Business Analytics

What are we going to do?

- Presentation.
- What is Business Analytics?
  - Objectives: Introduce the concept of Business Analytics ant why is important now. Review the history of data management in business to learn from errors.
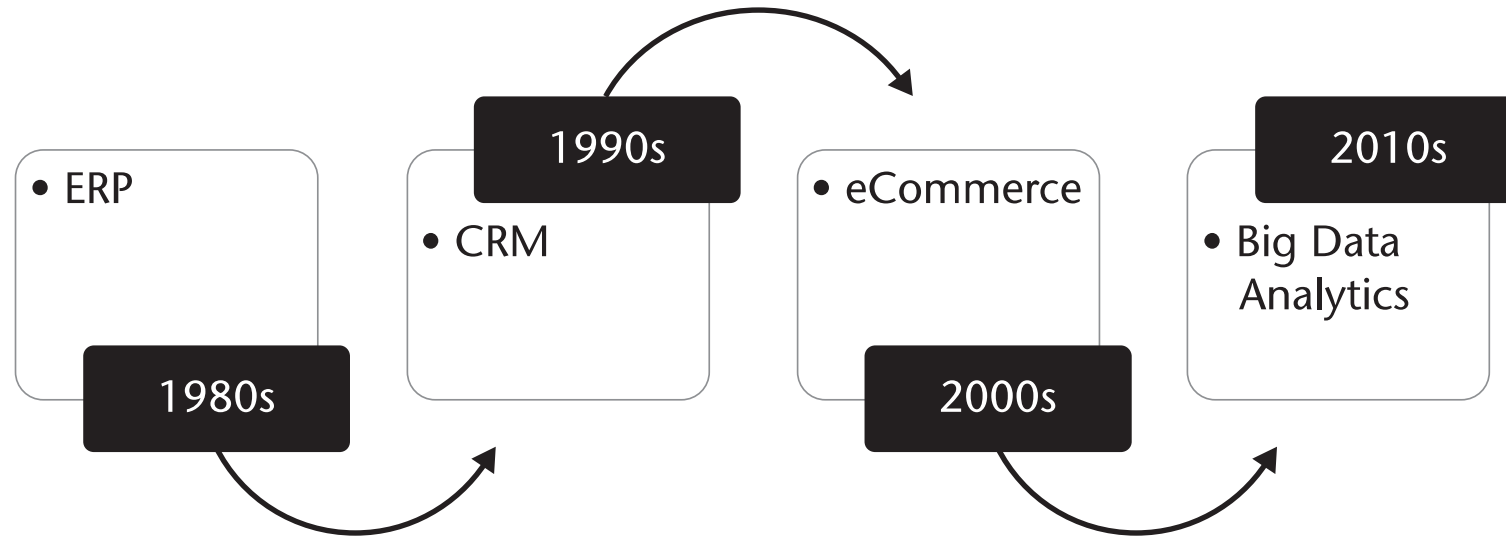
History

History

- 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 to computers. This change has brought analytics to a whole new level and has brought about endless possibilities.

History

Timeline of Recent Technology Developments

History

- Why is important History?
  - To learn from past mistakes: Do not want to repeat investing in new technologies that didn't fit into existing business frameworks.
    - During the customer relationship management (CRM) era of the 1990s, many companies made substantial investments in customer-facing technologies that subsequently failed to deliver expected value.
    - The reason for most of those failures was fairly straightforward: Management either forgot (or just didn't know) that big projects require a synchronized transformation of people, process, and technology.

History

- We can avoid those kinds of mistakes if we keep our attention focused on the outcomes we want to achieve.
  - The technology of Big Data is the easy part
  - The hard part is figuring out what you are going to do with the output generated by your Big Data Analytics – and this is Business Analytics
- Make sure that you have the people and process pieces ready before you commit to buying the technology.

