

Application of AI

张春阳
2020.10



Agenda

Business Intelligence

Computer Vision

Natural Language Processing

Agenda

Business Intelligence

Computer Vision

Natural Language Processing

What is Business Intelligence?

- Business Intelligence is an **umbrella** term for a set of
 - methods,
 - processes,
 - technologies, and
 - tools

that help us to **convert data into information, information into knowledge and knowledge into plans** that guide the organizations for its very betterment, traditionally known as **Decision Support System (DSS)**.

The search for the perfect “business insight system”

– 1980s

- Executive information systems (**EIS**), decision support systems (**DSS**)

– 1990s

- Data warehousing (**DW**), business intelligence (**BI**)

– 2000s

- Dashboards and scorecards, performance management

– 2010+

- Analytics, big data, mobile BI, in-memory cache, data science ...

Why BI?

BI is for answering following business related questions technically-



- What happened?
 - Why did it happen?

 - What is happening?

 - What will happen?
 - What do I want to happen?
- 
- Past
Present
Future
- A large blue downward-pointing arrow is positioned to the right of the list of questions. To the right of the arrow, the words "Past", "Present", and "Future" are stacked vertically, corresponding to the three time periods mentioned in the list.

Benefits of Business Intelligence

- **Improve Management Processes**
 - planning, controlling, measuring and/or changing results in increased revenues and reduced costs.
- **Improve Operational Processes**
 - fraud detection, order processing, purchasing..
- **Better Adjustment settings**
 - Competitor analysis, adjustments settings to changing trends.
- **Predict The Future**
 - Predictive analysis, Forecasting.

BI Application Areas

BI can be applied in all “businesses” both private and public sector

- Private

- Retail, manufacture, real-estate, sports, media, publication, etc.

- Public (non-profit)

- Education, government, healthcare, association, etc.

