

Advanced Big Data Analytics

Agenda

1. Analysis vs Analytics
2. Business & Data & Data Science
3. Business Intelligence (BI)
4. Artificial Intelligence (AI)
5. A Vision for Advanced Analytics
6. 365 Data Science Infographic
7. Questions

Analysis vs Analytics

Analysis vs Analytics

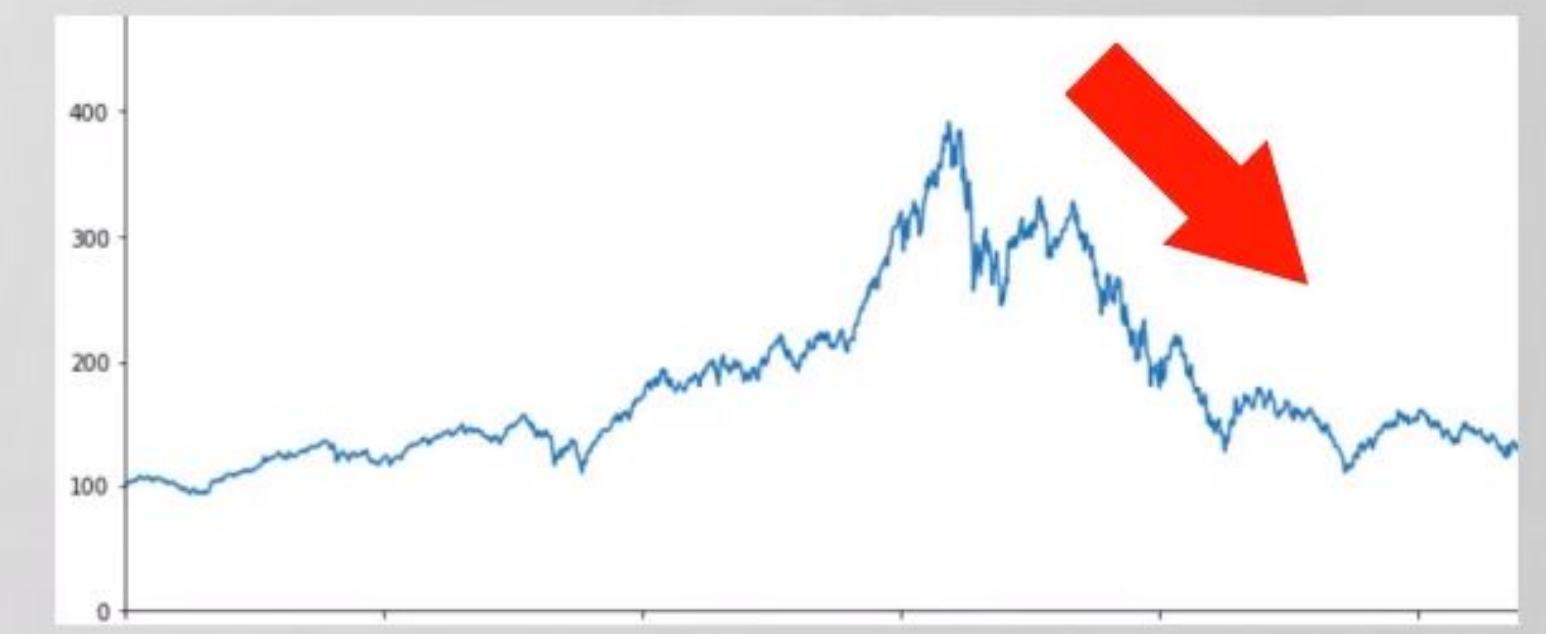
Analysis ? = Analytics

there is a lack of a transparent understanding of both

Data Analysis - 1

Analysis
←
Past

Explain
How? Why?



Data Analysis - 2

- Dividing data into **components** that are easier to understand
- Examining how **different parts** relate to each other
- Performed on **past** data, explaining '**how**' and '**why**':
 - the story ended in the way that it did
 - something happened

Data Analytics - 1



Data Analytics - 2

- The application of logical and computational reasoning
 - to the **component parts** obtained in an **analysis**
- We look for **patterns** and explore what we can do with **them** in the **future**

Analysis vs Analytics

Analysis ≠ Analytics

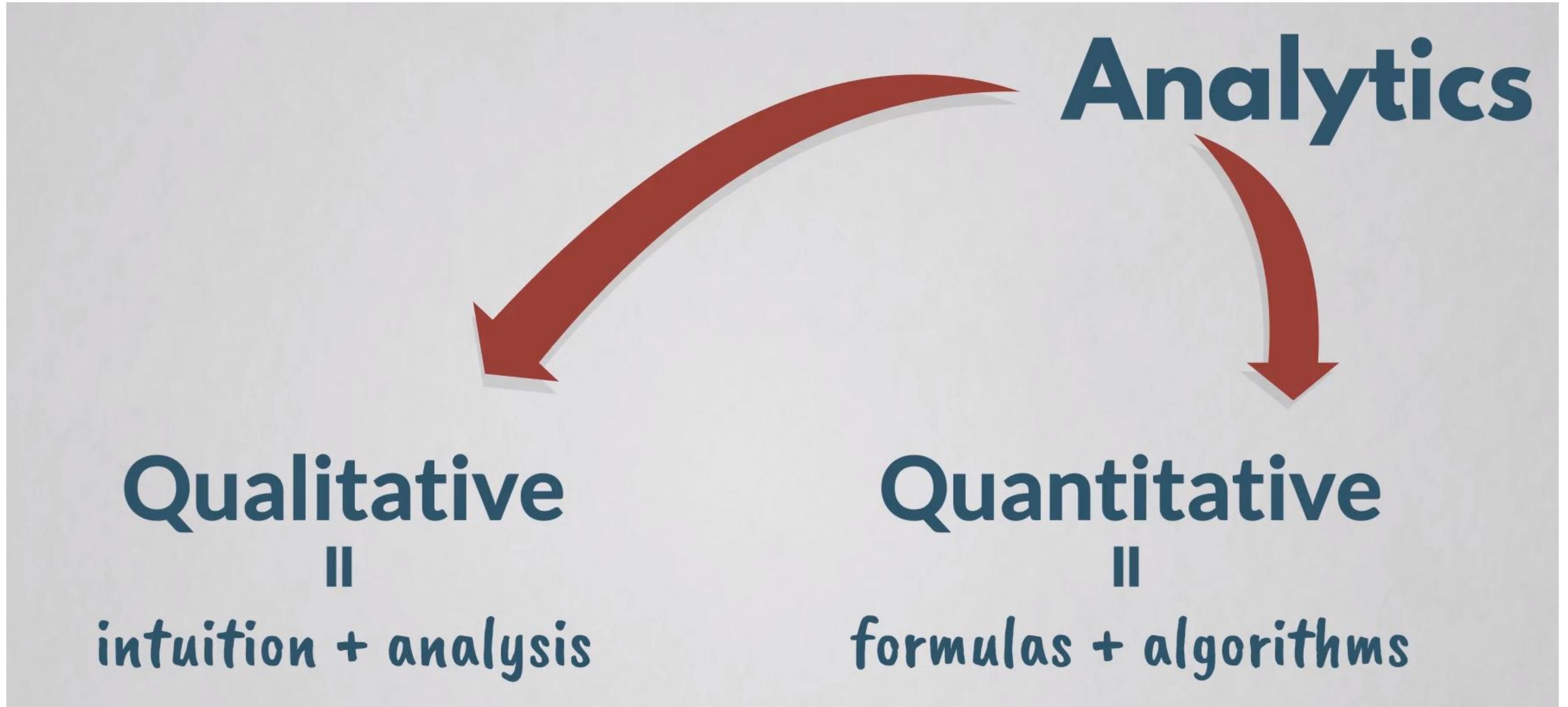
data analysis ≠ data analytics

business analysis ≠ business analytics

Analysis vs Analytics - Note

- **Analytics** has become a term comprising both:
 - **Analysis**
 - **Analytics**
- which is something confusing in practice

Quantitative Analytics vs Qualitative Analytics



Quantitative Analytics vs Qualitative Analytics

Quantitative Analytics

- Applying **formulas & algorithms** to **numbers** we have gathered from **analysis**

Qualitative Analytics

- Using **intuition & experience** + **analysis** to plan next business move

Quantitative Analytics Example

- When to introduce the new collection?
 - Relying on past sales data and UX data,
 - we could predict in which month it would be best to do that

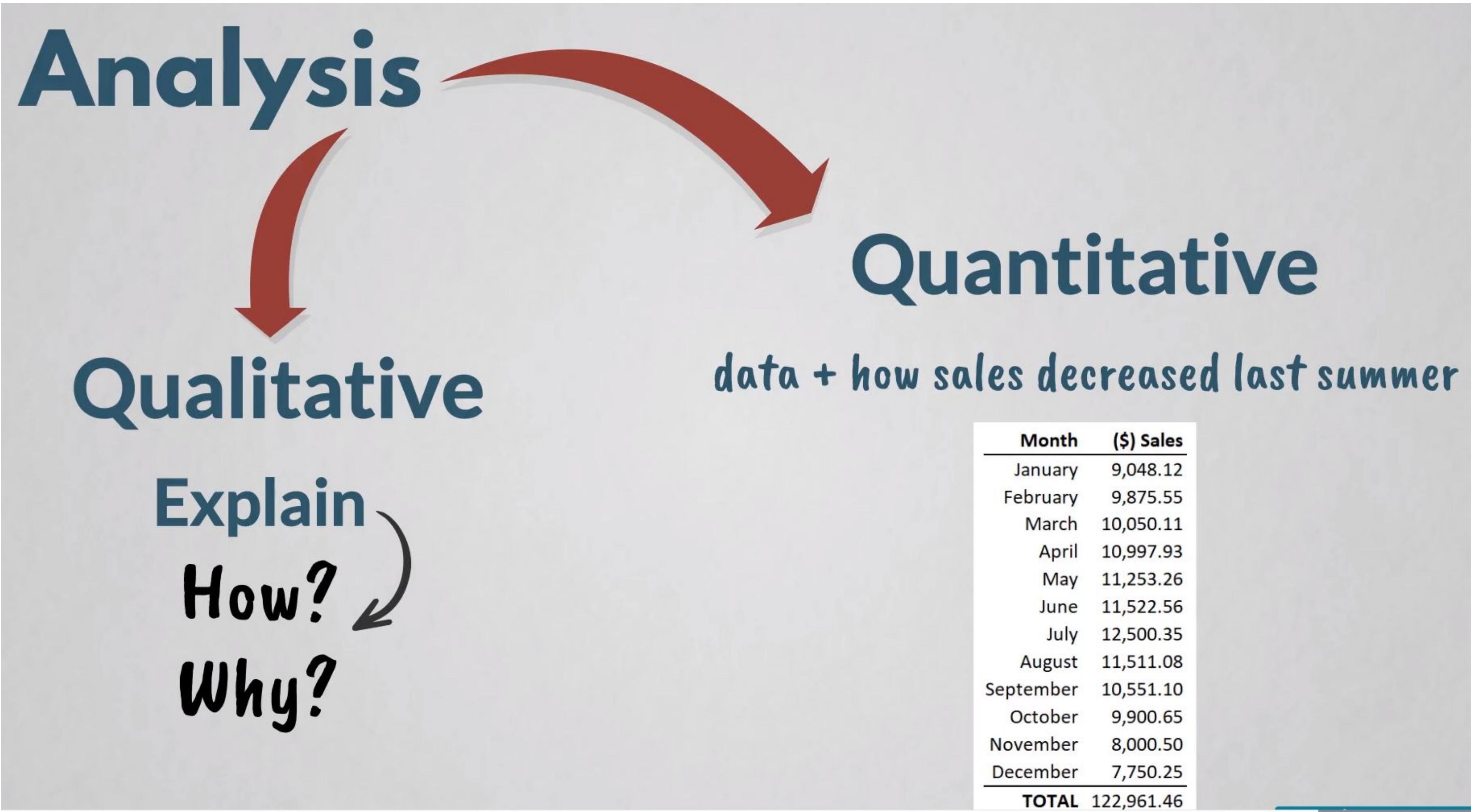


Qualitative Analytics Example

- An owner of an online clothing store
 - understands customers' needs and
 - perform a very detailed **analysis** of women's clothing articles
- Then
 - feels sure about which fashion trends to follow
 - uses **intuition** to decide on which styles of clothing to start selling



Quantitative Analysis vs Qualitative Analysis



SWOT Analysis

- **Qualitative Analysis** (such as SWOT) is not used for **Quantitative Analysis**
 - Hence, they are not part of BI
- **Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis**
 - a technique for assessing these four aspects of business
 - a tool that can help to
 - analyze what your company does best now
 - devise a successful strategy for the future

**Business &
Data &
Data Science**

Business

Business Case
Studies

Qualitative
Analytics

Preliminary
Data Report

Reporting with
Visuals

Creating
Dashboards

Sales
Forecasting

Business

Data?

Business Case
Studies

Qualitative
Analytics

Preliminary
Data Report

Reporting with
Visuals

Creating
Dashboards

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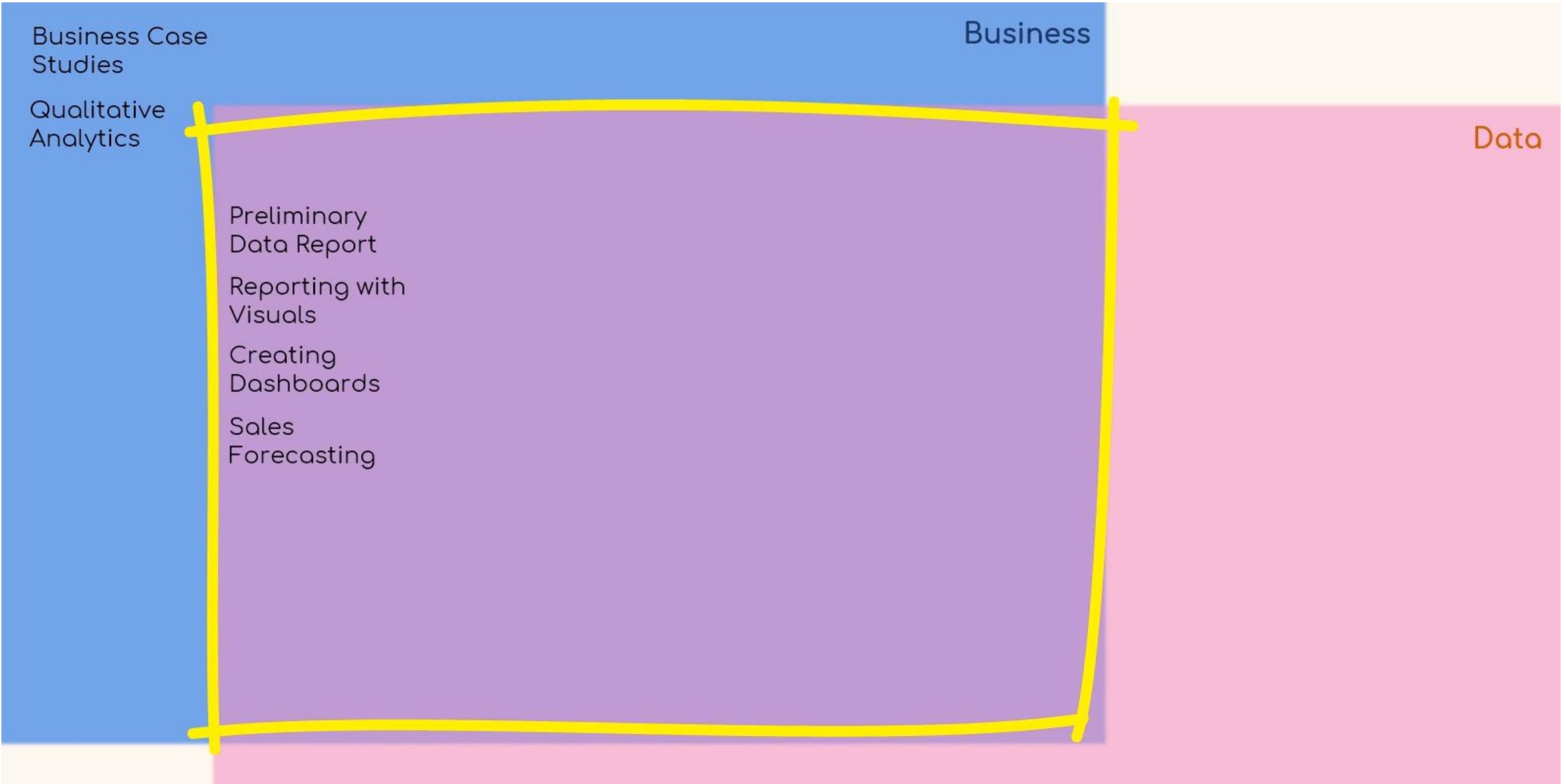
Business

How many of these terms involve working with data?

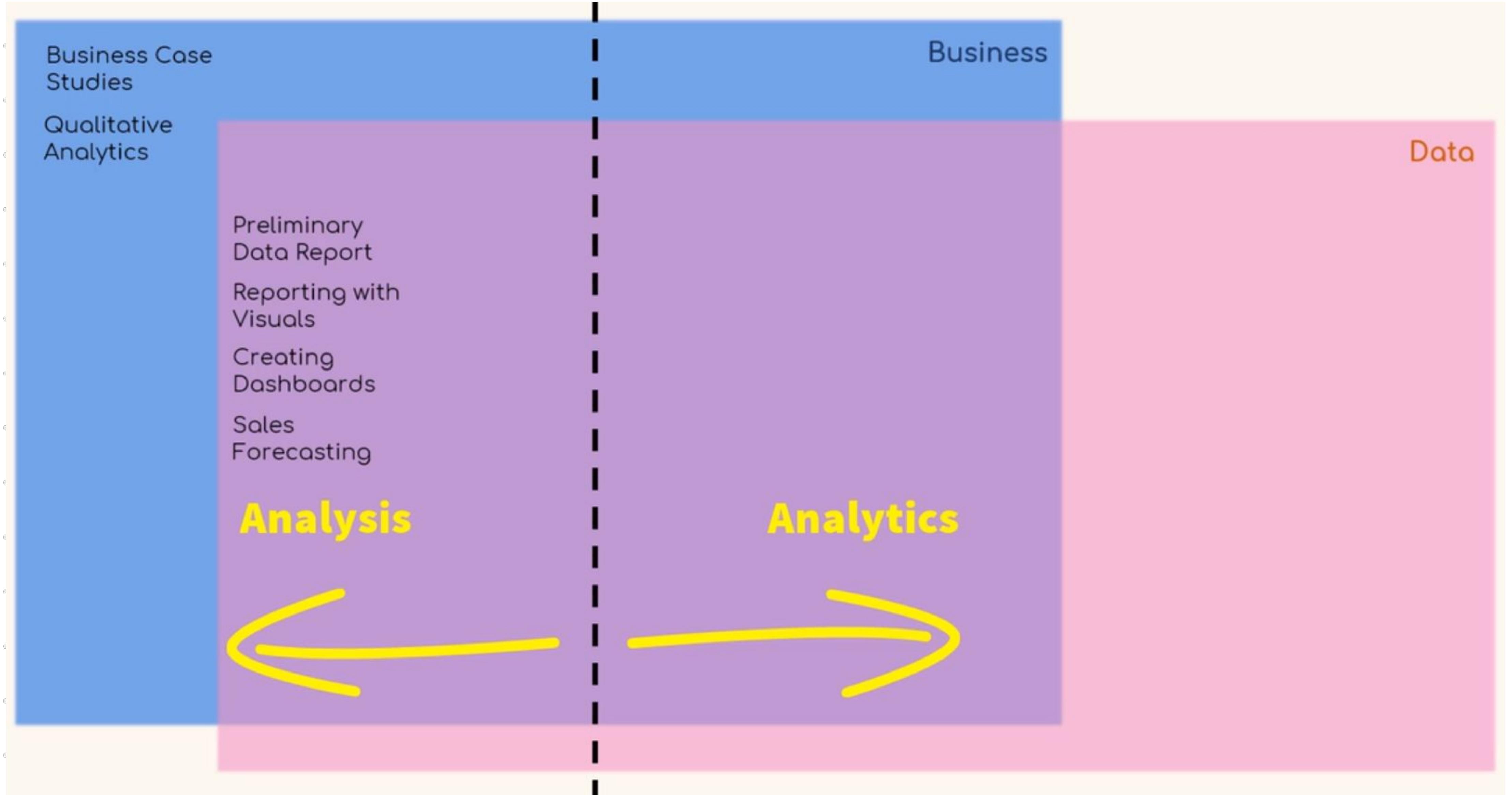
Data?



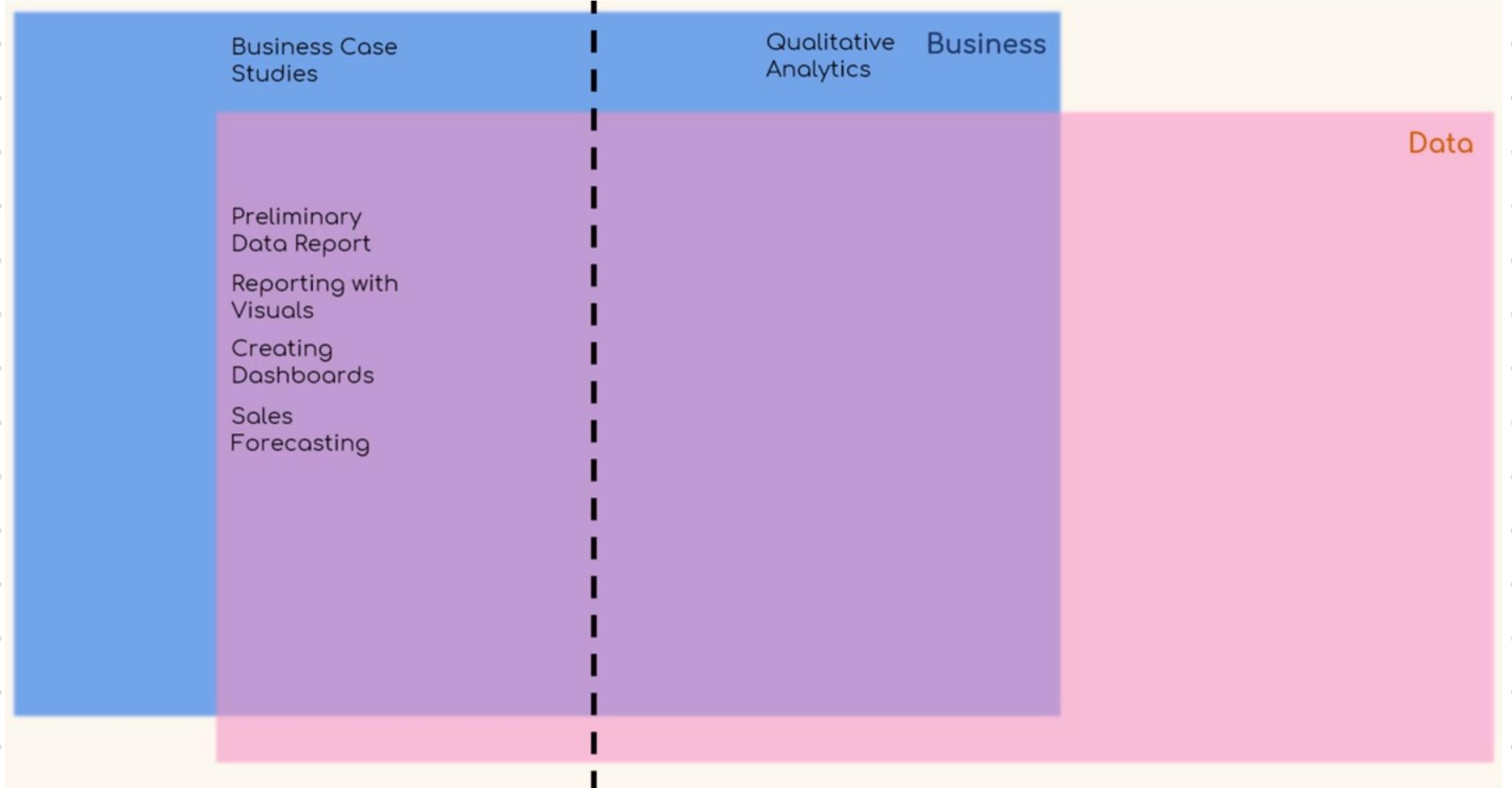
Data



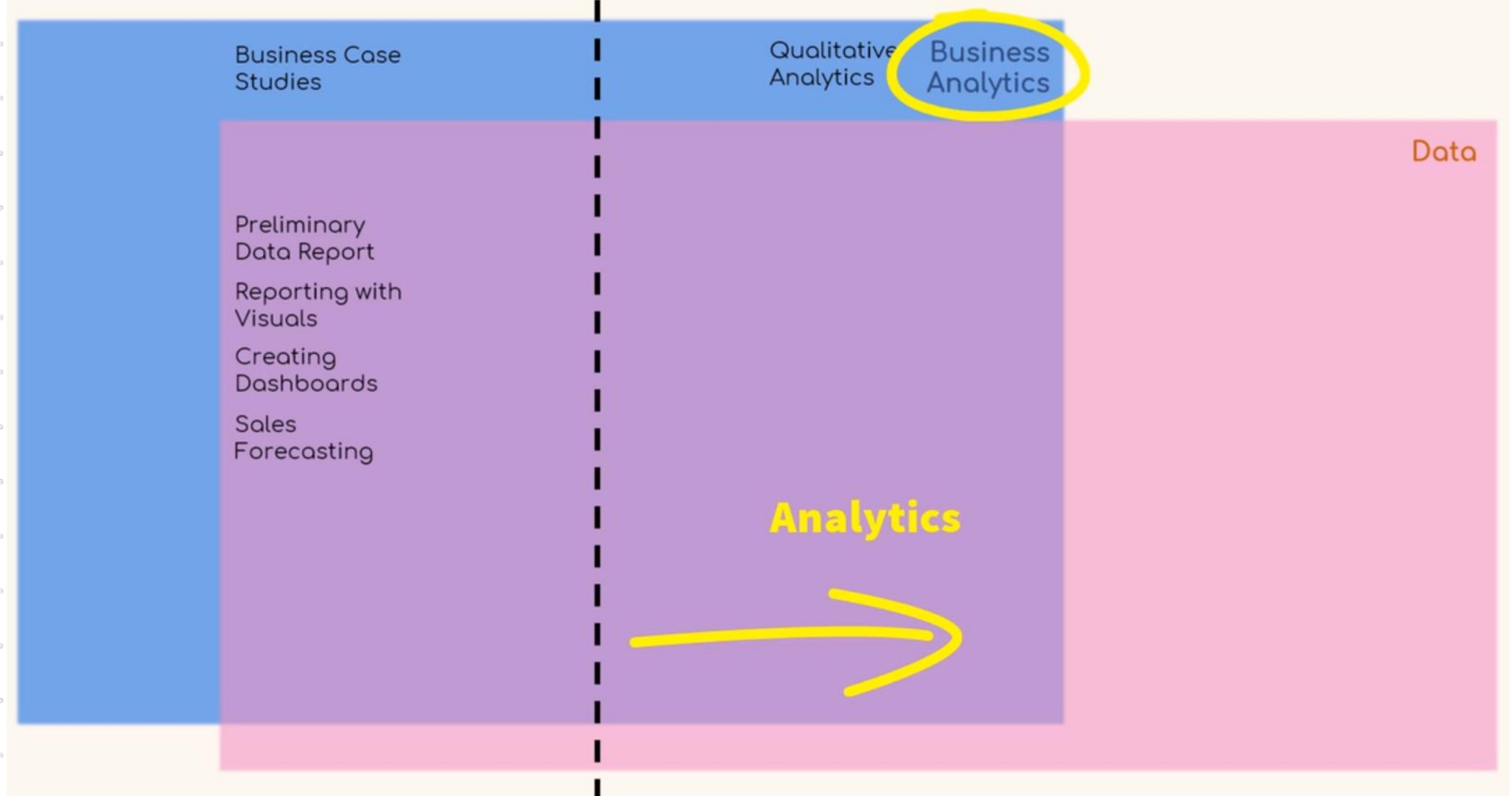
Past vs Future?



