

Business Analytics Basics

Prepared By Deepali Sonawane, Assistant Professor, SIOM

Definition of Analytics

- **Analytics** is the systematic computational analysis of data or statistics.
- **Analytics** is also mean by interpretation of data, understanding of data and pulling out meaningful information out of the data.
- **Analytics** is the discovery, interpretation, and communication of meaningful patterns in data.
- It also entails applying data patterns towards effective decision making.
- It can be valuable in area rich with recorded information, analytics relies on the simultaneous applications of statistics, computer programming and operations research to quantify performance.

What is Analytics ?

- **Analytics** is multidisciplinary and has lots of applications, like web analytics, business analytics, security analytics, people analytics, cloud analytics, text analytics and more.
- **Analytics** is analyzing or deep understand something using data.



Evolution of Analytics

- **Analytics 1.0 → Need for Business Intelligence**

Business intelligence (BI) refers to the procedural and technical infrastructure that collects, stores, and analyzes the data produced by a company's activities.

- **Analytics 2.0 → Big Data**

Big data is extremely large data sets that may be analyzed computationally to reveal patterns, trends, and associations, especially relating to human behavior and interactions.

- **Analytics 3.0 → Data Enriched Offerings**

Data enrichment is the process of combining first party data from internal sources with disparate data from other internal systems or third party data from external sources. Enriched data is a valuable asset for any organization because it becomes more useful and insightful.

- **Analytics 4.0 → Automated Capabilities**

Automated analytics is the analytical capability to automatically detect relevant anomalies, patterns and trends and deliver insights to business users in real-time, with no manual user-analysis or IT intervention required.

Need of Analytics

- Business analytics can help companies make better, more informed decisions and achieve a variety of goals.
- Marketing : Better understand consumer behavior
- Gain insight into their competitors
- Identify market trends
- Measure accomplishments against goals
- It helps businesses to optimize their performances
- Product development
- Target Content
- Efficiency in Operations

Business Analytics vs Business Analysis

Business Analytics	Business Analysis
Business analytics is the systematic computational analysis of data or statistics.	Business Analysis is the detailed examination of the elements or structure of Business.
Business analytics refers to investigation of past business performance using collection of tools, techniques and skills.	Business Analysis is defined as the discipline of recognizing business needs and identifying solutions to business problems.
Primary focus is on data and statistical analysis.	Primary focus is on processes, techniques and functions.
It is used to predict future states and drive business decisions.	It is used to solve complex business problems and give efficient solutions.
This requires statistical, mathematical and programming knowledge for performing business analytics.	Functional, business and domain knowledge is required for analysing business requirement.
The process lead to findings, which helps into further improvement opportunities.	It assists to improve performance by standardizing various process.
Making a dashboard to track the main performance metrics using statistical method to predict future sales based on past sales.	Defining and standardizing business processes across the business units for a company.

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Business Intelligence vs Data Science

Factor	Business Intelligence	Data Science
Concept	It is basically a set of technologies, applications and processes that are used by the enterprises for business data analysis.	It is a field that uses mathematics, statistics and various other tools to discover the hidden patterns in the data.
Focus	It focuses the past and present.	It focuses on the future.
Data	It mainly deals only with structured data.	It deals with both structured as well as unstructured data.
Flexibility	It is less flexible as in case of business intelligence data sources need to be pre-planned.	Data science is much more flexible as data sources can be added as per requirement.
Method	It makes the use of analytic method.	It makes the use of scientific method.
Complexity	It is much simpler as compared to data science.	It has a higher complexity in comparison to business intelligence.

Business Intelligence vs Data Science

Factor	Business Intelligence	Data Science
Expertise	It's expertise is business user.	It's expertise is data scientist.
Questions	It deals with the question what happened.	It deals with the questions what will happen and what if.
Tools	It's tools are InsightSquared Sales Analytics, Klipfolio, ThoughtSpot, Cyfe, TIBCO Spotfire etc.	It's tools are SAS, BigML, MATLAB, Excel etc.
Scope	Only implement formula into a report within existing platform	Explore data, find best method, build model, operationalize the model
Software	Software centric-you can only do what your software can.	Method centric- use of software that provides a method needed.