Sample BI Application Areas

- **Business management**

1. Strategic planning
2. Benchmarking

- **IT management**

1. Web analytics
2. Security management

- **Logistics**

1. Supplier & vendor management
2. Shipping and inventory control

- **City planning**

1. Traffic management
2. Urban Analytics

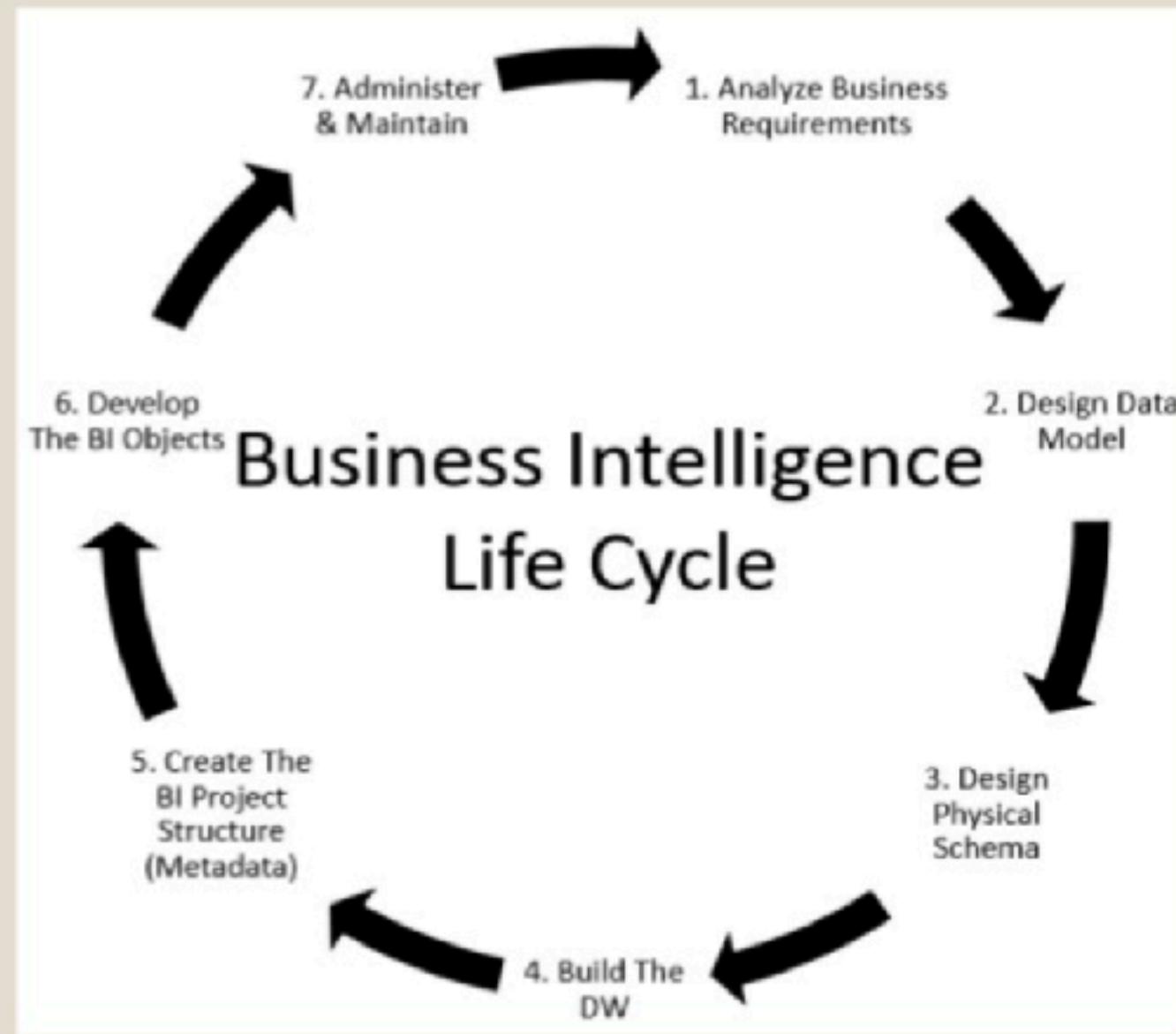
- **Education**

1. Learning analytics
2. Institutional effectiveness

- **Internet and web**

1. Social analytics
2. Sports and games analytics

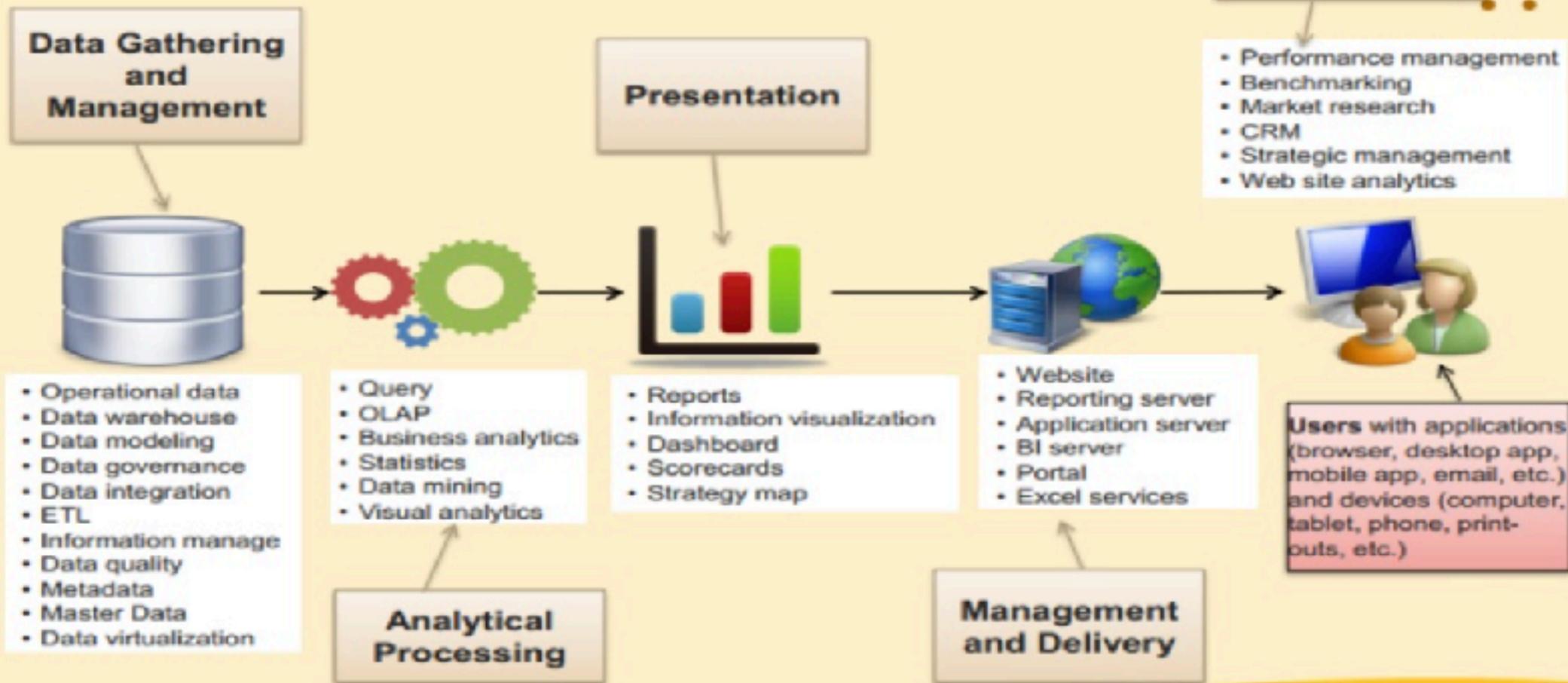
Business Intelligence Life Cycle(BILC)



Business Intelligence Life Cycle(BILC)

- **Analyze Business Requirements** - reviewing business requirements to determine the types of analysis user need to perform.
- **Design Data Model** - Based on the business requirements, design the logical data model, which shows the information that users want to analyze and the relationships that exists within the data.
- **Design the Physical Schema** - Using the data model design physical schema (*creating dimension and fact table hence star schema*) which defines the content and structure of the *data warehouse*.
- **Build the Data Warehouse** - Build the data warehouse according to the schema design and load data into the warehouse (Developing *RPD* with 3 layers accordingly- *Physical, Logical/BMM, Presentation layers*) from source systems through *ETL*.
- **Create the Project Structure (Metadata)** - Create the metadata and begin to connect and map the metadata to table in the data warehouse e.g.
- **Develop The BI Objects** - Develop object, like *reports, scorecards and dashboard*.
- **Administer and Maintain the Project** - Administer and maintain the project as it undergoes continued development and changes, monitor performance and make adjustments to improve it, manage security, and perform other ongoing administrative tasks.

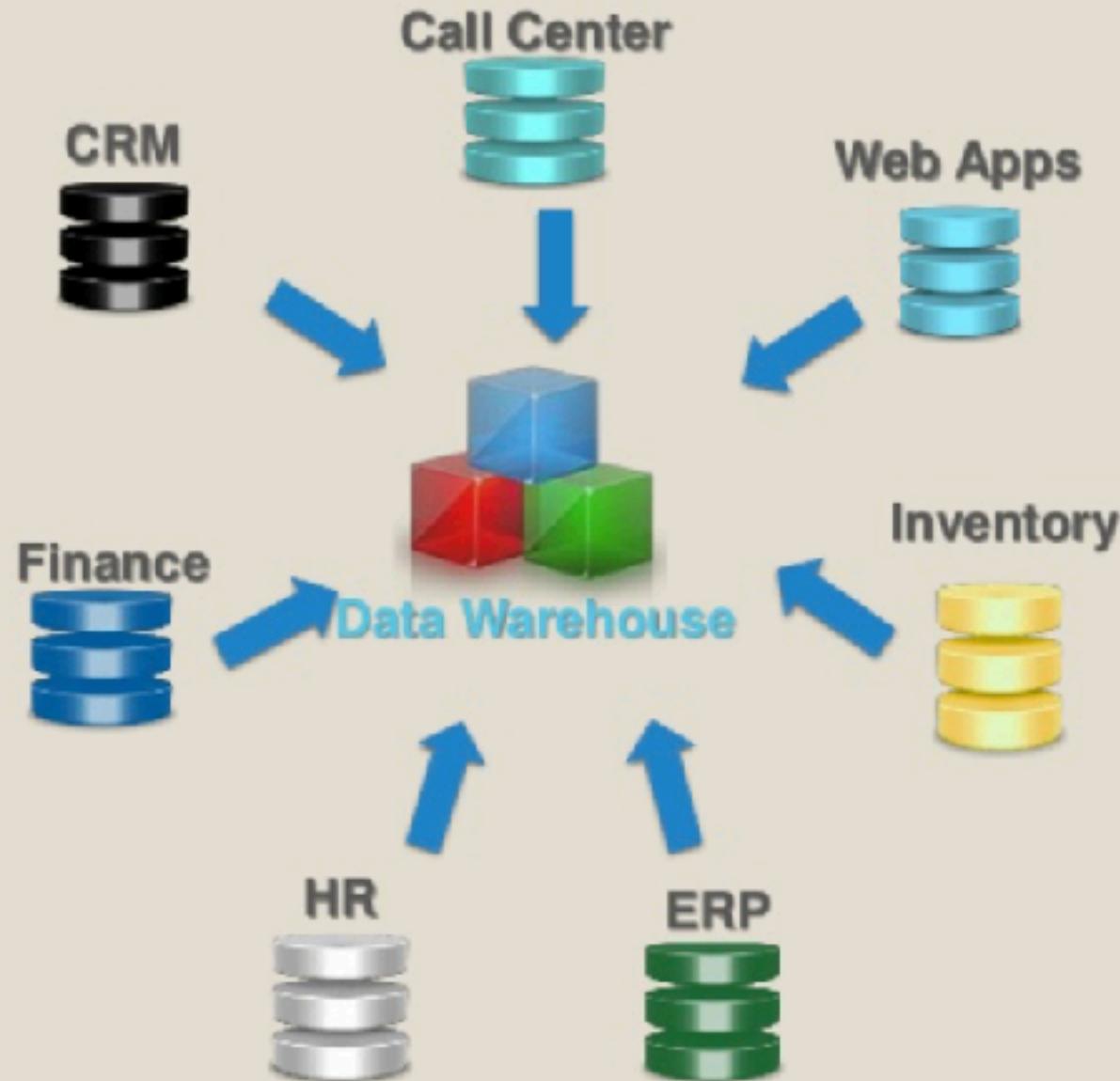
BI System at a Glance



Data Management

- A special database system called **Data Warehouse** or **Data Mart** (a subset of Data Warehouse) is often used to store enterprise data
 - The purpose of a data warehouse is to organize lots of stable data for ease of analysis and retrieval.
- Large databases that aggregate data collected from multiple sources
- Enterprise level data are coming from multiple different sources, but finally combined into **Data Warehouse**
 - Operational databases
 - Spreadsheets
 - Text, CSV
 - PDF, Paper

