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DATA SCIENCE DARMAJAYA  
“YOUR BEST FUTURE IN DATA”

MEETING: [2]

# **INTRODUCTION TO BUSINESS ANALYTICS**

BY: HENDRA KURNIAWAN



# Introduction to Business Analytics

- 1. Introduction to Analytics**
- 2. Tools**
- 3. Data**
- 4. Models**
- 5. Problem solving with analytics**



# What is Business Analytics?

Analytics is the use of: data, information technology, statistical analysis, quantitative methods, and mathematical or computer-based models.

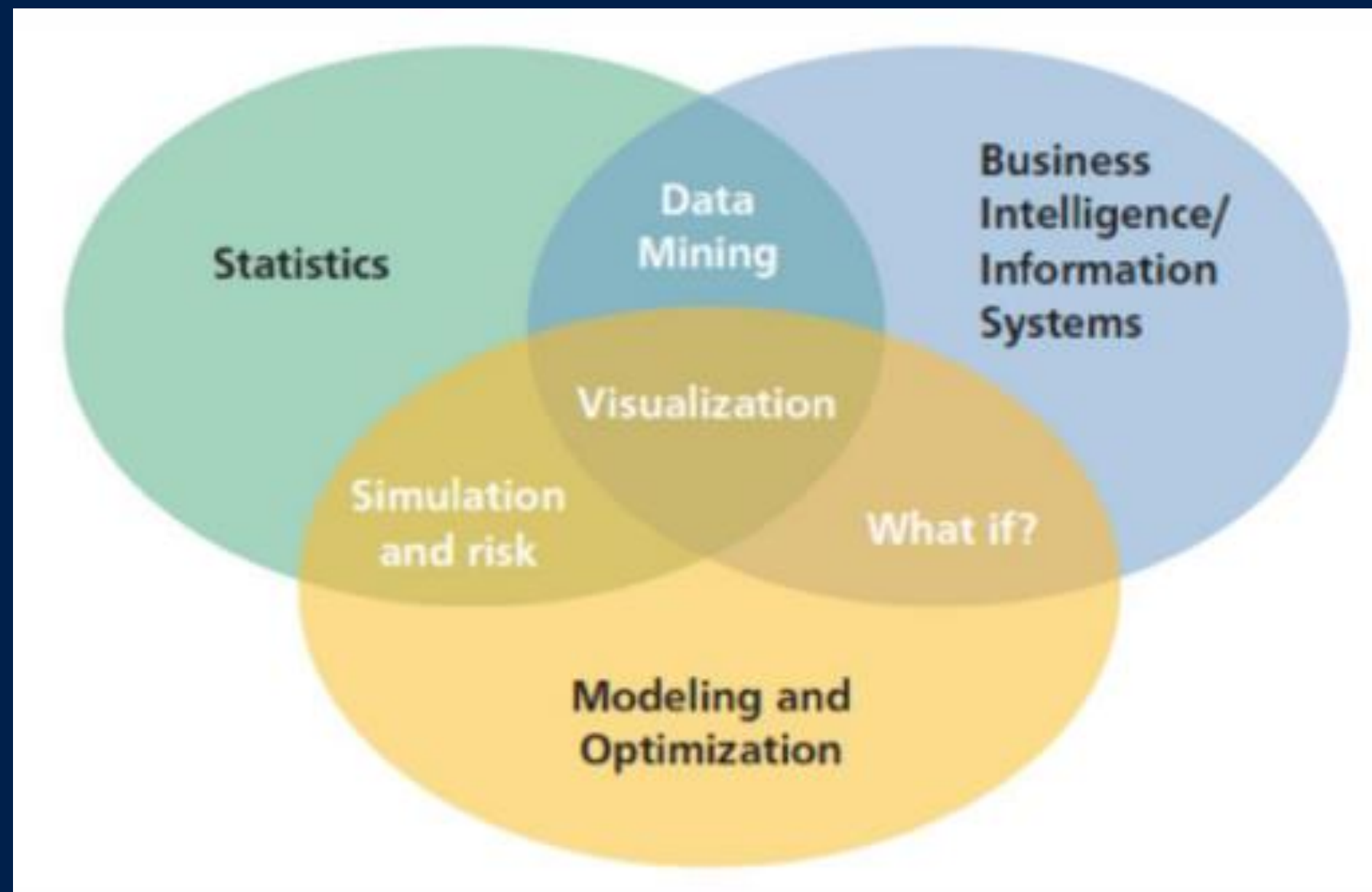
to help managers gain improved insight about their business operations and make better, factbased decisions.