Data Analyst Vs Business Analyst

Data Analyst	Business Analyst
Data analysts tend to work more closely with the data itself.	Business analysts tend to be more involved in addressing business needs and recommending solutions.
A data analyst's fundamental job is to describe stories with data that empower organizational leaders to make better, more informed decisions.	Business analysts are responsible for using data to inform strategic business decisions.
Duty of Data Analyst is designing and maintaining data systems and databases.	Duty of Business Analyst is evaluating business processes for efficiency, cost, and other valuable metrics.
Mining and cleaning data in preparation for analysis.	Communicating insights with business teams and key stakeholders.
Presenting data in such a way that it tells a compelling story.	Presenting strategic recommendations for process adjustments, procedures, and performance improvements
Visualizing data to make it easier to understand.	Creating visuals and financial models to support business decisions
Data analysts are more interested in gathering and analyzing data for the business to evaluate and use to make decisions on their own	Business analysts use data to help organizations make more effective business decisions.

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Types of Analytics

- Descriptive Analytics
- Diagnostic Analytics
- Predictive Analytics
- Prescriptive Analytics



DESCRIPTIVE

What have we
done in the past?



DIAGNOSTIC

Why have we seen
past results?



PREDICTIVE

Where are we going
and when?



PRESCRIPTIVE

How should we take
action?

Descriptive Analytics

- Descriptive analytics answer the question, “What happened?”.
- **Descriptive analytics** is the process of using current and historical data to identify trends and relationships.
- It helps companies understand things such as:
 - What were our sales?
 - What was our overall productivity?
 - What was our market share?
- Descriptive analytics is used to understand the overall performance at an aggregate level and is by far the easiest place for a company to start as data tends to be readily available to build reports and applications.
- Basic statistical software, such as Microsoft Excel or data visualization tools such as Google Charts and Tableau, can help parse data, identify trends and relationships between variables, and visually display information.
- Example : Reports, Financial statements, Survey

Diagnostic Analytics

- Diagnostic analytics, just like descriptive analytics, uses historical data to answer a question. But instead of focusing on “the what”, diagnostic analytics addresses the critical question of **why** an occurrence.
- **Diagnostic analytics** is the process of using data to determine the causes of trends and correlations between variables.
- It can be viewed as a logical next step after using descriptive analytics to identify trends.
- This type of analytics helps companies answer questions such as:
 - Why did our company sales decrease in the previous quarter?
 - Why are we seeing an increase in customer churn?
 - Why are a specific basket of products vastly outperforming their prior year sales figures?
- Example : Examining Market Demand, Explaining Customer Behaviour, Identifying Technology Issues, Improving Company Culture

Predictive Analytics

- **Predictive analytics** is the use of data to predict future trends and events.
- It uses historical data to forecast potential scenarios that can help drive strategic decisions.
- Predictive analysis can be conducted manually or using machine-learning algorithms. Either way, historical data is used to make assumptions about the future.
- This type of analytics helps companies answer questions such as:
 - What are the expected sales?
 - What is the expected market share?
 - What product should we market to them?
- Example : Finance: Forecasting Future Cash Flow, Marketing: Behavioural Targeting, Entertainment & Hospitality: Determining Staffing Needs

Prescriptive Analytics

- **Prescriptive analytics** is the process of using data to determine an optimal course of action.
- By considering all relevant factors, this type of analysis yields recommendations for next steps. Because of this, prescriptive analytics is a valuable tool for **data driven decision making**.
- Prescriptive analytics pertains to true guided analytics where your analytics is prescribing or guiding you toward a specific action to take.
- Machine-learning algorithms are often used in prescriptive analytics to parse through large amounts of data faster and often more efficiently than humans can.
- Example : Investment Decisions, Sales: Lead Scoring, Banking: Fraud Detection, Marketing: Email Automation
- **Note: Predictive analytics uses collected data to come up with future outcomes, while prescriptive analytics takes that data and goes even deeper into the potential results of certain actions.**