Data Warehouse (DHW)



Data Gathering and Integration

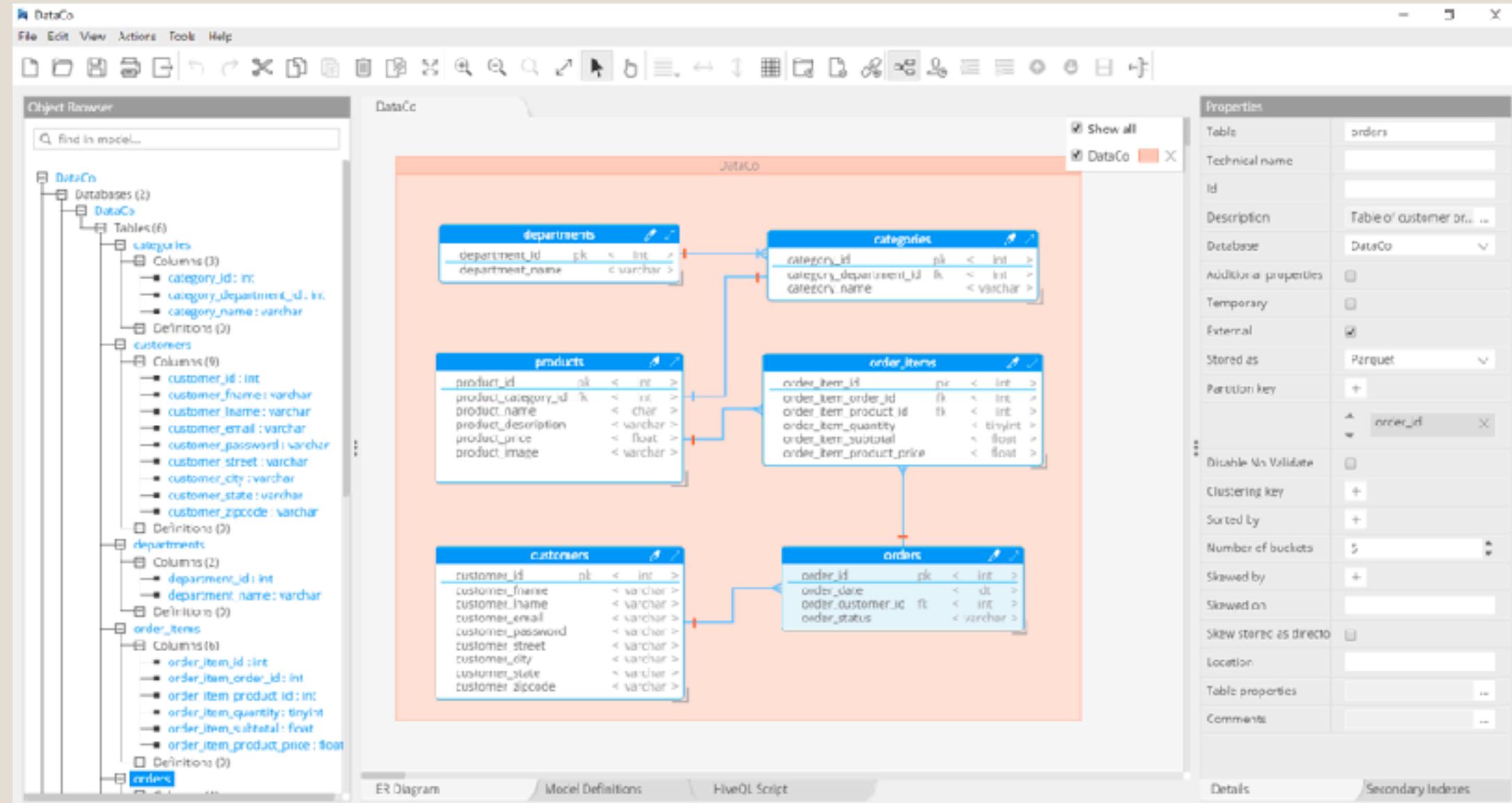
ETL System - Extract, Transform, Load (ETL)

ETL is a process in Business Intelligence that:

- **Extract** data from the source systems including database, flat files, spreadsheets, etc.
- **Transform** the data to convert it to a desired state, data cleanse.
- **Load** the data into the data warehouse and check for data integrity



Creating Repository



BI - Analysis Tool

- **Basic querying and reporting** - “Tell me what happened.”

- Structured and fixed format reports Based on simple and direct queries
- Usually involves simple descriptive analysis and transformation of data, such as calculating, sorting, filtering, grouping, and formatting

- **Ad hoc query and reporting** - “Tell me what happened when they need.”

- Similar to operational reporting but on a need basis

- **Business analysis(OLAP)** - “Tell me what happened with why.”

- A multi-dimensional analysis and reporting application for aggregated data
- Great for discovering details from large quantities of data
- Business analytics (BA) is the practice of iterative, methodical exploration of an organization's data with emphasis on statistical analysis.

- **Data mining** - “Tell me what might happen” or “Tell me something interesting.”

- Data mining techniques are a blend of statistics and mathematics, and artificial intelligence and machine-learning.

- **Data mining (or, knowledge discovery in database - KDD)**
 - Processes and techniques for seeking knowledge (relationship, trends, patterns, etc.) from a large amount of data
 - Extremely large datasets
- **Data mining applications use for**
 - sophisticated statistical and mathematical techniques to find patterns and relationships among data
 - Classification, clustering, association, estimation, prediction, trending, pattern, etc.
- **Common techniques**
 - Neural network, genetic algorithm, machine learning

Presentation

- **Reports**

- A report is the presentation of data transformed into formatted and organized information according to specific business requirements.
- Based on simple and direct queries: usually involves simple analysis and transformation of data (sorting, calculating, filtering, grouping, formatting, etc.)
- Reports can be static or interactive. But most reports are ready for printing.