# Example of Applications?

1. Pricing
  - setting prices for consumer and industrial goods, government contracts, and maintenance contracts
2. Customer segmentation
  - identifying and targeting key customer groups in retail, insurance, and credit card industries
3. Merchandising
  - determining brands to buy, quantities, and allocations
4. Location
  - finding the best location for bank branches and ATMs, or where to service industrial equipment
5. Social Media
  - understand trends and customer perceptions; assist marketing managers and product designers

# Visual Perspective of Business Analytics





# Impacts and Challenges

## Benefits

- ...reduced costs, better risk management, faster decisions, better productivity and enhanced bottom-line performance such as profitability and customer satisfaction.

## Challenges

- ...lack of understanding of how to use analytics, competing business priorities, insufficient analytical skills, difficulty in getting good data and sharing information, and not understanding the benefits versus perceived costs of analytics studies.



# Scope of Business Analytics

- **Descriptive analytics:** the use of data to understand past and current business performance and make informed decisions
- **Predictive analytics:** predict the future by examining historical data, detecting patterns or relationships in these data, and then extrapolating these relationships forward in time.
- **Prescriptive analytics:** identify the best alternatives to minimize or maximize some objective



# Example: Retail Markdown Decisions

- Most department **stores clear seasonal inventory** by reducing prices.
- *Key question:* When to reduce the **price** and by how much to maximize revenue?
- Potential applications of analytics:
  - Descriptive analytics: examine historical data for similar products (prices, units sold, advertising, ...)
  - Predictive analytics: predict sales based on price
  - Prescriptive analytics: find the best sets of pricing and advertising to maximize sales revenue



## Comparison Between Business Analytics vs Data Science

Business Analytics	Data Science
Business Analytics is the statistical study of business data to gain insights	Data science is the study of data using statistics, algorithms and technology.
Uses mostly structured data	Uses both structured and unstructured data
Does not involve much coding. It is more statistics oriented	Coding is widely used. This field is a combination of traditional analytics practice with good computer science knowledge
The whole analysis is based on statistical concepts	Statistics is used at the end of analysis following coding
Studies trends and patterns specific to business.	Studies almost every trend and pattern.
Top industries where business analytics is used: finance, healthcare, marketing, retail, supply chain, telecommunications.	Top industries/applications where data science is used: e-commerce, finance, machine learning, manufacturing.



## 2. Tools

- ▣ Database queries and analysis
  - ▣ Spreadsheets
  - ▣ Data visualization
  - ▣ Dashboards to report key performance measures
  - ▣ Data and Statistical methods
  - ▣ Data Mining basics (predictive models)
- 
- ▣ Simulation
  - ▣ Forecasting
  - ▣ Scenario and “what-if” analyses
  - ▣ Optimization
  - ▣ Text Mining
  - ▣ Social media, web, and text analytics



# Software Support

- **SQL** various databases
- **Excel** Spreadsheets
- Tableau Software Simple drag and drop tools for visualizing data from spreadsheets and other databases.
- IBM Cognos Express An integrated business intelligence and planning solution designed to meet the needs of midsize companies, provides reporting, analysis, dashboard, scorecard, planning, budgeting and forecasting capabilities.
- **SAS / SPSS / Rapid Miner** Predictive modeling and data mining, visualization, forecasting, optimization and model management, statistical analysis, text analytics, and more using visual workflows.
- R / Python Advanced programming-based data preparation, analytics and visualization.

