

# Practices of Business Intelligence

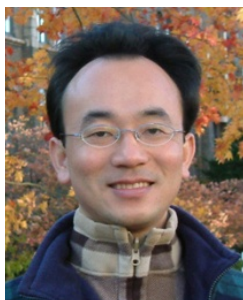
## 商業智慧、分析與資料科學

### (Business Intelligence, Analytics, and Data Science)

1071BI02

MI4 (M2084) (2888)

Wed, 7, 8 (14:10-16:00) (B217)



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2018-09-19



# 課程大綱 (Syllabus)

- | 週次 (Week) | 日期 (Date)  | 內容 (Subject/Topics)   |
|-----------|------------|---|
| 1         | 2018/09/12 | 商業智慧實務課程介紹<br>(Course Orientation for Practices of Business Intelligence)                                   |
| 2         | 2018/09/19 | 商業智慧、分析與資料科學<br>(Business Intelligence, Analytics, and Data Science)  |
| 3         | 2018/09/26 | 人工智慧、大數據與雲端運算<br>(ABC: AI, Big Data, and Cloud Computing)   |
| 4         | 2018/10/03 | 描述性分析I：數據的性質、統計模型與可視化<br>(Descriptive Analytics I: Nature of Data, Statistical Modeling, and Visualization) |
| 5         | 2018/10/10 | 國慶紀念日 (放假一天) (National Day) (Day off)   |
| 6         | 2018/10/17 | 描述性分析II：商業智慧與資料倉儲<br>(Descriptive Analytics II: Business Intelligence and Data Warehousing)                 |

# 課程大綱 (Syllabus)

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|-----------|------------|--|
| 7         | 2018/10/24 | 預測性分析I：資料探勘流程、方法與演算法<br>(Predictive Analytics I: Data Mining Process, Methods, and Algorithms) |
| 8         | 2018/10/31 | 預測性分析II：文本、網路與社群媒體分析<br>(Predictive Analytics II: Text, Web, and Social Media Analytics)       |
| 9         | 2018/11/07 | 期中報告 (Midterm Project Report)  |
| 10        | 2018/11/14 | 期中考試 (Midterm Exam)  |
| 11        | 2018/11/21 | 處方性分析：最佳化與模擬<br>(Prescriptive Analytics: Optimization and Simulation)                          |
| 12        | 2018/11/28 | 社會網絡分析<br>(Social Network Analysis)  |

# 課程大綱 (Syllabus)

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|-----------|------------|--|
| 13        | 2018/12/05 | 機器學習與深度學習<br>(Machine Learning and Deep Learning)  |
| 14        | 2018/12/12 | 自然語言處理<br>(Natural Language Processing)  |
| 15        | 2018/12/19 | AI交談機器人與對話式商務<br>(AI Chatbots and Conversational Commerce)                               |
| 16        | 2018/12/26 | 商業分析的未來趨勢、隱私與管理考量<br>(Future Trends, Privacy and Managerial Considerations in Analytics) |
| 17        | 2019/01/02 | 期末報告 (Final Project Presentation)  |
| 18        | 2019/01/09 | 期末考試 (Final Exam)  |

# Business Intelligence (BI)

①

Introduction to BI and Data Science

2

Descriptive Analytics

3

Predictive Analytics

4

Prescriptive Analytics

5

Big Data Analytics

6

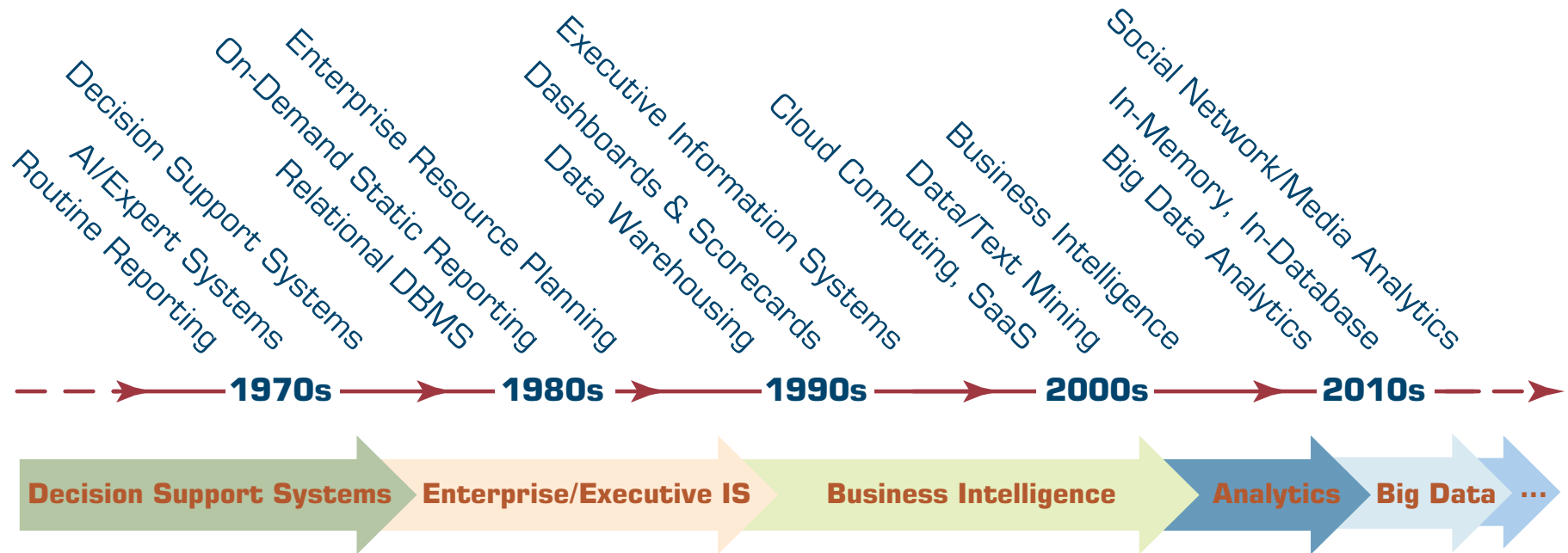
Future Trends

# Outline

- Business Intelligence (BI)
- Analytics
- Data Science

# **Business Intelligence (BI)**

# Evolution of Decision Support, Business Intelligence, and Analytics





# Changing Business Environments and Evolving Needs for Decision Support and Analytics

1. Group communication and collaboration
2. Improved data management
3. Managing giant data warehouses and Big Data
4. Analytical support
5. Overcoming cognitive limits in processing and storing information
6. Knowledge management
7. Anywhere, anytime support

# Decision Support Systems (DSS)

(Gorry and Scott-Morton, 1971)

“interactive  
computer-based systems,  
which help decision makers  
utilize data and models to  
solve unstructured problems”