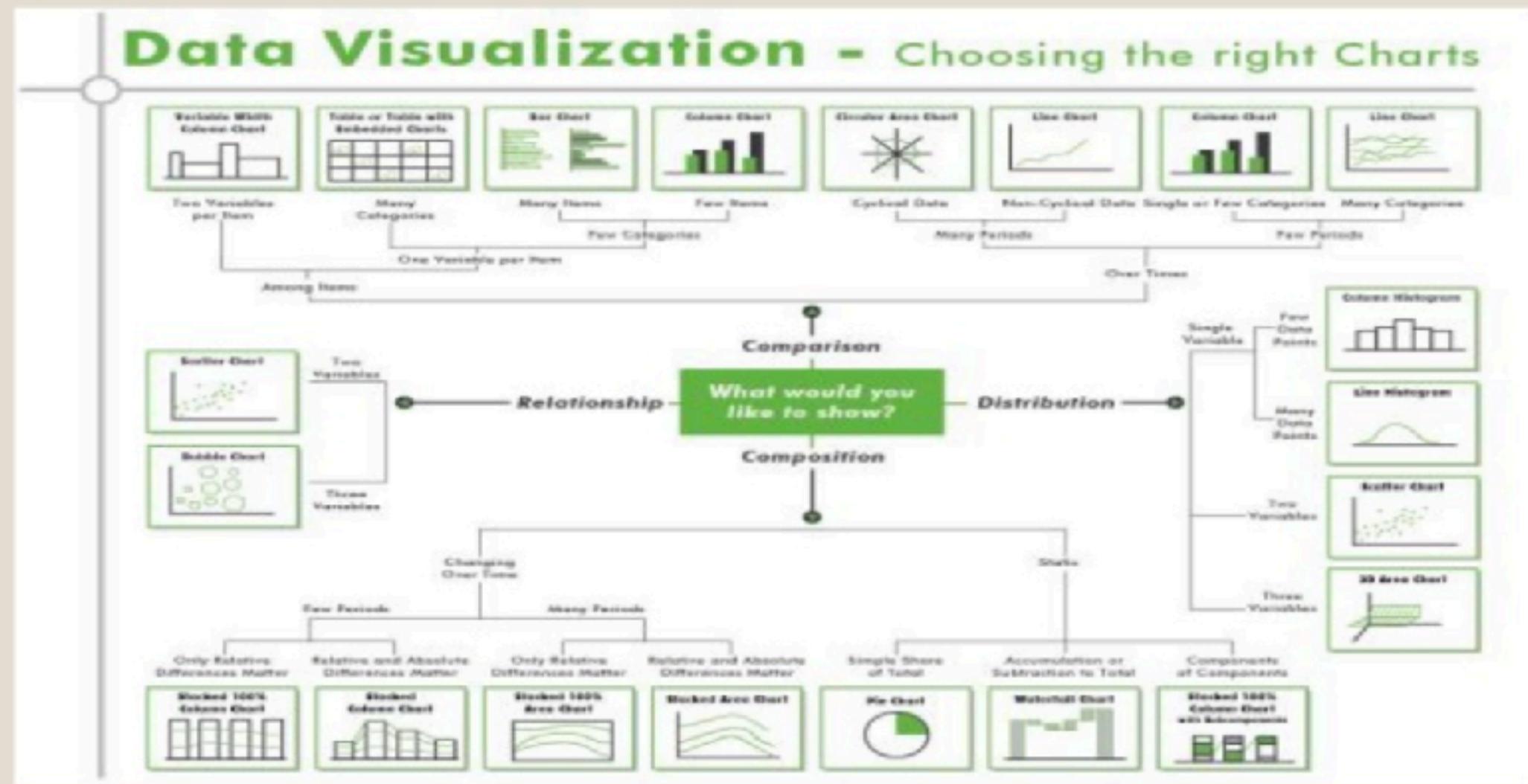
- **Visualization**

- An essential way for human understanding and sense making
- In the forms of table, charts, diagrams
- Visualization can also be part of the analysis process (visual analytics)

- **Dashboard**

- A dashboard is a visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance.
- Ability to identify trends and Gain total visibility of all systems instantly at one place

Data Visualization



Types of Dashboard

- Monitoring: Operational real time view of important indicators
- Analysis/data interaction: Provides optimized UI and information seeking and navigation feature among data and metrics to support analysis.
- Summary/overview: As a summary high level report of operating status



"Help me do my job"



"Show me the numbers"



"What's most important?"



Category	Value
Category A	Value A
Category B	Value B
Category C	Value C
Category D	Value D
Category E	Value E
Category F	Value F
Category G	Value G
Category H	Value H
Category I	Value I
Category J	Value J
Category K	Value K
Category L	Value L
Category M	Value M
Category N	Value N
Category O	Value O
Category P	Value P
Category Q	Value Q
Category R	Value R
Category S	Value S
Category T	Value T
Category U	Value U
Category V	Value V
Category W	Value W
Category X	Value X
Category Y	Value Y
Category Z	Value Z



Dashboards

D1 History and Trends

Welcome, Administrator | Dashboards - Answers - More Products - Settings - Log Out

1 History **2a Seasonality** **2b Seasn. Day** **2c Seasn. Qtr** **3a Trending** **3b Trd. Day** **3c Trd. Qtr** **4 Trend Lines**

Page Options ▾

Index **Help**

Divide Metric Value by **Go**

Select Metric **F1 Revenue**, "1-01 Revenue (Sum All)" **Go**

Historical Trend Analysis

History of "F1 Revenue", "1-01 Revenue (Sum All)" values on default time dimension:

1 - By Year

Year	Total
2007	11,371,280
2008	13,531,784

2 - By Quarter

Year	Total	Q1	Q2	Q3	Q4
2007	11,371,280	952,206	3,887,276	4,987,811	2,944,186
2008	13,531,784	3,278,988	6,073,910	2,874,711	1,304,255

3 - By Month

Month	Min Avg by Qtr	Min Avg by Yr
2007.01	11,371,280	11,371,280
2007.02	11,371,280	11,371,280
2007.03	11,371,280	11,371,280
2007.04	11,371,280	11,371,280
2007.05	11,371,280	11,371,280
2007.06	11,371,280	11,371,280
2007.07	11,371,280	11,371,280
2007.08	11,371,280	11,371,280
2007.09	11,371,280	11,371,280
2007.10	11,371,280	11,371,280
2007.11	11,371,280	11,371,280
2007.12	11,371,280	11,371,280
2008.01	11,371,280	11,371,280
2008.02	11,371,280	11,371,280
2008.03	11,371,280	11,371,280
2008.04	11,371,280	11,371,280
2008.05	11,371,280	11,371,280
2008.06	11,371,280	11,371,280
2008.07	11,371,280	11,371,280
2008.08	11,371,280	11,371,280
2008.09	11,371,280	11,371,280
2008.10	11,371,280	11,371,280
2008.11	11,371,280	11,371,280

4 Trend Lines

Year	Total	Q1	Q2	Q3	Q4
2007	11,371,280	952,206	3,887,276	4,987,811	2,944,186
2008	13,531,784	3,278,988	6,073,910	2,874,711	1,304,255

Grand Total

Year	Total	Monthly Avg	Qtrly Avg
2007	11,371,280	947,807	2,842,820
2008	13,531,784	1,230,180	3,371,912
Average	12,451,522	1,068,884	3,207,366
Grand Total	24,903,064	1,082,741	3,191,516

Dashboards

S-Dash Board S-Metric S-Brand Analysis

* Year: 2007
 2008
 2009
 2010
 2011

Company:

* For weeks: -

Between: -

Products:

Apply Reset

TDS Per Name Year is equal to 2007, 2008, 2009, 2010, 2011

S-Product Line Analysis
S-Master Details
Time run: 2/22/2011 7:07:08 PM

	2008	2009	2010	Grand Total
Products Hierachy				
Total Products	16,500,000	15,000,000	18,500,000	50,000,000
BizTech	6,990,741	6,362,087	7,707,172	21,060,000
Communication	3,530,490	3,278,613	4,073,314	10,882,416
Electronics	3,457,251	3,023,475	3,633,858	10,114,584
FunPod	5,723,187	5,160,340	6,616,473	17,500,000
HomeView	3,786,072	3,537,573	4,176,395	11,500,000
Services	296,447	330,837	376,561	1,003,845
TV	3,497,625	3,206,735	3,799,795	10,494,155

S-Trending Graphs
S-Trending Analysis
Date run: 2/22/2011

2008 2009 2010

1. Revenue

Legend:

- BizTech, Communication, Cell Phones
- BizTech, Communication, Smart Phon...
- BizTech, Electronics, Accessories
- BizTech, Electronics, Audio
- FunPod, Digital, Camera
- FunPod, Games, Fixed
- FunPod, Games, Portable
- HomeView, Services, Install
- HomeView, Services, Maintenance
- HomeView, TV, LCD
- HomeView, TV, Plasma