Tools of Analytics

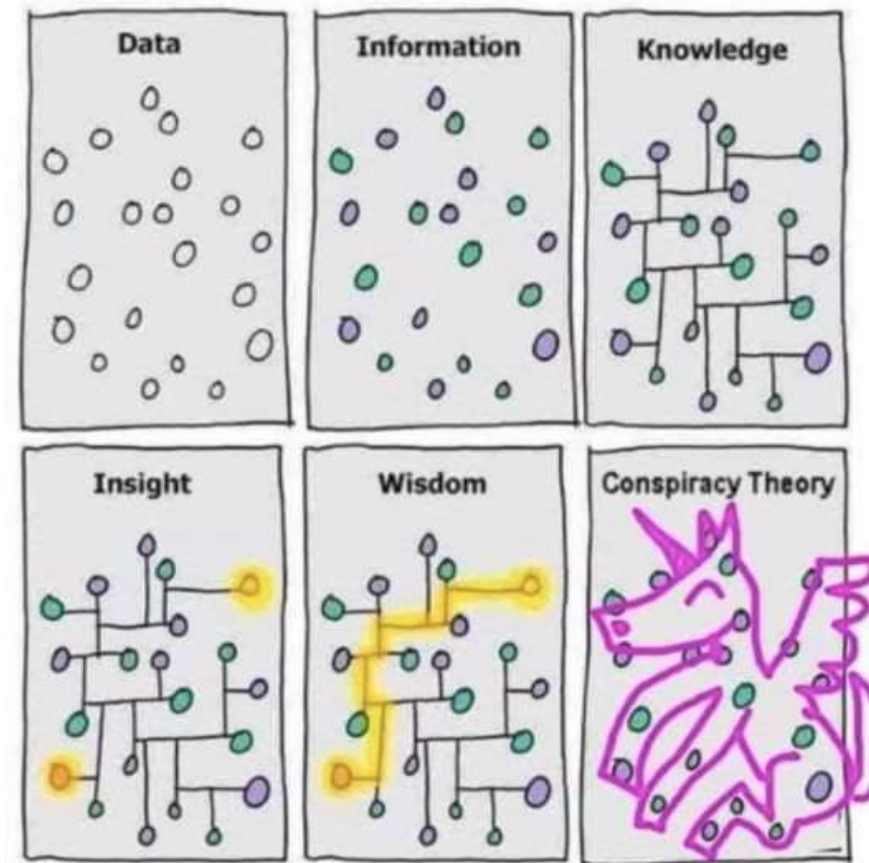
The term '**Data analytics tools**' is used to classify software and applications used by Data Analysts to create and execute analytic processes that help businesses make smarter, more informed business decisions while minimizing cost and boosting profits.

Examples of Data Analytics tools:

- | | |
|--------------------|-------------|
| 1) R | 6) KNIME |
| 2) Python | 7) Power BI |
| 3) Microsoft Excel | 8) QlikView |
| 4) Tableau | 9) Talend |
| 5) RapidMiner | 10) Splunk |

Concept of insights

- **Insight** is the value obtained through the use of analytics.
- **Analytical insights** are incredibly powerful and can be used to grow your business by identifying areas of opportunity.
- A **business insight** combines data and analysis to find meaning and increase understanding of a situation, resulting in some competitive advantage for your business.
- This provides more than low-level understanding of an issue, giving you deeper insight into major mechanics related to your particular business.



