoring project performance
- Collaborating with users and stakeholders
- Working closely with senior management, partners, clients and technicians

Types of Data

Qualitative vs. Quantitative Data



1. Quantitative data

- Quantitative data seems to be the easiest to explain. It answers key questions such as "how many, "how much" and "how often".
- Quantitative data can be expressed as a number or can be quantified. Simply put, it can be measured by numerical variables.
- Quantitative data are easily amenable to statistical manipulation and can be represented by a wide variety of statistical types of graphs and charts such as line, bar graph, scatter plot, and etc.

Examples of quantitative data:

- Scores on tests and exams e.g. 85, 67, 90 and etc.

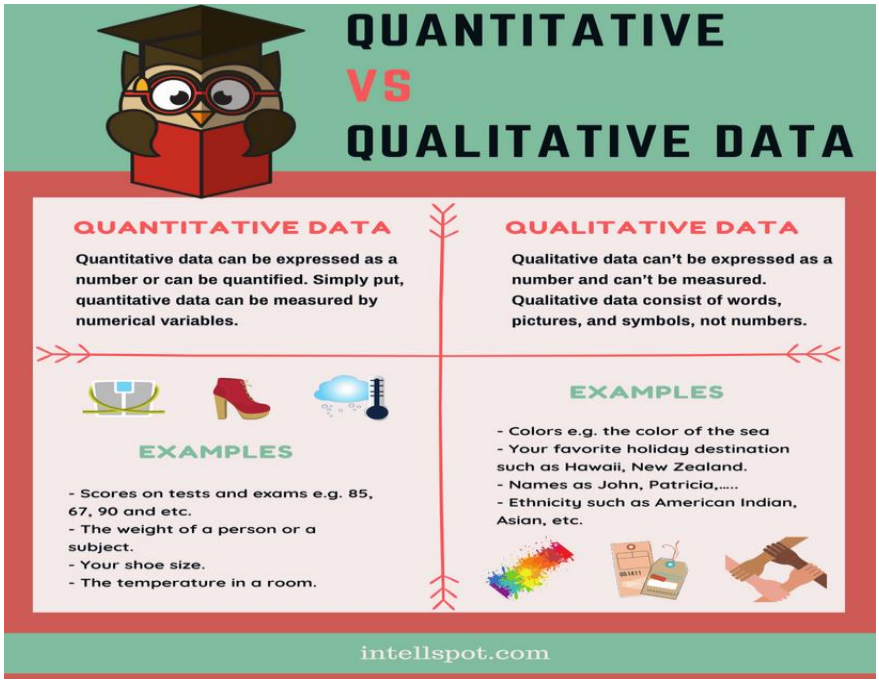
- The weight of a person or a subject.
- Your shoe size.
- The temperature in a room.

2. Qualitative data

- Qualitative data can't be expressed as a number and can't be measured. Qualitative data consist of words, pictures, and symbols, not numbers.
- Qualitative data is also called categorical data because the information can be sorted by category, not by number.
- Qualitative data can answer questions such as "how this has happened" or and "why this has happened".

Examples of qualitative data:

- Colors e.g. the color of the sea
- Your favorite holiday destination such as Hawaii, New Zealand and etc.
- Names as John, Patricia..
- Ethnicity such as American Indian, Asian, etc.



Nominal vs. Ordinal Data

3. Nominal data

Nominal data is used just for labelling variables, without any type of quantitative value. The name 'nominal' comes from the Latin word "nomen" which means 'name'.

The nominal data just name a thing without applying it to order. Actually, the nominal data could just be called "labels."

Examples of Nominal Data:

- Gender (Women, Men)
- Hair color (Blonde, Brown, Brunette, Red, etc.)
- Marital status (Married, Single, Widowed)
- Ethnicity (Hispanic, Asian)

Eye color is a nominal variable having a few categories (Blue, Green, Brown) and there is no way to order these categories from highest to lowest.

4. Ordinal data

Ordinal data shows where a number is in order. This is the crucial difference from nominal types of data.

Ordinal data is data which is placed into some kind of order by their position on a scale. Ordinal data may indicate superiority.