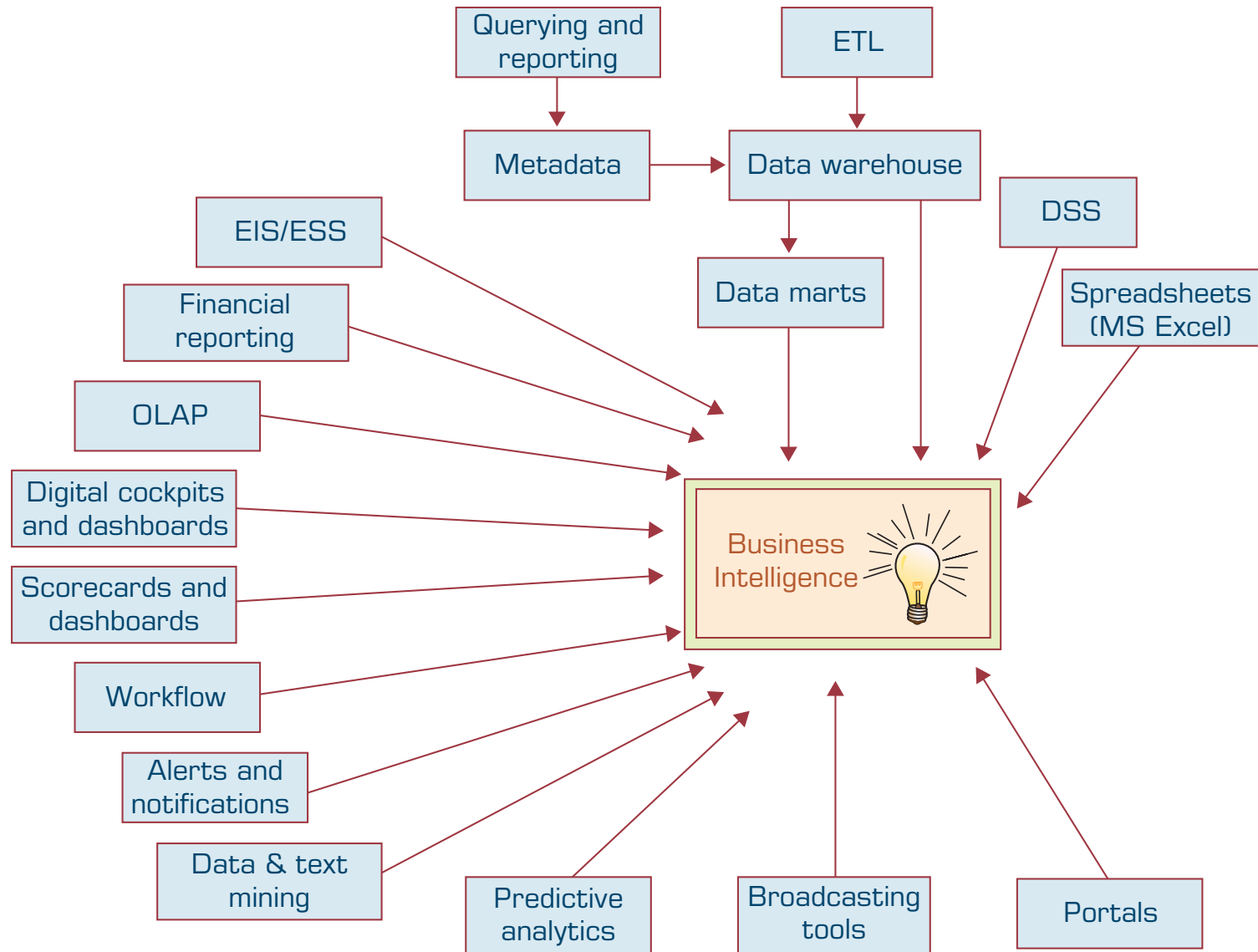
# Decision Support Systems (DSS)

(Keen and Scott-Morton, 1978)

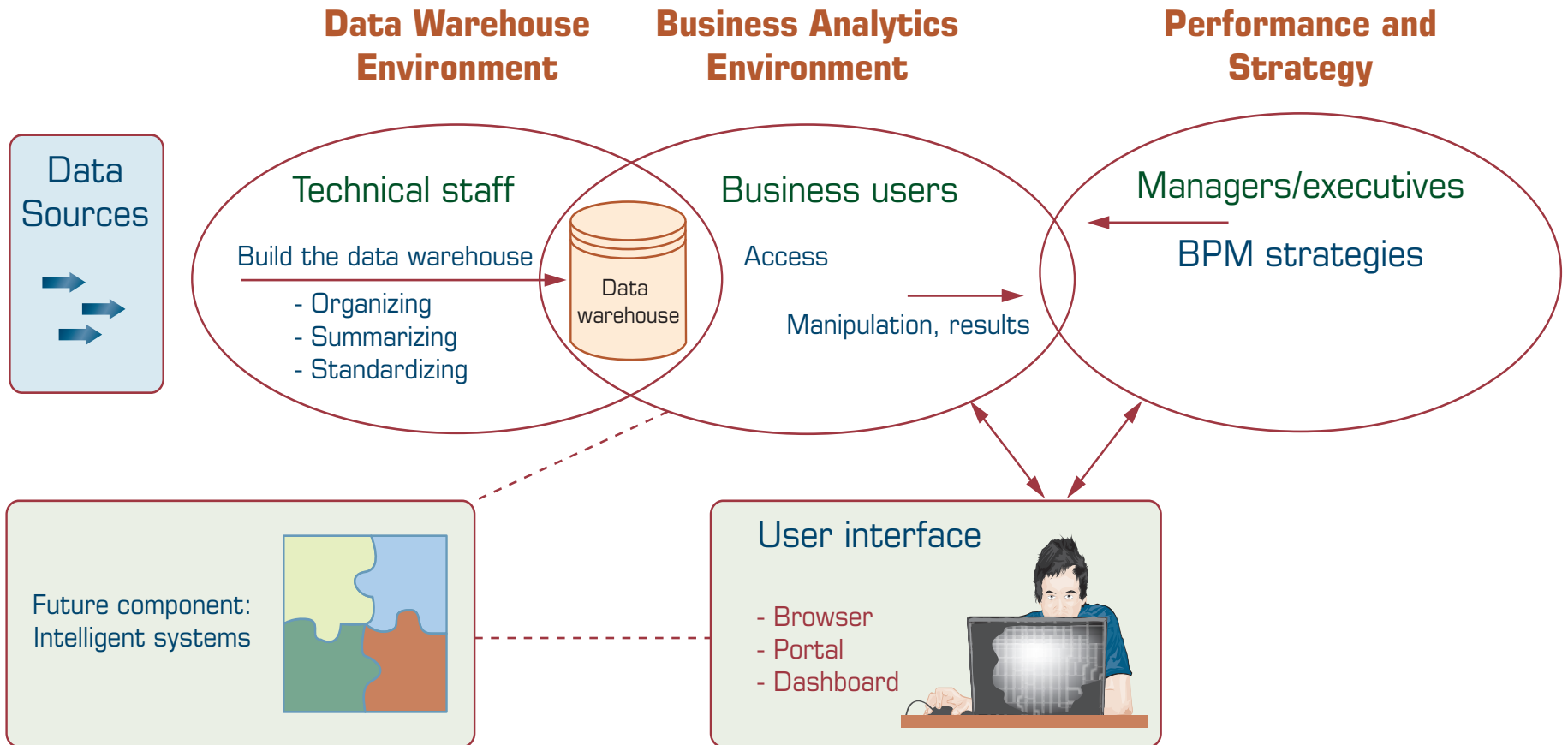
“Decision support systems couple the **intellectual resources** of individuals with the **capabilities of the computer** to **improve the quality of decisions.**

It is a computer-based support system for management decision makers who deal with semistructured problems.”

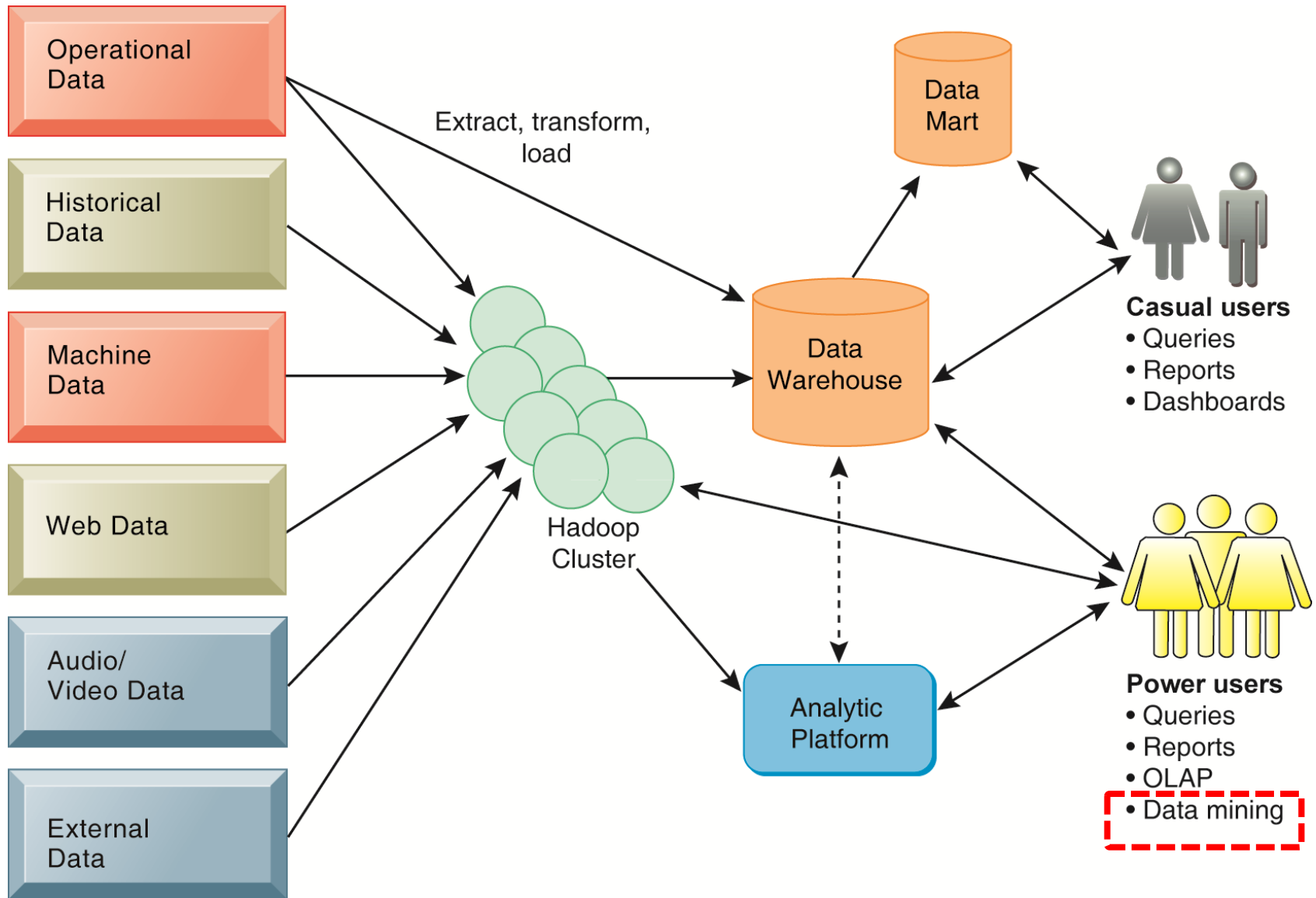
# Evolution of Business Intelligence (BI)