Past vs Future



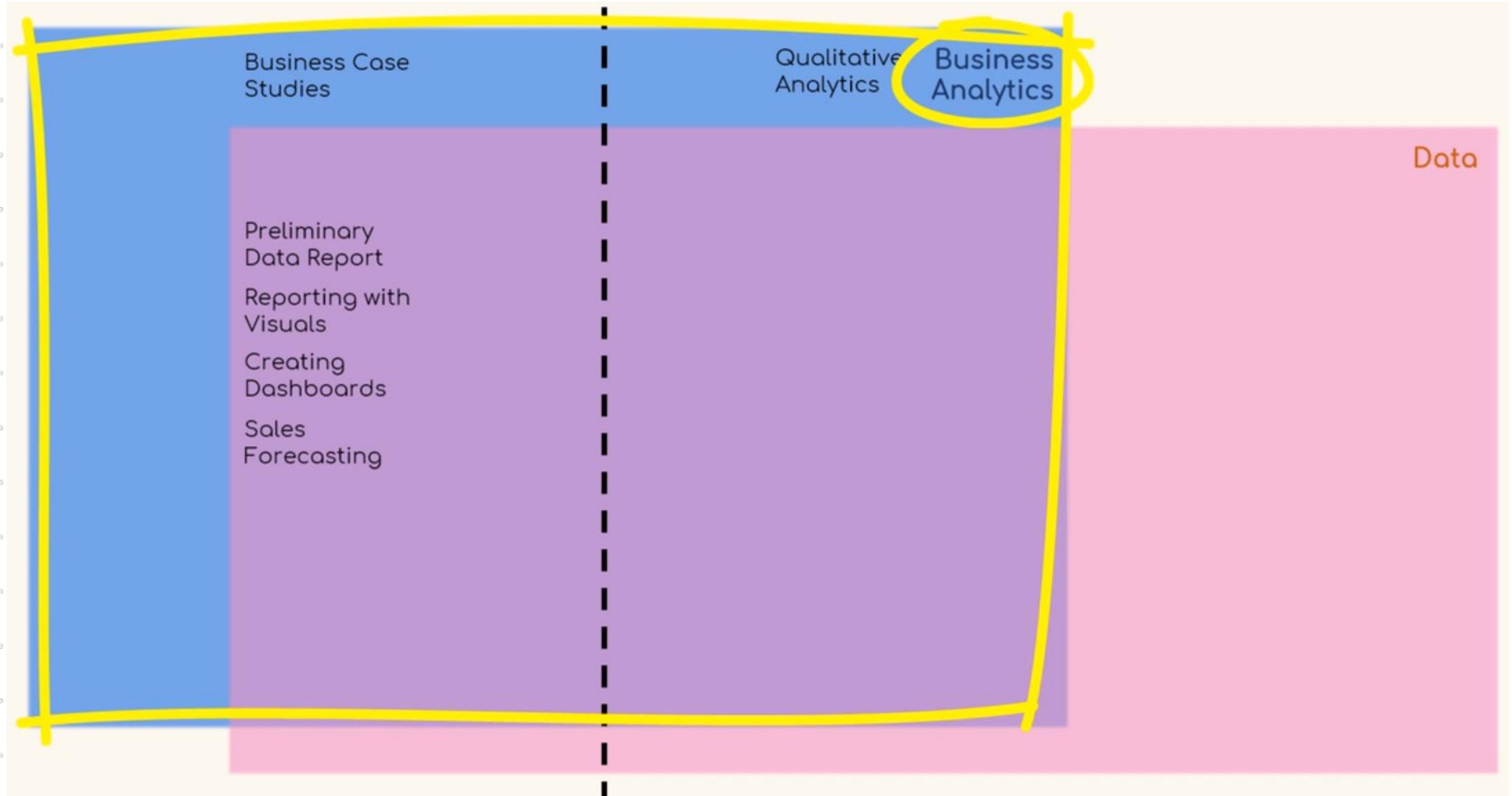
Business Analytics



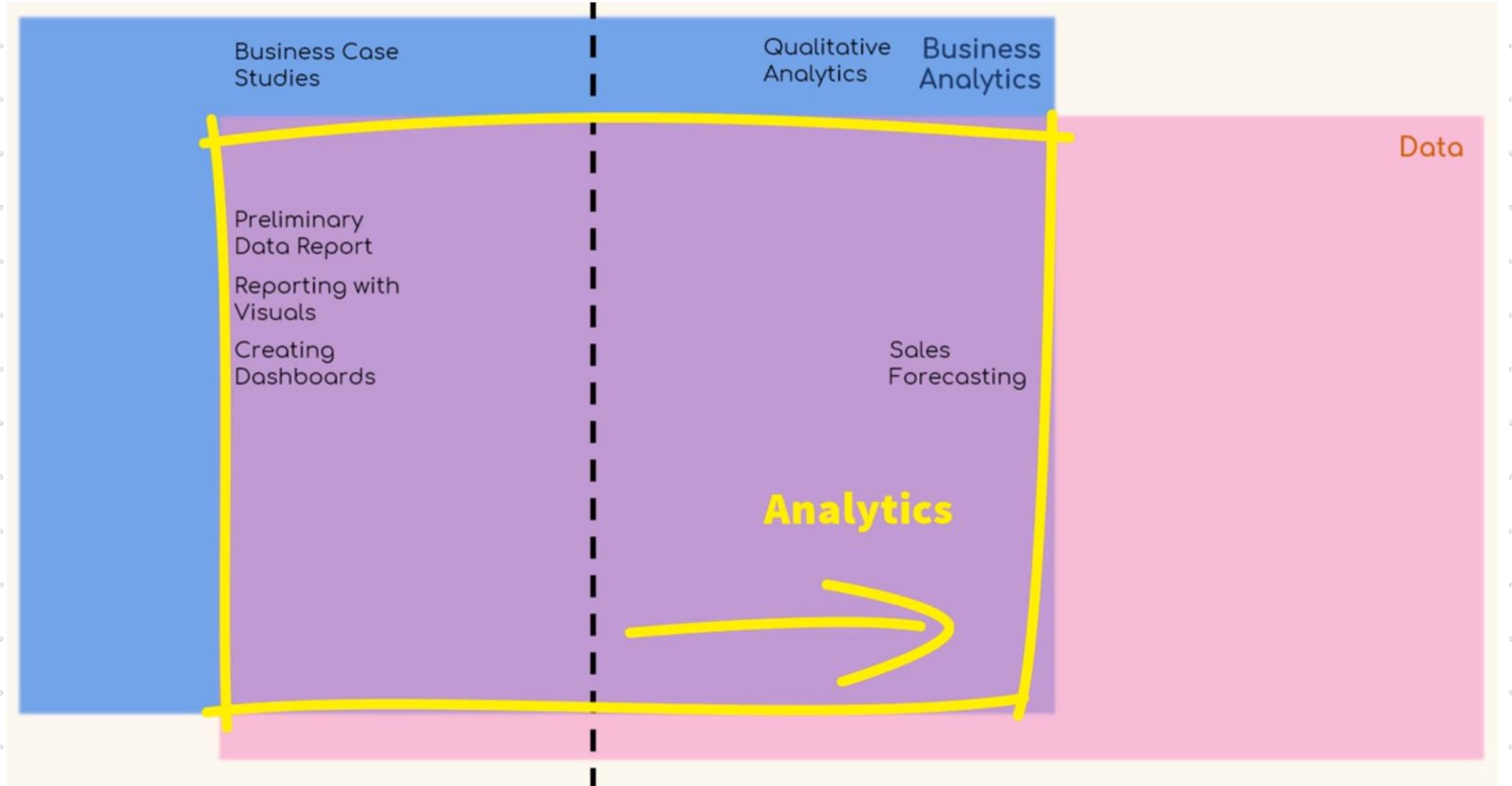
Business Analysis



Business Analytics += Business Analysis



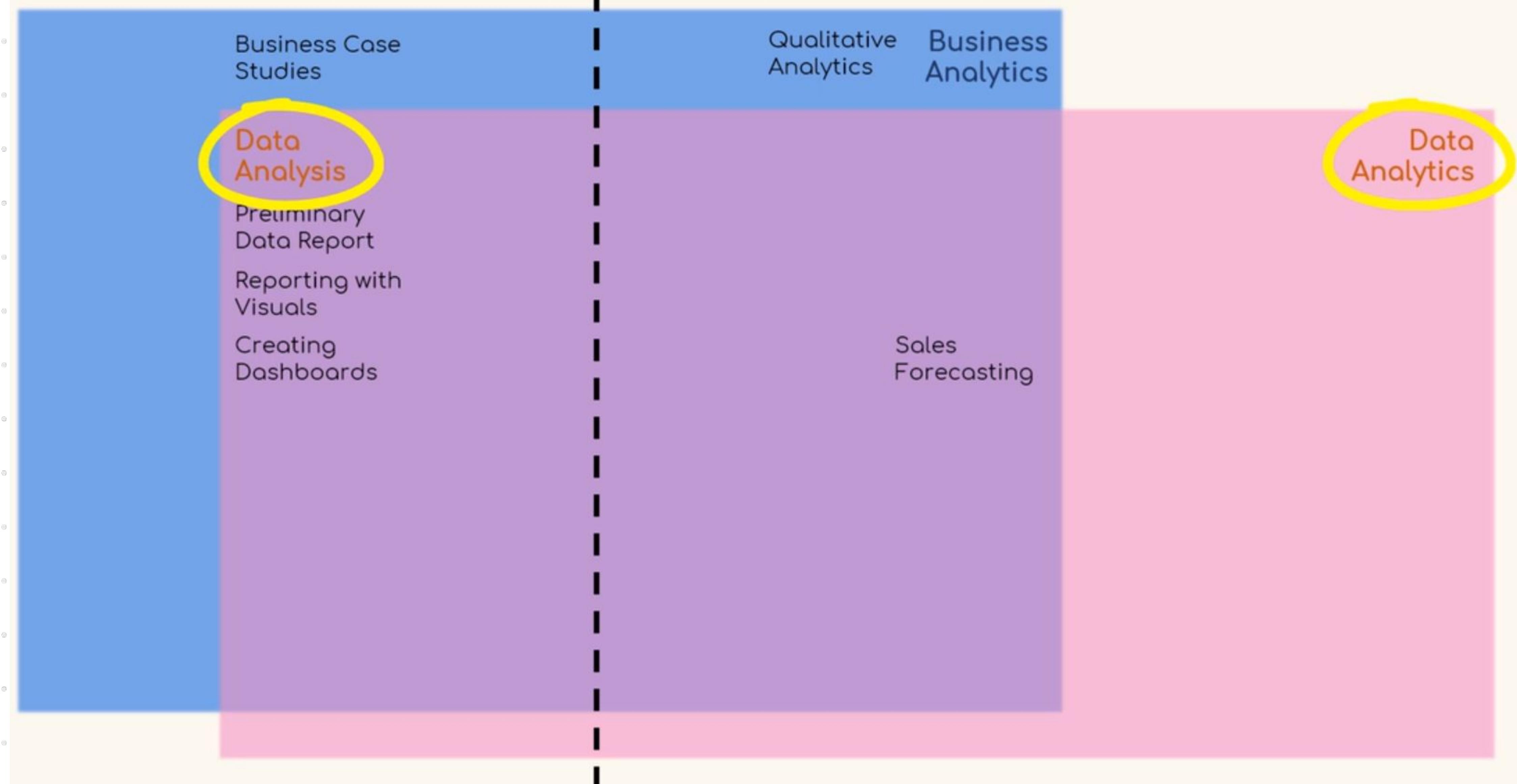
Data Analytics?