Example of insights

DATA



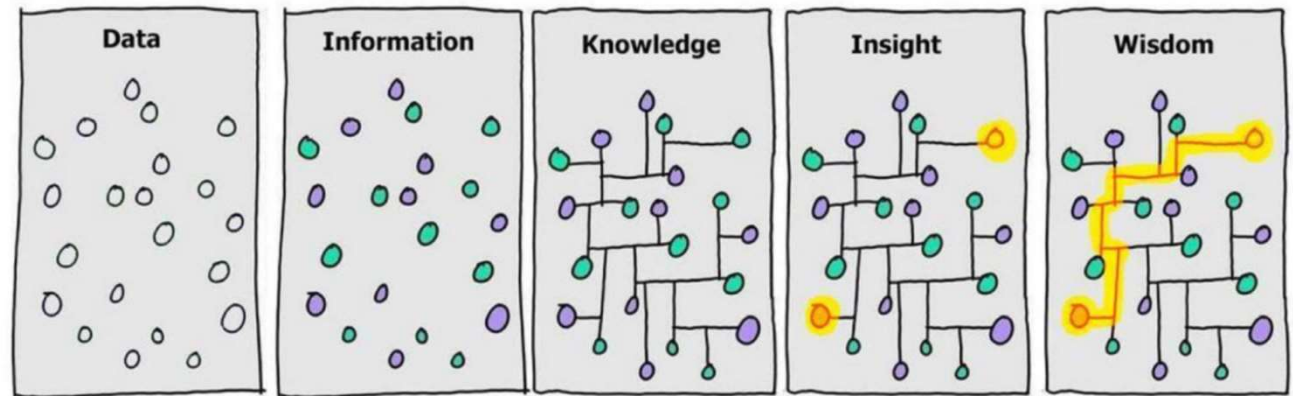
SORTED



ARRANGED



PRESENTED
VISUALLY



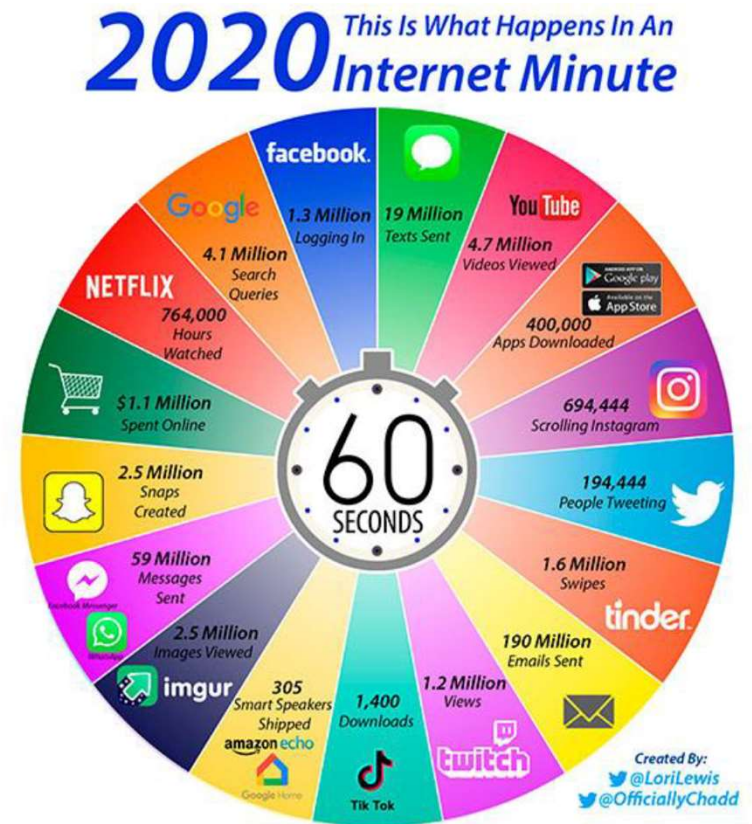
Importance of data in business analytics

- **Data** is important in business analytics because it helps businesses to optimize their performances.
- Implementing it into the business model means companies can help **reduce costs** by identifying more efficient ways of doing business and by storing large amounts of data.
- A company can also use data analytics to make **better business decisions** and help analyze customer **trends and satisfaction**, which can lead to **new and better products and services**.