S-Gauges
Performance Index to Company Avg

2008 2009 2010

BizTech FunPod HomeView

S-Top Customers Bookings
Time run: 2/22/2011 7:07:08 PM

Seaton Baley ranks #20 with 123.97k bookings value over 40 orders

S-Daily Revenue Timeline
Time run: 2/22/2011 7:07:08 PM

1. Revenue — Payments

Revenue: 326.0K, 208.3K, 91.7K

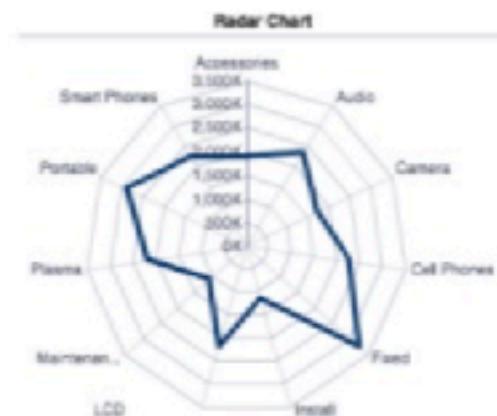
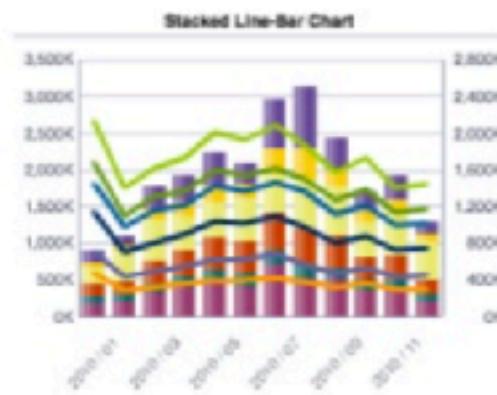
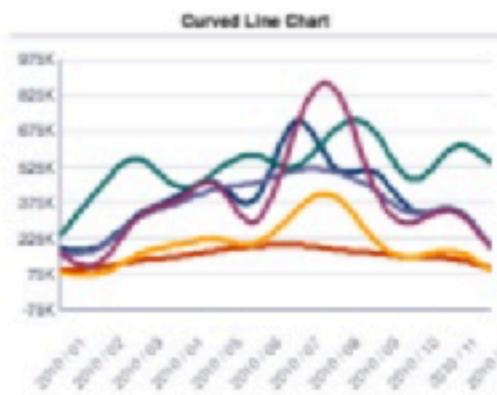
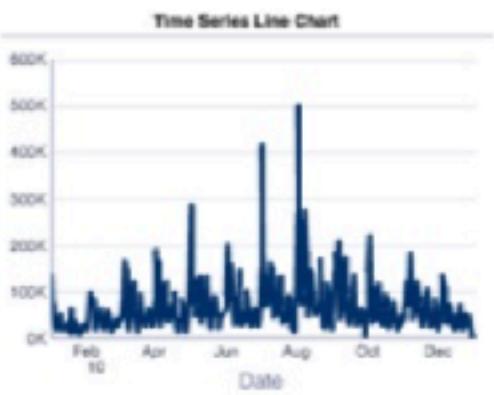
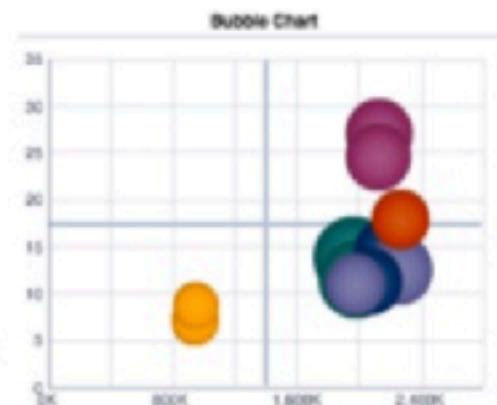
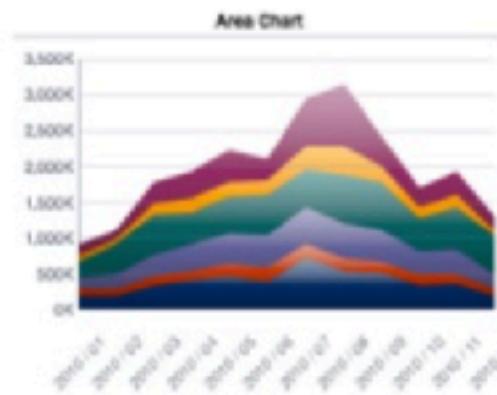
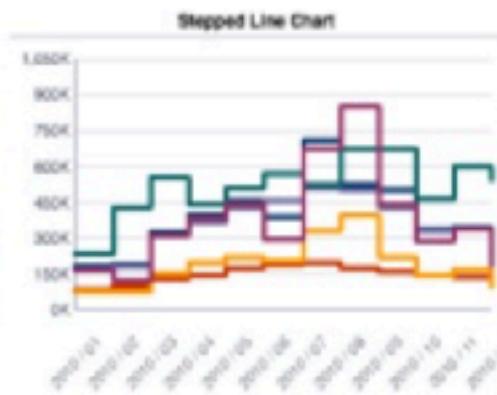
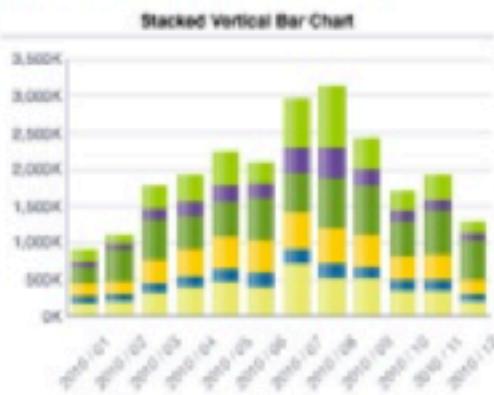
Payments: 100K, 80K, 60K, 40K, 20K, 0K

Dashboards(Charts)

Examples of Standard Charts Visuals

[Return to Main Index page](#)

Examples of Standard Visualizations



Dashboards(Maps & Multimedia)

Product

page 1 Music Image

Photo Gallery



Music Player



Video Bar



Google Map Viewer



Different Users of BI

Users

Casual Users (Top-down)

- Executives/Managers
- Salespeople
- Operations staff
- Customers & suppliers

80%

Monitor metrics
Analyze anomalies
Drill to detail

TOP-DOWN



Reports/Dashboards

Top-down

Bottom-up

Power Users (Bottom -up)

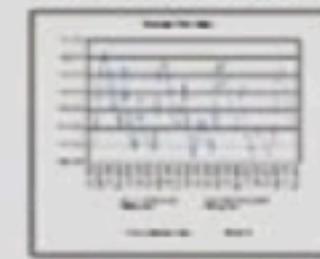
- Super users
- Business analysts
- Analytical modelers
- Data scientists