However, **you cannot do arithmetic with ordinal numbers** because they only show sequence.

Ordinal variables are considered as "in between" qualitative and quantitative variables.

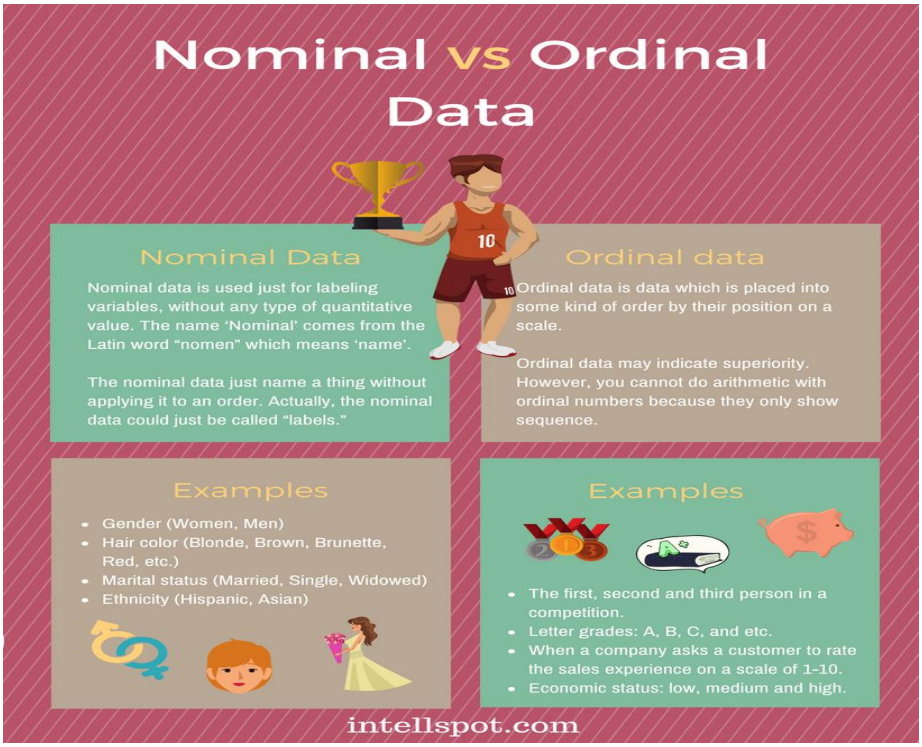
In other words, the ordinal data is qualitative data for which the values are ordered.

In comparison with nominal data, the second one is qualitative data for which the values cannot be placed in an ordered.

We can also assign numbers to ordinal data to show their relative position. But we cannot do math with those numbers. For example: "first, second, third…etc."

Examples of Ordinal Data:

- The first, second and third person in a competition.
- Letter grades: A, B, C, and etc.
- When a company asks a customer to rate the sales experience on a scale of 1-10.
- Economic status: low, medium and high.



Discrete vs. Continuous Data

In statistics, marketing research, and data science, many decisions depend on whether the basic data is discrete or continuous.

5. Discrete data

Discrete data is a count that involves only integers. The discrete values cannot be subdivided into parts.

For example, the number of children in a class is discrete data. You can count whole individuals. You can't count 1.5 kids.

To put in other words, discrete data can take only certain values. The data variables cannot be divided into smaller parts.

It has a limited number of possible values e.g. days of the month.

Examples of discrete data:

- The number of students in a class.
- The number of workers in a company.
- The number of home runs in a baseball game.
- The number of test questions you answered correctly

6. Continuous data

Continuous data is information that could be meaningfully divided into finer levels. It can be measured on a scale or continuum and can have almost any numeric value.

For example, you can measure your height at very precise scales — meters, centimeters, millimeters and etc.