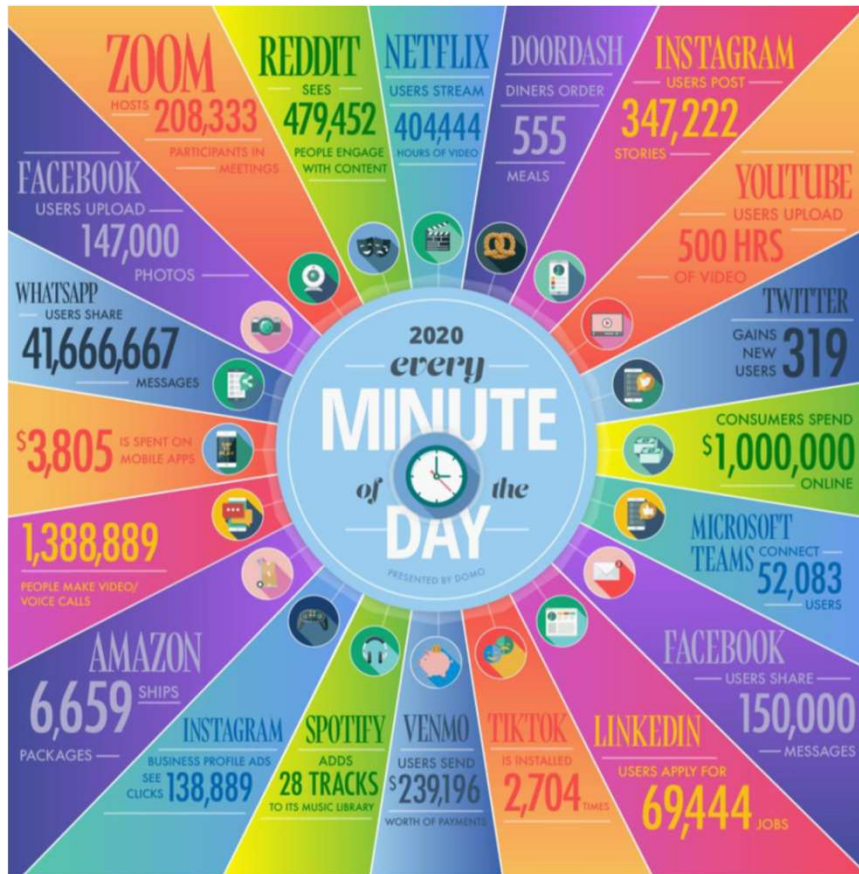
Data and Information

- **Data** is a raw, unanalyzed, unorganized, unrelated and an uninterrupted entity.
- There are multiple forms of data such as numbers, letters, set of characters, images, graphics.
- Measuring units for data are Bits, Nibble, Byte, KiloBytes(KB), MegaBytes(MB), GigaBytes(GB), TeraBytes(TB), PetaBytes(PB), ExaBytes(EB), ZettaBytes(ZB), YottaBytes(YB).
- When data are processed, interpreted, organized, structured or presented so as to make them meaningful or useful, they are called **information**.
- Information provides context for data.

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What Happens in an Internet Minute?-COVID EFFECT!



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- More time indoors has given rise to creativity among users
- Virtual meeting platforms are used even more
- People prefer online deliveries to visiting malls
- Users are looking out for online job opportunities