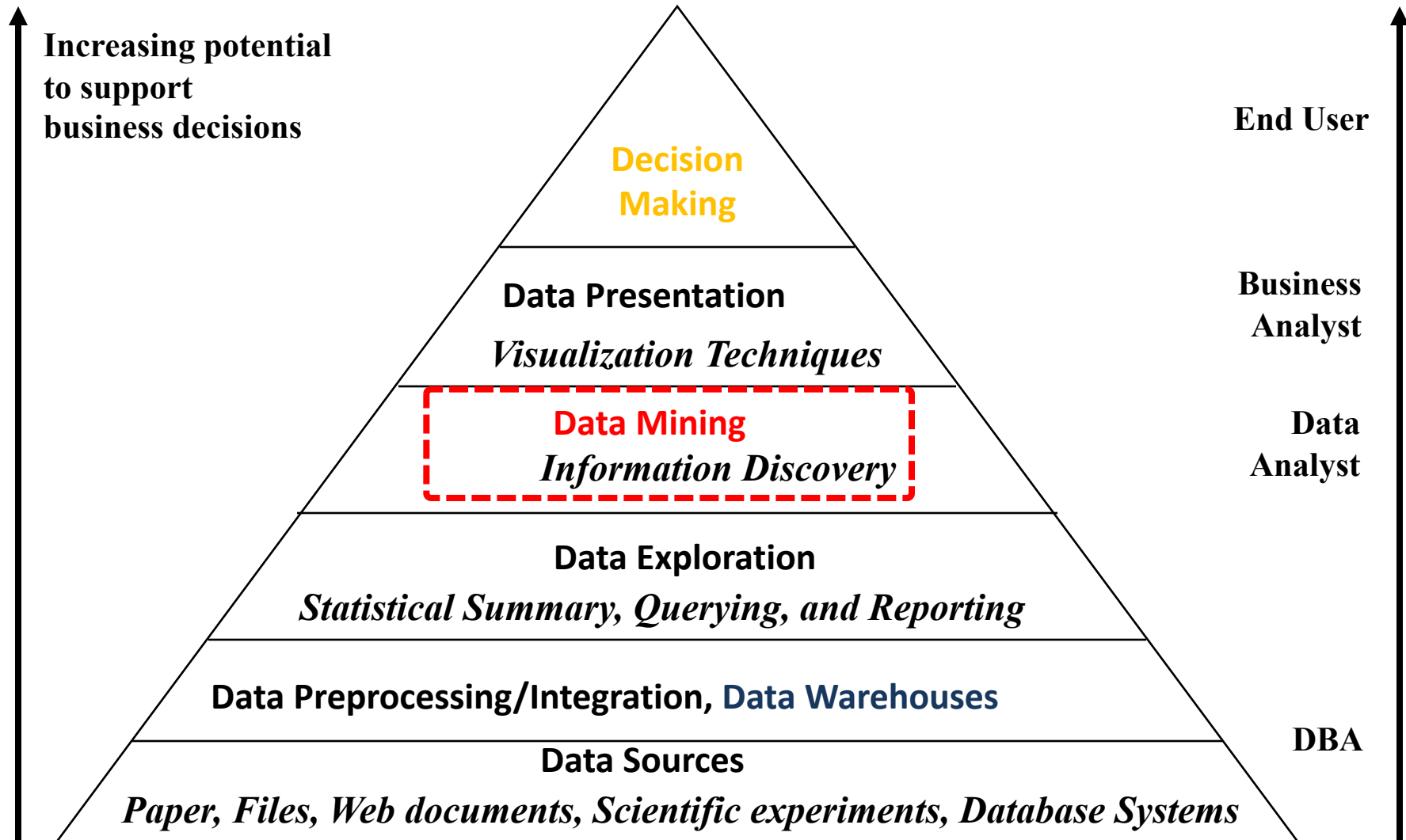
# A High-Level Architecture of BI



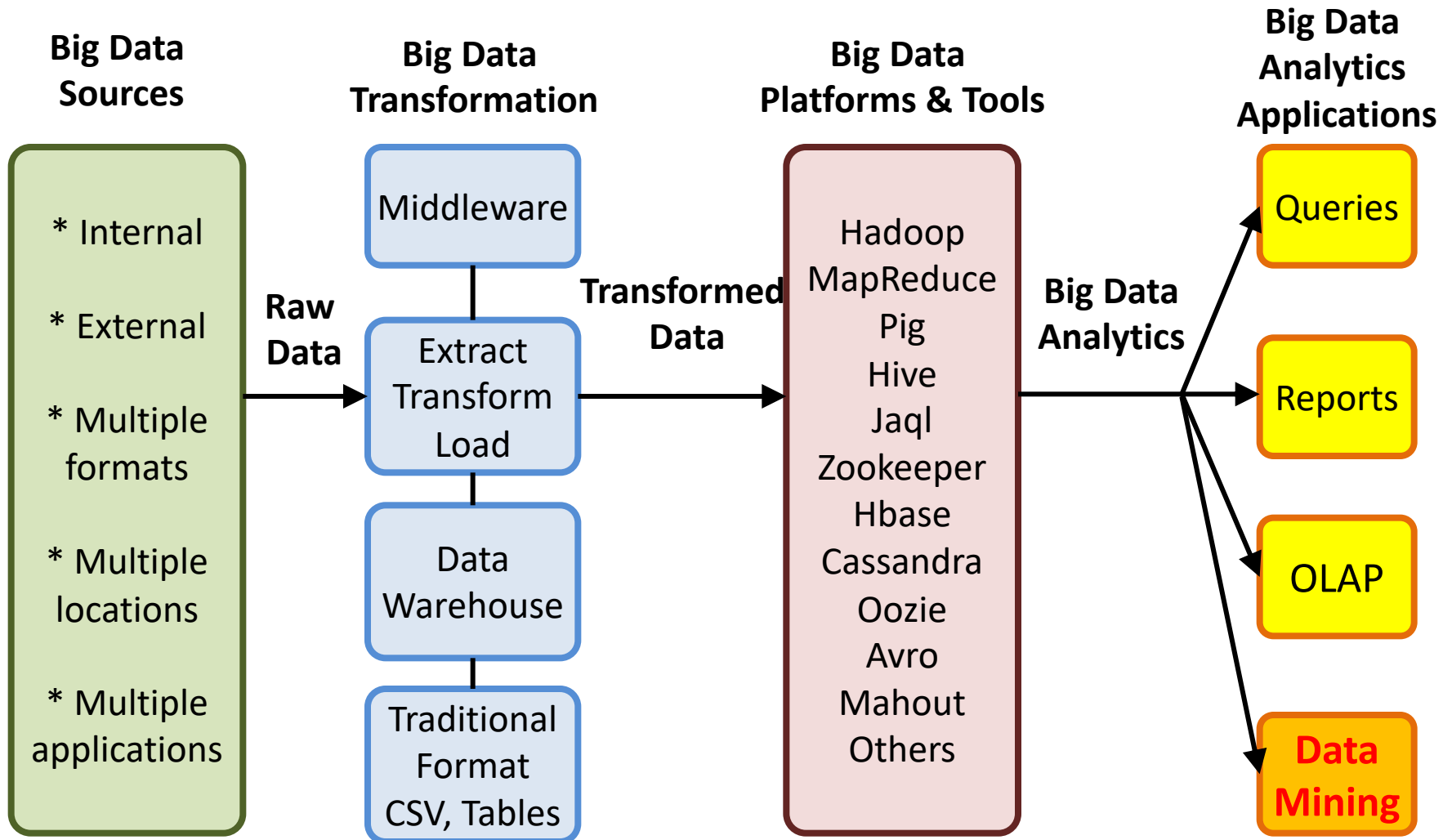
# Business Intelligence (BI) Infrastructure