Enterprise resource planning (ERP) software market revenues worldwide from 2019 to 2025 (in million U.S. dollars)
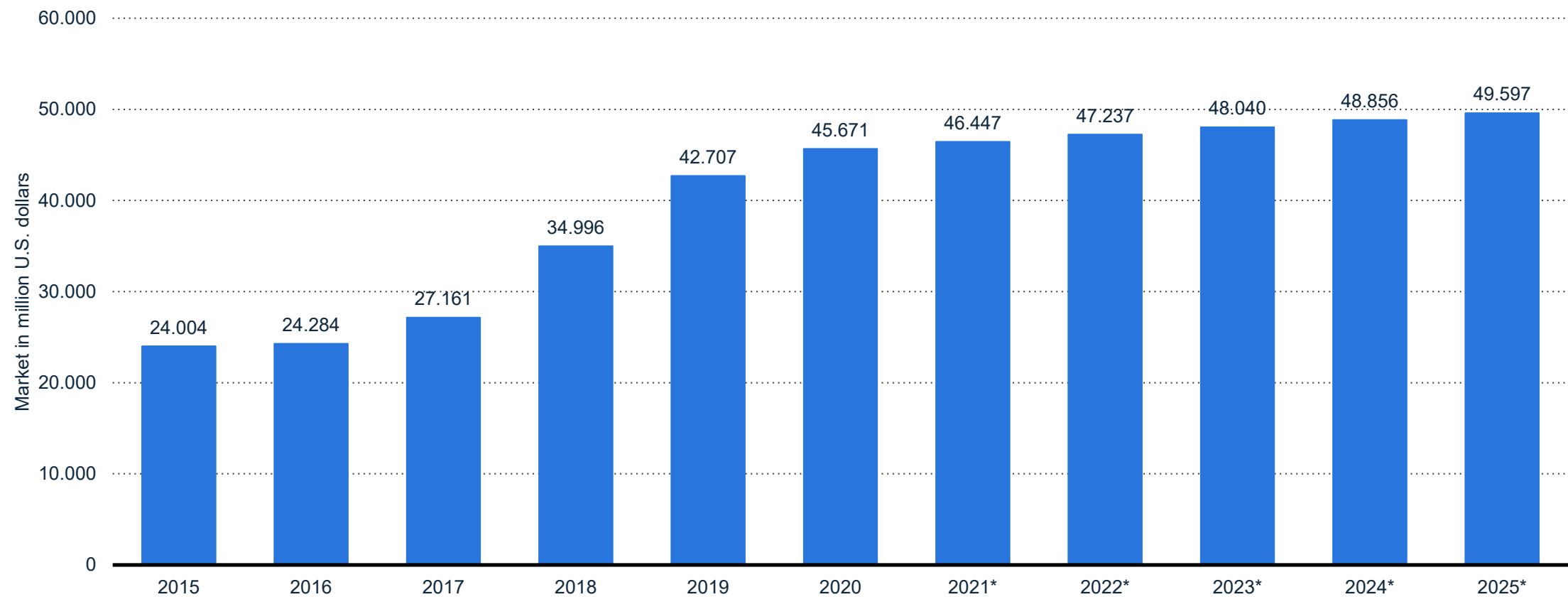
Worldwide enterprise resource planning software market size 2019-2025
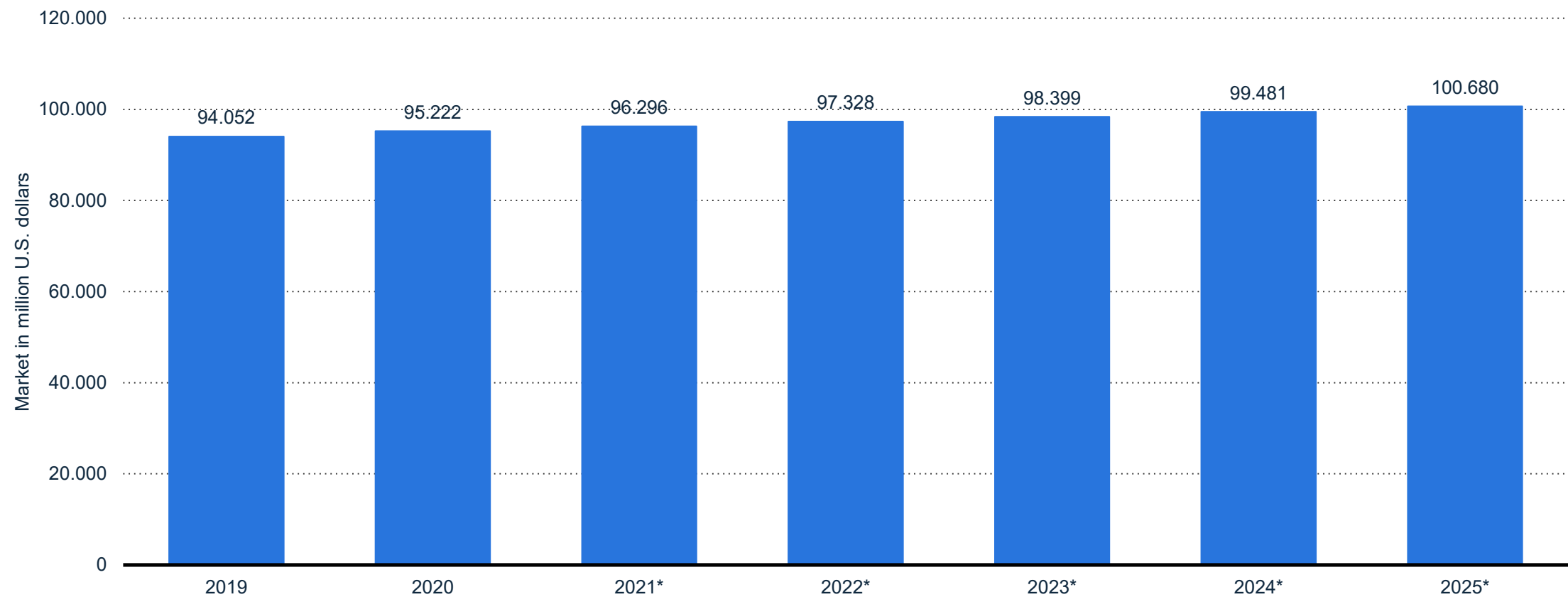
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Customer relationship management (CRM) software market revenues worldwide from 2015 to 2025 (in million U.S. dollars)