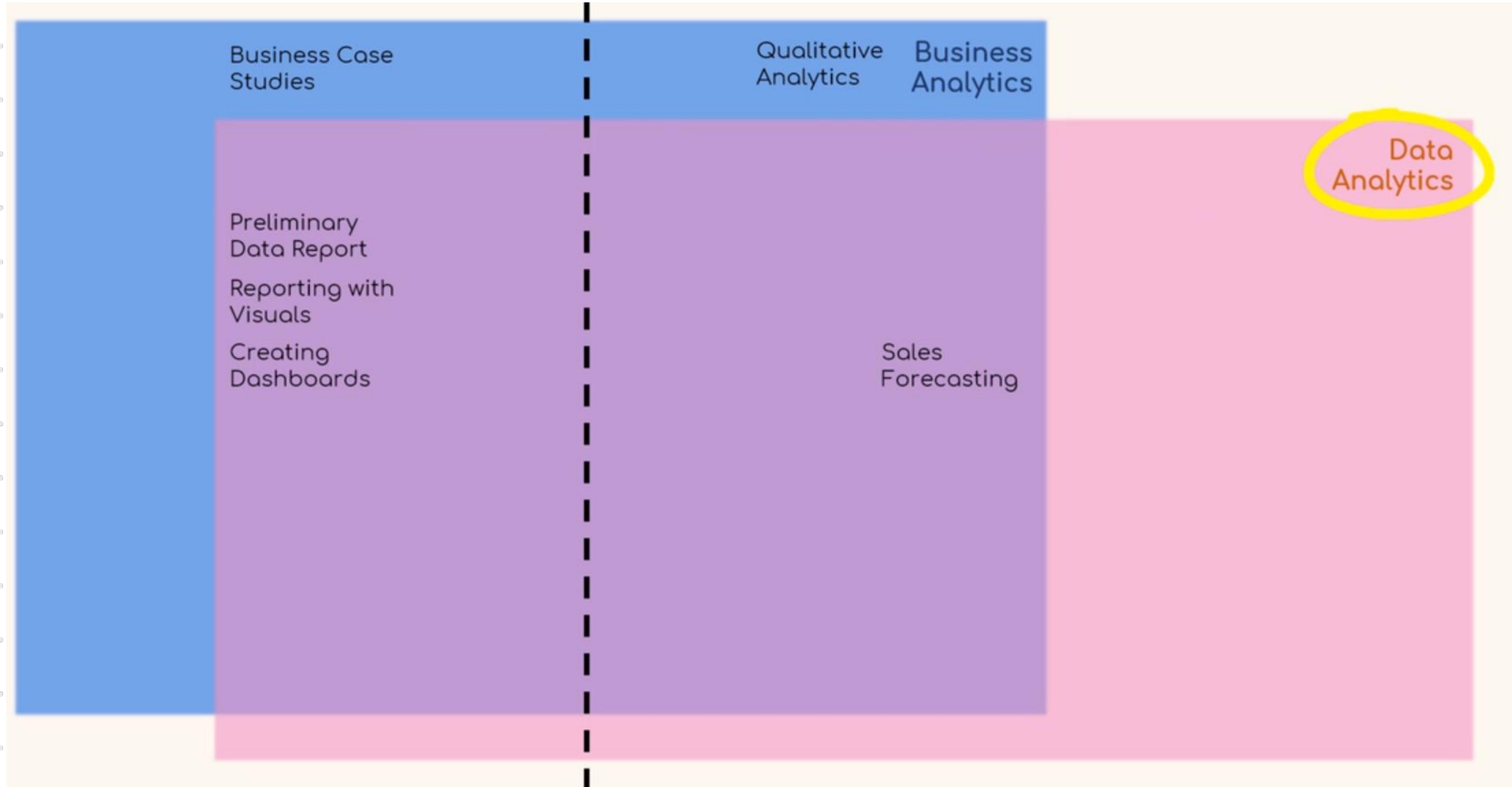
Data Analytics



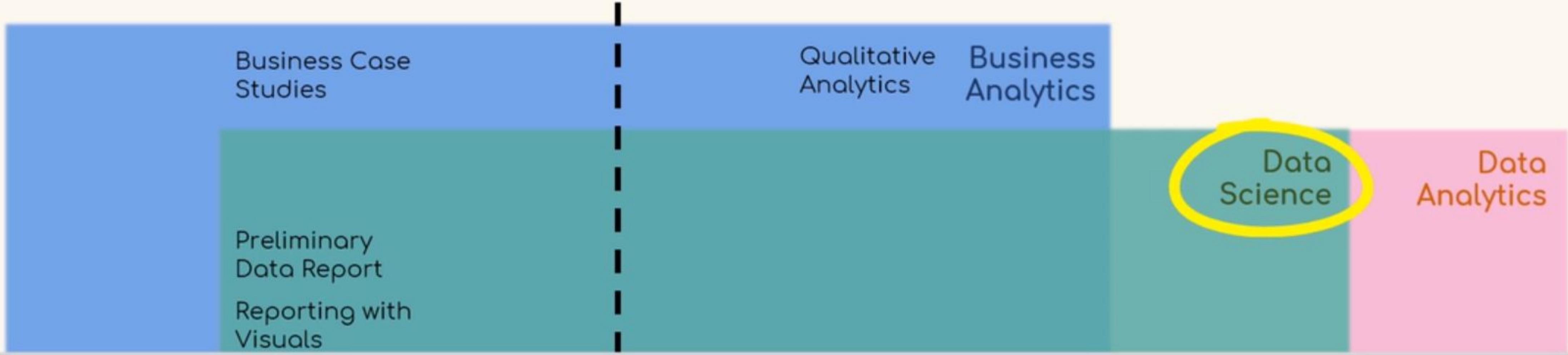
Data Analysis



Data Analytics += Data Analysis

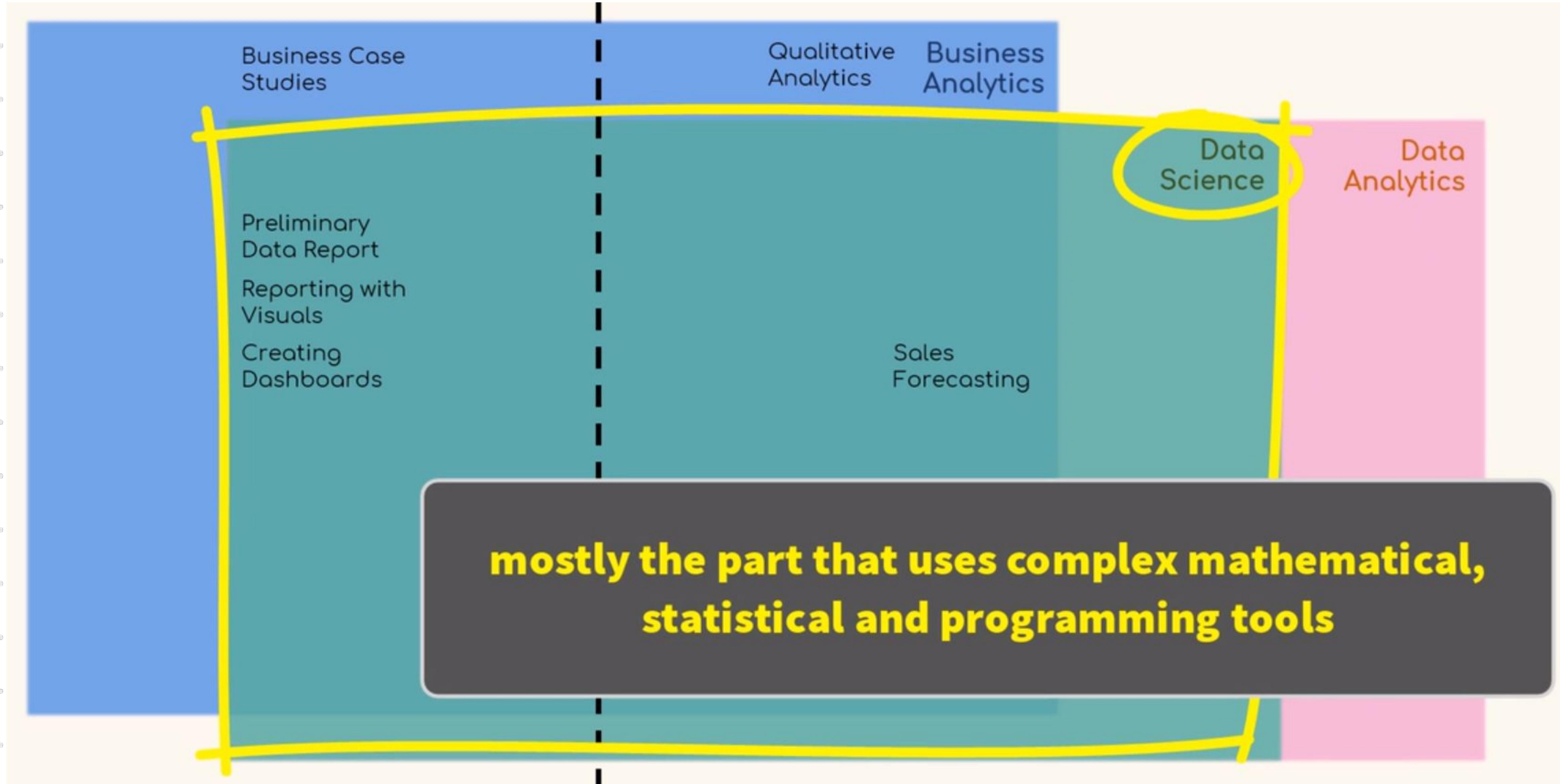


Data Science - 1

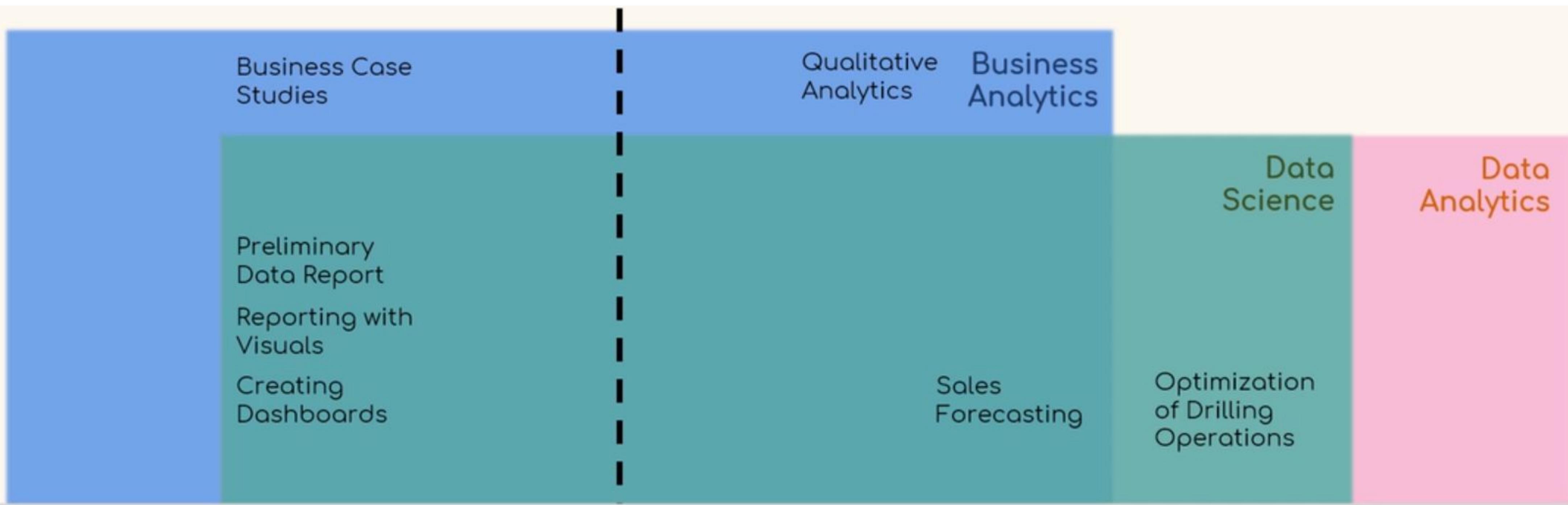


**data science is a discipline reliant on data availability,
while business analytics does not completely rely on data**

Data Science - 2

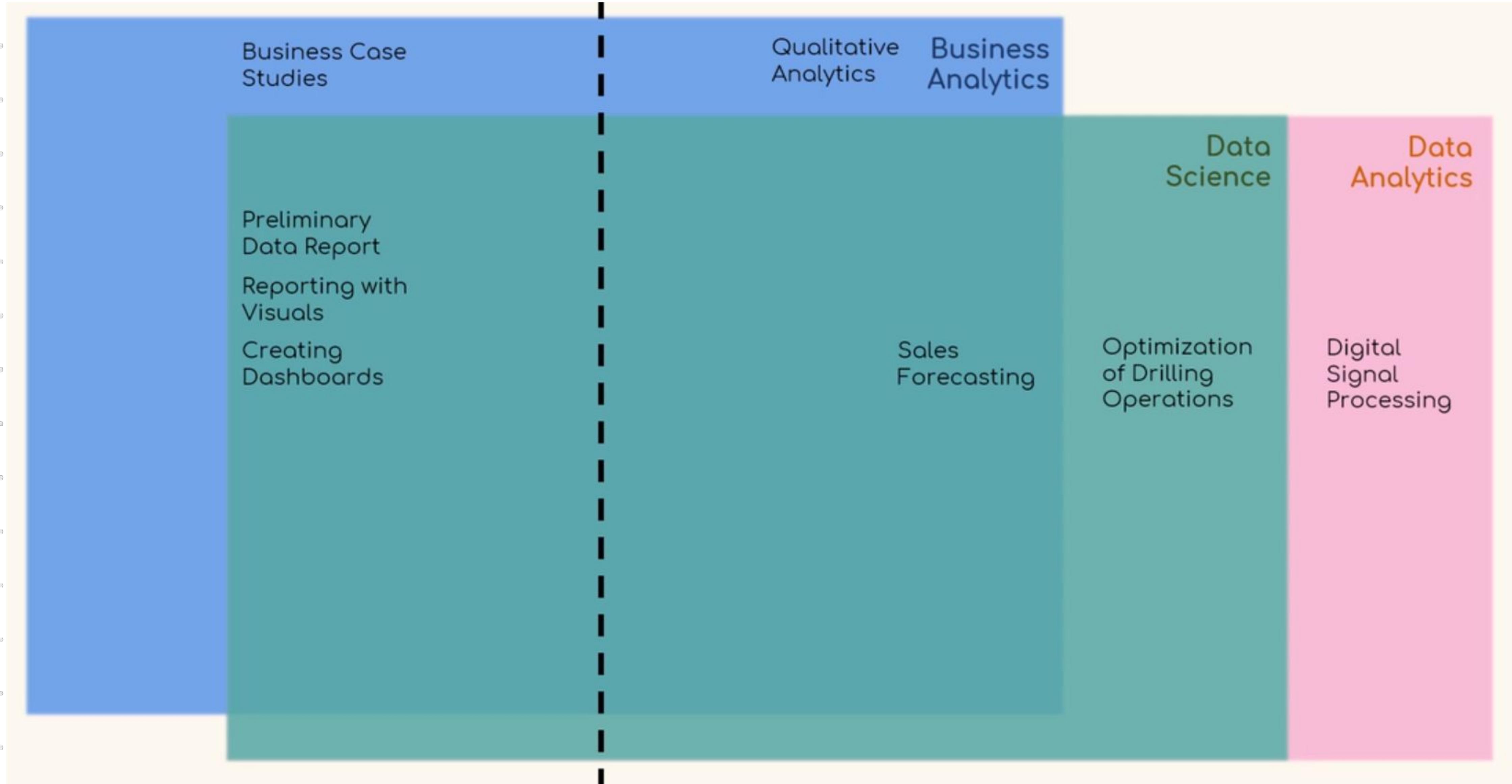


Drilling Operations Optimization



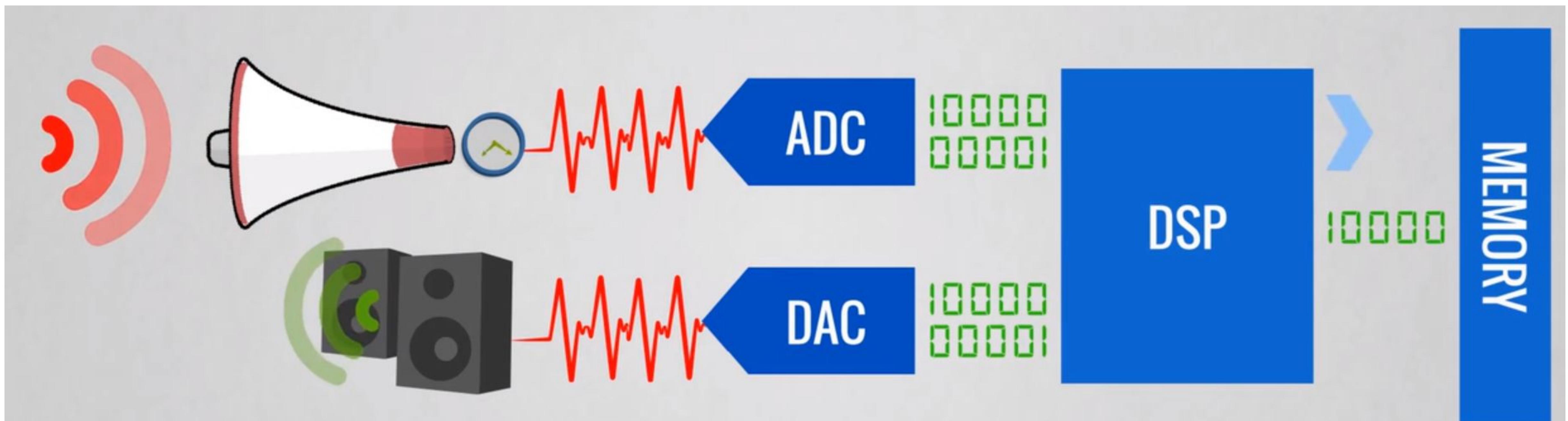
data science can be used to improve the accuracy of predictions based on data extracted from various activities typical for drilling efficiency

Digital Signal Processing (DSP) - 1



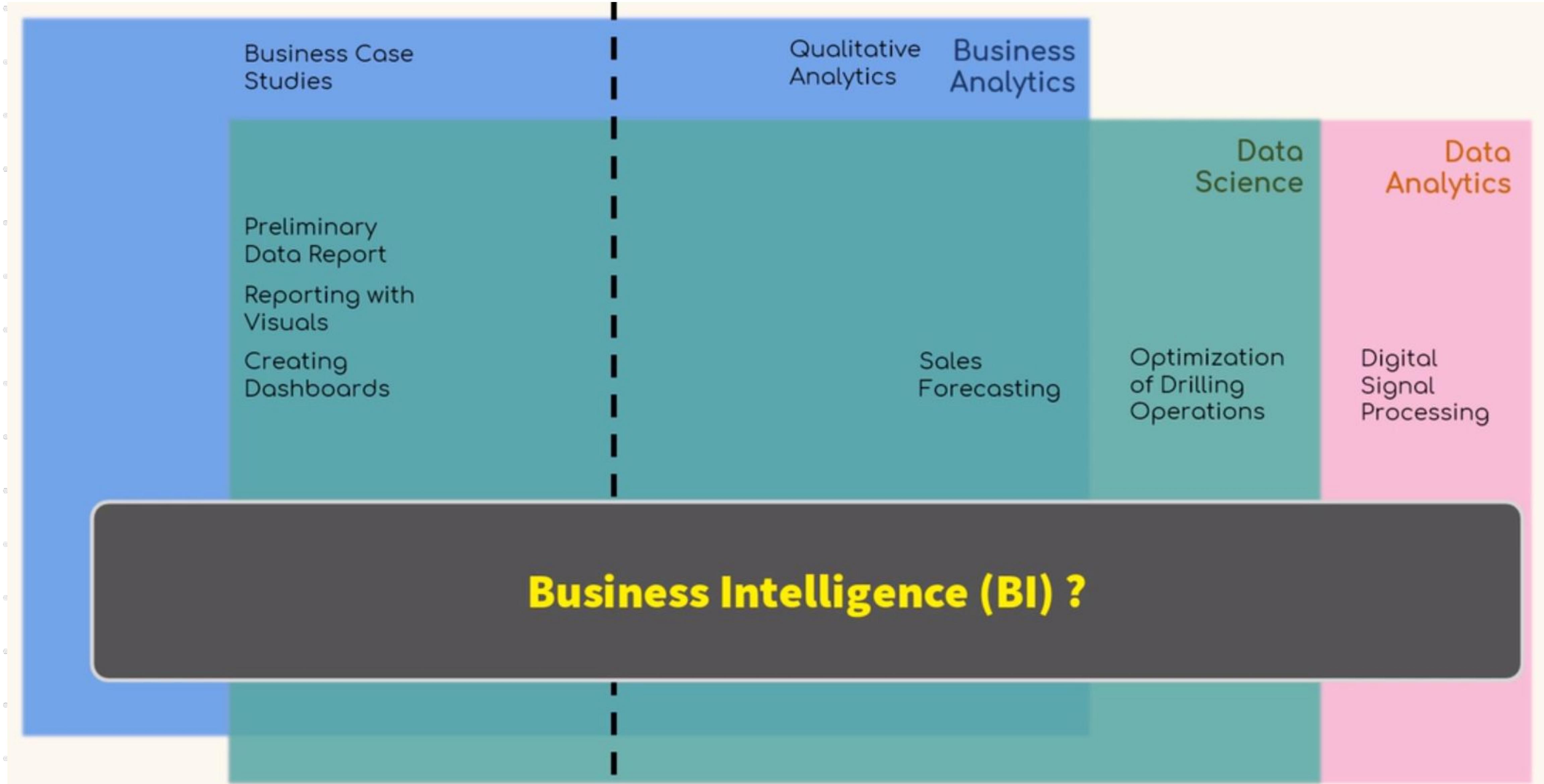
Digital Signal Processing (DSP) - 2

- Apply **Data Analytics** to **Digital Signal** to produce a higher quality signal
 - Analog-to-Digital Conversion (ADC)
 - Digital-to-Analog Conversion (DAC)



BI

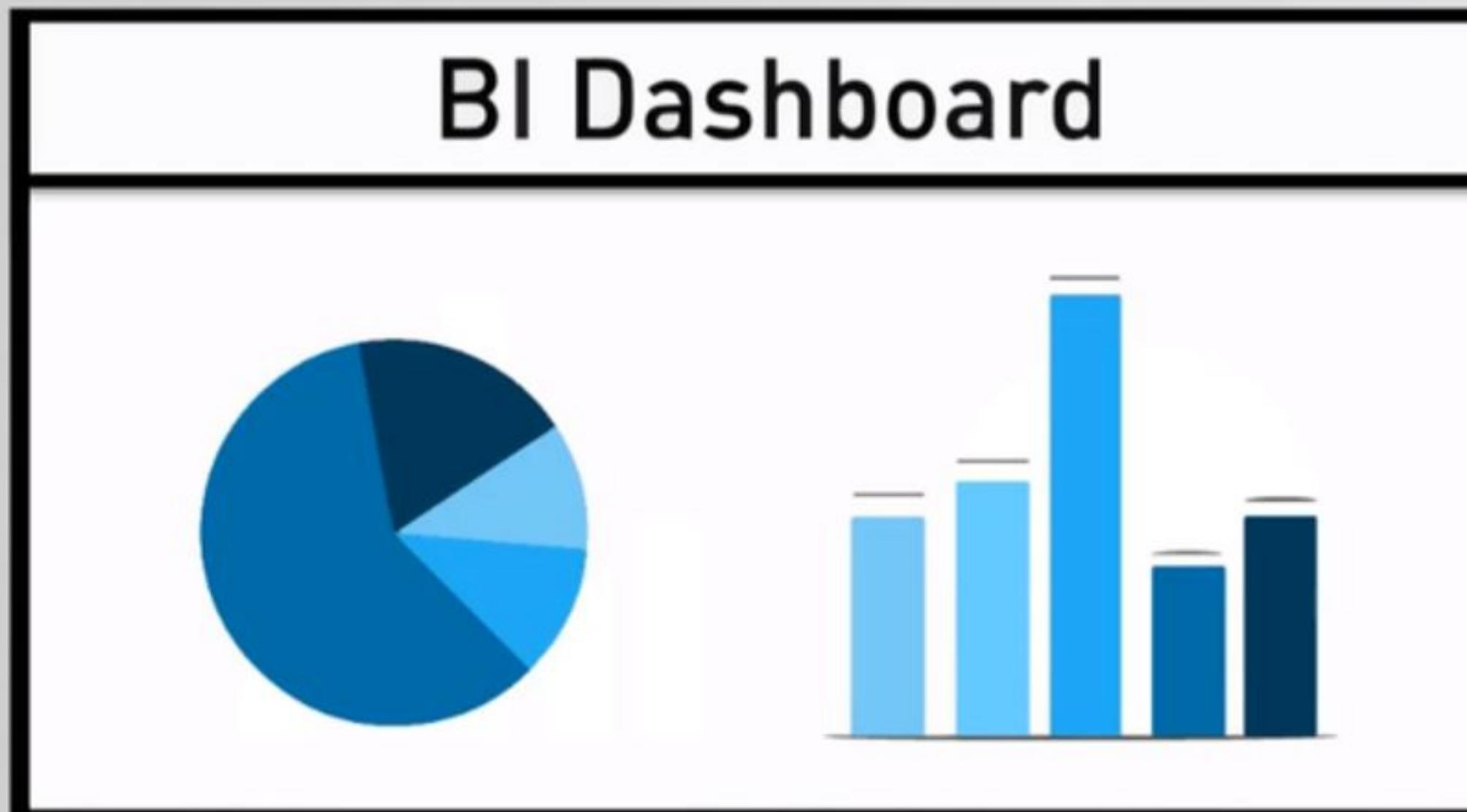
Business Intelligence (BI) ?



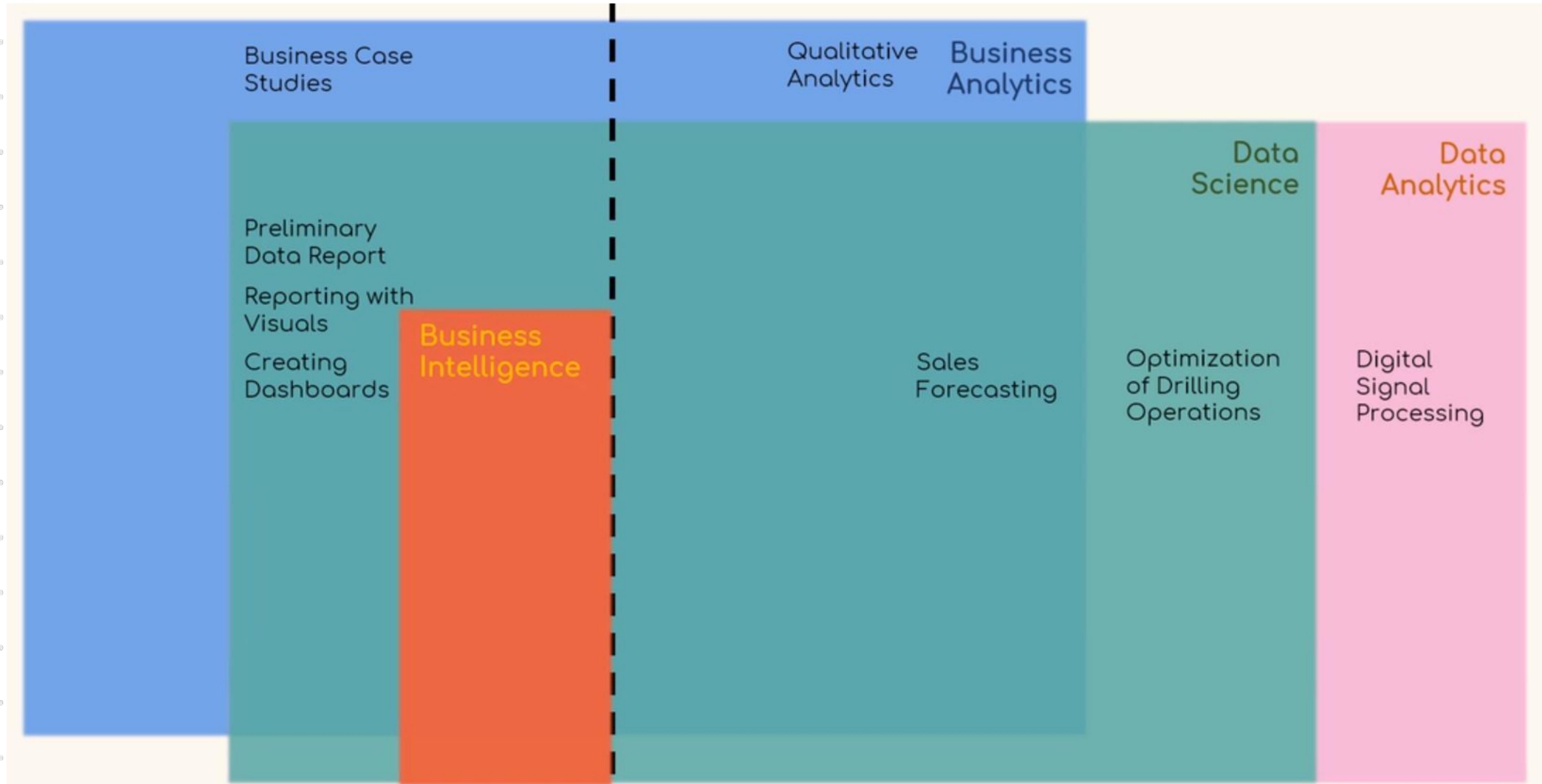
Business Intelligence (BI) - 1

business intelligence (BI): the process of analysing and reporting historical business data

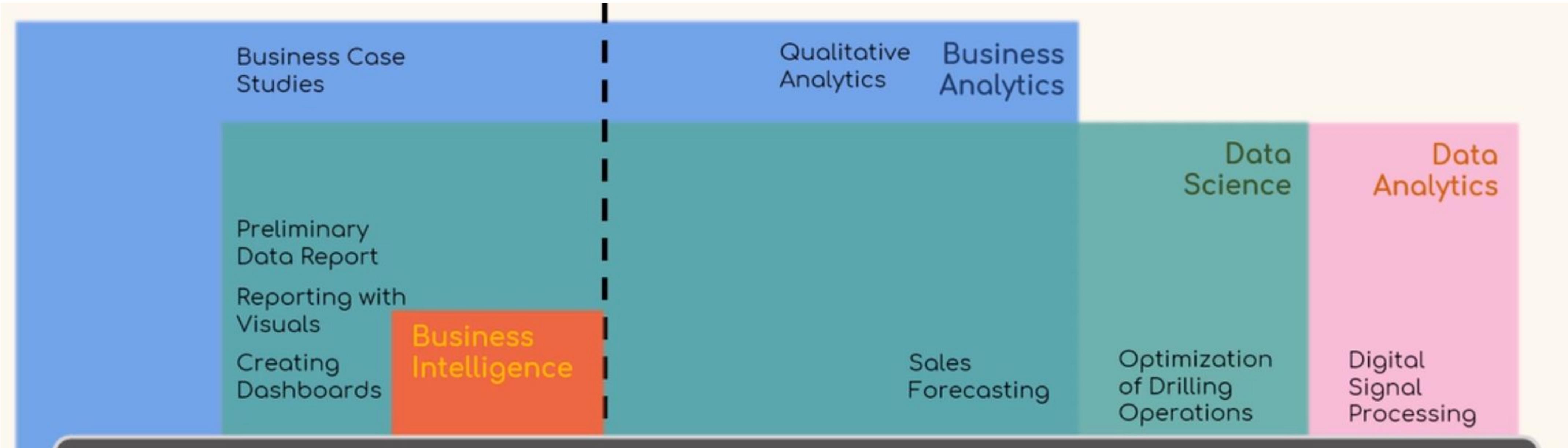
aims to explain past events using business data



Business Intelligence (BI) - 2



Business Intelligence (BI) - 3



Business intelligence is the preliminary step of predictive analytics

1. analyse past data and extract useful insights

2. create appropriate models

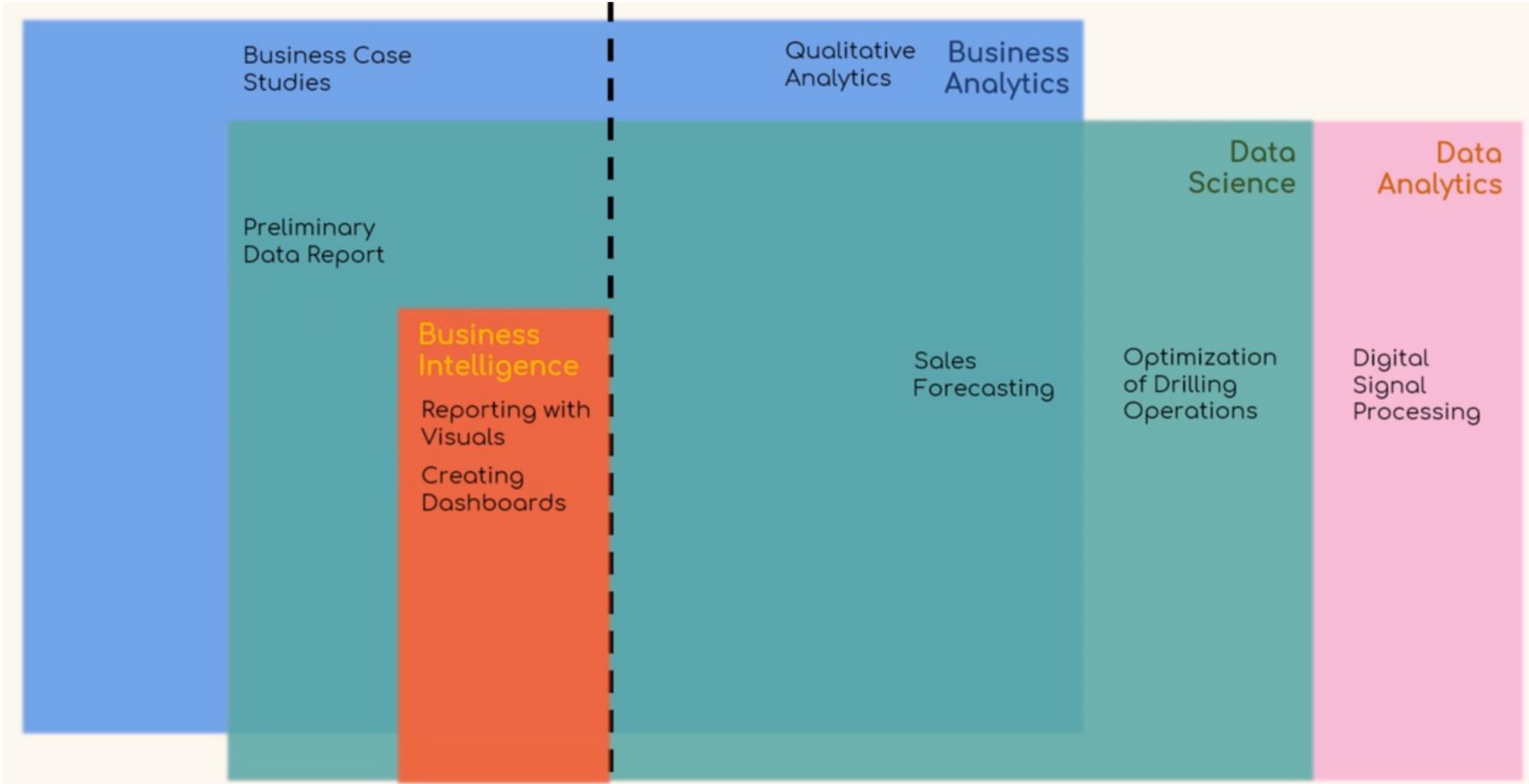
Business Intelligence (BI) - 4

- analyse the **past** that you acquired (analyse past data)
- allows to make decisions, extract insights, and extract ideas
- includes all technology-driven tools involved in the process of:
 - analysing
 - understanding
 - reporting available past data

Business Intelligence (BI) - 5

- After preparing Reports & Dashboards:
 - They can be used to make strategic/tactical business decisions
 - by end-users (such as general manager)
 - Using these inferences will allow to
 - create appropriate models that could predict the future of business accurately

Business Intelligence (BI) - 6



Preliminary Data Report - 1



Preliminary Data Report - 2

Preliminary Data

- are data that do not have 12 months of reporting delay
- can apply to both annual and cumulative quarterly data



23 January 2023
ESMA70-446-775

Reasons for publication

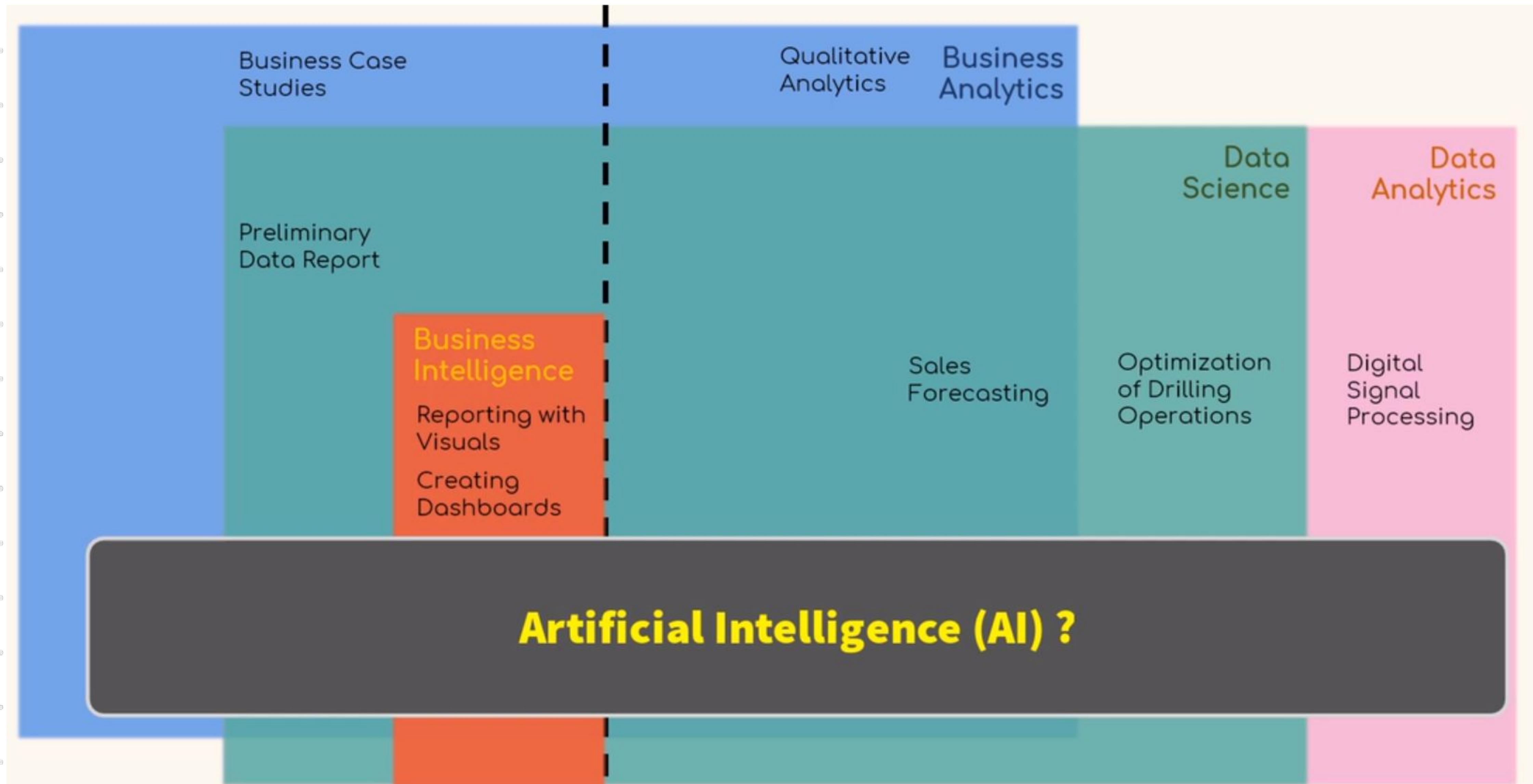
On 22 December 2022, the European Council adopted Regulation (EU) 2022/2578 (the Regulation) establishing a market correction mechanism (MCM) to protect Union citizens and the economy against excessively high prices. The Regulation will enter into force on 1 February with application from the same day while the MCM only starts applying on 15 February 2023. Under Article 8(5) of the Regulation, ESMA is required to publish a preliminary data report concerning the introduction of the MCM by 23 January 2023 to be followed by an effects assessment by 1 March 2023. This report is the ESMA preliminary data report. ACER is also required to publish such a data report and ACER and ESMA have produced their respective reports in close cooperation.