# Business Intelligence and Data Mining



# Architecture of Big Data Analytics



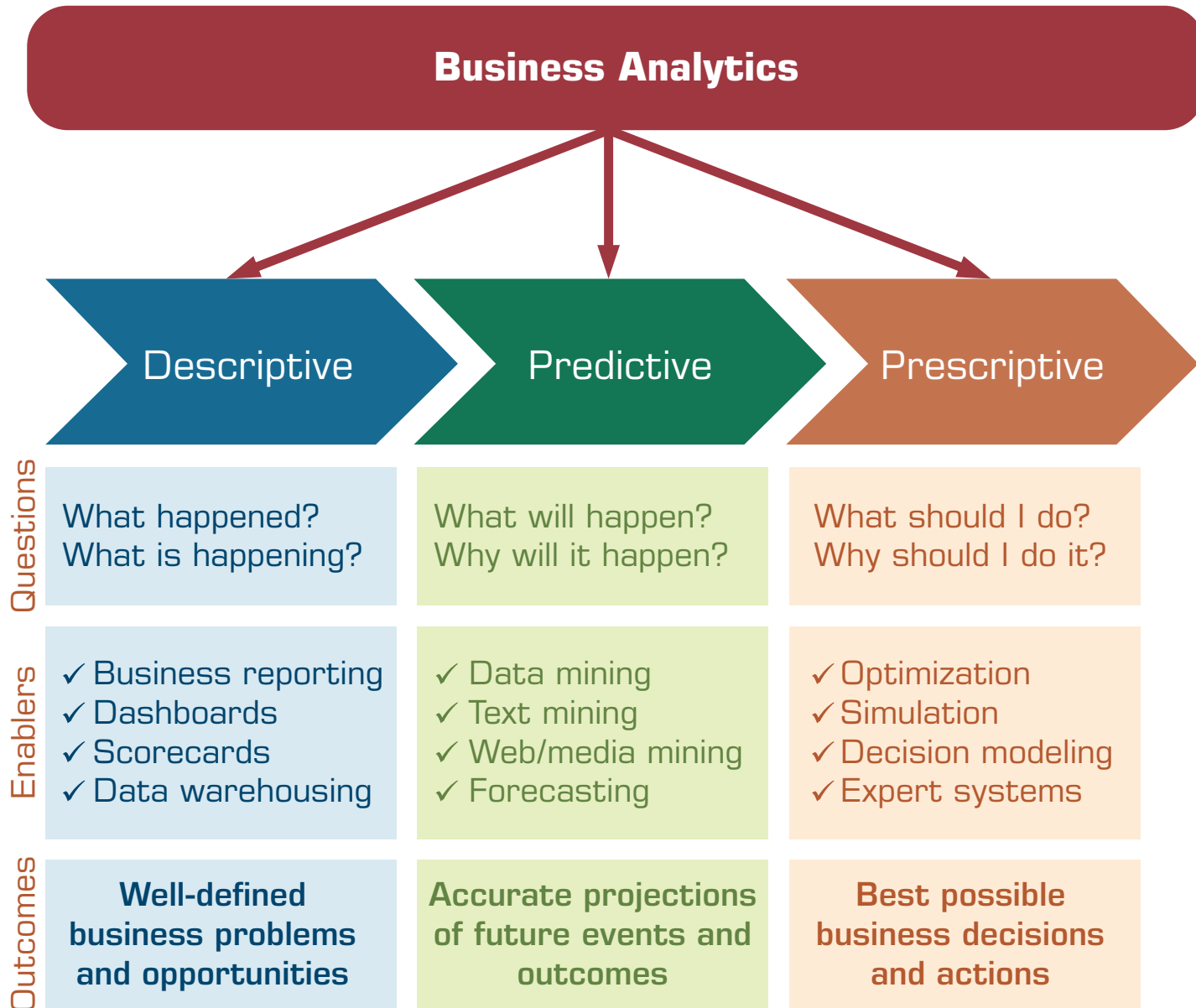


# Architecture of Big Data Analytics



# Analytics

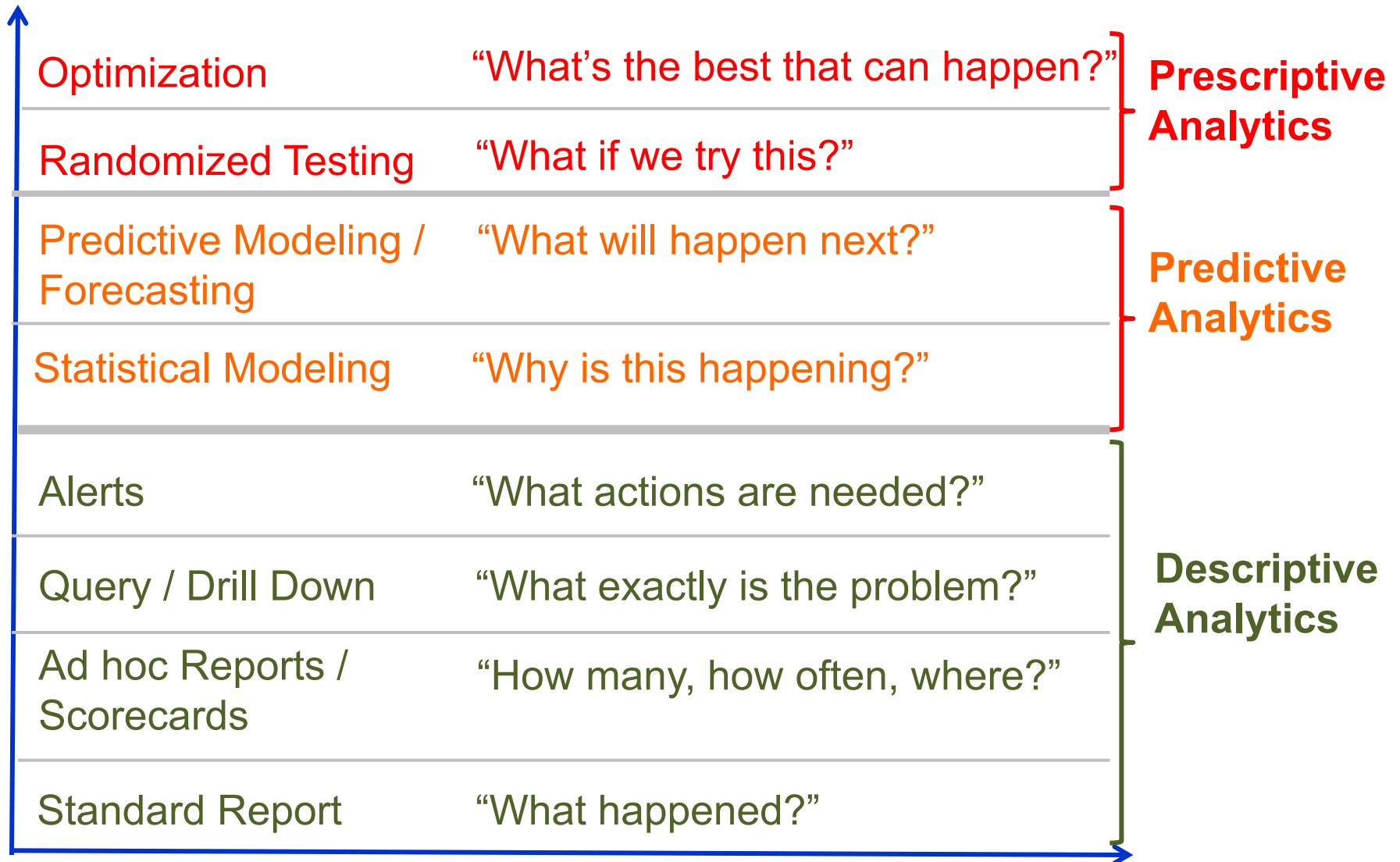
# Three Types of Analytics



# Three Types of Business Analytics

- Prescriptive Analytics
- Predictive Analytics
- Descriptive Analytics

# Three Types of Business Analytics



# Business Intelligence and Enterprise Analytics

- Predictive analytics
- Data mining
- Business analytics
- Web analytics
- **Big-data** analytics