Worldwide customer relationship management software market size 2015-2025

2

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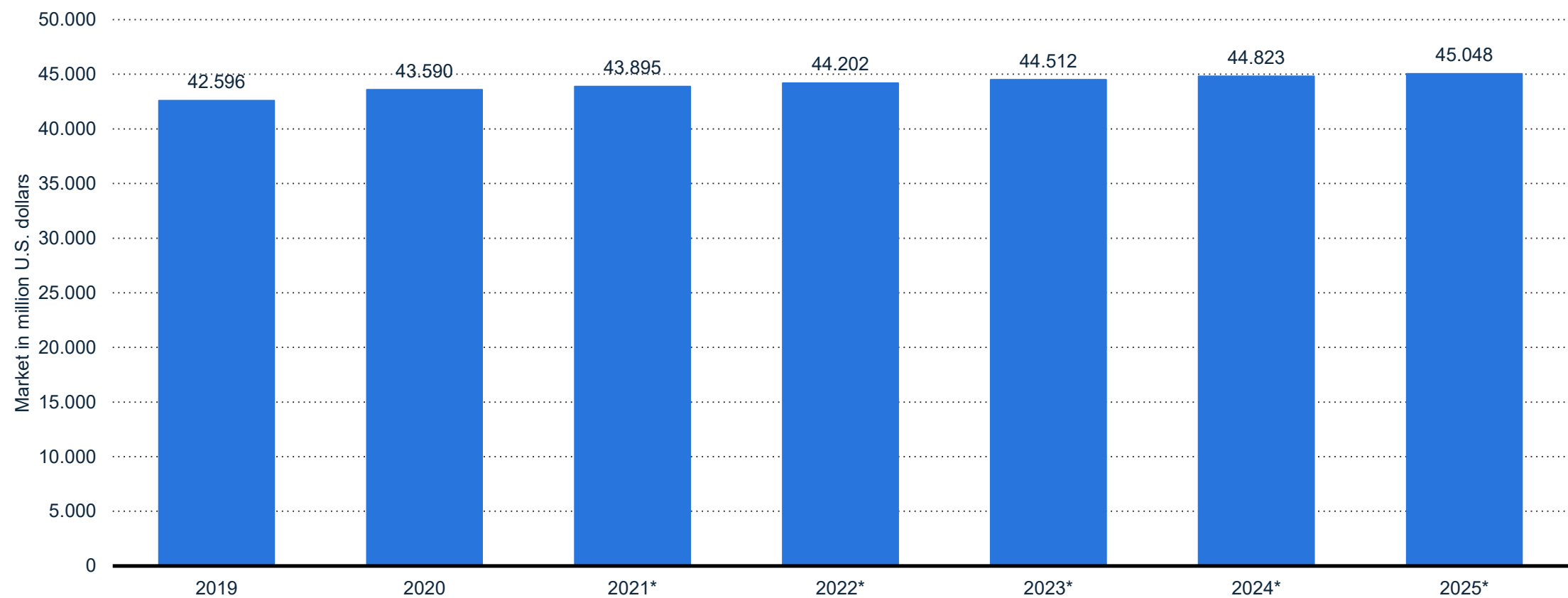# Content management software application market revenues worldwide from 2019 to 2025 (in million U.S. dollars)