Preliminary data report

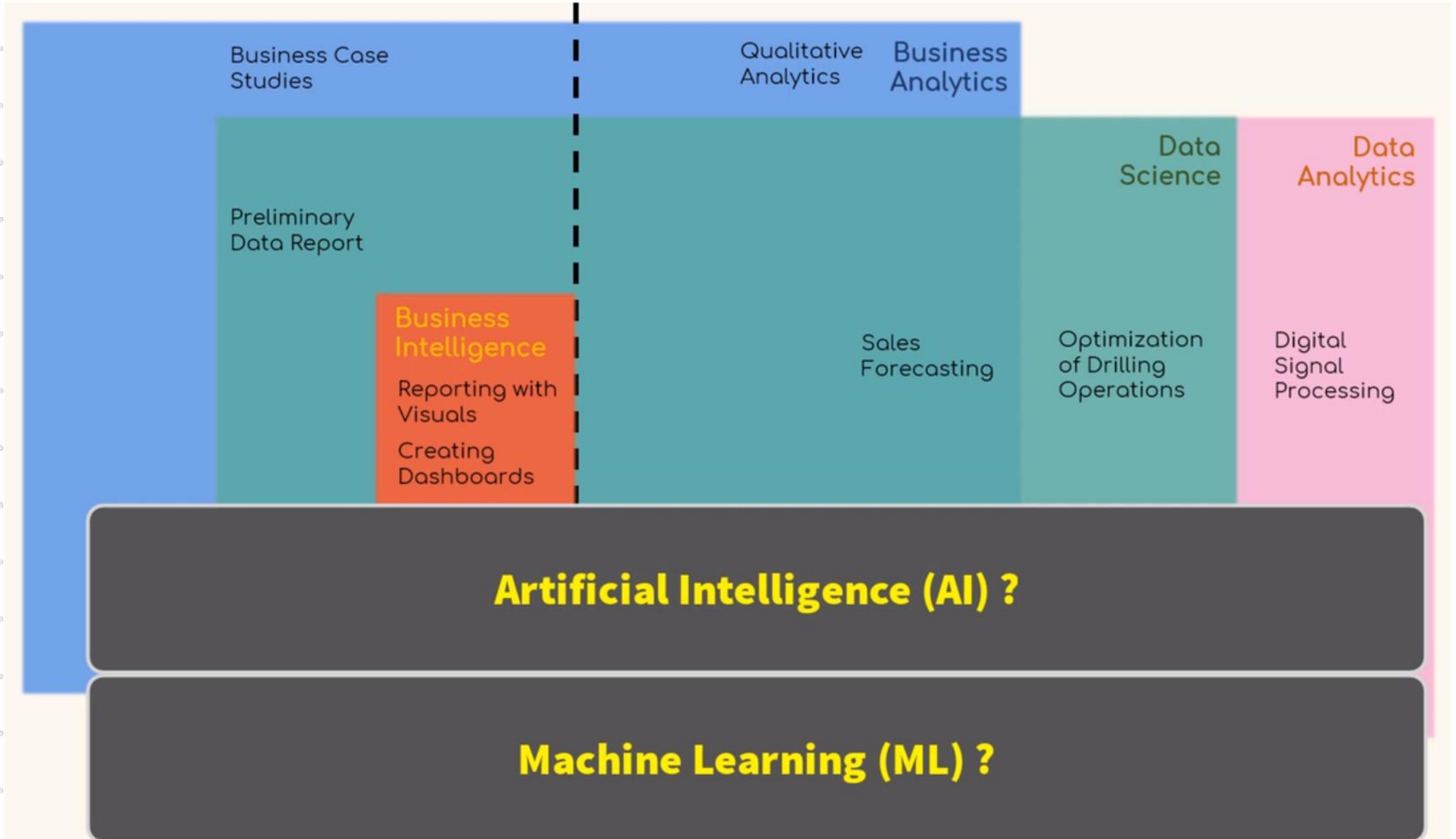
On the introduction of the market correction mechanism

AI

Artificial Intelligence (AI)?



Machine Learning (ML)?



Machine Learning (ML) - 1

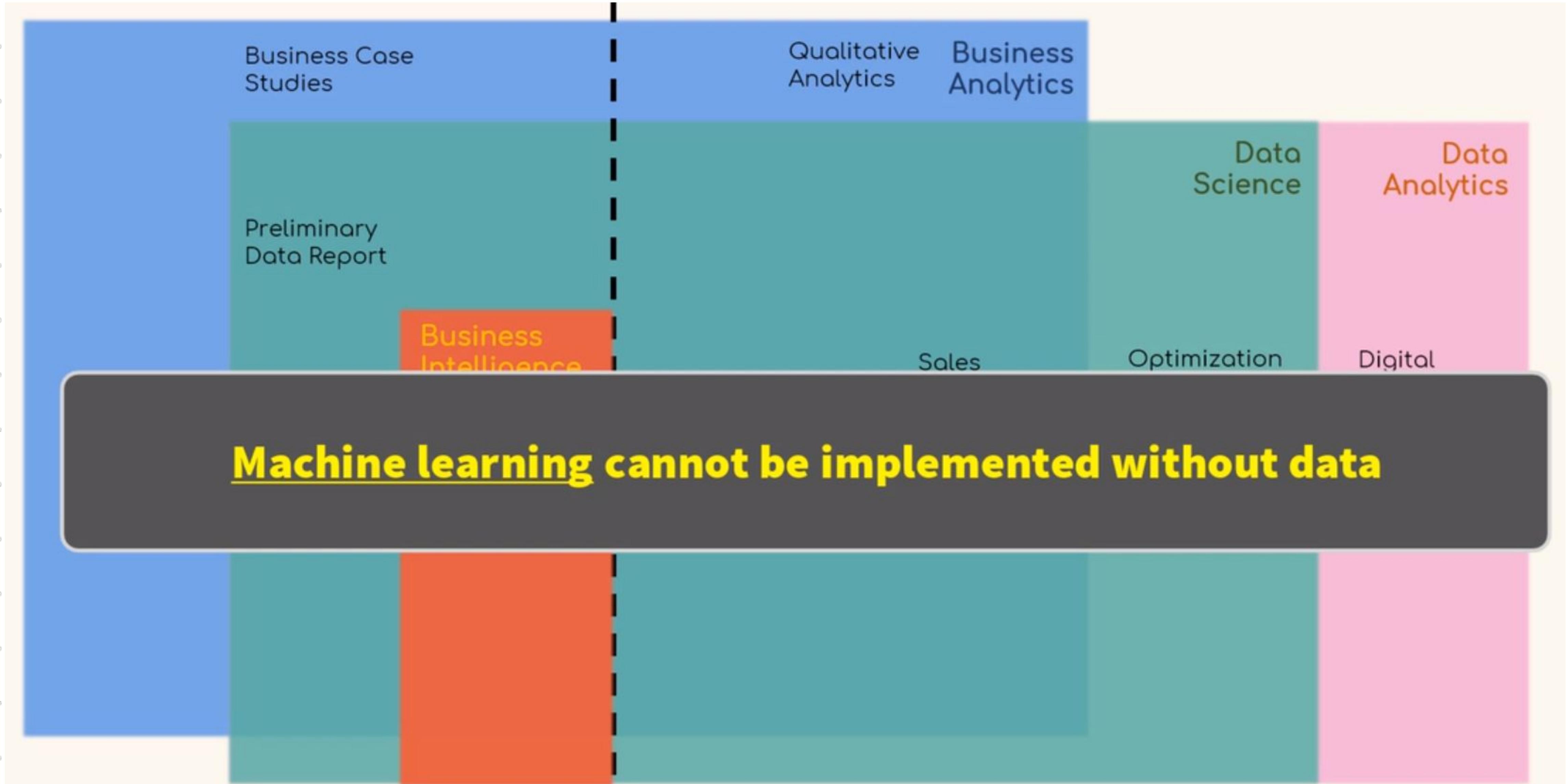
machine learning: The ability of machines to predict outcomes without being explicitly programmed



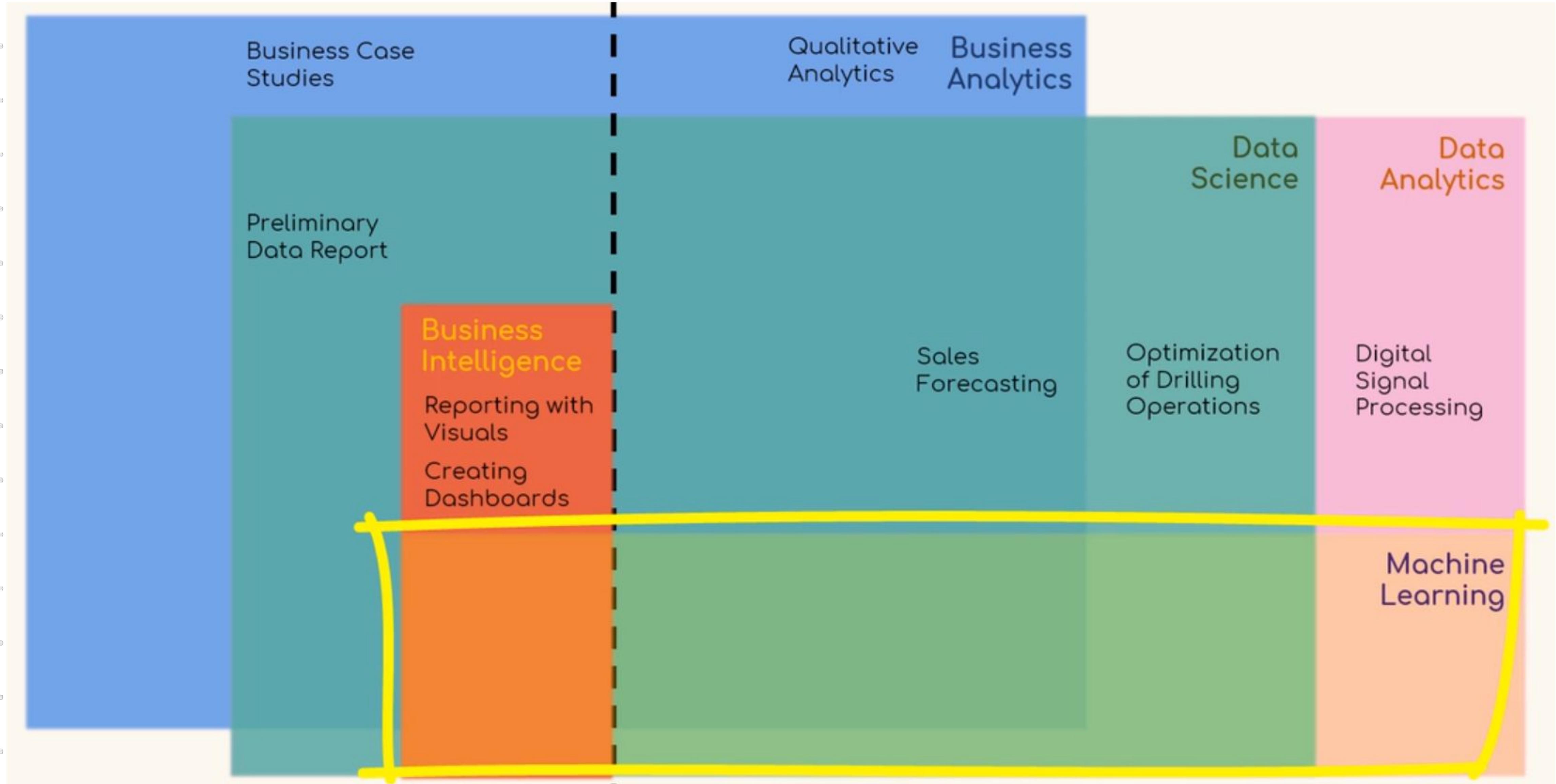
ML is about creating and implementing algorithms that let machines receive data and use this data to:

- make predictions
- analyse patterns
- give recommendations

Machine Learning (ML) - 2

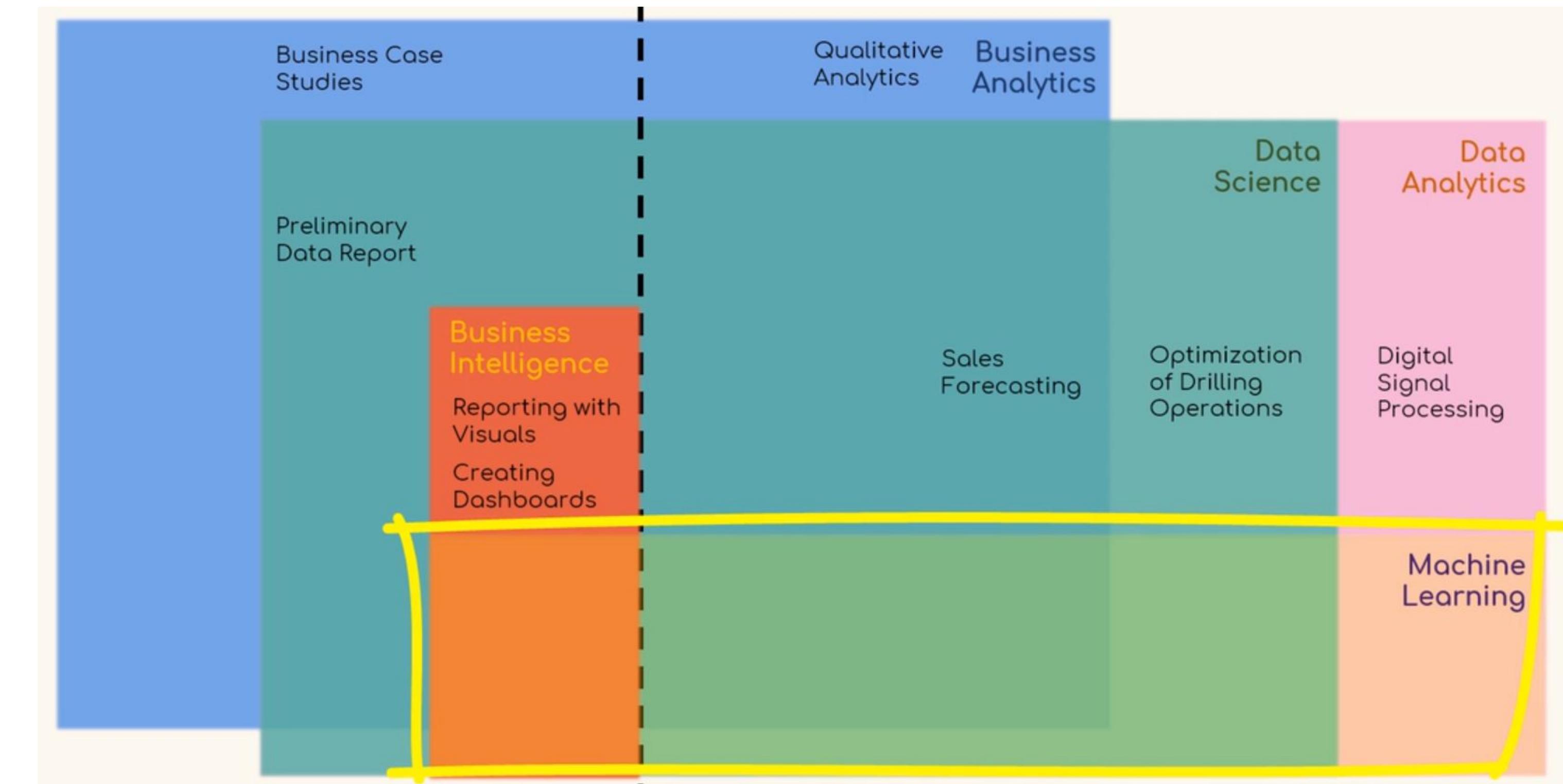


Machine Learning (ML) - 3

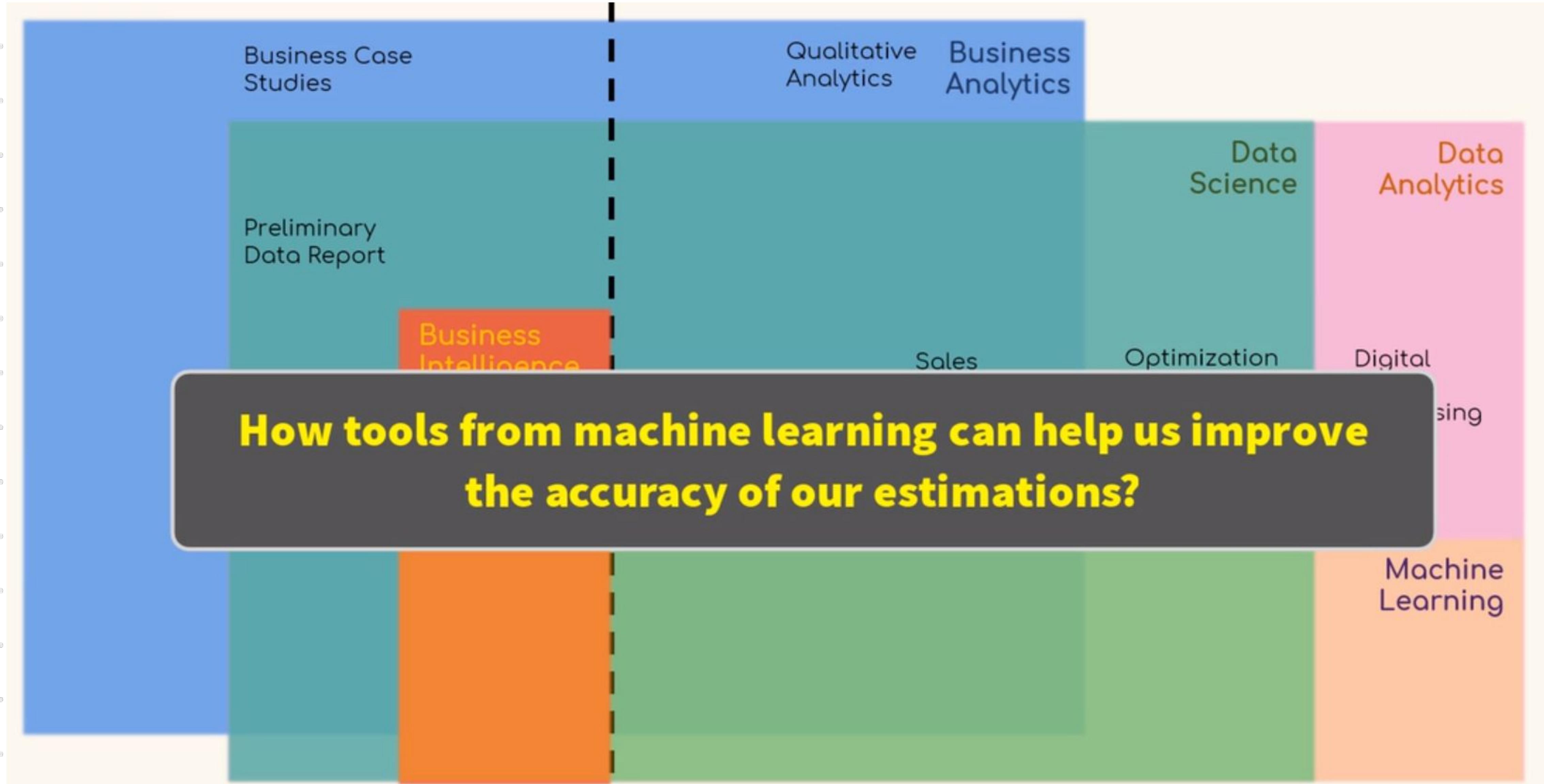


Machine Learning (ML) - 4

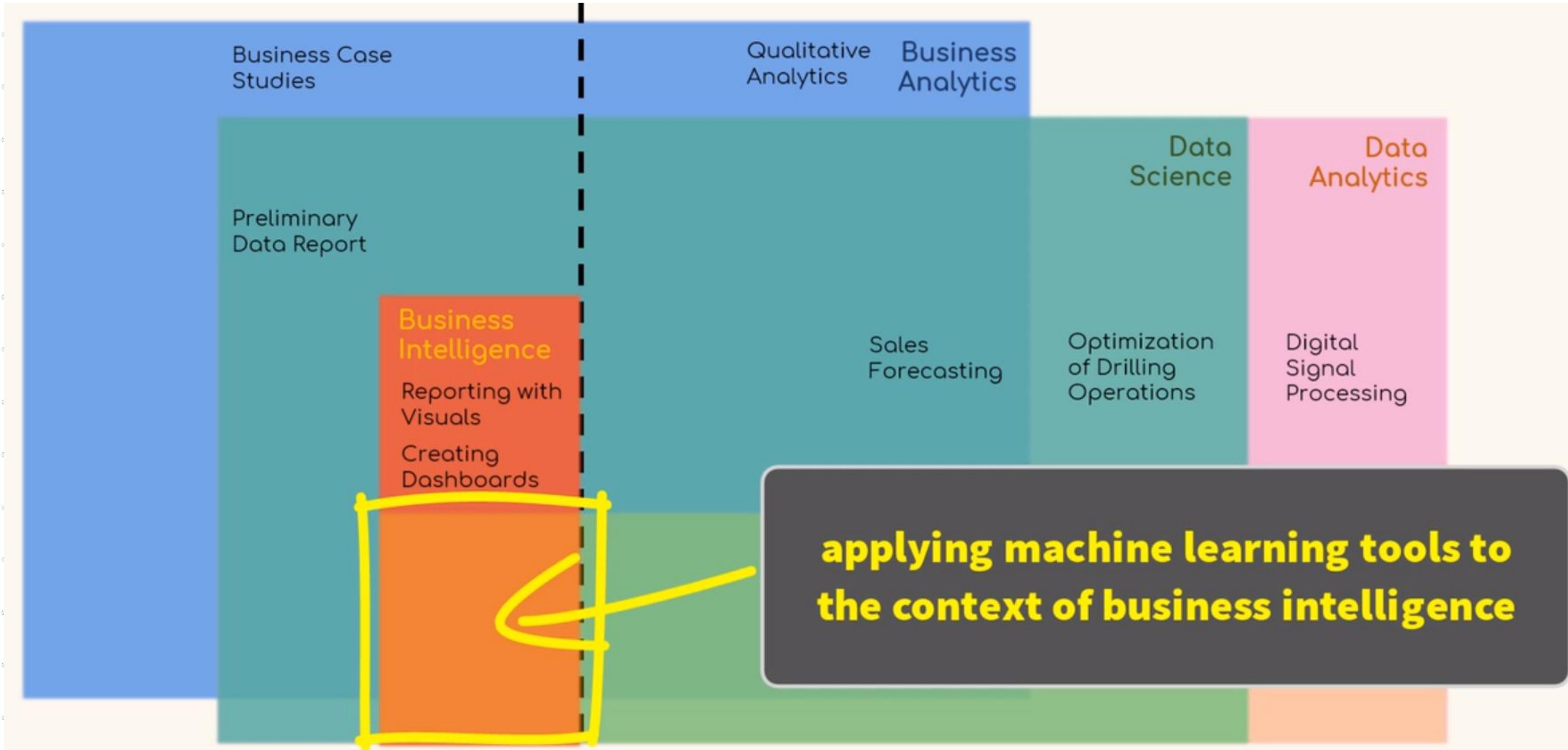
- ML stay within Data Analytics completely
- This could be considered a **bold statement** to make
 - As it **debatable** whether this is correct
 - Some argue that **Data Analytics** and **ML** are two unrelated scientific fields