# Data Science

# Data Analyst

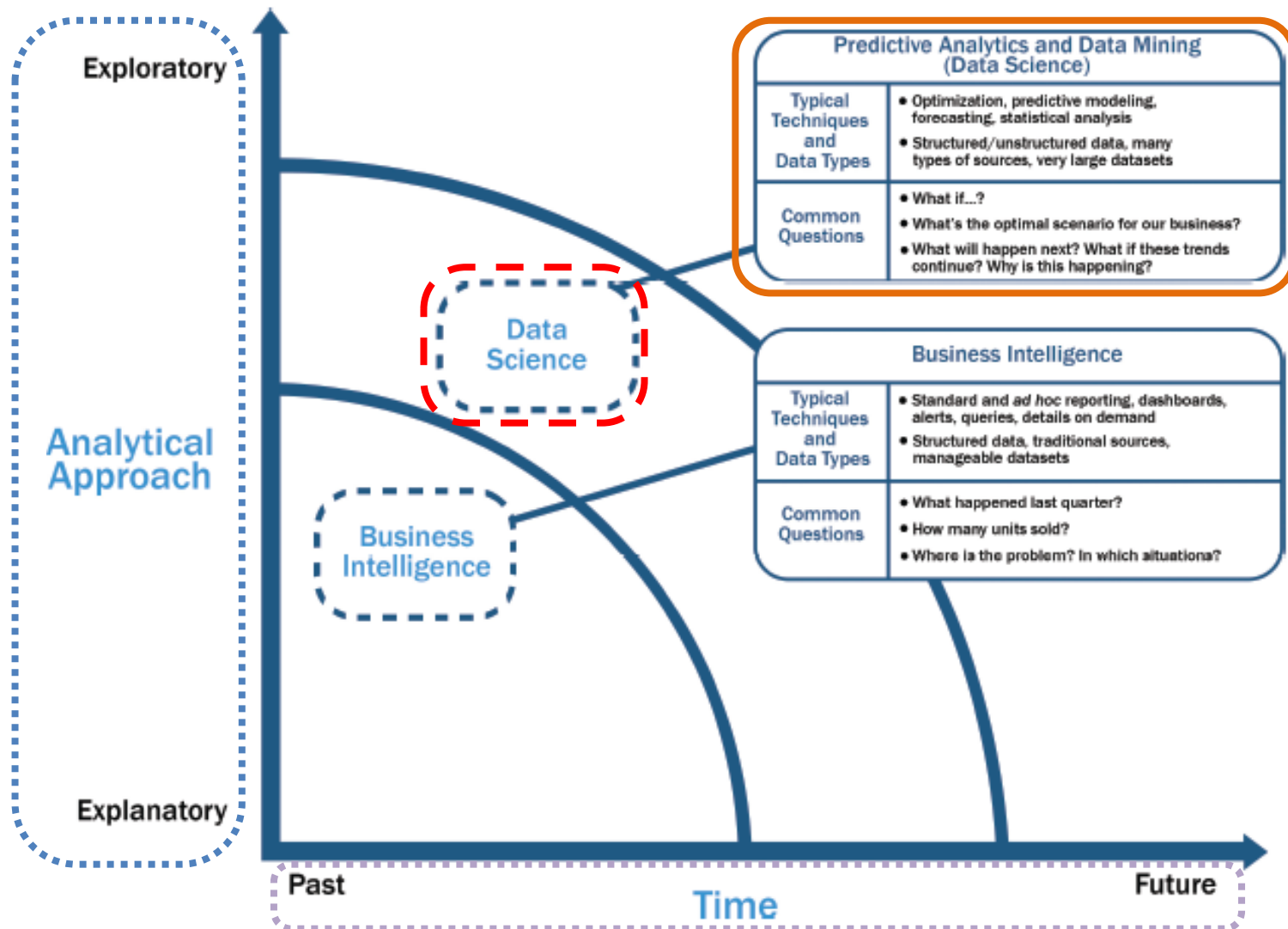
- Data analyst is just another term for professionals who were doing BI in the form of data compilation, cleaning, reporting, and perhaps some visualization.
- Their skill sets included Excel, some SQL knowledge, and reporting.
- You would recognize those capabilities as descriptive or reporting analytics.



# Data Scientist

- Data scientist is responsible for **predictive analysis, statistical analysis**, and more **advanced analytical tools and algorithms**.
- They may have a deeper knowledge of algorithms and may recognize them under various labels—**data mining, knowledge discovery, or machine learning**.
- Some of these professionals may also need deeper programming knowledge to be able to write code for data cleaning/analysis in current Web-oriented languages such as Java or Python and statistical languages such as R.
- Many analytics professionals also need to build significant expertise in **statistical modeling, experimentation, and analysis**.

# Data Science and Business Intelligence



# Data Science and Business Intelligence



## Predictive Analytics and Data Mining (Data Science)

Past

Time

Future

# Predictive Analytics and Data Mining (Data Science)

Structured/unstructured data, many types of sources,  
very large datasets

Optimization, predictive modeling, forecasting statistical analysis

What if...?

What's the optimal scenario for our business?

What will happen next?

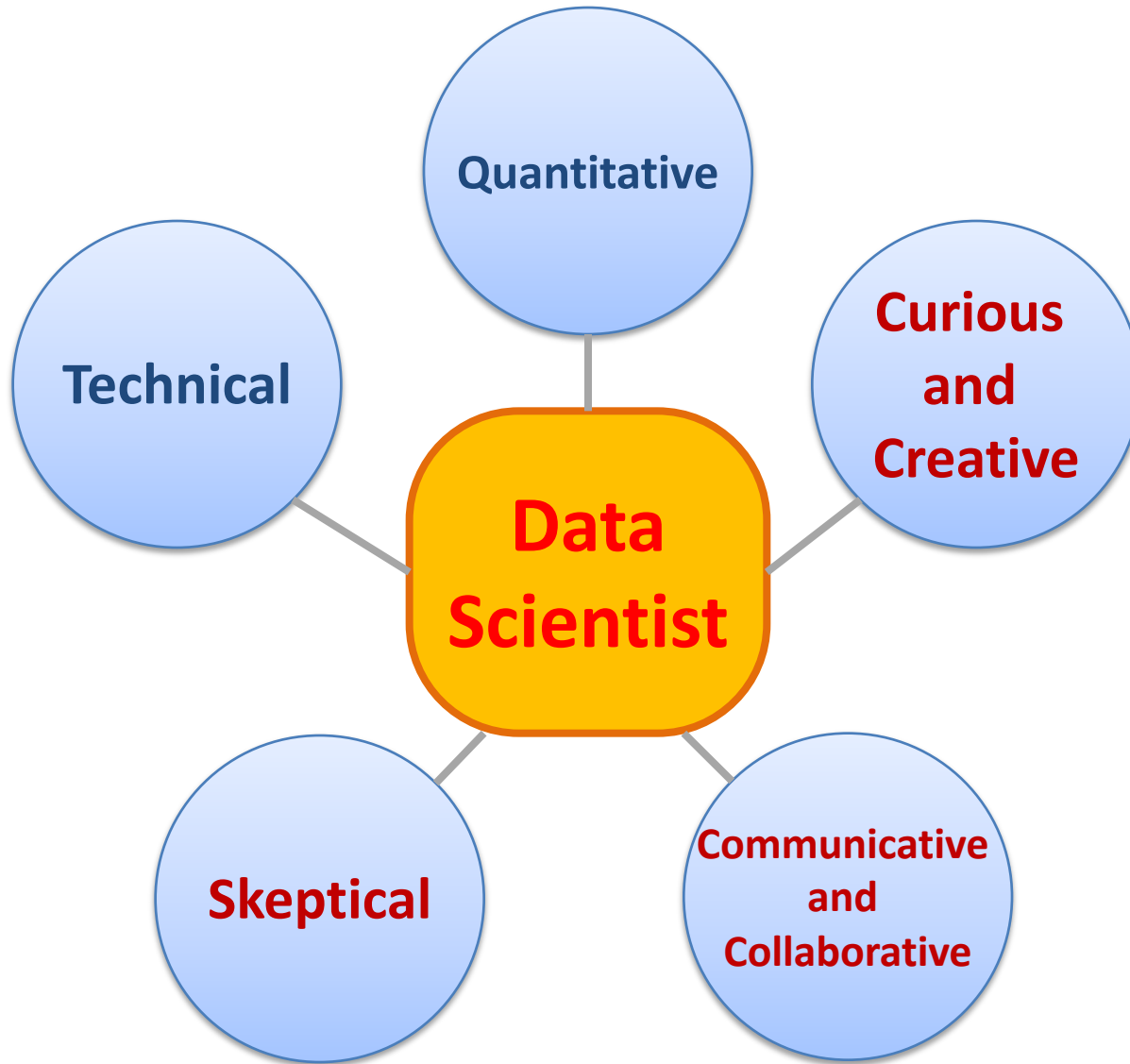
What if these trends continue?