Worldwide content management software market size 2019-2025

Note(s): Worldwide; 2019 to 2020
Further information regarding this statistic can be found on page 8.
Source(s): Apps Run The World; Statista; ID 643850

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Size of the business intelligence and analytics software application market worldwide, from 2019 to 2025 (in million U.S. dollars)

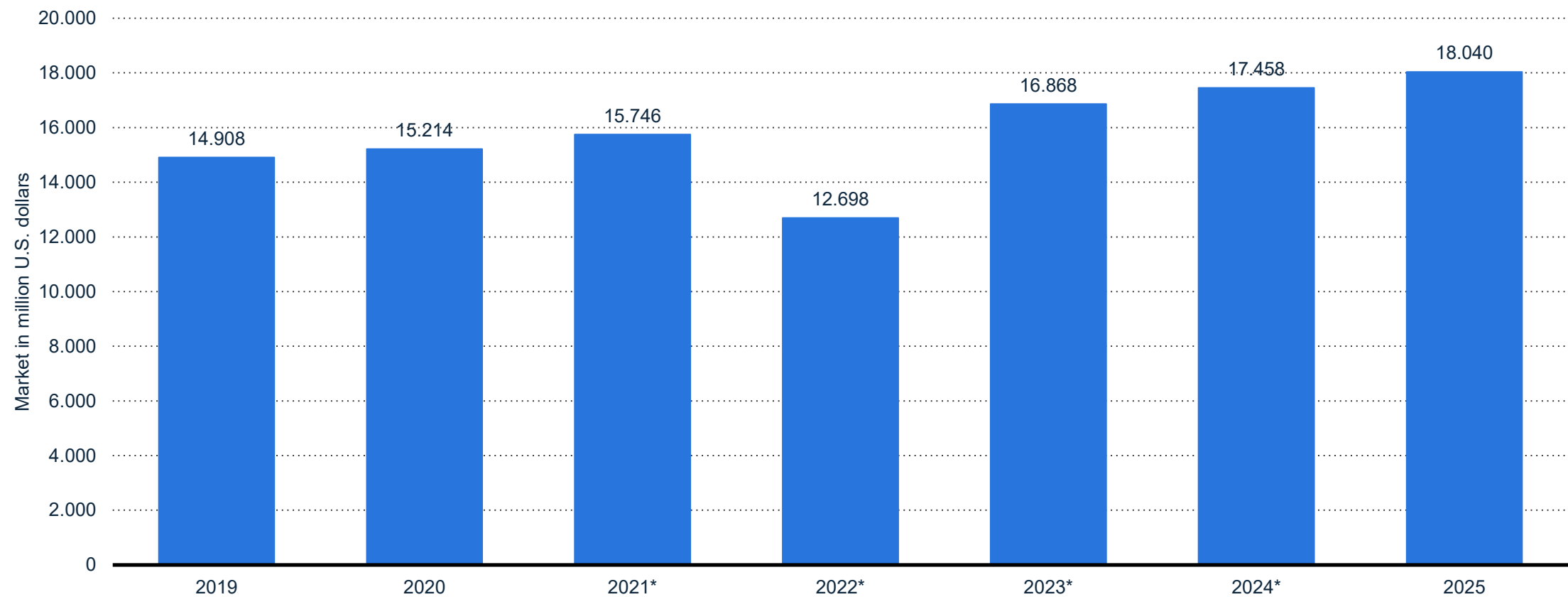Global BI & analytics software market size 2019-2025

Note(s): Worldwide; 2019 to 2020
Further information regarding this statistic can be found on page 8.
Source(s): Apps Run The World; Statista; ID 590054

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What is Business Analytics?

What is Business Analytics? Definition of Big Data

- Big Data has various definitions in the literature. Some of those are specified below:
  - Big Data is the amount of data beyond the ability of technology to store, manage and process efficiently (Manyika et.al, 2011).
  - Big Data is a term which defines the hi-tech, high speed, high-volume, complex and multivariate data to capture, store, distribute, manage and analyze the information (TechAmerica Foundation, 2014).
  - Big data is high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization (Gartner, 2014; Gürsakal, 2014).
  - Big Data Technologies are new generation technologies and architectures which were designed to extract value from multivariate high volume data sets efficiently by providing high speed capturing, discovering and analyzing (Gantz and Reinsel, 2011).
  - Hashem et.al. define Big Data by combining various definitions in literature as follows: The cluster of methods and technologies in which new forms are integrated to unfold hidden values in diverse, complex and high volume data sets (Hashem et.al., 2015).
- As the definitions suggest, there are some points to take into consideration in big data sets. The data should be complex and multiple together with its size. Therefore conventional methods have difficulty in analyzing big data sets and new methods and technologies are needed.