Machine Learning (ML) - 5



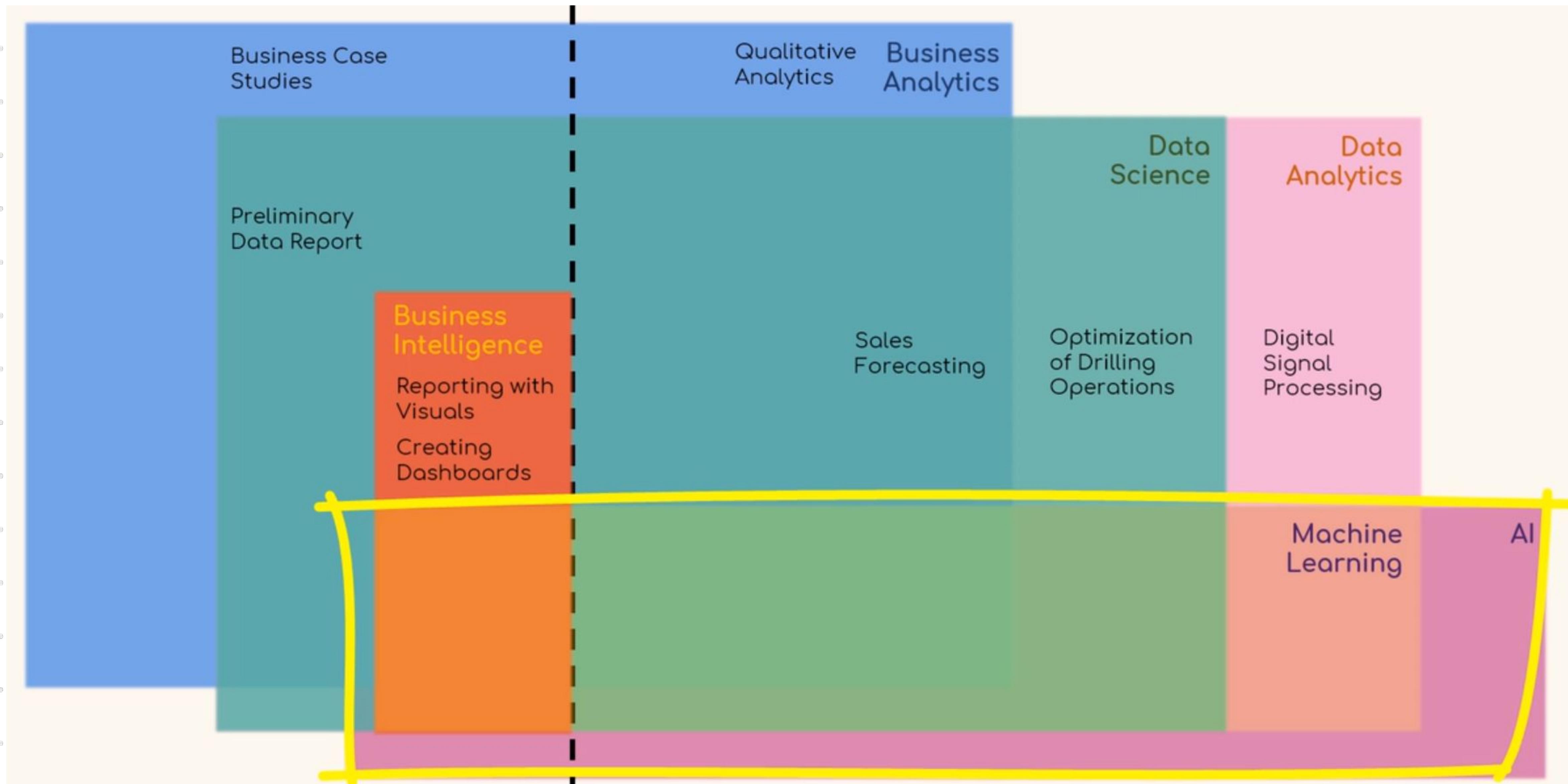
ML with BI - 1



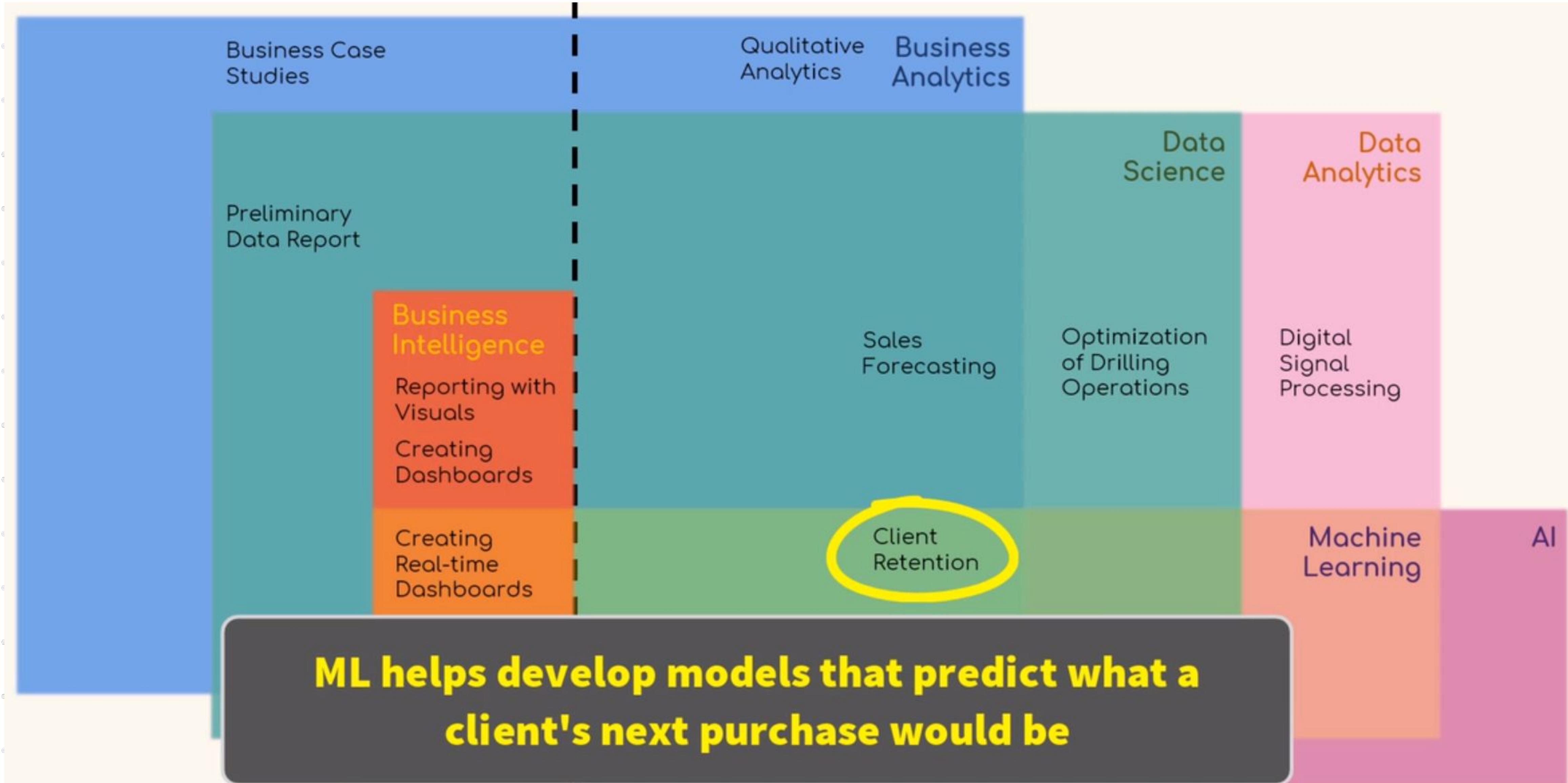
ML with BI - 2

- The demand for accurate **Real-time Dashboards** opens space for more **ML** apps
- **ML** software can
 - pull data from third-party companies (as Facebook or Shopify)
 - detect new patterns from their data
 - →suggest real-time recommendations and insights to managers/decision-makers
- A great way to improve the performance of business
- In general, this field has a lot of potential for development

Artificial Intelligence (AI) - 1



Client Retention



Fraud Prevention - 1



Fraud Prevention - 2

- We can feed an **ML algorithm** with prior fraudulent activity data
- **ML** will find patterns that the human brain is incapable of seeing
- Having a model which can detect such transactions or operations in real time has helped the financial system prevent a massive amount of fraudulent activity



Where
Image/Speech
Recognition?

Speech Recognition

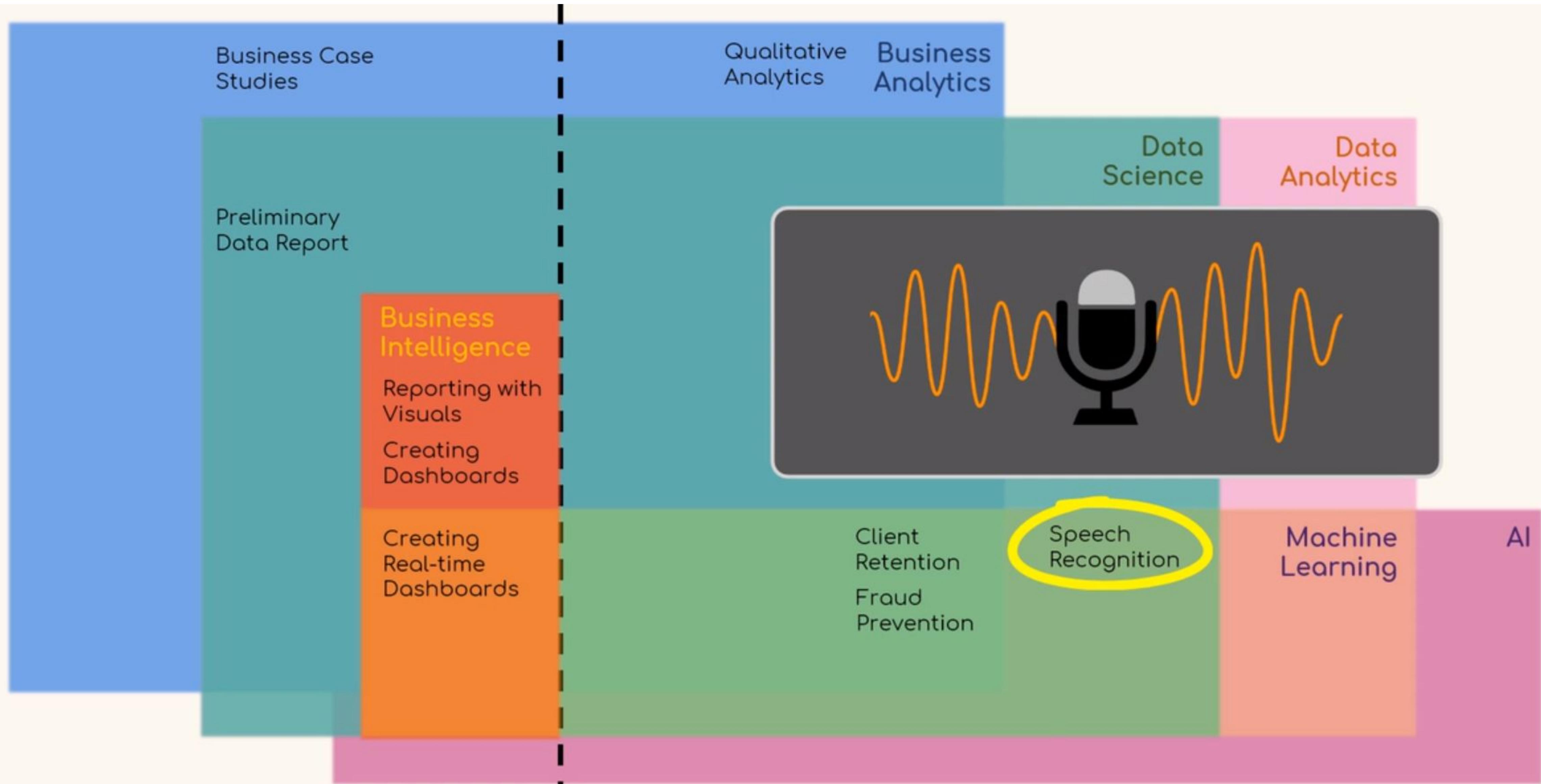
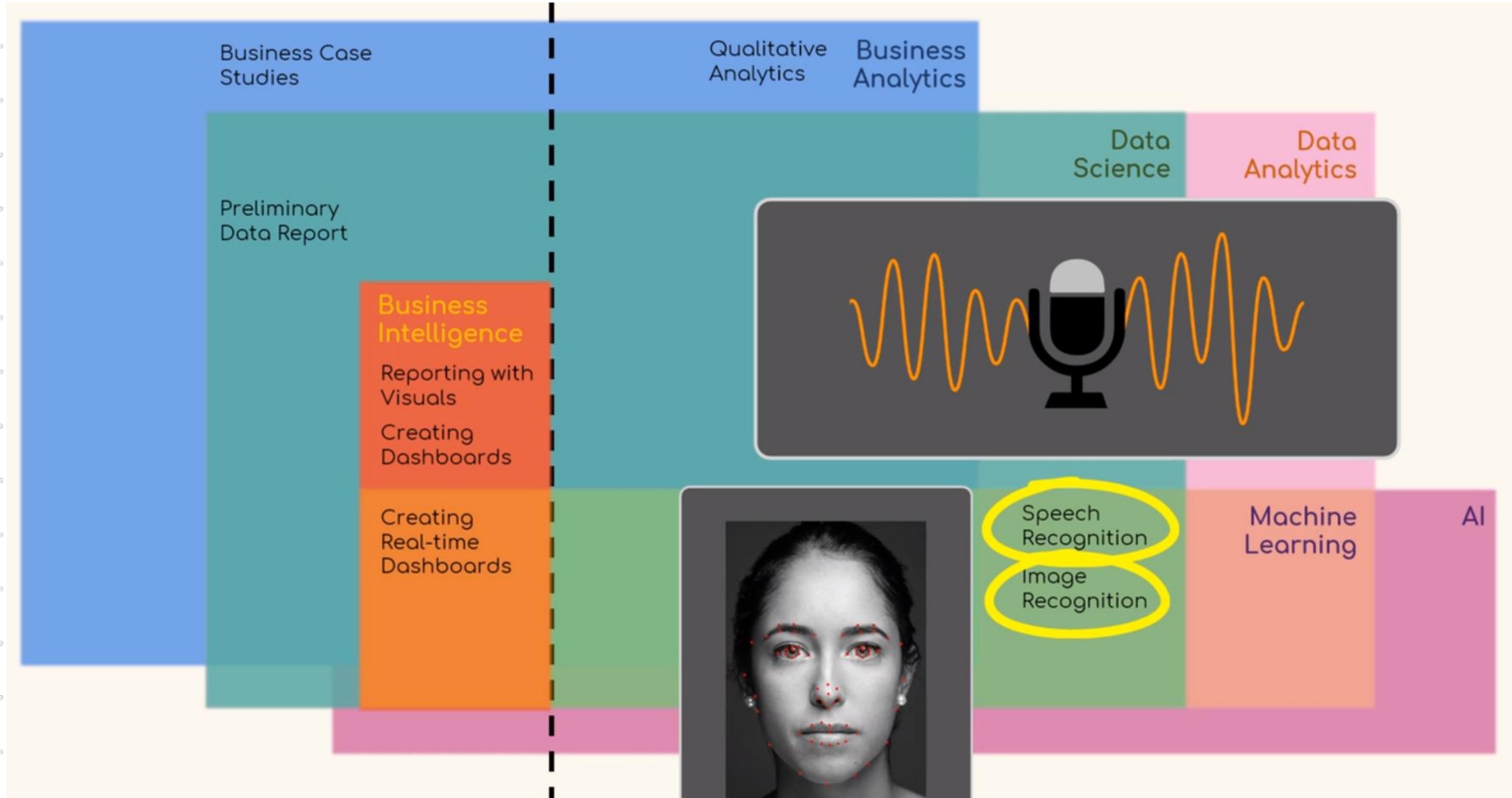
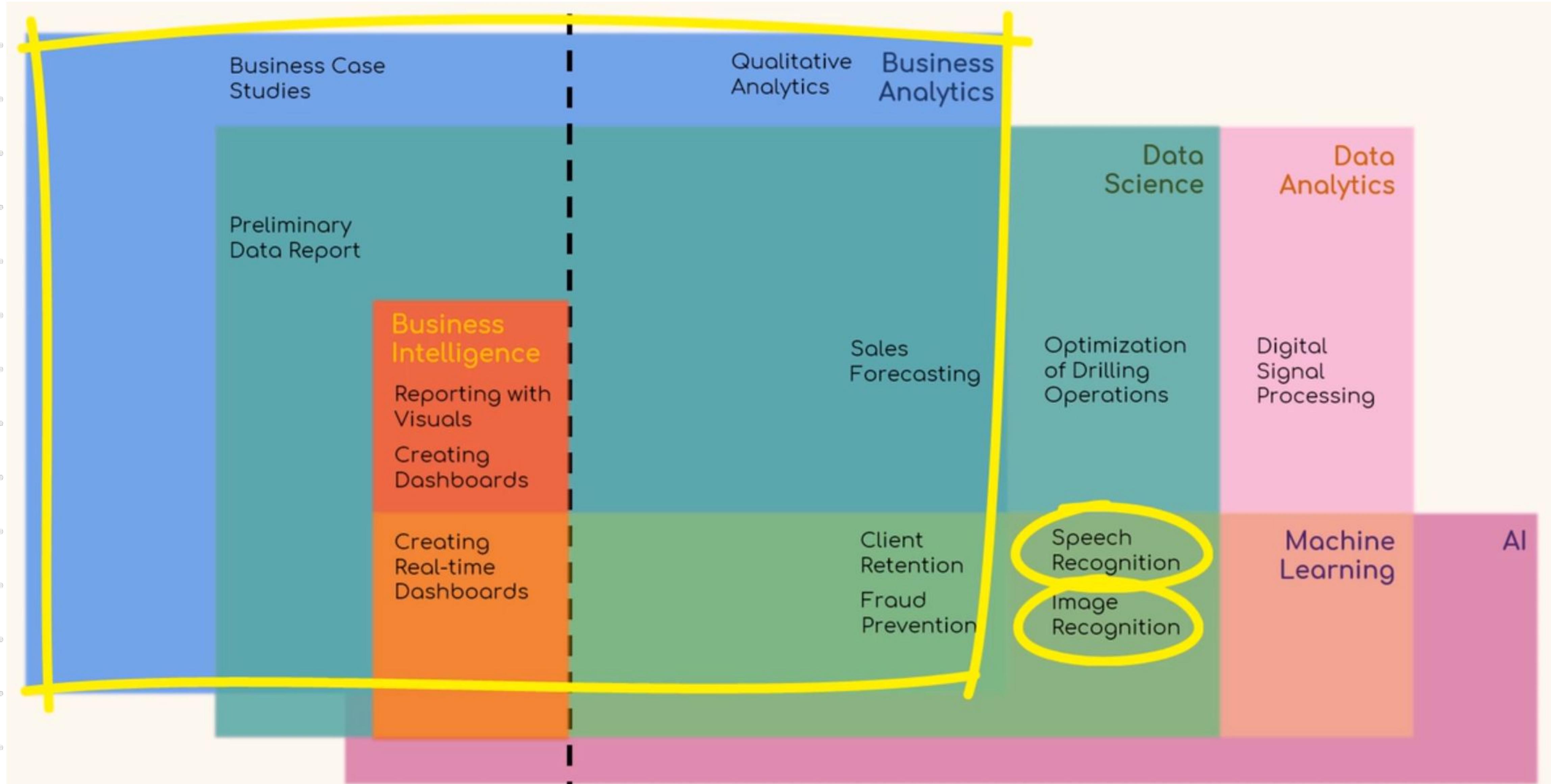