Why is this happening?

# Profile of a Data Scientist

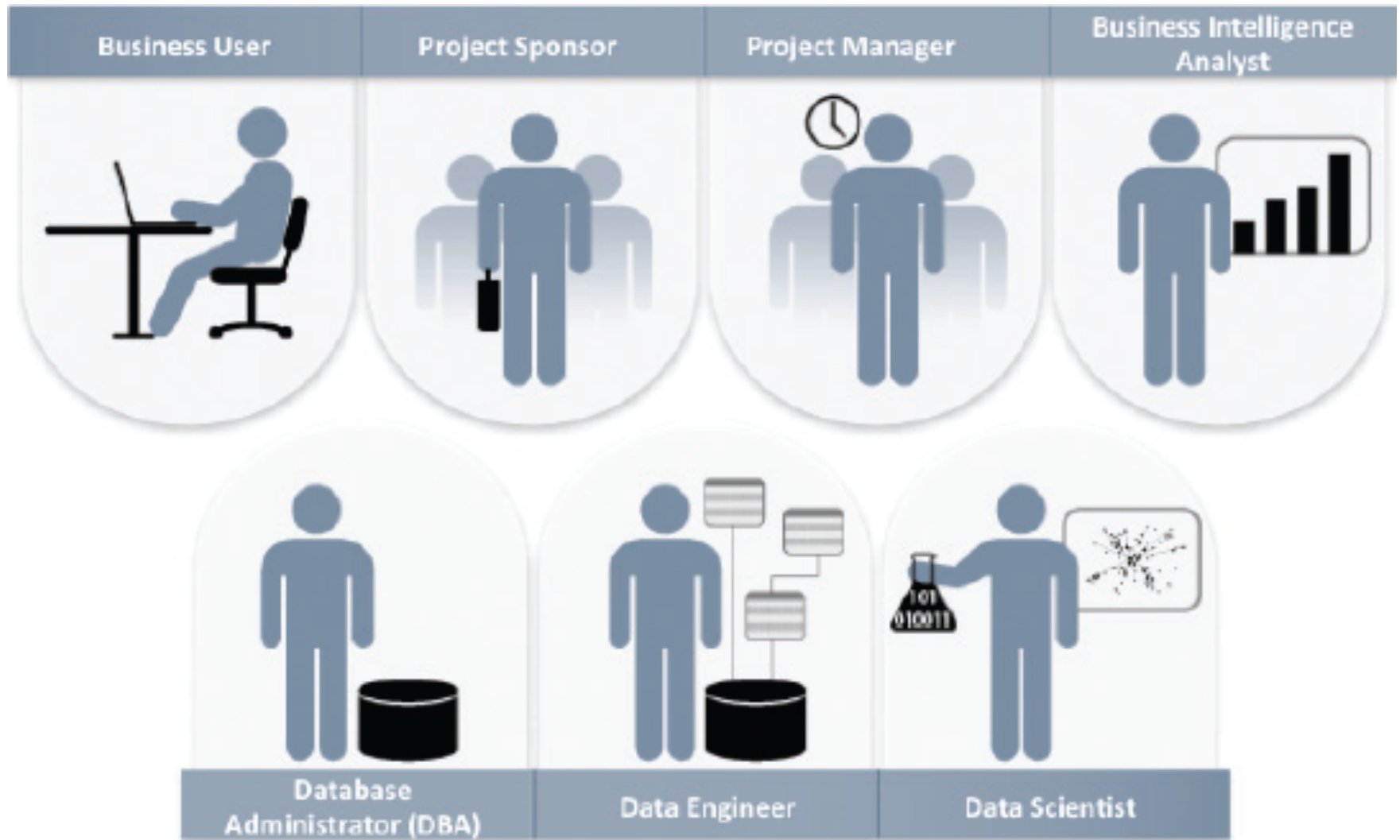
- **Quantitative**
  - mathematics or statistics
- **Technical**
  - software engineering,  
machine learning,  
and programming skills
- **Skeptical mind-set** and **critical thinking**
- **Curious** and **creative**
- **Communicative** and **collaborative**