What is Business Analytics? Characteristics of Big Data
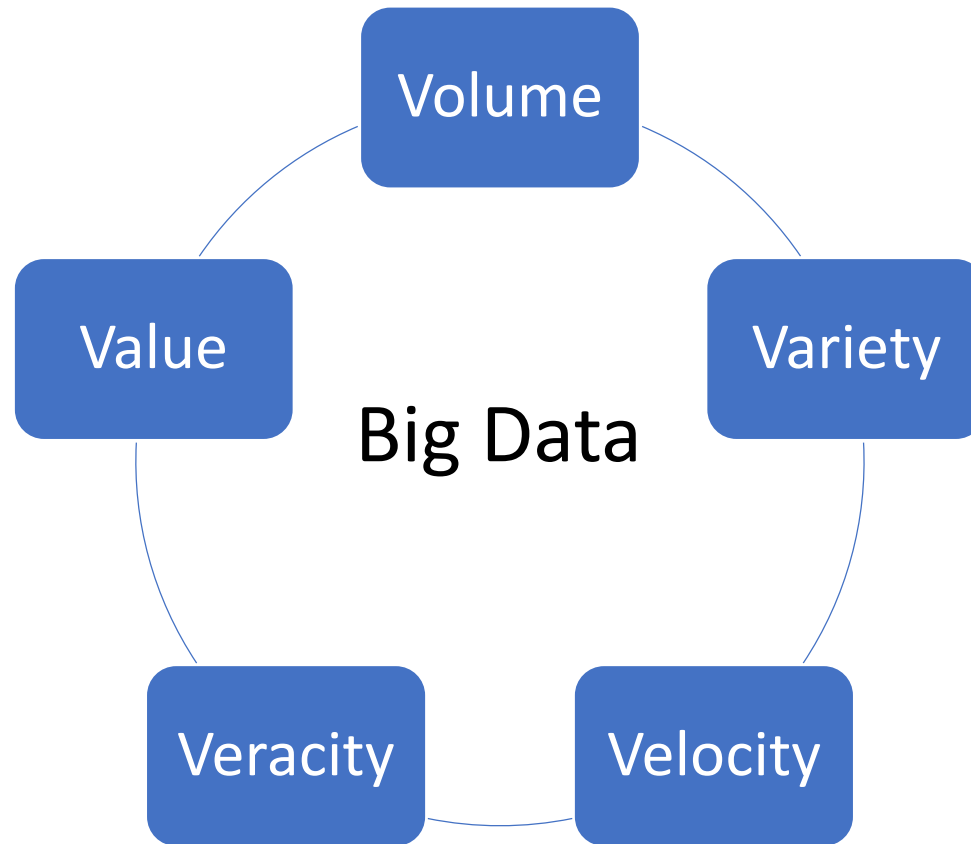
What is Business Analytics? Characteristics of Big Data

- **Volume:** It is the most important characteristic of big data. It represents the size of the big data set.

- **Variety:** Various data come to the companies from numerous resources (internal or external). These data entries from separate resources cause variance in data set. External data are hardly ever structural.

- **Velocity:** The production rate of big data is notably high. The heavy increase in data means that the data should be analyzed more swiftly. The faster the data increases, the faster the need for the data increases; therefore the process shows increase as well.

- **Veracity:** It is the accuracy of the data. The data should be acquired from correct resources and its security should be provided. Only authorized people should have the access permission.

- **Value:** A result should be generated after all of the procedures and the result should enrich the process.

What is Business Analytics? Classification of Big Data

- The characteristic of big data can be understood better by dividing it into classes. These classes are:
  - Data Sources : Web & Social, Machine, Sensing, Transactions and IoT
  - Content Format : Structured, Semi-Structured and Unstructured
  - Data Stores : Document-oriented, Column-oriented, Graph based and Key-value
  - Data Staging : Cleaning, Normalization and Transform
  - Data Processing : Batch and Real time

What is Business Analytics? Big Data process

- Big data process:
  - Data Management
    - Acquisition and Recording
    - Extraction, Cleaning and Annotation
    - Integration, Aggregation and Representation
  - Analytics
    - Modeling and Analysis
    - Interpretation

Big Data Processes

Data Management

| Acquisition and Recording | Extraction, Cleaning and Annotation | Integration, Aggregation and Representation |

Analytics

| Modeling and Analysis | Interpretation |

What is Business Analytics? It's about Analytics

- Business analytics refers to the skills, technologies, 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.
  - In contrast, business intelligence traditionally focuses on using a consistent set of metrics to both measure past performance and guide business planning, which is also based on data and statistical methods.