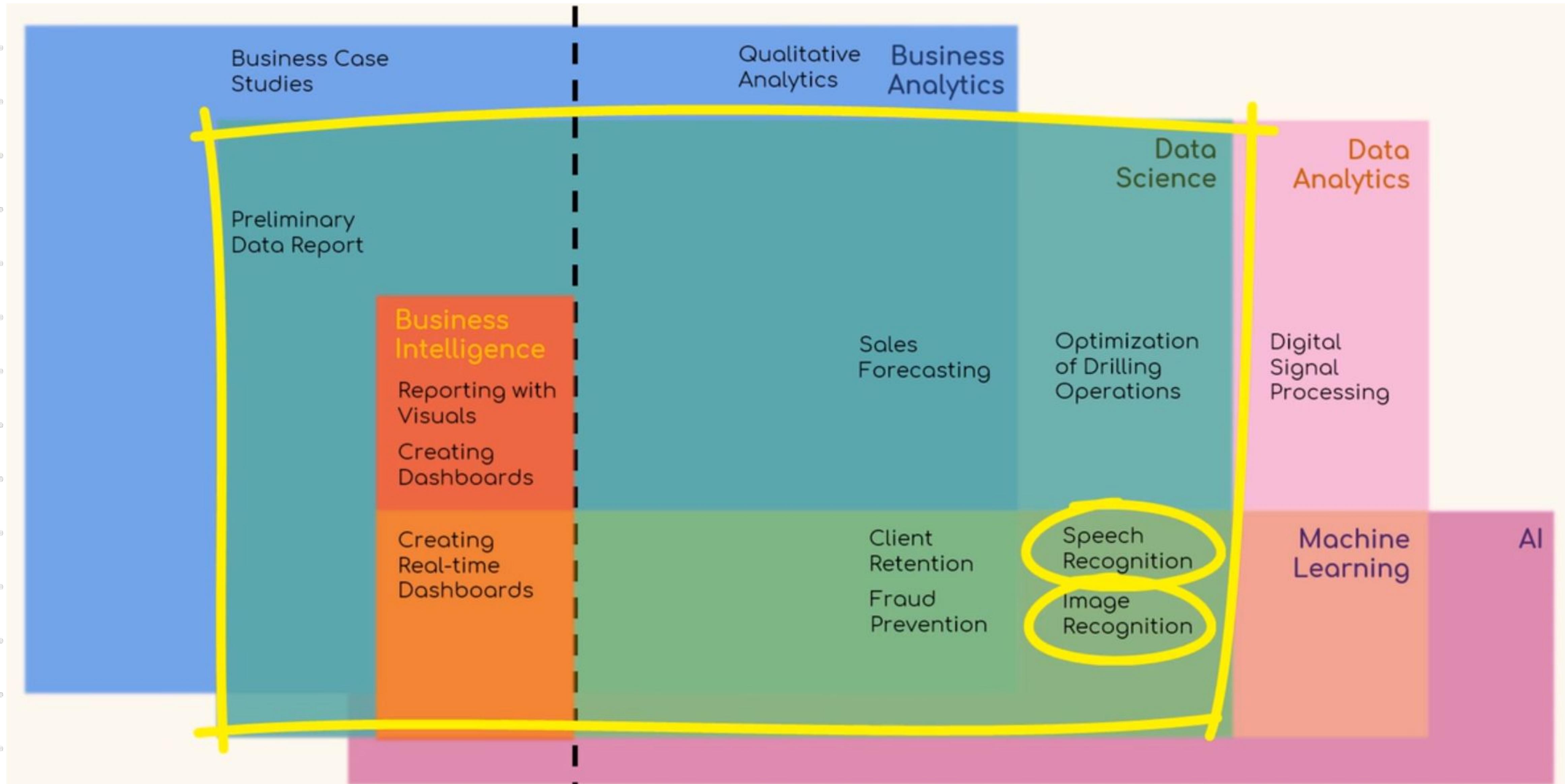
Image Recognition



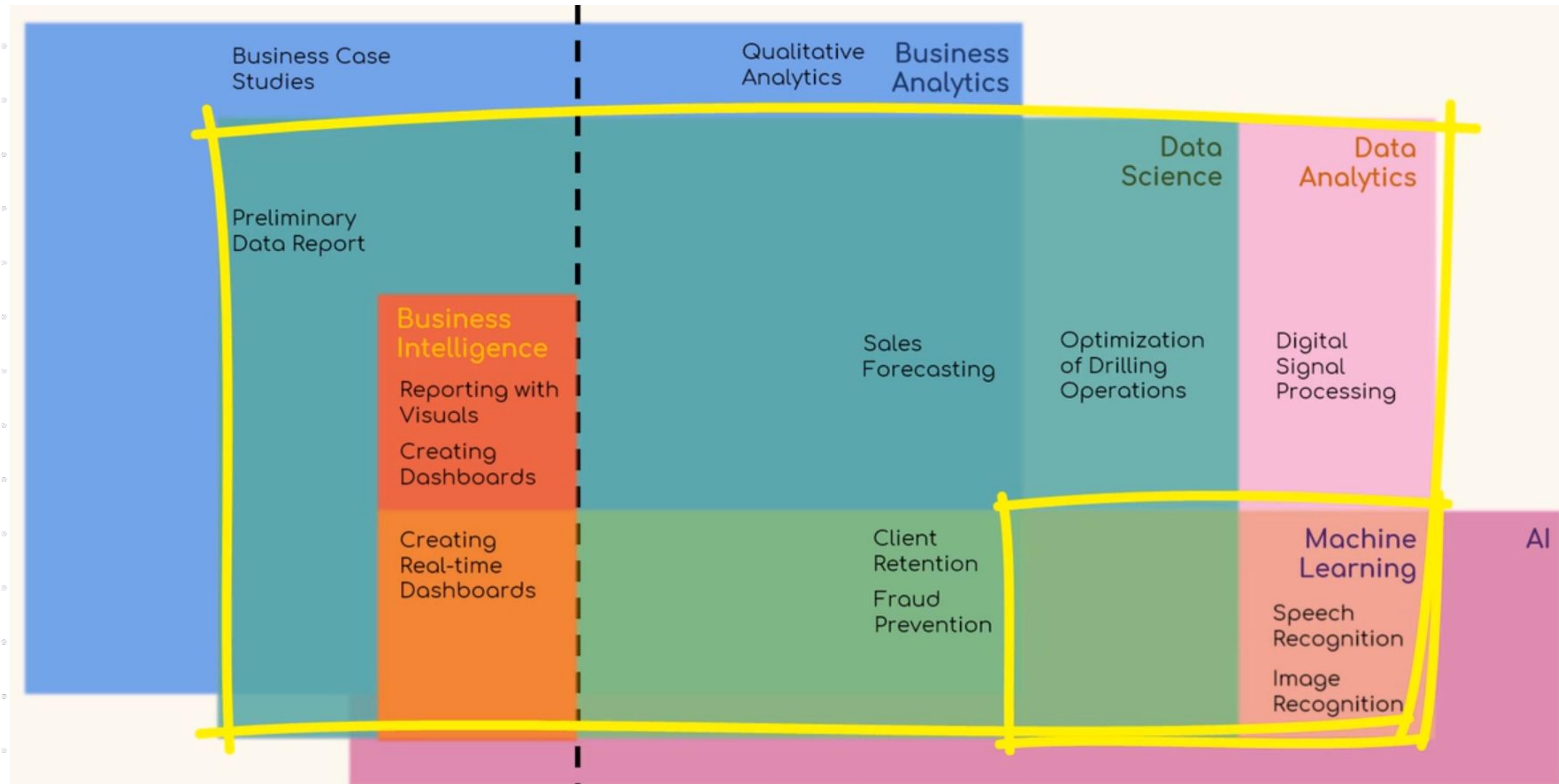
Where Image/Speech Recognition? - 1



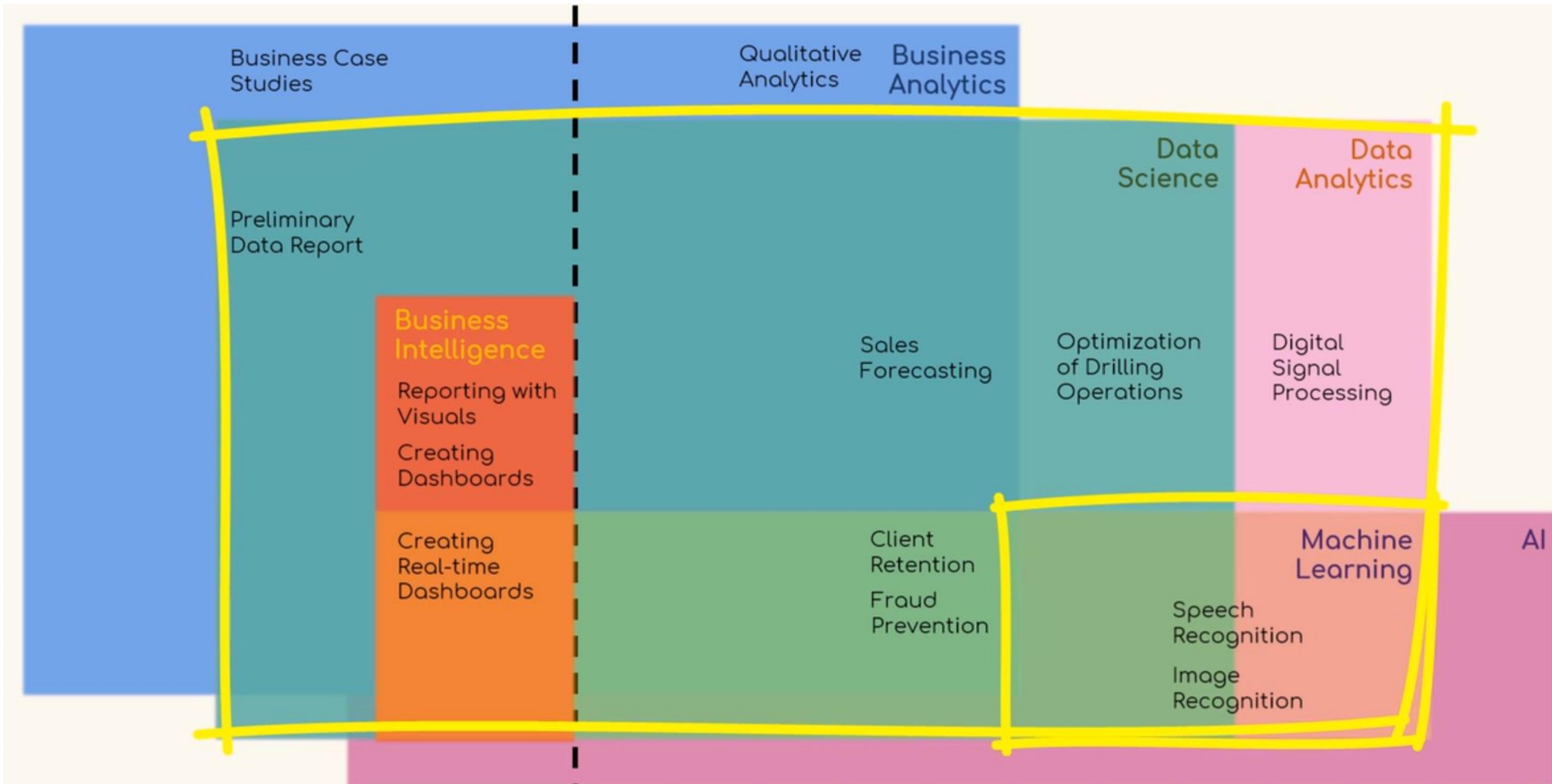
Where Image/Speech Recognition? - 2



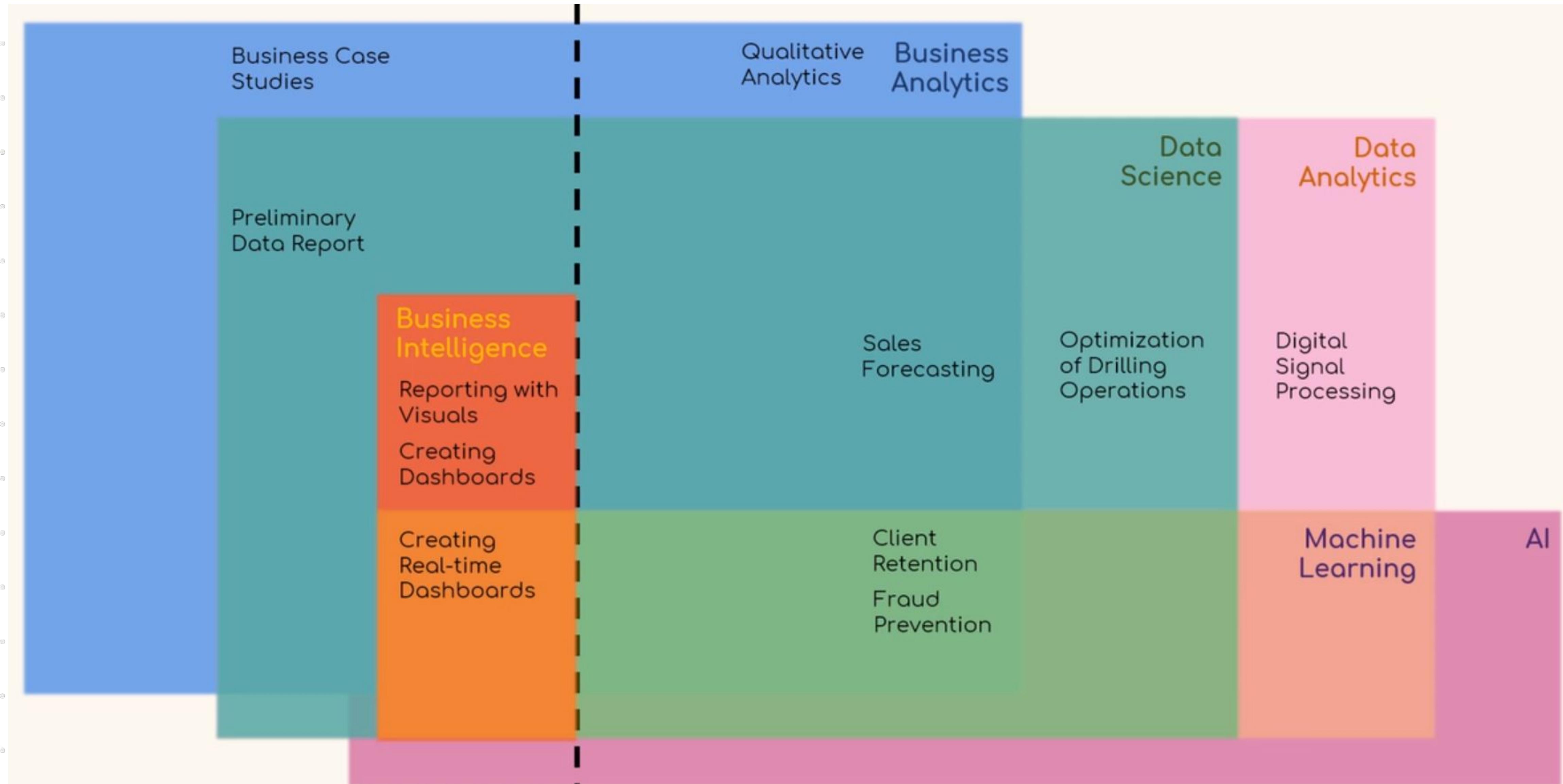
Where Image/Speech Recognition? - 3



Where Image/Speech Recognition? - 4

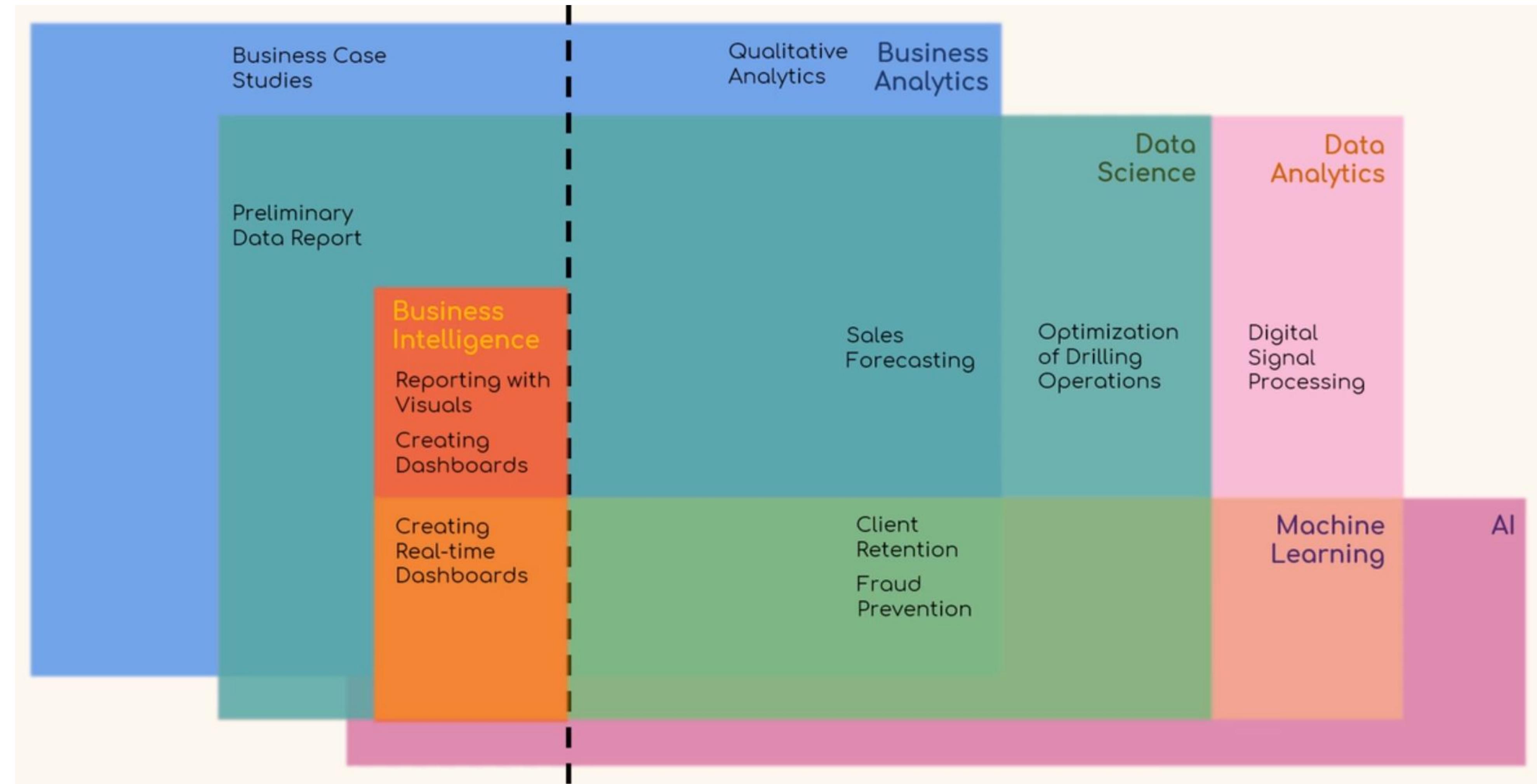


Where Image/Speech Recognition? - 5



Removing Image/Speech Recognition

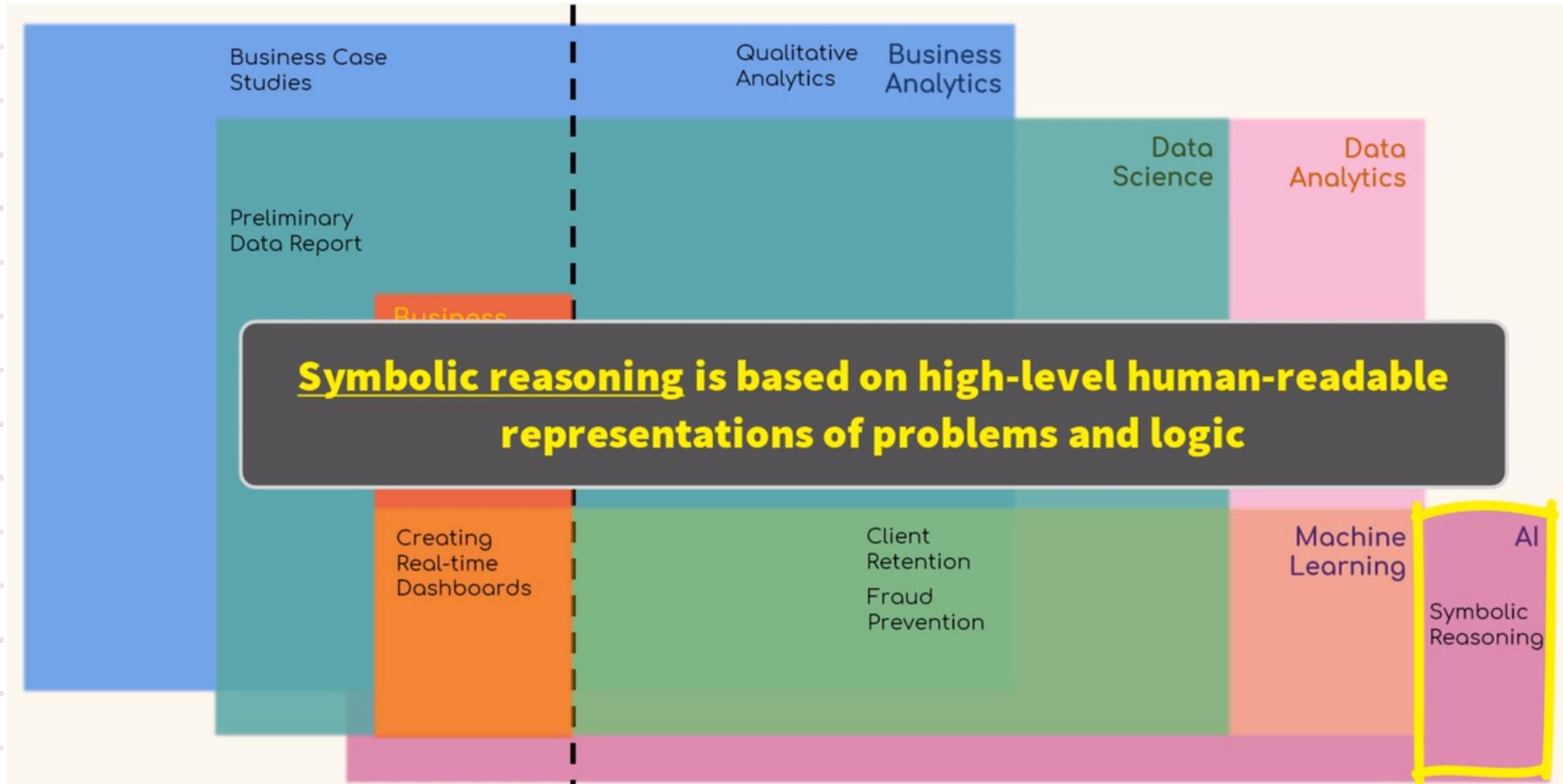
- **Image/Speech Recognition** are outside the business context
 - To avoid further disputes, let's take **Image/Speech Recognition** out of the picture





Where
Symbolic
Reasoning?

Symbolic Reasoning



Symbolic Logic Example

Propositions:

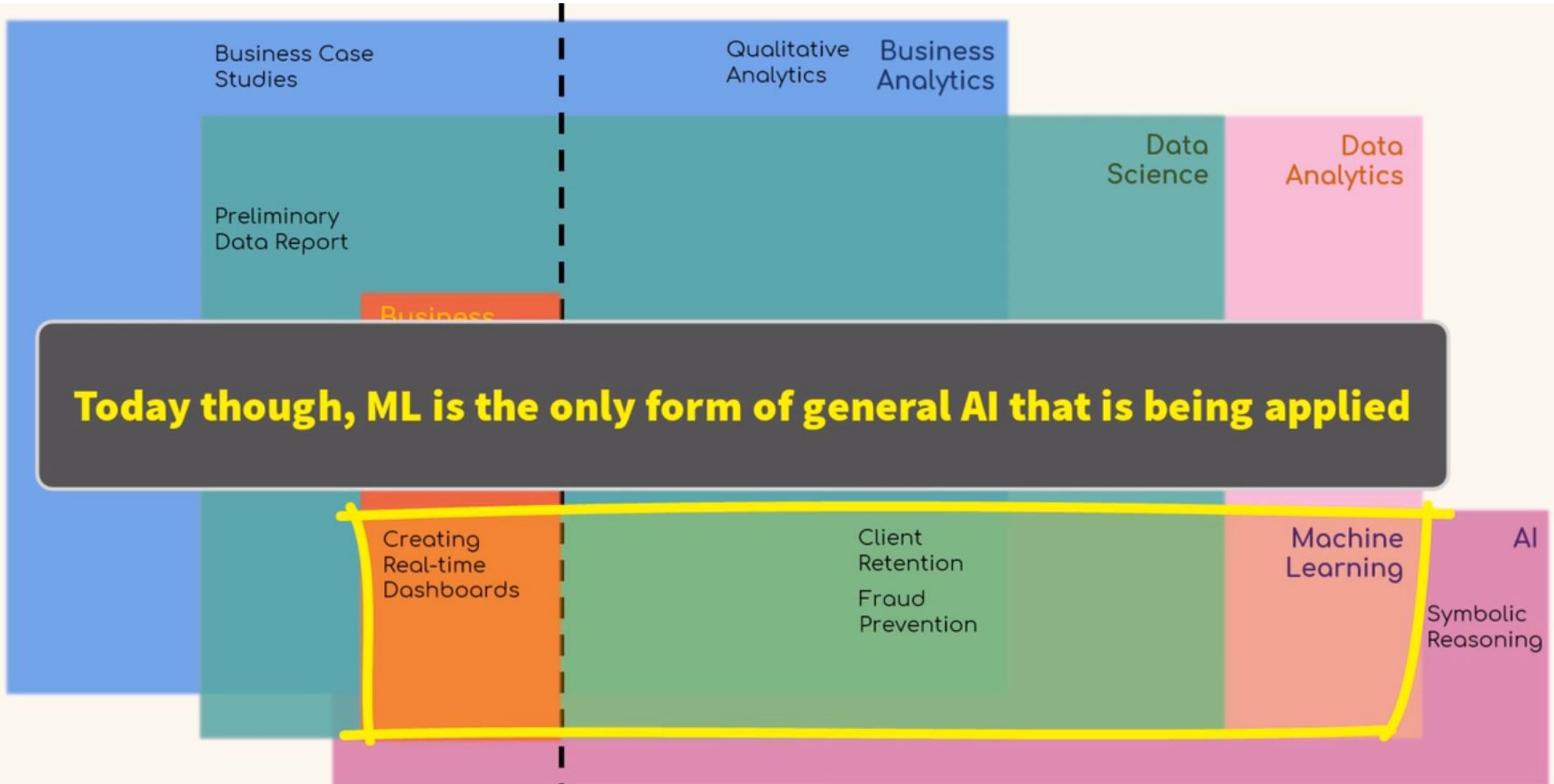
- If all mammals feed their babies milk from the mother (A)
- If all cats feed their babies mother's milk (B)
- \Rightarrow All cats are mammals(C)

Conclusion: $A \wedge B \Rightarrow C$ (\wedge symbol means and & \Rightarrow symbol means implies)

Explanation:

- Proposition A and proposition B lead to the conclusion C

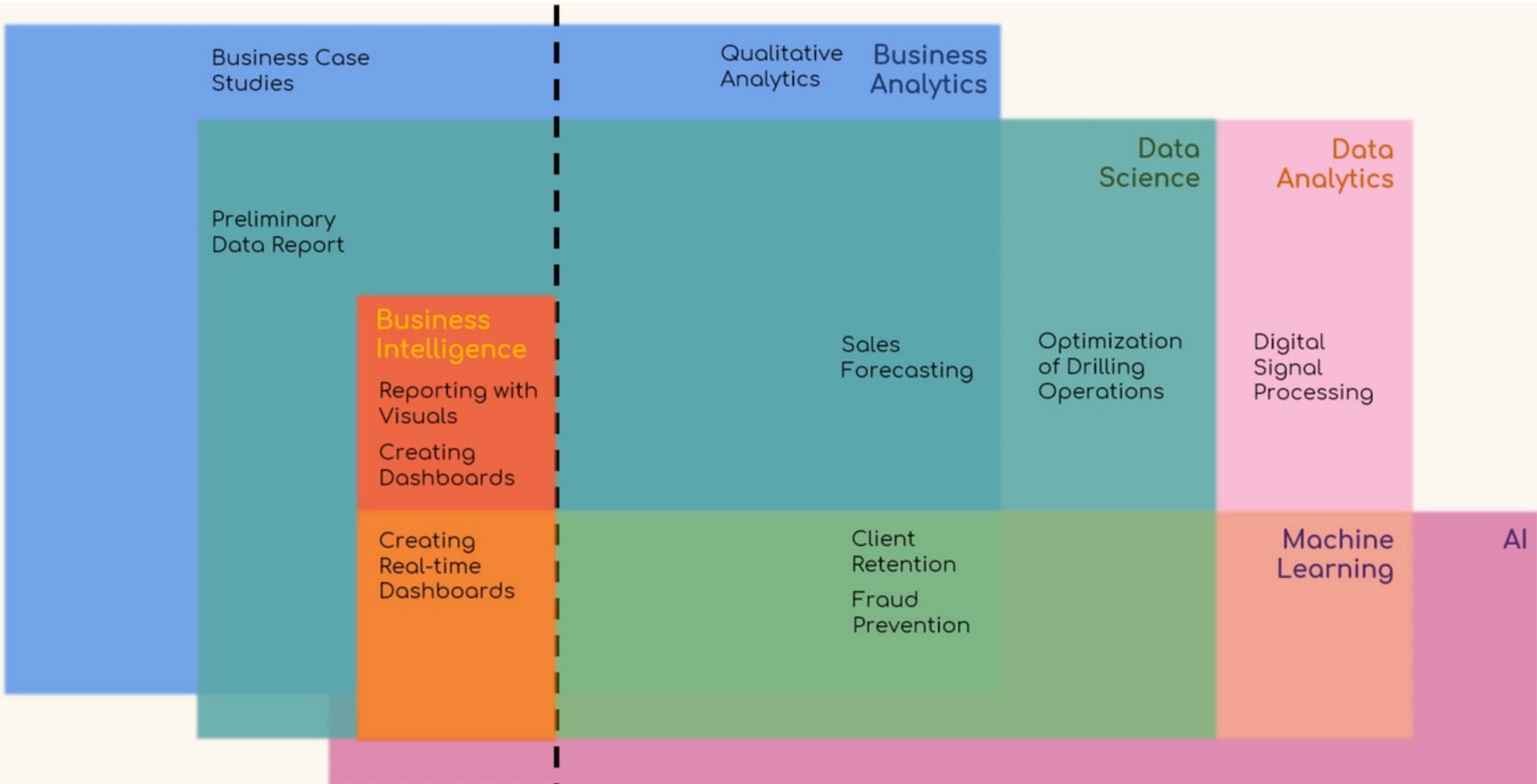
Now ML



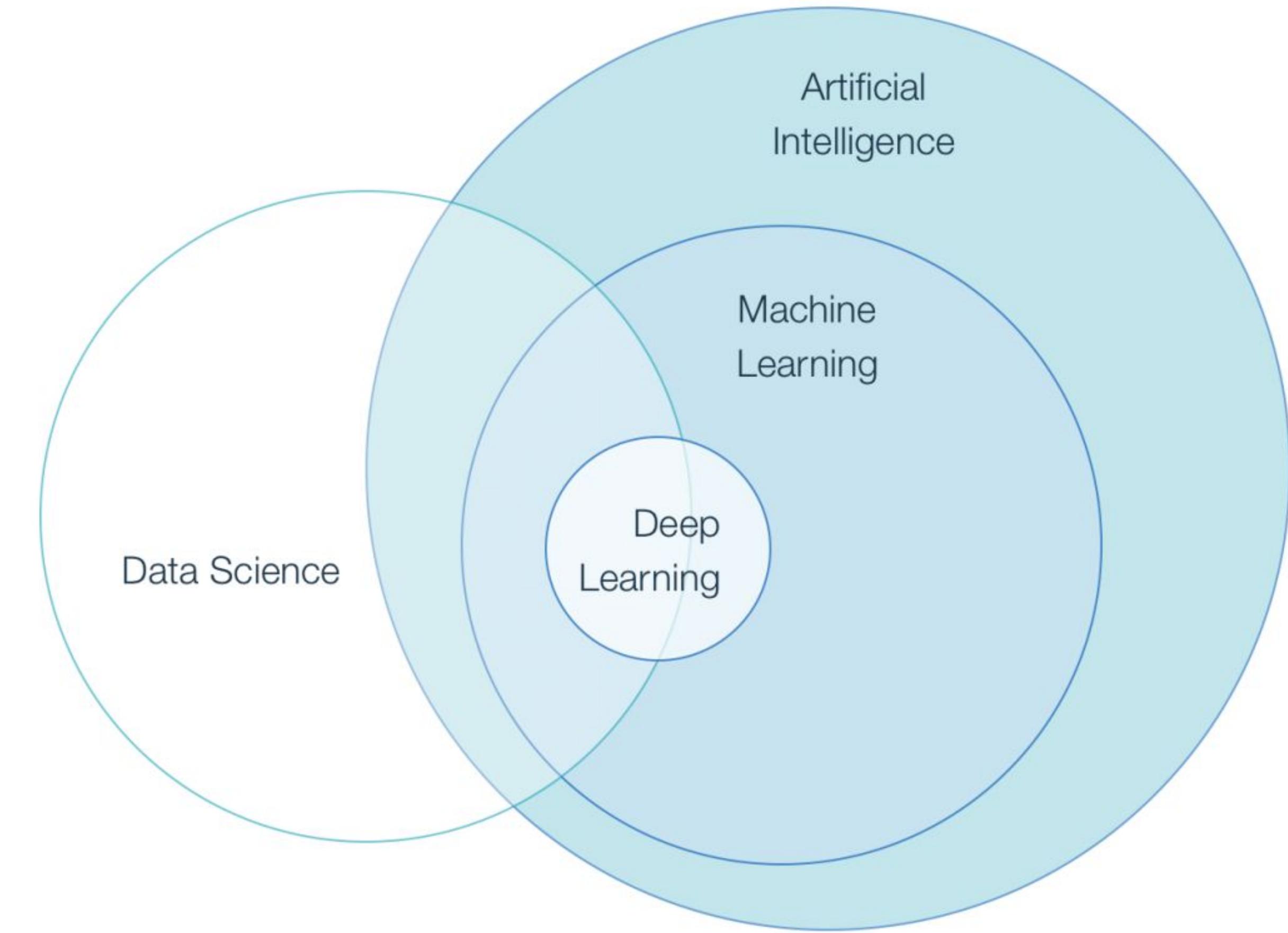
Symbolic Reasoning was

- **was** once a trend when people were trying to create human-like intelligence
- Today though, **ML** is the only form of **general AI**
- And **Symbolic AI** is rarely encountered, let alone practiced