# Data Scientist Profile



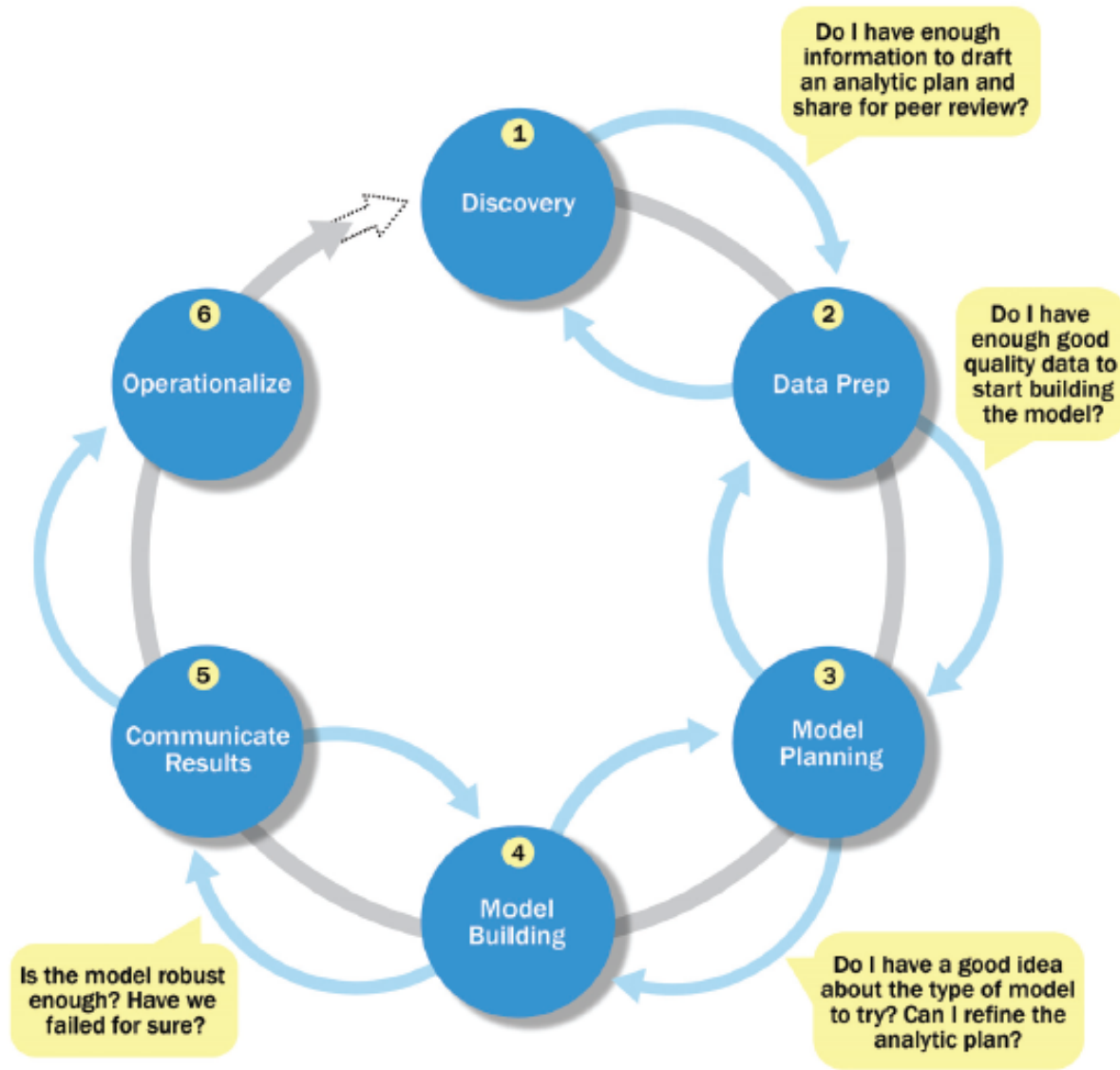
# Big Data Analytics Lifecycle

# Key Roles for a Successful Analytics Project





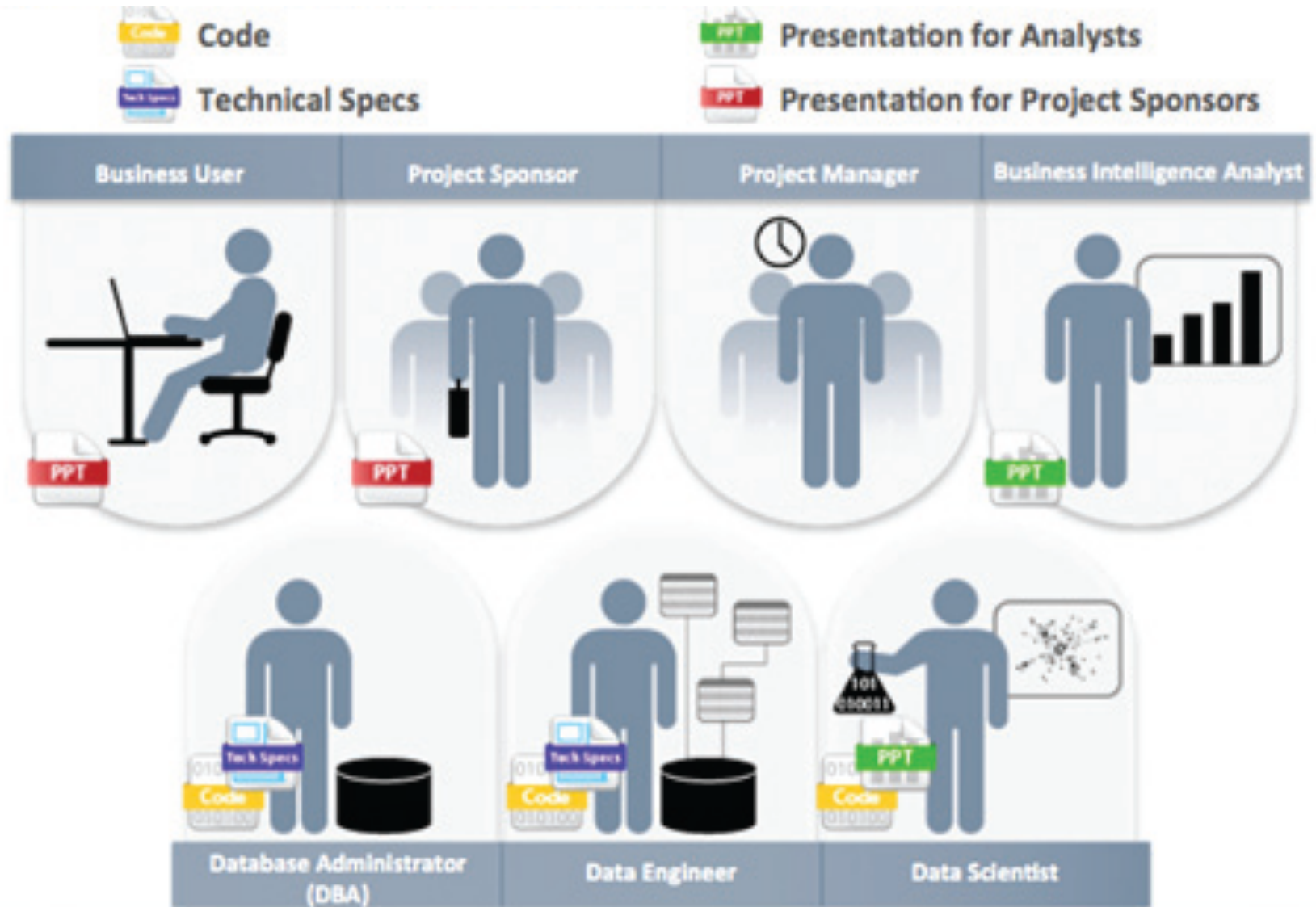
# Overview of Data Analytics Lifecycle



# Overview of Data Analytics Lifecycle

1. Discovery
2. Data preparation
3. Model planning
4. Model building
5. Communicate results
6. Operationalize

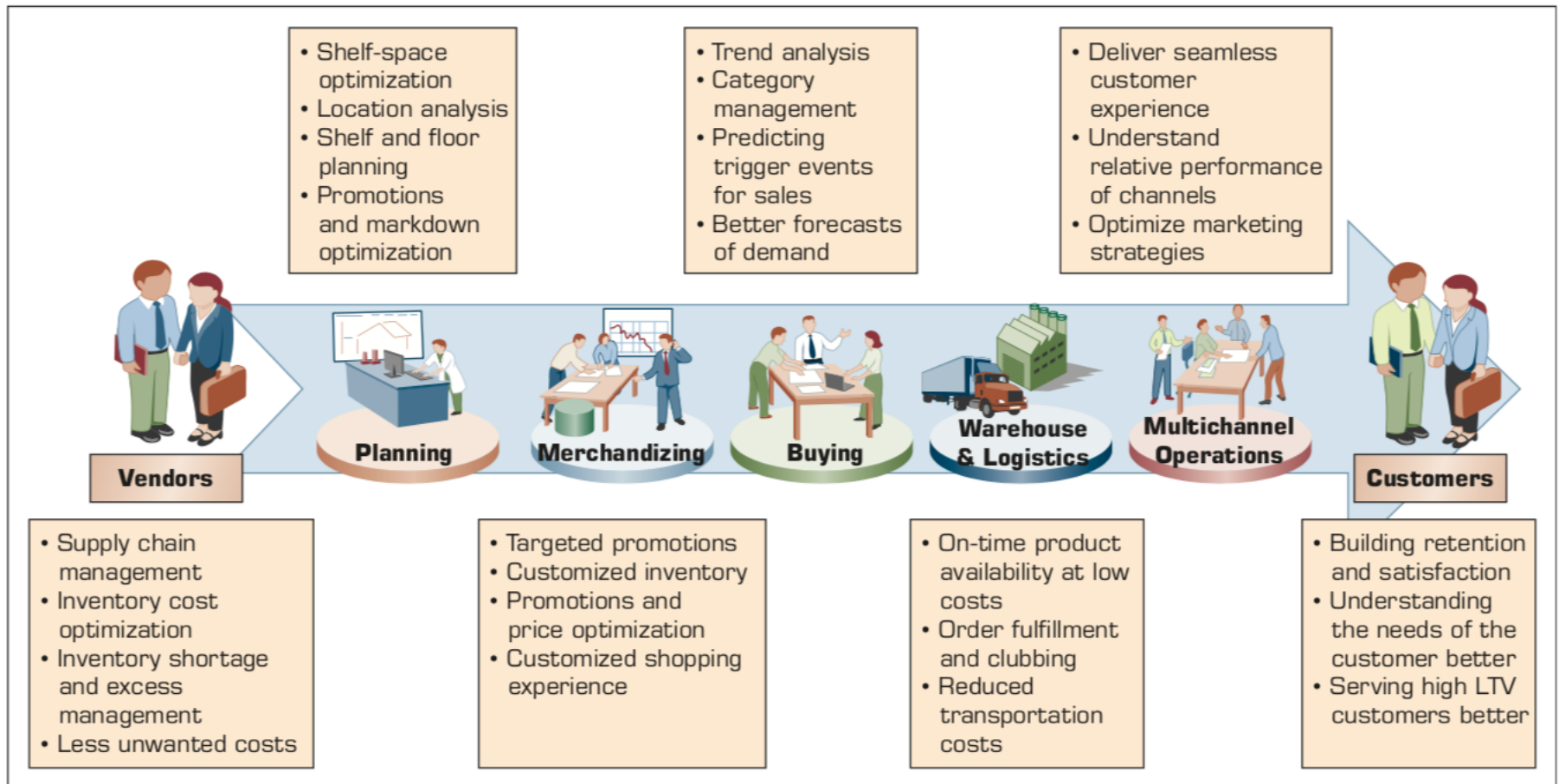
# Key Outputs from a Successful Analytics Project