- Business analytics makes extensive use of statistical analysis, including explanatory and predictive modeling, and fact-based management to drive decision making. It is therefore closely related to management science. Analytics may be used as input for human decisions or may drive fully automated decisions.
  - Business intelligence is querying, reporting, online analytical processing, and alerts.

- Business analytics can answer questions like why is this happening, what if these trends continue, what will happen next (that is, predict), what is the best that can happen (that is, optimize).
  - Business Intelligence can answer questions such as what happened, how many, how often, where the problem is, and what actions are needed.

What is Business Analytics? It's about Analytics
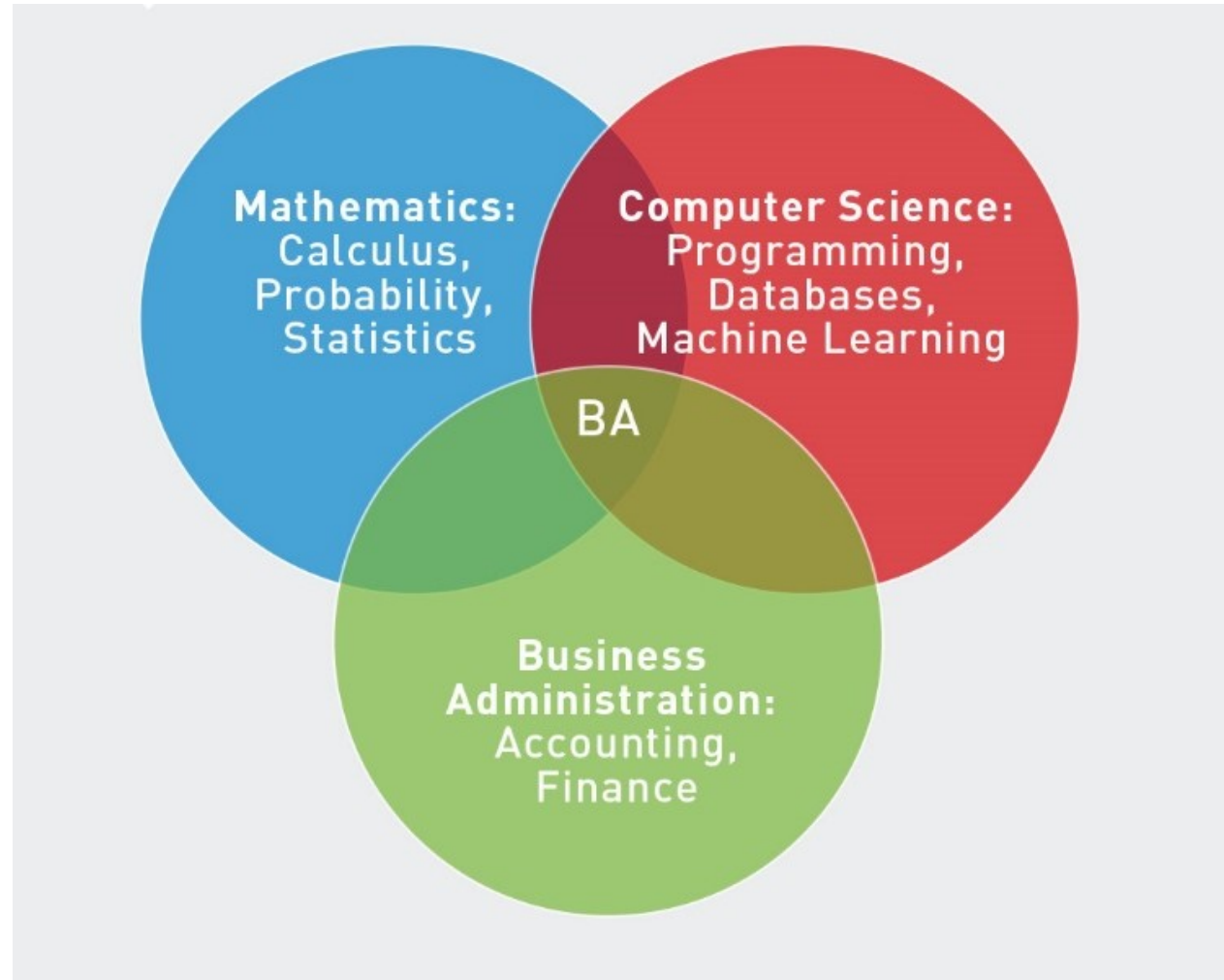
What is Business Analytics? Type of Analytics

Descriptive

- The application of simple statistical techniques that describes what is contained in a data set or database. Example: An age bar chart is used to depict retail shoppers for a department store that wants to target advertising to customer by age.