## 3. Data for Business Analytics

- **Data:** numerical or textual facts and figures that are collected through some type of measurement process.



- **Information:** result of analyzing data; that is, extracting **meaning** from data to support evaluation and decision making.



## 3. Data for Business Analytics

- Internal
  - Annual reports
  - Accounting audits
  - Financial profitability analysis
  - Operations management performance
  - Human resource measurements
- External
  - Economic trends
  - Marketing research
- New developments: Web behavior – Social Media – Mobile - IOT
  - page views, visitor's country, time of view, length of time, origin and destination paths, products they searched for and viewed, products purchased, what reviews they read, and many others.

## 3. Database vs Data Set

- **Database** - a collection of related tables containing records on people, places, or things.
  - In a database table the columns correspond to each individual element of data (called *fields*, or *attributes*), and the rows represent records of related data elements.



- **Data set** - a collection of data (often a single “spread sheet” or data mining table).
  - Examples: Marketing survey responses, a table of historical stock prices, and a collection of measurements of dimensions of a manufactured item.



## 3. Types of Data

- **Discrete** - derived from **counting** something.
  - For example, a delivery is either on time or not; an order is complete or incomplete; or an invoice can have one, two, three, or any number of errors. Some discrete metrics would be the proportion of on-time deliveries; the number of incomplete orders each day, and the number of errors per invoice.
- **Continuous** based on a **continuous scale of measurement**.
  - Any metrics involving dollars, length, time, volume, or weight, for example, are continuous.



# Measurement Scales

- **Categorical (nominal) data** - sorted into categories according to specified characteristics.
- **Ordinal data** - can be ordered or ranked according to some relationship to one another.
- **Interval data** - ordinal but have constant differences between observations and have arbitrary zero points.
- **Ratio data** - continuous and have a natural zero.

Operations have meaning

Equality: Are values the same?

Sort: Is one value larger/better?  
Median

Addition/Subtraction:  
E.g. Average

Multiplication:  
E.g. % change



# Models in Business Analytics

- **Model** - an abstraction or representation of a real system, idea, or object.
  - Often a **simplification** of the real thing.
  - Captures the **most important features**.
  - Can be a written or verbal description, a visual representation, a mathematical formula, or a spreadsheet.



# Problem Solving with Analytics

1. Recognize a problem
2. Define the problem
3. Structure the problem
4. Analyze the problem
5. Interpret results and make a decision
6. Implement the solution

} Focus of the remainder of this course

# Recognize a Problem



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Problems exist when there is a gap between what is happening and **what we think should be happening.**

- For example, costs are too high compared with competitors.

# Define the Problem



- Clearly defining the problem is not a trivial task.
- Complexity increases when the following occur:
  - large number of courses of action
  - the problem belongs to a group and not an individual
  - competing objectives
  - external groups are affected
  - problem owner and problem solver are not the same person
  - time limitations exist
- **What is part of the problem? What not?**

# Structure the Problem



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- Stating **goals** and objectives
- Characterizing the possible decisions
- Identifying any **constraints** or restrictions

# Analyze the Problem



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- Analytics plays a major role.
- Analysis involves some sort of experimentation or solution process, such as evaluating different scenarios, analyzing risks associated with various decision alternatives, finding a solution that meets certain goals, or **determining an optimal solution.**

# Interpret Results and Ma



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- What do the results found by the model mean for the application?
- Models cannot capture every detail of the real problem. Managers must understand the **limitations of models** and their underlying assumptions and often incorporate judgment into making a decision.

# Implement the Solution



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- Translate the results of the model back to the real world.
- Requires providing adequate resources, motivating employees, eliminating resistance to change, modifying organizational policies, and developing trust.



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# THANK YOU!!

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