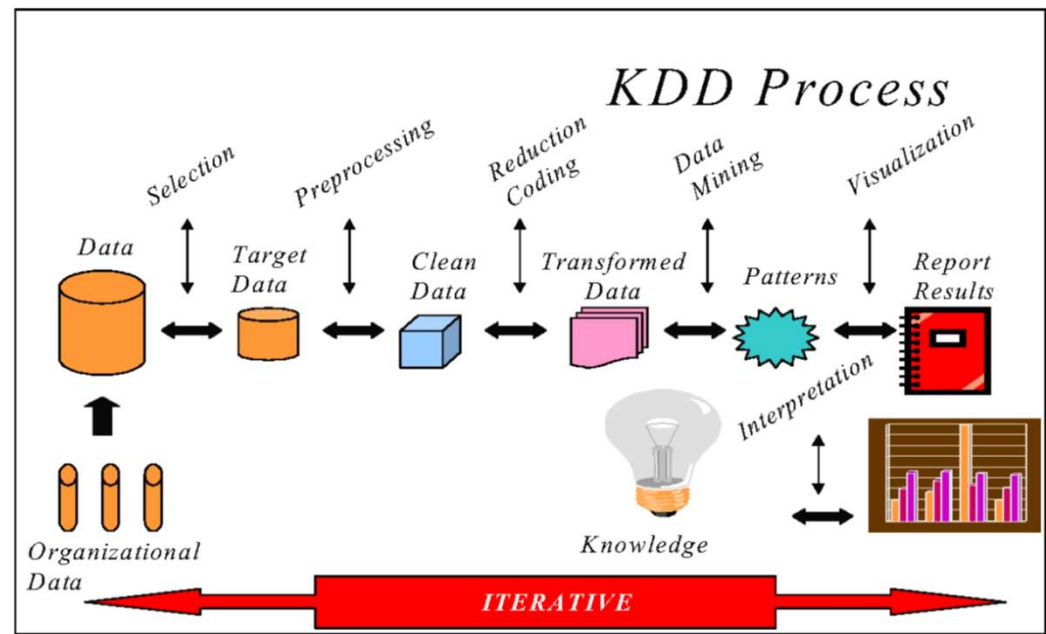
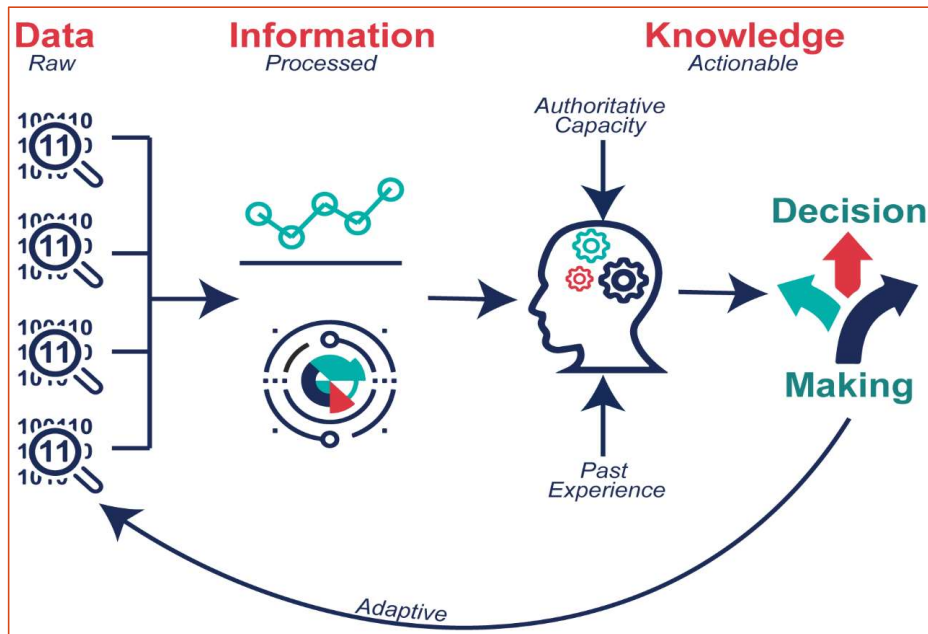
How BIG can data be?

- **1 Kilobyte (KB)**
 - 2 or 3 paragraphs of text
 - Size of small files is in KBs
- **1 Megabyte (MB)**
 - An image, a PowerPoint presentation
 - A song of 2-3 min
- **1 Gigabyte (GB)**
 - 256 MP3 files, data generated by user per day per person
 - 15 GB space available on google drive and gmail per user
 - Storage capacity of pen drive
- **1 Terabyte (TB)**
 - Facebook generates 500+ Terabytes of data per day
 - Storage capacity of large storage devices
- **1 Petabyte**
 - Walmart generates 40 Petabytes of data per day
 - Google and FB store > 100 PB data on their servers
- **1 Exabyte**
 - Google processes 3.5 billion requests per day, storing 10 Exabytes of data
- **1 Zettabyte**
 - All data in the world is made up of few ZB
- **1 Yottabyte**
 - Not yet in use