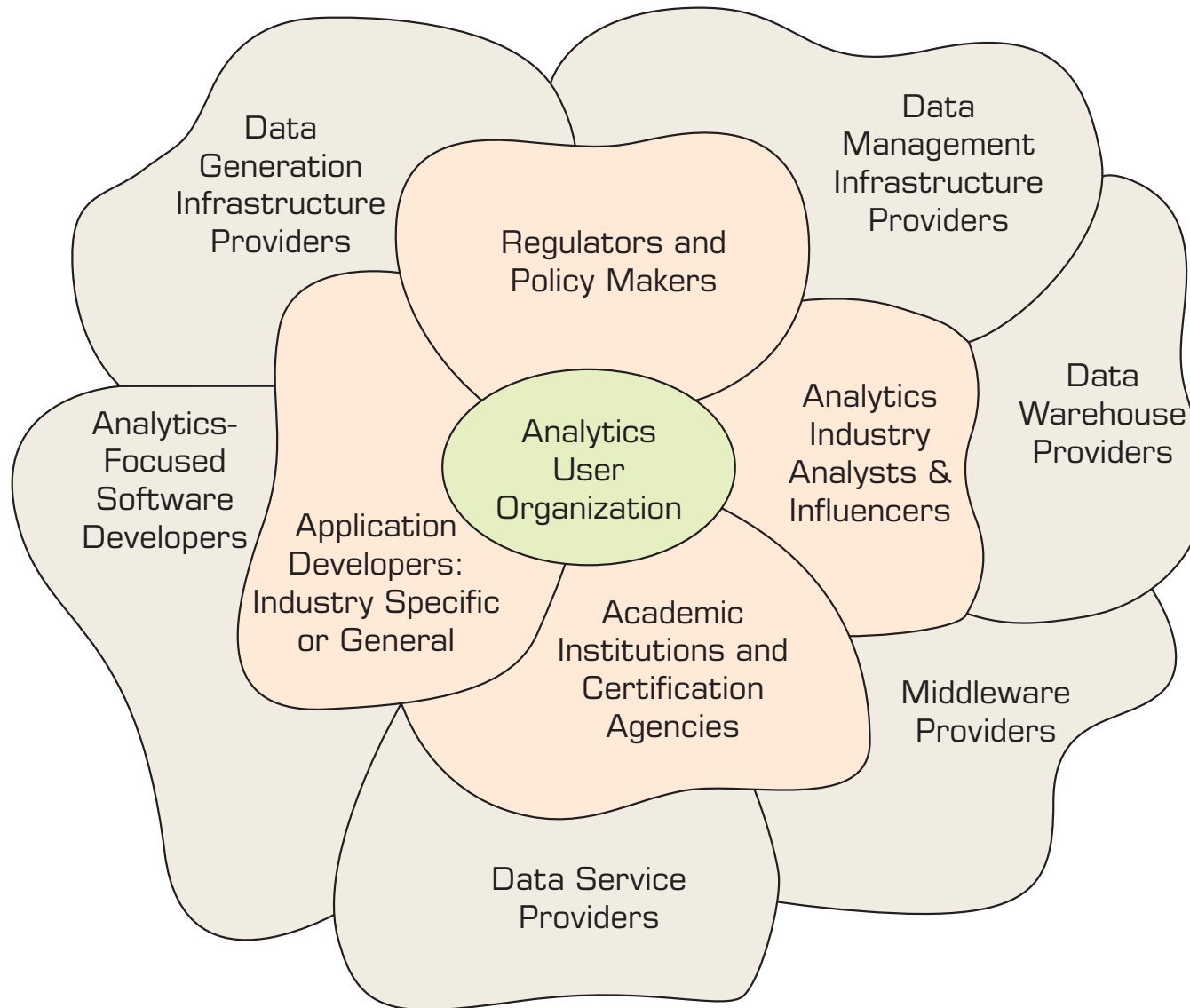
# Example of Analytics Applications in a Retail Value Chain

## Retail Value Chain

Critical needs at every touch point of the Retail Value Chain



# Analytics Ecosystem



# Job Titles of Analytics





# Google Colab

The screenshot shows the Google Colaboratory web interface. At the top, the browser address bar displays the URL <https://colab.research.google.com/notebooks/welcome.ipynb>. The main header includes the 'Hello, Colaboratory' logo and a menu with options like File, Edit, View, Insert, Runtime, Tools, and Help. Below the header, there are buttons for '+ CODE', '+ TEXT', '↑ CELL', '↓ CELL', and 'COPY TO DRIVE'. On the right side, there are 'CONNECT' and 'EDITING' options, along with a 'SHARE' button and a user profile picture.

The left sidebar contains a 'Table of contents' with sections: 'Getting Started', 'Highlighted Features', 'TensorFlow execution', 'GitHub', 'Visualization', 'Forms', 'Examples', and 'Local runtime support'. A '+ SECTION' button is at the bottom of the sidebar.

The main content area features a large 'Welcome to Colaboratory!' message with the Colab logo and a brief description: 'Colaboratory is a free Jupyter notebook environment that requires no setup and runs entirely in the cloud. See our [FAQ](#) for more info.' Below this is a 'Getting Started' section with a list of links: 'Overview of Colaboratory', 'Loading and saving data: Local files, Drive, Sheets, Google Cloud Storage', 'Importing libraries and installing dependencies', 'Using Google Cloud BigQuery', 'Forms, Charts, Markdown, & Widgets', 'TensorFlow with GPU', and 'Machine Learning Crash Course: Intro to Pandas & First Steps with TensorFlow'.

Further down, there are two expandable sections: 'Highlighted Features' and 'TensorFlow execution'. The 'Highlighted Features' section includes a 'Seedbank' subsection with the text: 'Looking for Colab notebooks to learn from? Check out [Seedbank](#), a place to discover interactive machine learning examples.' The 'TensorFlow execution' section includes the text: 'Colaboratory allows you to execute TensorFlow code in your browser with a single click. The example below adds two matrices.'

At the bottom of the 'TensorFlow execution' section, there is a mathematical equation showing the addition of two matrices:

$$\begin{bmatrix} 1. & 1. & 1. \end{bmatrix} + \begin{bmatrix} 1. & 2. & 3. \end{bmatrix} = \begin{bmatrix} 2. & 3. & 4. \end{bmatrix}$$

# Summary

- Business Intelligence (BI)
- Analytics
- Data Science



# References

- Ramesh Sharda, Dursun Delen, and Efraim Turban (2017), Business Intelligence, Analytics, and Data Science: A Managerial Perspective, 4th Edition, Pearson.
- Kenneth C. Laudon & Jane P. Laudon (2014), Management Information Systems: Managing the Digital Firm, Thirteenth Edition, Pearson.
- Jiawei Han and Micheline Kamber (2006), Data Mining: Concepts and Techniques, Second Edition, Elsevier.
- Stephan Kudyba (2014), Big Data, Mining, and Analytics: Components of Strategic Decision Making, Auerbach Publications.
- EMC Education Services, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley, 2015.