80%

Explore data
Model data
Source data

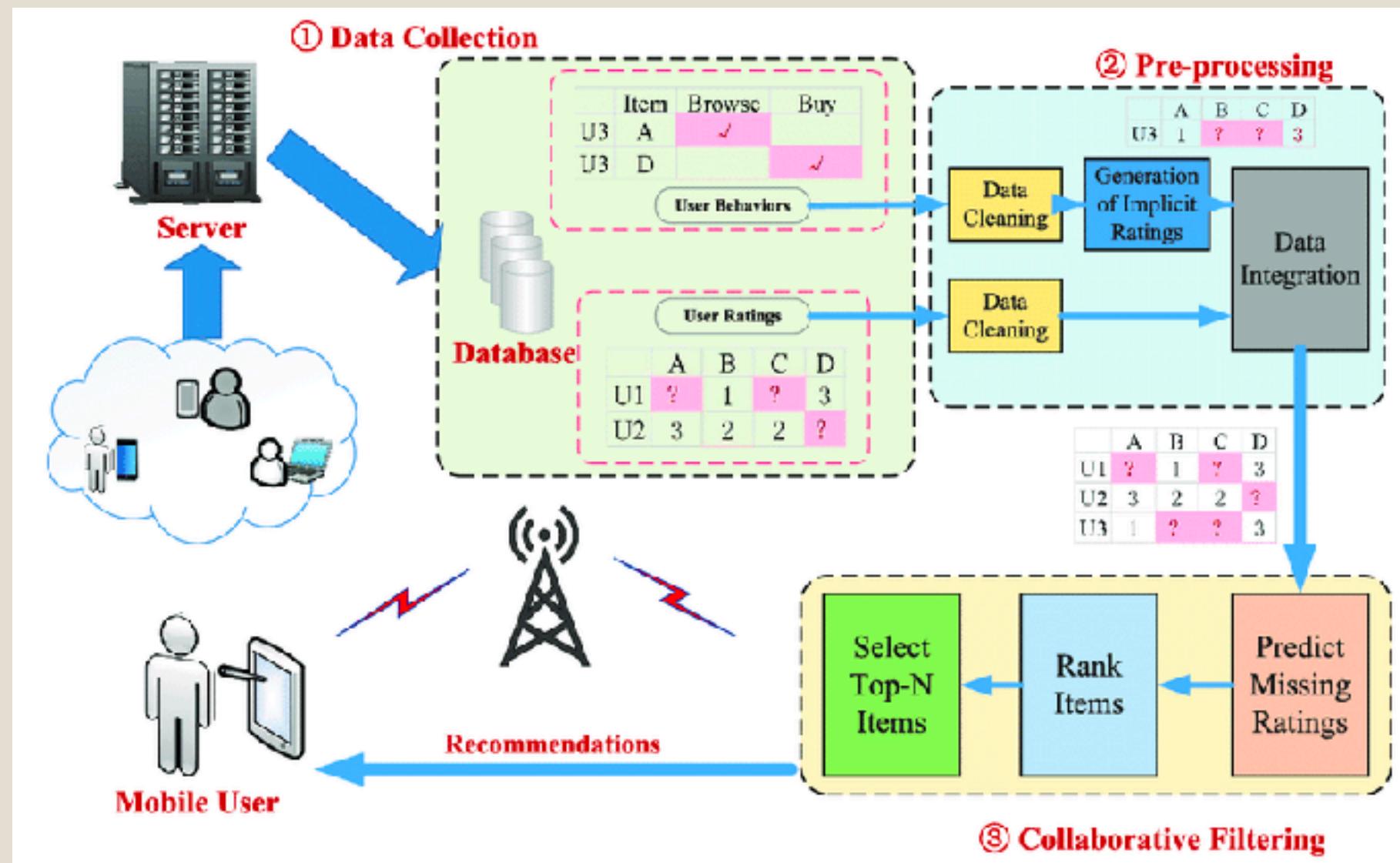


BOTTOM-UP



Excel, OLAP, Visual
Discovery, Mining

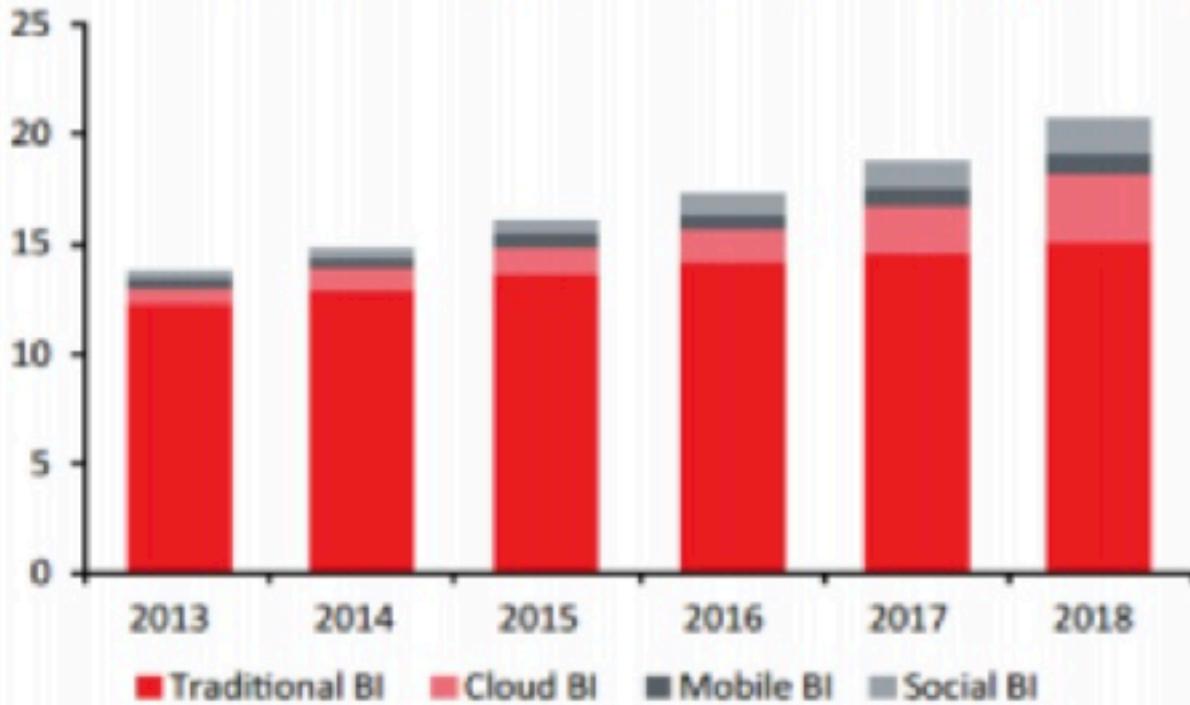
Recommend System



BI Future Market

The global Business Intelligence and Analytics Software Market is expected to grow from \$17.90 billion in 2014 to \$26.78 billion by 2019, at a Compound Annual Growth Rate (CAGR) of 8.4%.

CHART 1: GLOBAL INTELLIGENCE MARKET SIZE, BY TECHNOLOGIES, 2013-2018 (\$ BILLION)



Sources: Gartner, Redwood Capital

BA and Data Scientist

Jon Hao MBA Lifestyle

MBA討生活

Business Intelligence的分類與就業趨勢 附帶Jon的面試密技

Agenda

Business Intelligence

Computer Vision

Natural Language Processing

What is Computer Vision(CV)?