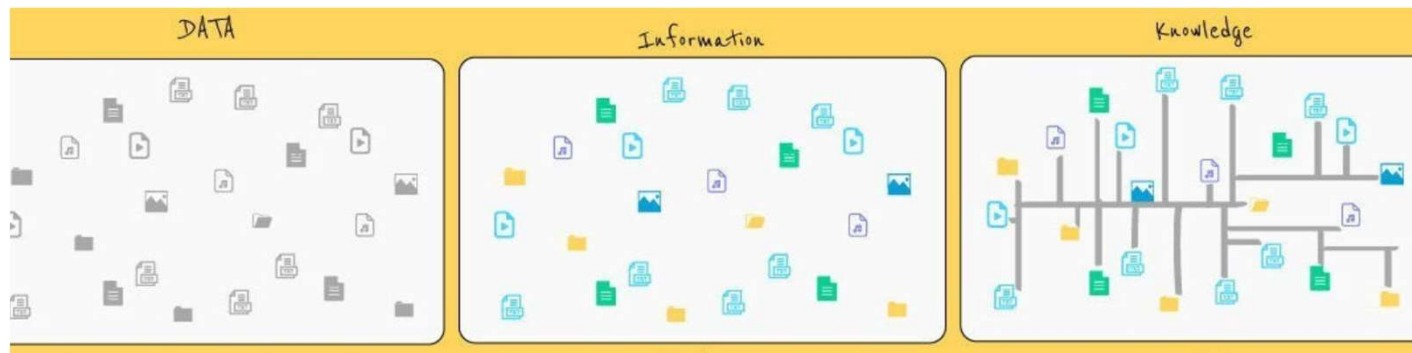
Knowledge

- **Knowledge** describes the collected information that is available about a particular fact or a person.
- In order to gain knowledge, it is necessary to **process information**.
- The knowledge makes it possible to make **informed decisions** and **solve problems**.
- Knowledge influences the **thinking and actions** of people.
- **Machines** can also make decisions based on new knowledge generated by information.