Predictive

- An application of advanced statistical, information software or operations research methods to identify predictive variables and build predictive models to identify trends and relationships not readily observed in a descriptive analysis. Example: Multiple regression is used to show the relationship (or lack of relationship) between age, weight and exercise on diet food sales. Knowing that relationship exists helps explain why one set of independent variables influences dependent variables such as business performance.
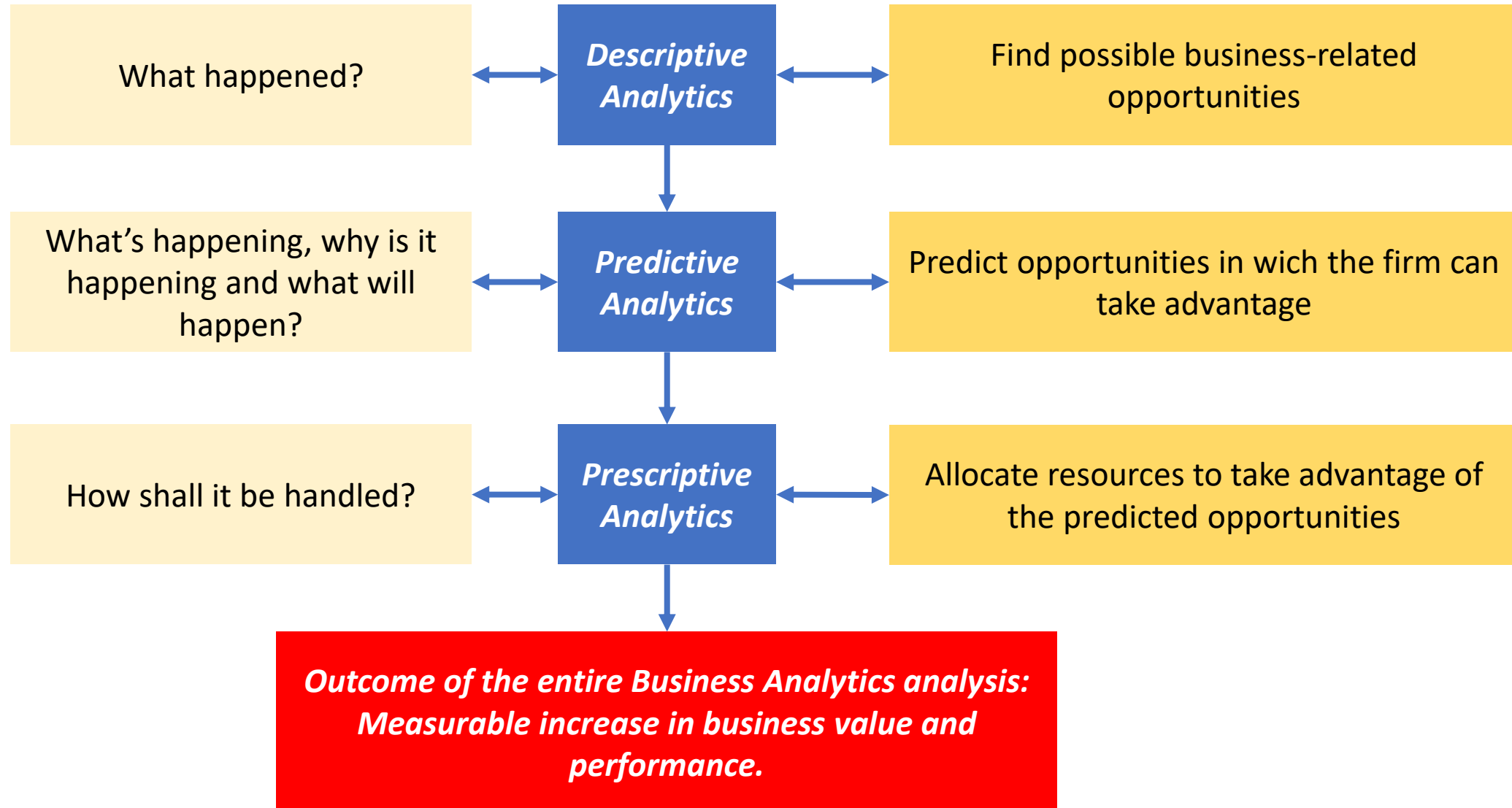
Prescriptive