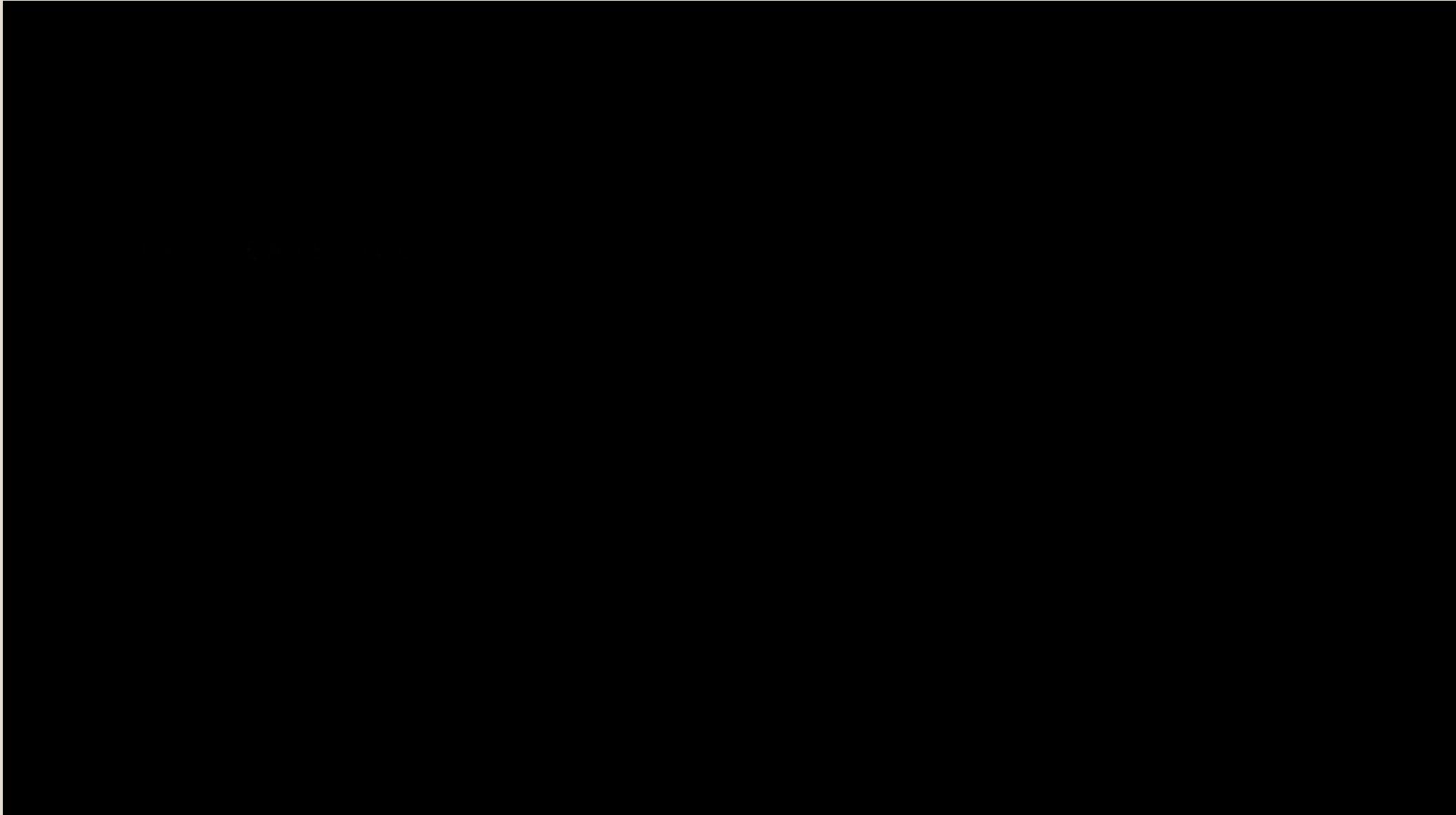
Business use case - beauty camera



Business use case - film



Business use case - film



Business use case - self-service supermarket



Business use case - self-service supermarket(security)



Business use case - self-driving



Business use case - Health Care



Artificial intelligence to help treat cancer



Dr R. Jena, Neuro-oncologist at University of Cambridge Cancer Centre, UK
Dr A. Criminisi, Principal Researcher at Microsoft Cambridge, UK