Removing Symbolic Reasoning

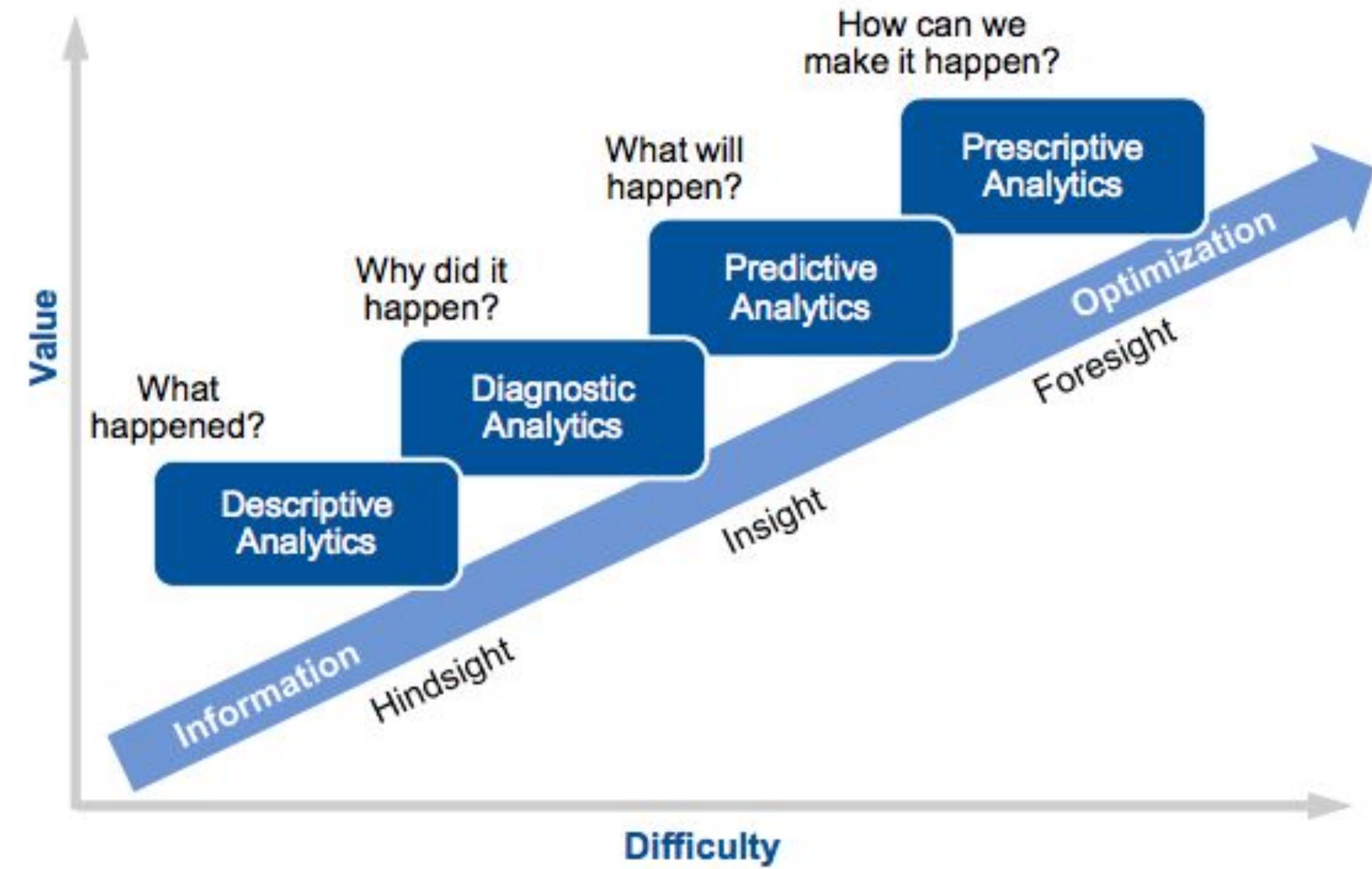


Data Science & AI from another Viewpoint



A Vision for Advanced Analytics

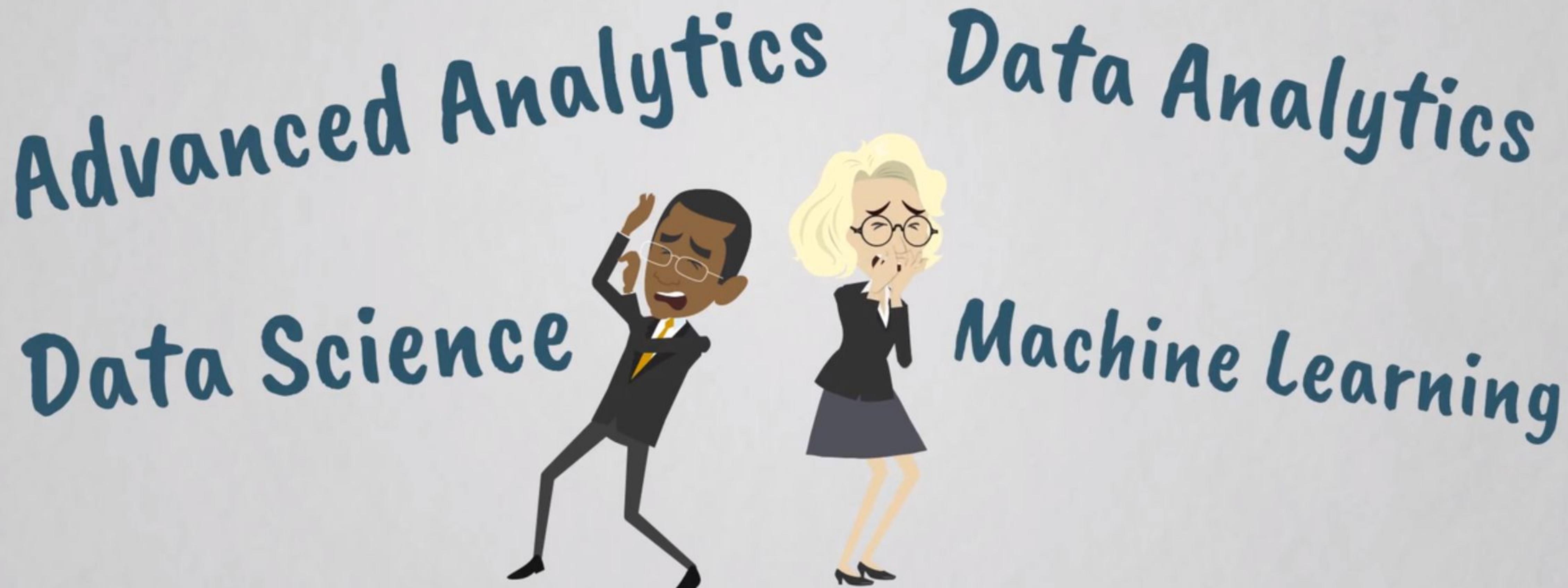
Data Analytics Types



Source: Gartner (March 2012)

Advanced Data Analytics?

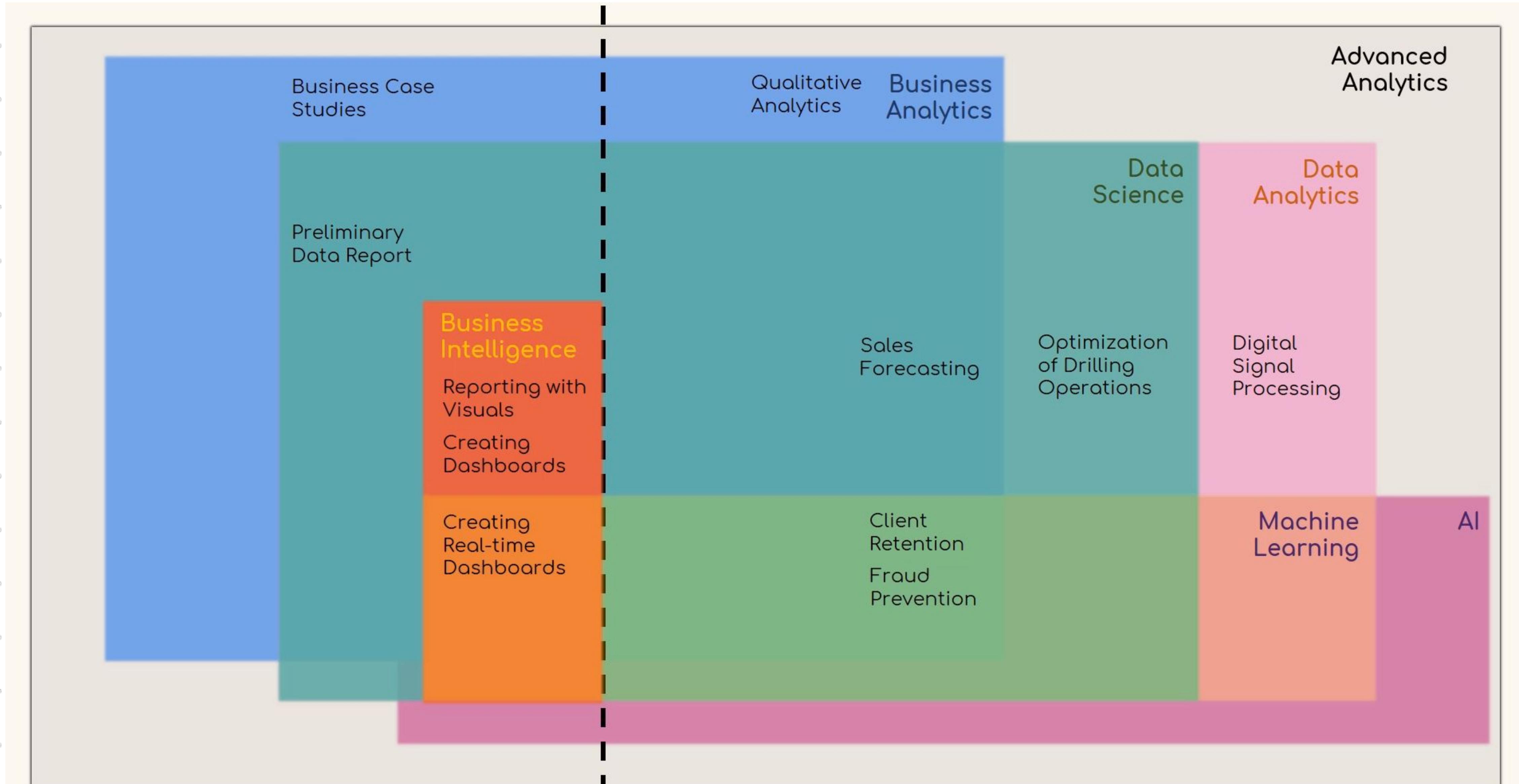
advanced analytics: a marketing term...



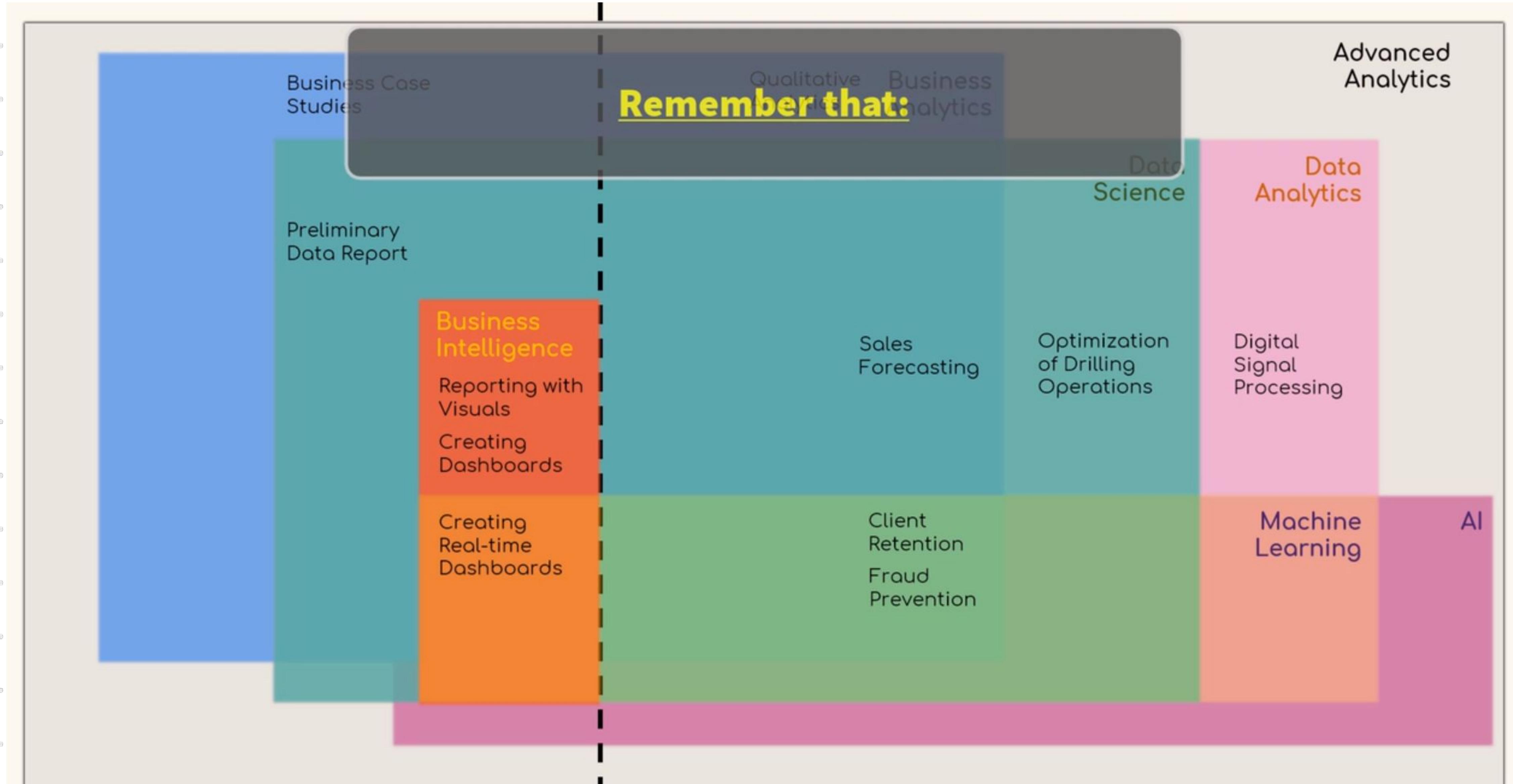
Advanced Data Analytics?

- It is a marketing term coming from people who want to say that the types of analytics they are dealing with are not easy-to-handle
- Intimidating-sounding terms maybe used to discourage learning and create prestige
- So, we will collectively group all areas of analytics under **Advanced Analytics**
 - With the idea that any part of analytics can seem advanced at first
 - But no part is exclusively or permanently within this category

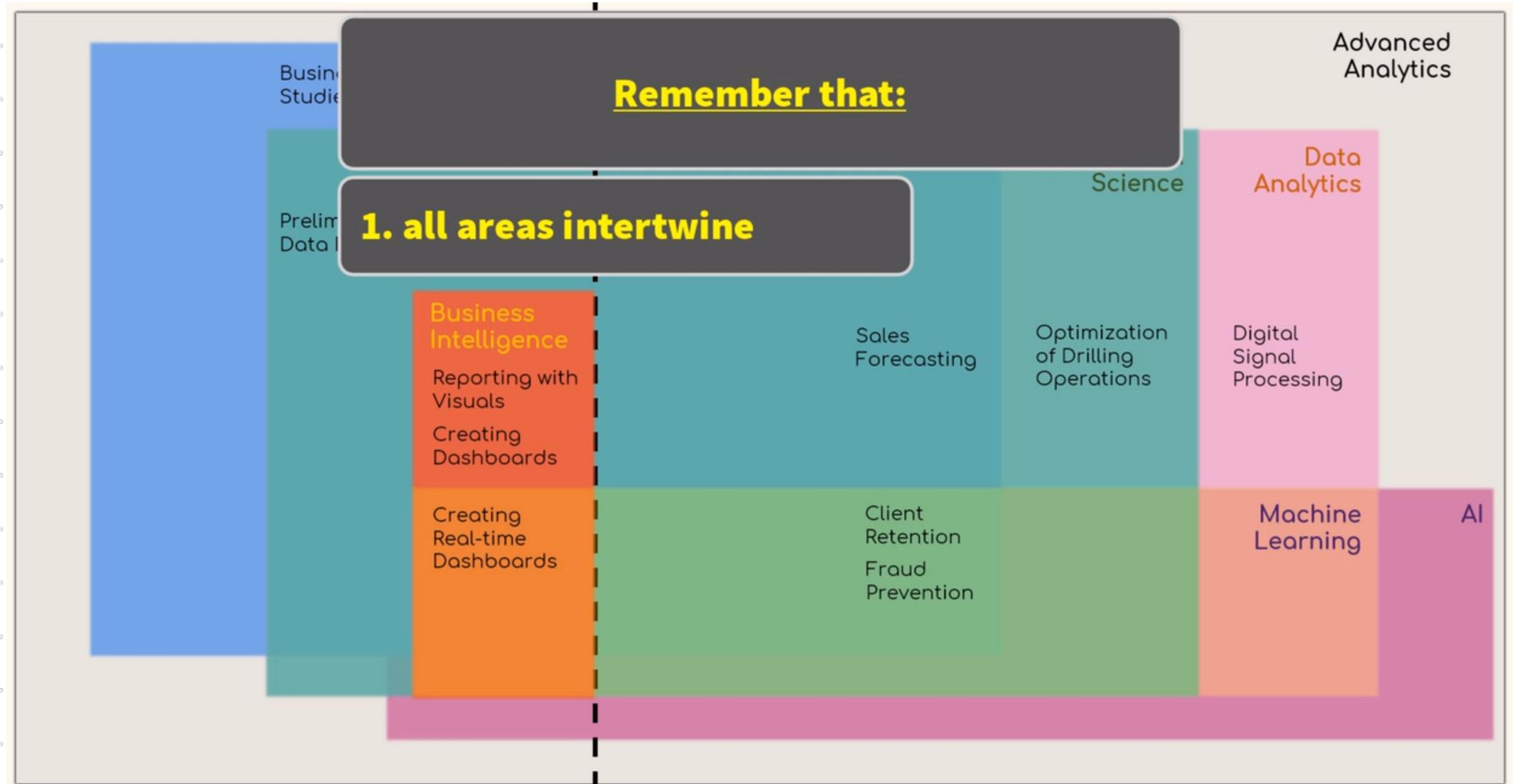
Advanced Data Analytics (Advanced Analytics)



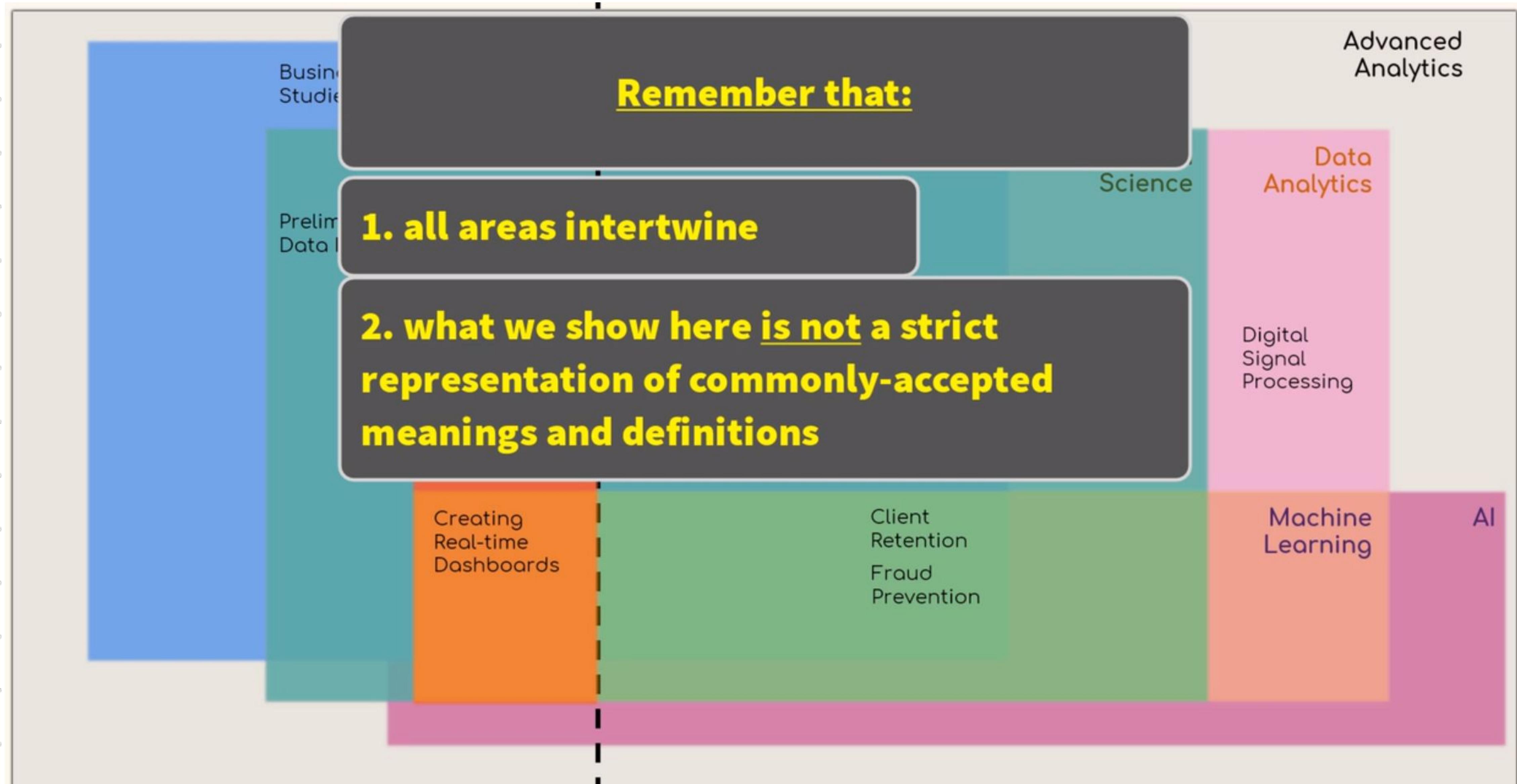
Advanced Data Analytics?