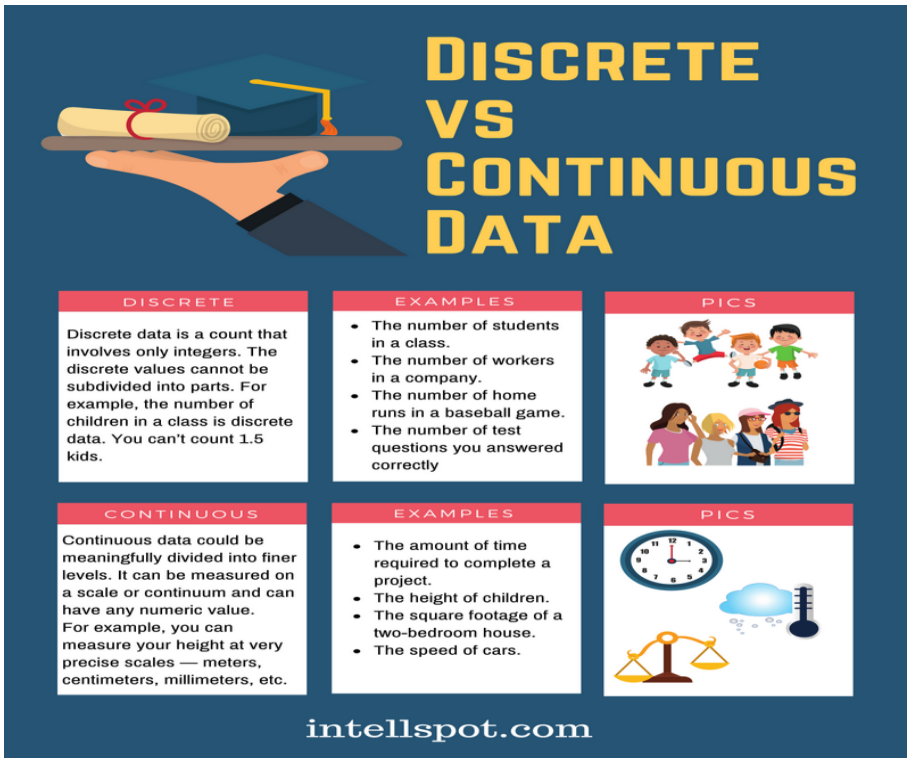
You can record continuous data at so many different measurements – width, temperature, time, and etc. This is where the key difference from discrete types of data lies.

The continuous variables can take any value between two numbers. For example, between 50 and 72 inches, there are literally millions of possible heights: 52.04762 inches, 69.948376 inches and etc.

A good great rule for defining if a data is continuous or discrete is that if the point of measurement can be reduced in half and still make sense, the data is continuous.

Examples of continuous data:

- The amount of time required to complete a project.
- The height of children.
- The square footage of a two-bedroom house.
- The speed of cars.



Conclusion

All of the different types of data have a critical place in statistics, research, and data science. Data types work great together to help organizations and businesses from all industries build successful data-driven decision-making process.

Working in the data management area and having a good range of data science skills involves a deep understanding of various types of data and when to apply them.

❖ ROLES OF A BUSINESS ANALYST

1. BA LEVELS

There are four levels that a business analyst in an organization comprises of:

- **Strategic management:** This is the analysis level, where a business analyst evaluates and calculates the strategic where about if a company. This is one of the most critical levels because unless the evaluation is done on the point, none of the further steps can work appropriately.
- **Analysis of business model:** This level has to do with evaluating policies that are currently being employed by the company. This not only enables us to implement what's new but also helps in checking the previous ones.
- **Designing the process:** Like an artist creates his imagination, business analysts do that with their skills. The step includes modelling the business processes, which comes out to be designing and modelling.
- **Analysis of technology:** Technical systems need a thorough analysis too. This is something that, if not taken care of, leads to severe consequences.

The key **business analyst roles and responsibilities**:

- ✓ **What does a business needs:** As a business analyst, it is his key responsibility to understand what stakeholders need and pass these requirements to the developers, and also give on the developer's expectations to the stakeholders. A business analyst's skill for this responsibility is the communication skills that can impress everyone across. While he transfers the information, he is the one who needs to put these in such words that make a difference. This responsibility is no doubt tome taking because he needs to listen and execute, which might seem easy, but only a skilled professional can handle all this.
- ✓ **Conducting meetings with developing team and stakeholders:** Business analysts are supposed to coordinate with both stakeholders and the development team whenever a new feature or update is added to a project. This may vary from project to project. This facilitates the collection of client feedback and the resolution of issues encountered by the development team when implementing new features. The **business analyst role** is to understand and explain the new feature updates to clients and take feedback for further development. Based on client feedback, Business Analyst instructs the development team to make amendments or continue as is. At times, the client requests an additional feature be added to a project, and the BA must determine whether or not it is feasible, and then assign resources if necessary to implement it.
- ✓ **System possibilities:** A business analyst might be considered one among those working in the software team, but their key responsibility Is not what the team does. He has to ensure that he figures out what a project needs. He is the one who leads the

path to the goals. He might be the one who dreams of targets, but he is also the one who knows how to make those dreams a reality. Looking for the opportunities and grabbing them before they go is what a business analyst is good at.

- ✓ **Present the company:** He can be called the face of a business. A business analyst is responsible for putting a business's thoughts and goals in front of the stakeholders. In short, he is the one who needs to impress the stakeholders with his presentation skills and the skill to present what the person on the other side is looking for and not what the company has in store for them.
- ✓ **Present the details:** A project brings with itself hundreds of minute details that might be left unseen. A business analyst is the one who is responsible for elaborating the project with the tiniest of the loopholes or hidden secrets. This is considered the most crucial role of a business analyst because unless the details are put across the stakeholders, they won't take an interest, and unless they show the part, the project is likely to take a pause.
- ✓ **Implementation of the project:** After going through all the steps mentioned above, the next and the most important role of a business analyst in agile is to implement whatever has been planned. Execution is not easy unless the previous steps have been taken care of in a systemized fashion.
- ✓ **Functional and non-functional requirements of a business:** As an organization, the main goal is to receive an end product that is productive and gives a company a long time. The role of business analyst in it company is to take care of the business's functional aspect, which includes the steps and ways to ensure the working of the project. Sideways he is also supposed to take care of the non-functional that comprise how a project or a business is supposed to work.
- ✓ **Testing:** The role of a business analyst is way longer than expected. Once the product is prepared, the next step is to test it among the users to know it's working capacity and quality. The Business Analyst tests the prototype/interface by involving some clients and recording their experiences with the model that has been developed, according to the role description. Based on their feedback, Business Analyst intends to make some changes to the model that will make it even better. They conduct UAT (user acceptance test) to determine whether or not the prototype meets the requirements of the project under consideration.
- ✓ **Decision making and problem-solving:** The **responsibilities of business analyst** range from developing the required documents to making decisions in the most stringent circumstances, job role of business analyst is **to** do it all. Moreover, a business analyst is expected to be the one who tackles things most easily and calmly because he should also be good at problem-solving, even if that's related to the stakeholders, employees, or the clients.
- ✓ **Maintenance:** Like they say that care is as essential as building something new. No matter how much human resources, energy, or finds you spend on a project, if the maintenance part is not taken care of properly or is neglected, it tends to spoil the entire hard work put across. What is the role of a business analyst here? Is it just limited to the maintenance of the clients or sales; it also has to ensure that the quality and the promised products are maintained throughout.
- ✓ **Building a team:** Everyone is born with varied skills. As a business analyst, the business analyst's responsibility is to make the team with people possessing different skills required for the project. Not only the hiring but retaining them is as essential. A well united and skilled team can do wonders. The things that are required in a great

section inside co combination, structuring, and skills. A good team tends to take the company to the heights of success.

- ✓ **Presentation and Documentation of the Final Project**: After the business project is completed, the Business Analyst must document the details of the project and share the project's findings with the client. In most cases, **BA roles and responsibilities** include preparing reports and presenting the results of a project to key stakeholders and clients. During building the project, they must also record all of the lessons learned and challenges they encountered in a concise form. This step aids the business analyst in making better decisions in the future.

CONCLUSION

A business analyst might be another position in an organization but its roles and responsibilities play a vital role in an organization's success. While he needs to be a good orator, he should possess the quality of bringing people closers to his team and across. His roles are not limited to a specific step in project management. He is required one overstep till the end. From the initial stages of evaluation to the maintenance, a company needs a business analyst's skill.