- An application of decision science, management science and operations research methodologies (applied mathematical techniques) to make best use of allocable resources. Example: A department store has limited advertising budget to target customers. Linear programming models can be used to optimally allocate the budget to various advertising media

What is Business Analytics? And now Business Analytics

Characteristics	Analytics	Business Analytics	Business Intelligence
Business performance planning role	**What is happening and what will be happening?**	**What is happening now, what will be happening and what is the best strategy to deal with it?**	**What is happening now, and what have we done in the past to deal with it?**
Use of descriptive analytics as a major component of analysis	Yes	Yes	Yes
Use of predictive analytics as a major component of analysis	Yes	Yes	No (only historically)
Use of prescriptive analytics as a major component of analysis	Yes	Yes	No (only historically)
Use of all three in combination	No	Yes	No
Business focus	Maybe	Yes	Yes
Focus on storing and maintaining data	No	No	Yes
Required focus on improving business value and performance	No	Yes	No

What is Business Analytics? And now Business Analytics

| What happened? | **Descriptive Analytics** | Find possible business-related opportunities |

| What's happening, why is it happening and what will happen? | **Predictive Analytics** | Predict opportunities in wich the firm can take advantage |

| How shall it be handled? | **Prescriptive Analytics** | Allocate resources to take advantage of the predicted opportunities |

Outcome of the entire Business Analytics analysis: Measurable increase in business value and performance.

And why now?

And why now?

- The reasons for this new age are varied and complex:
  - Computing perfect storm
    - Big Data analytics are the natural result of four major global trends:
      - Moore's Law
      - Mobile computing
      - Social networking
      - Cloud computing
  - Data perfect storm.
    - More volume, velocity and variety—the three Vs—of data that has arrived in unprecedented ways. This perfect storm of the three Vs makes it extremely complex and cumbersome with the current data management and analytics technology and practices.
  - Convergence perfect storm.
    - Another perfect storm is happening, too. Traditional data management and analytics software and hardware technologies, open-source technology, and commodity hardware are merging to create new alternatives for IT and business executives.

And why now?

- And we have the ability to arrive at the third stage of evolution:
  - Dependent (Early Days). Data systems were fairly new and users didn't know quite know what they wanted. IT assumed that "Build it and they shall come."
  - Independent (Recent Years). Users understood what an analytical platform was and worked together with IT to define the business needs and approach for deriving insights for their firm.
  - Interdependent (Big Data Era). Interactional stage between various companies, creating more social collaboration beyond your firm's walls.

And why now?

In conclusion

- Organizations capture trillions of bytes of information about their customers, suppliers, and operations through digital systems.
  - Primary research (i.e., surveys, experiments, observations)
  - Secondary research (i.e., competitive and marketplace data, industry reports, consumer data, business data)
  - Supply chain data (i.e., EDI, vendor catalogs and pricing, quality information)
- Millions of networked sensors embedded in mobile phones, automobiles, and other products are continually sensing, creating, and communicating data.
  - Internet data (i.e., clickstream, social media, social networking links)
  - Location data (i.e., mobile device data, geospatial data)
  - Image data (i.e., video, satellite image, surveillance)
  - Device data (i.e., sensors, PLCs, RF devices, LIMs, telemetry)
- The real challenge is identifying or developing most cost-effective and reliable methods for extracting value from all the terabytes and petabytes of data now available. That's where Business Analytics become necessary.

In conclusion

- As people age, what kinds of different services will they need from us?
  - In the past, the companies would have been forced to settle for general answers. Today, they can use their data to find answers that are more specific and significantly more
  - You can look at actual data, from real customers. You can extract and analyze every policy they've ever held. The answers to your questions are buried in this kind of massive mound of data—potentially petabytes worth of data if you consider all of your insurance customers across the lifespan of their policies. It's unbelievable how much information exists.
  - But now you've got to go from the level of petabytes and terabytes down to the level of a byte. That's a very complex process.
  - But today you can do it—you can compare one individual to all the other people in an age bracket and perform an analysis, in real time.

In conclusion

- You go into a store to buy a pair of pants. You take the pants up to the cash register and the clerk asks you if you would like to save 10 percent off your purchase by signing up for the store's credit card.
  - 99.9 percent of the time, you're going to say "no." But now let's imagine if the store could automatically look at all of my past purchases and see what other items I bought when I came in to buy a pair of pants—and then offer me 50 percent off a similar purchase? Now that would be relevant to me. The store isn't offering me another lame credit card—it's offering me something that I probably want, at an attractive price.

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Thank You