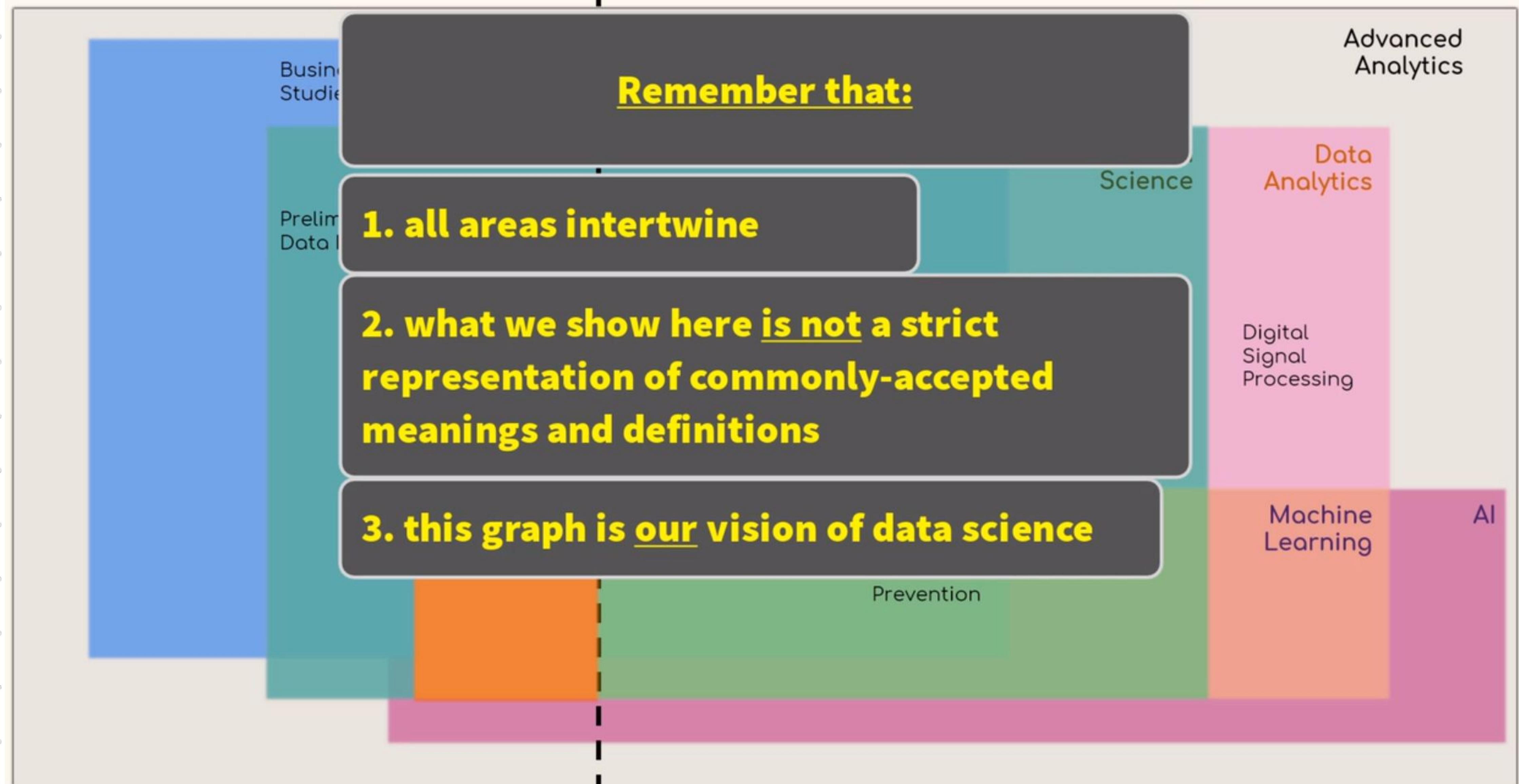
Advanced Data Analytics?



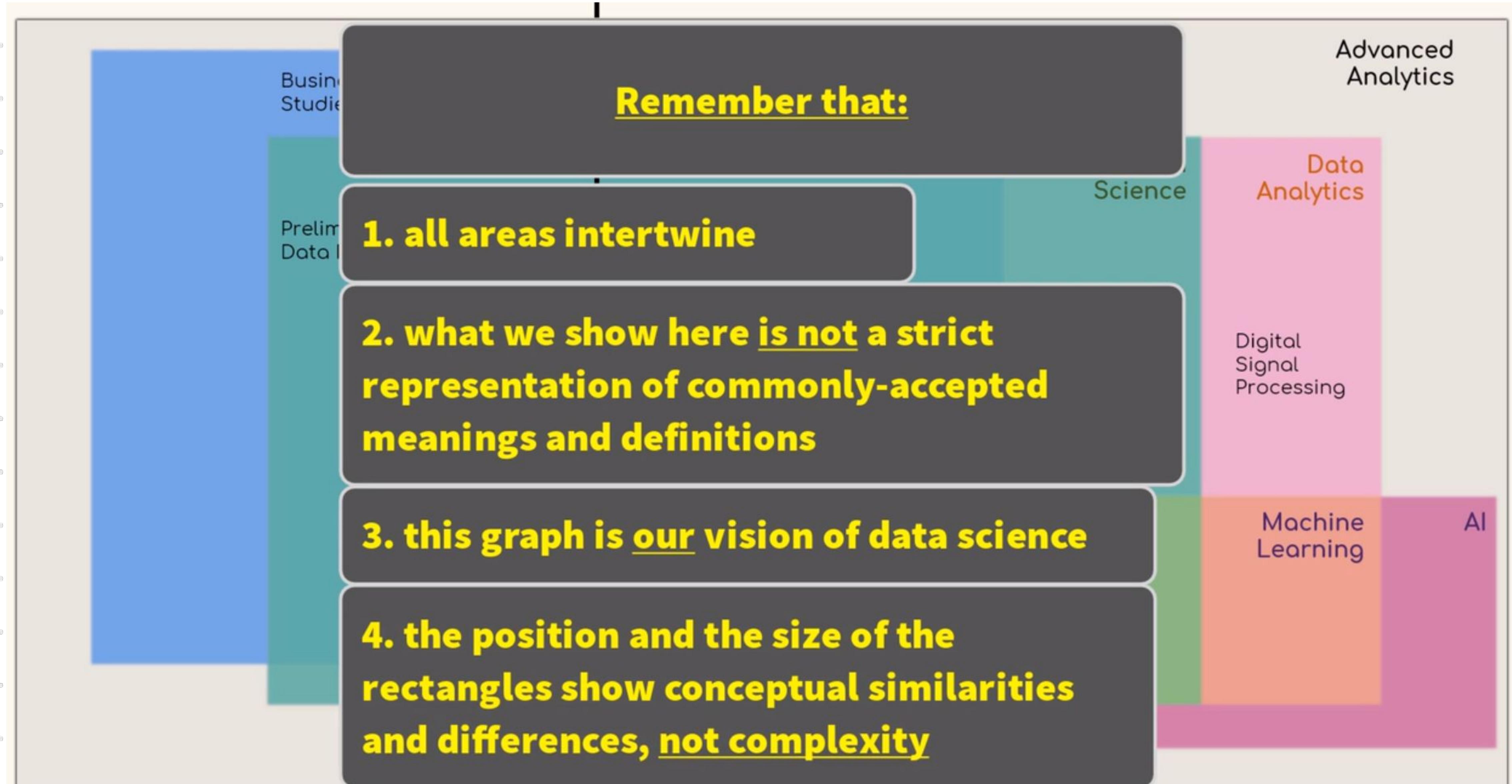
Advanced Data Analytics?



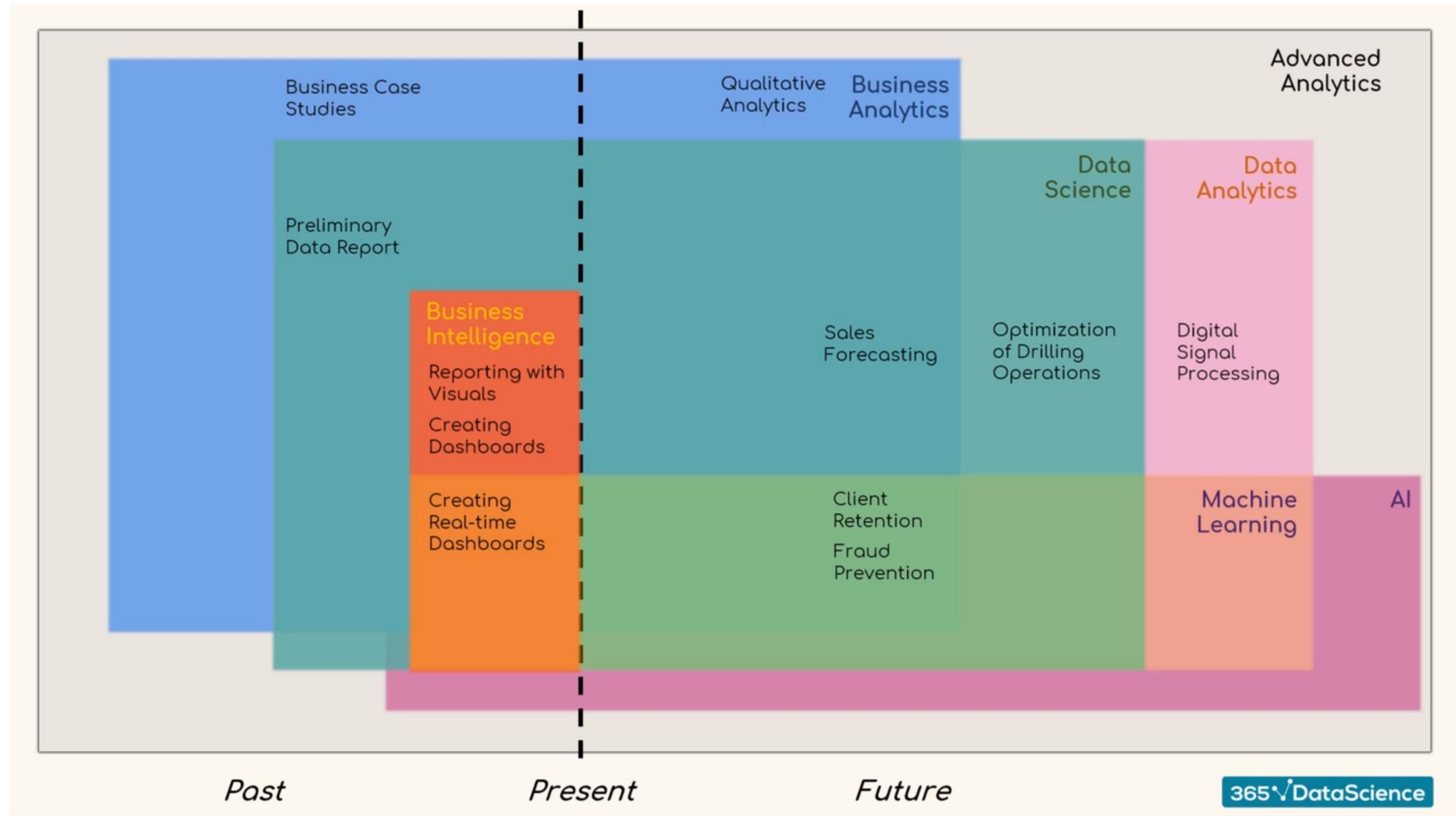
Advanced Data Analytics?



Advanced Data Analytics?



365 DataScience Advanced Data Analytics Diagram



Remember that about the Diagram

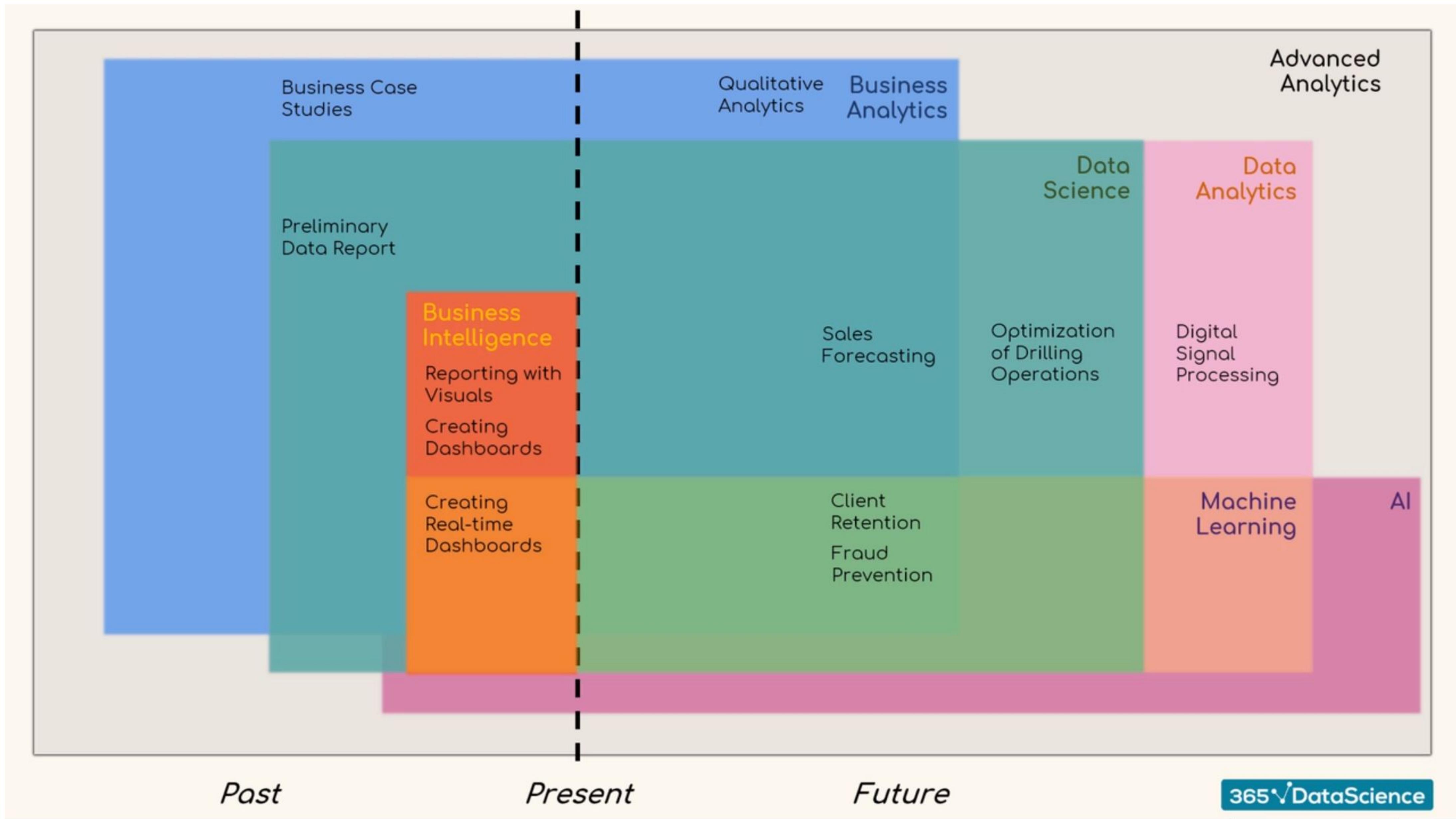
- This diagram is **365 DataScience Vision** of data science (a matter of interpretation)
 - concentrate on Data science and its applications in business
- The locations of some of the components are somewhat controversial
- The diagram can be seen as a very comprehensive depiction of what these disciplines are about and how they overlap.

365

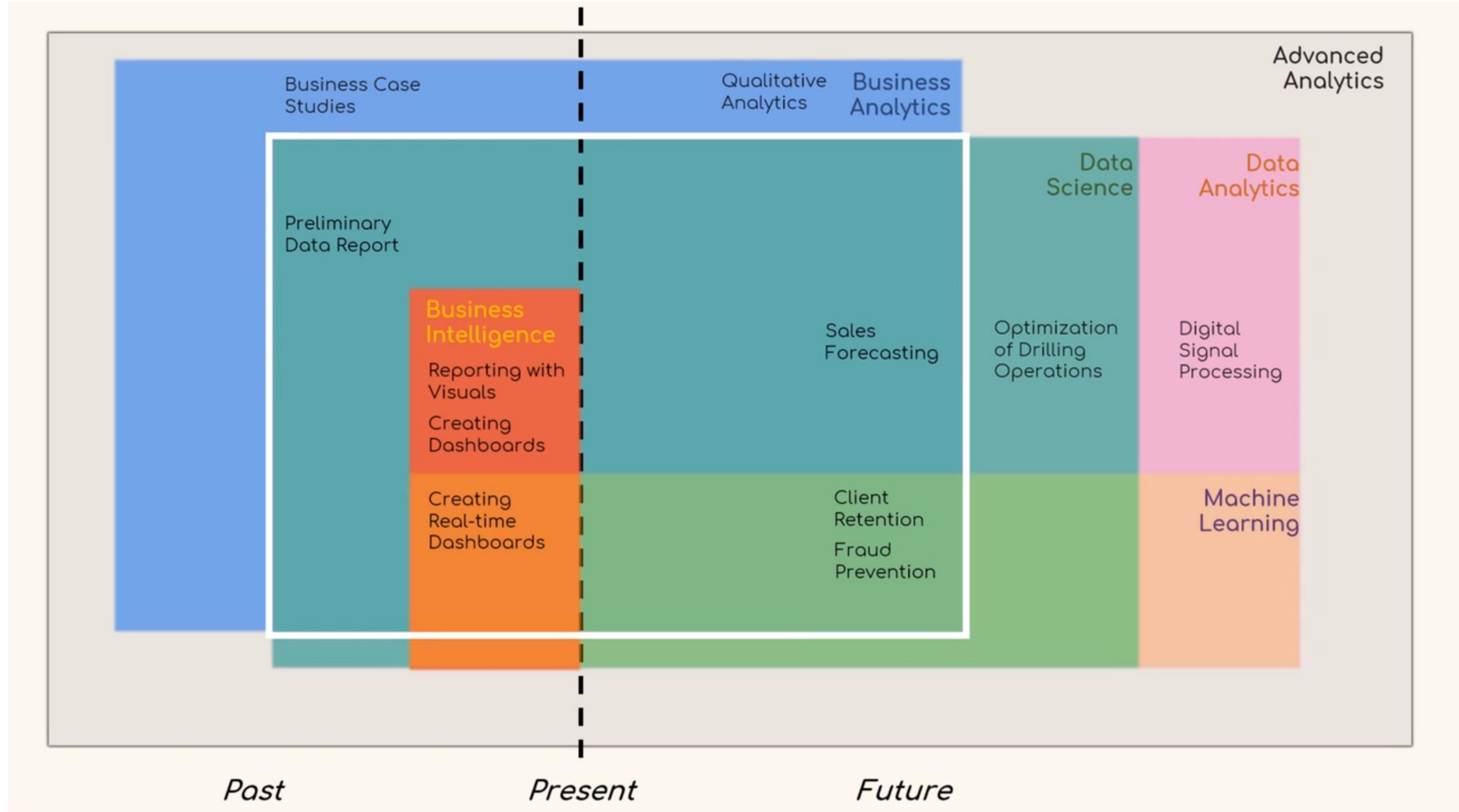
Data Science

Infographic

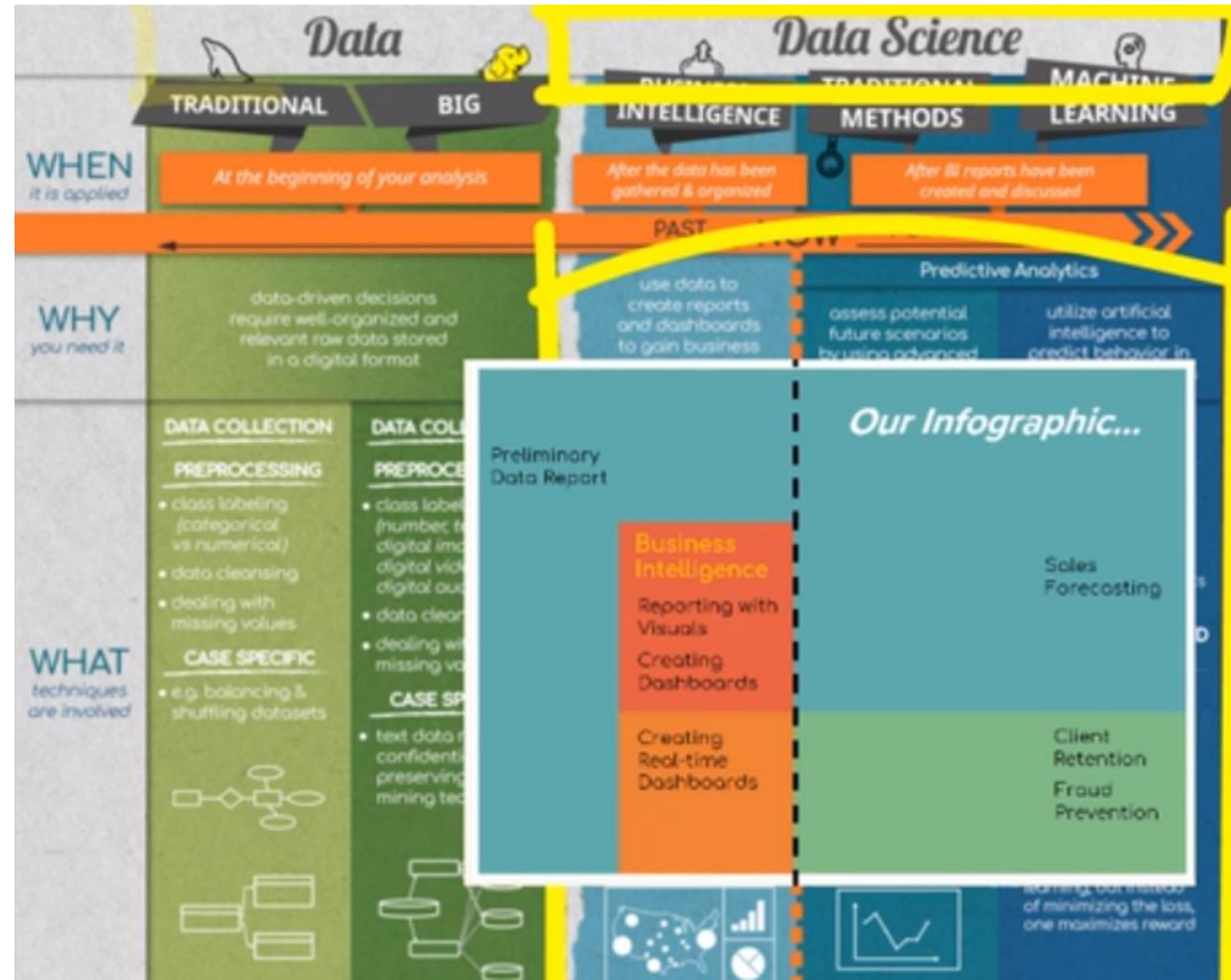
Advanced Data Analytics Diagram



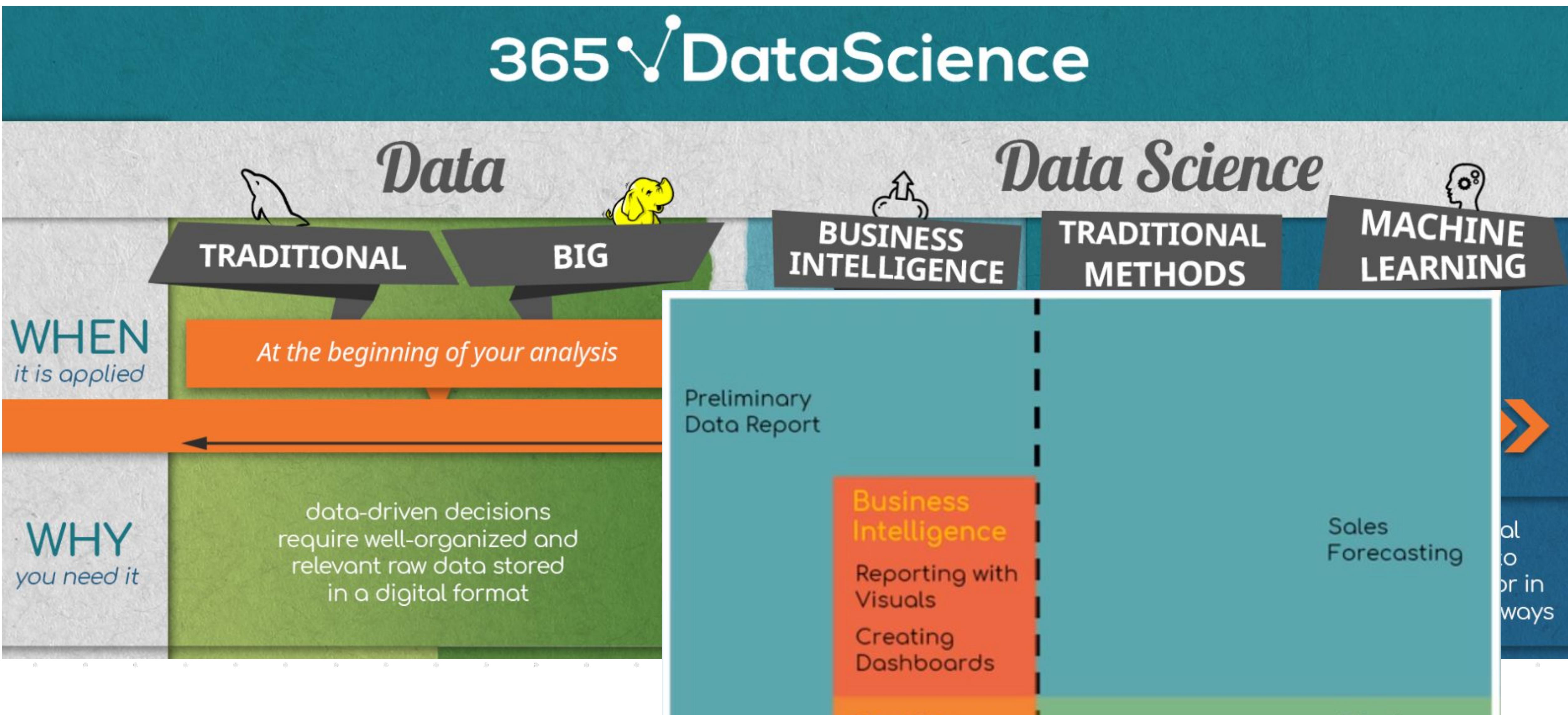
Advanced Analytics & concentrate on Business



Advanced Analytics & its companion Infographic



365 DataScience Infographic - Question 1,2



Questions

Links

<https://github.com/FCAI-B/bda>