Flow of Data, Information and Knowledge



Difference between Data, Information and Knowledge

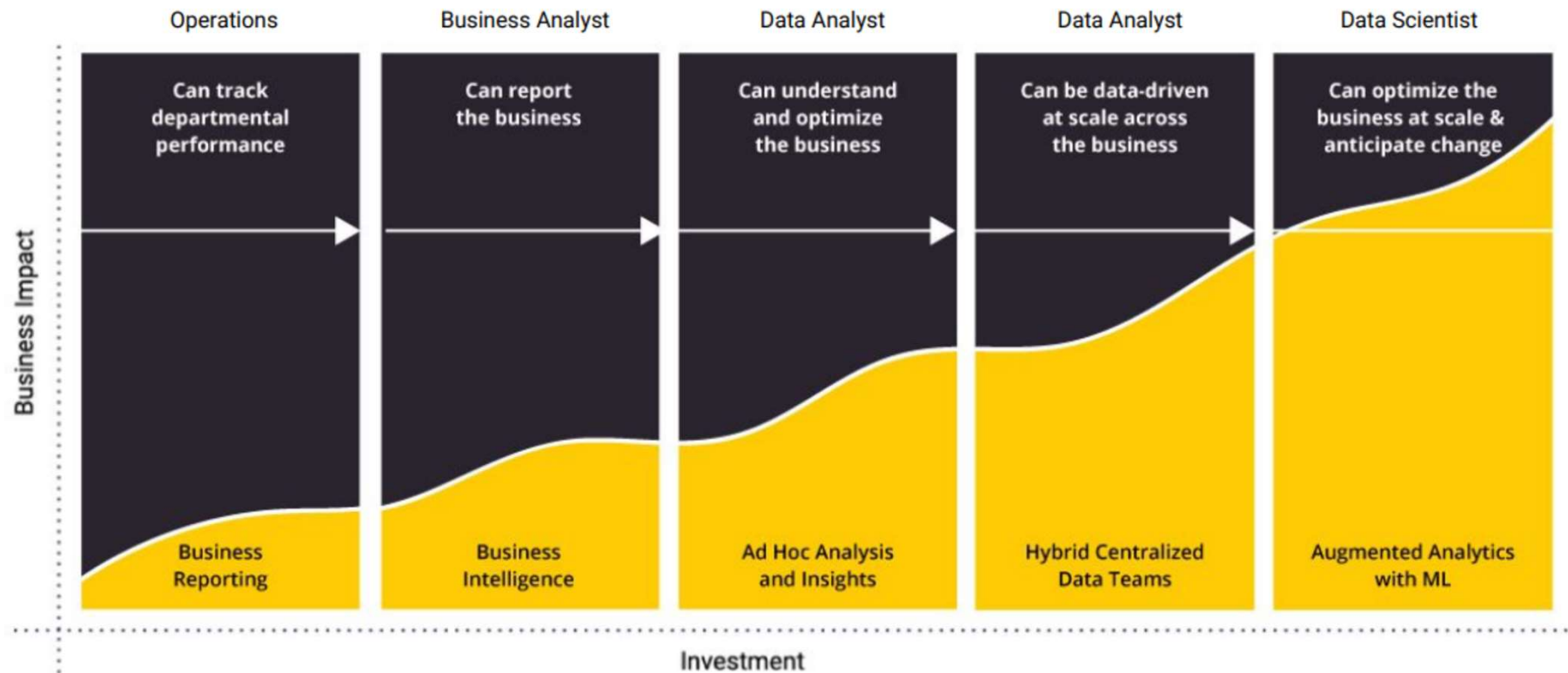


Data	Information	Knowledge
Is objective	Should be objective	Is subjective
Has no meaning	Has a meaning	Has meaning for a specific purpose
Is unprocessed	Is processed	Is processed and understood
Is quantifiable, there can be data overload	Is quantifiable, there can be information overload	Is not quantifiable, there is no knowledge overload

Data Maturity

- **Data maturity** is the journey towards improvement and increased capability in using data.
- Data maturity is a measurement that demonstrates the level at which a company makes the most out of their data.
- It is the extent to which an organization is able to utilize its data to **extract meaningful insights** that drive decision-making.
- A five-stage model demonstrates data team maturity and organizational impact.
 1. Business reporting
 2. Business intelligence
 3. Ad hoc analysis and insights
 4. Hybrid centralized data teams
 5. Augmented Analytics with machine learning

Stages of an organization in terms of data maturity



Data Quality

- The majority of data in the world has been generated over the last few years, as we have adopted **Internet of Things**.
- One of the key concerns during this analysis is that of the **data quality**.
- High-quality data is important because it gives us accurate and timely information to manage **services and accountability**.
- Also, it helps us to prioritize and ensure the **best use of resources**.
- Good quality data will lead to **valuable information** and **appropriate insights** for your organization.

Factors that causes Data Quality issues

Database Consolidation

When systems are consolidated, the old systems are replaced or merged with new ones. This process leads to database consolidation. Often it happens that the data from old systems does not fit in with the new systems. This creates overlapped data and degrades the data quality.

Data Purging

When data is purged, relevant data can also get eliminated. This can impact the data quality.

Real Time Interfacing

When data is gained from real-time systems, it arrives at a great speed. There is little or no time to verify the data's accuracy. This compromises data quality.

- **Database consolidation** involves placing multiple databases onto a single set of computing infrastructure or in the Oracle Cloud.
- **Data purging** is a mechanism that permanently deletes inactive or obsolete records from the database.
- **Real time interfacing** is a process of transforming data from one place to another.

Ways to improve Data Quality

- **Data Profiling:**

- Examine your data defects through data profiling
- Data profiling analyzes the correctness and uniqueness of data
- It also checks whether the data is reusable by collecting appropriate statistics

- **Data Normalization:**

- Data normalization is the organization of data to appear similar across all records and fields.
- Data normalization is essential to establishing a singular approach and to remove redundancy.

Ways to improve Data Quality

- **Semantic Metadata Management:**

- As the number and variety of data sources grow, situations can occur when end users in different parts of an organization will misinterpret some of the data concepts and terms.
- Thus, centralizing the management of business-relevant metadata is required.
- Establishing corporate standards and reduce inconsistent interpretations.

- **Data Quality Firewall:**

- Data is a strategic information asset to an organization and has a huge financial value. Hence it must be protected.
- A data quality firewall uses software to keep data error free and non redundant.

Thank you

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