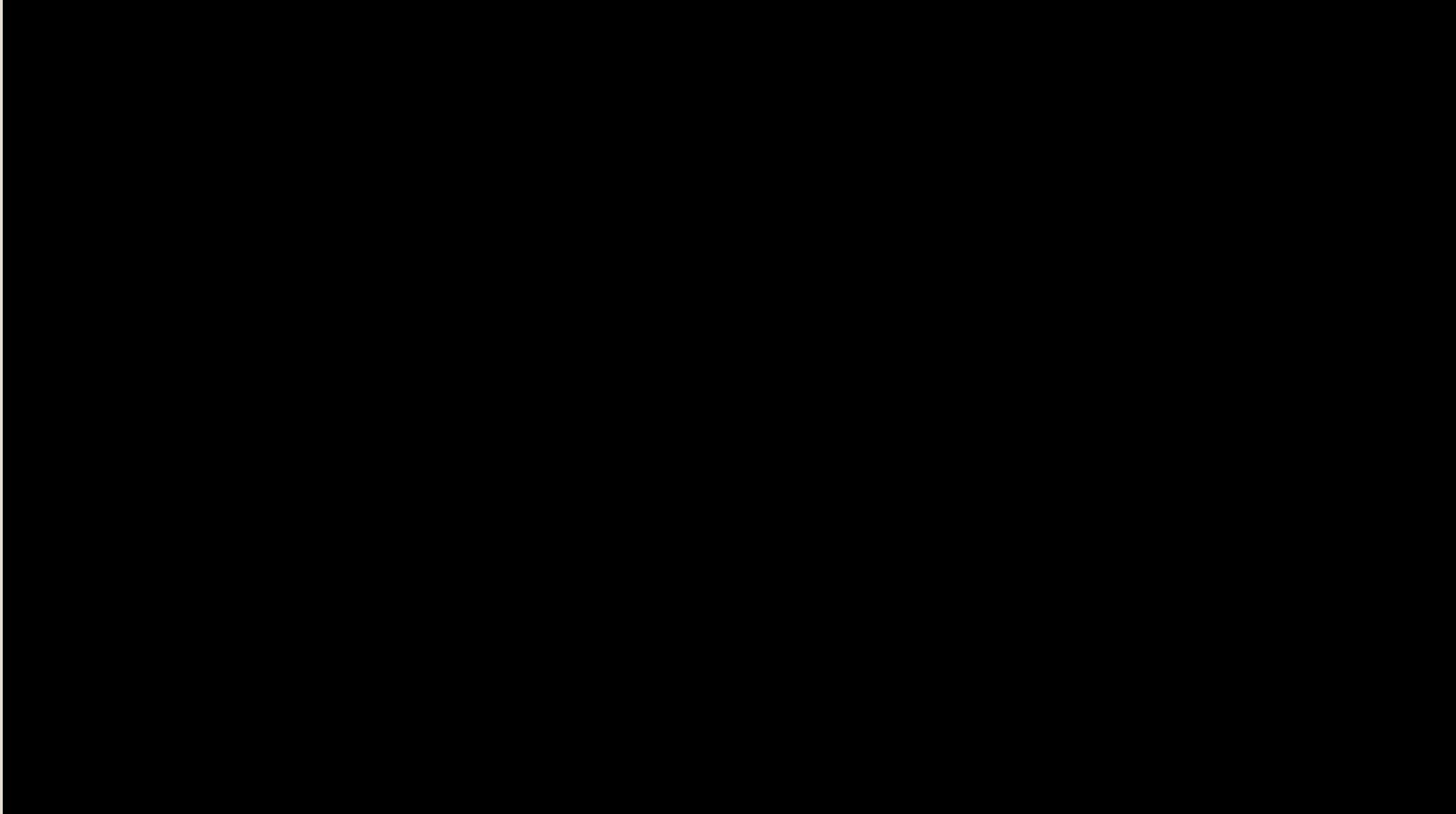
Business use case - Agriculture



Business use case - Industrial



Business use case - VR



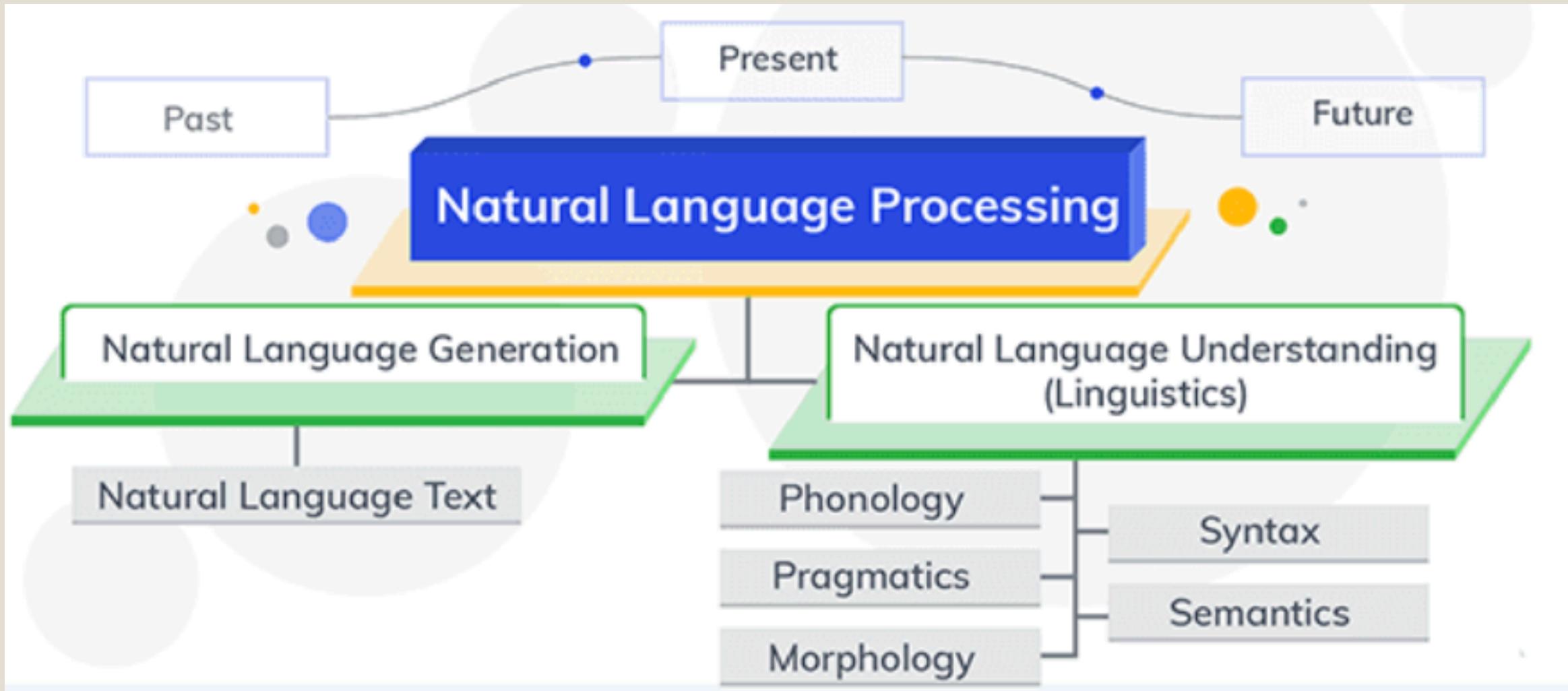
Agenda

Business Intelligence

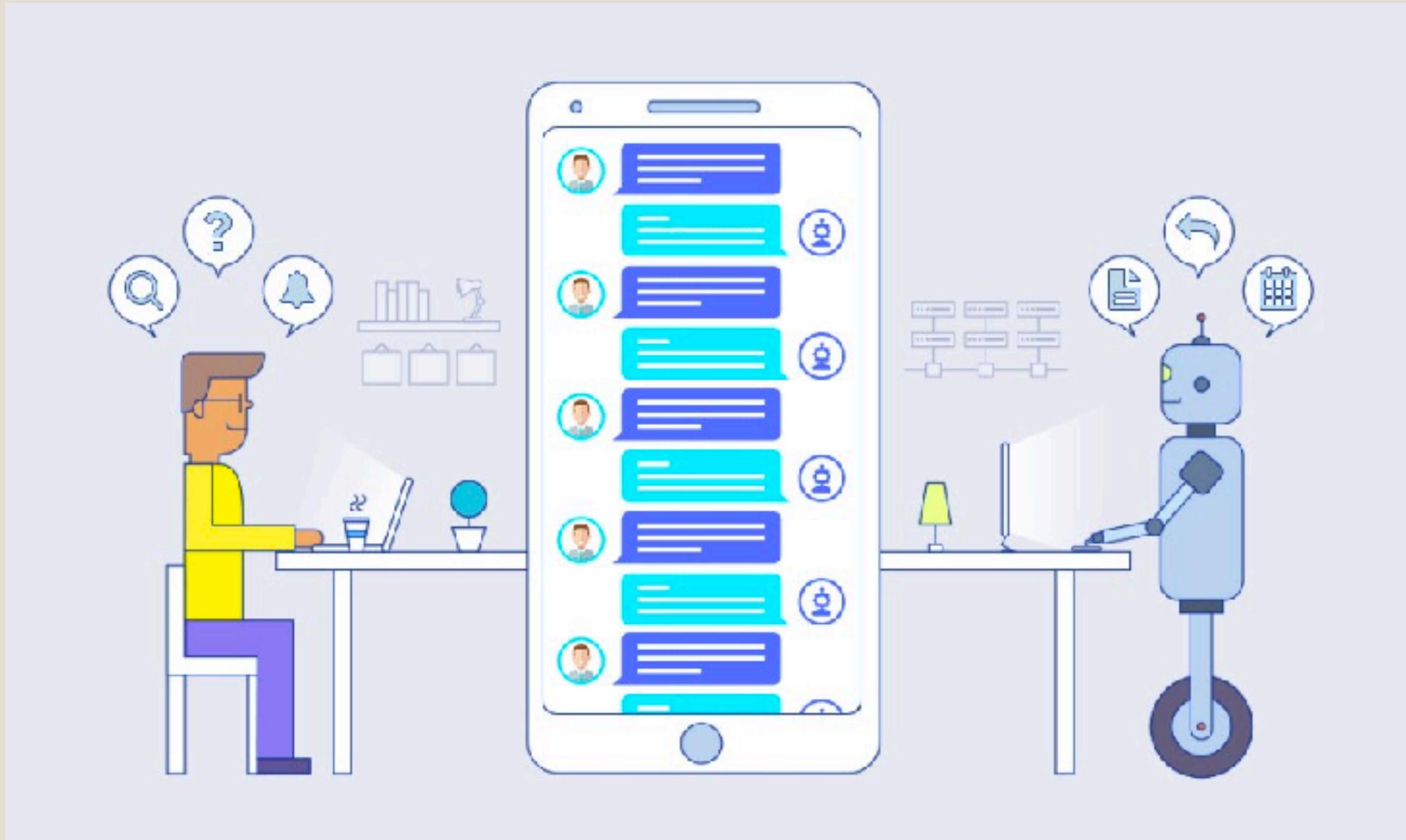
Computer Vision

Natural Language Processing

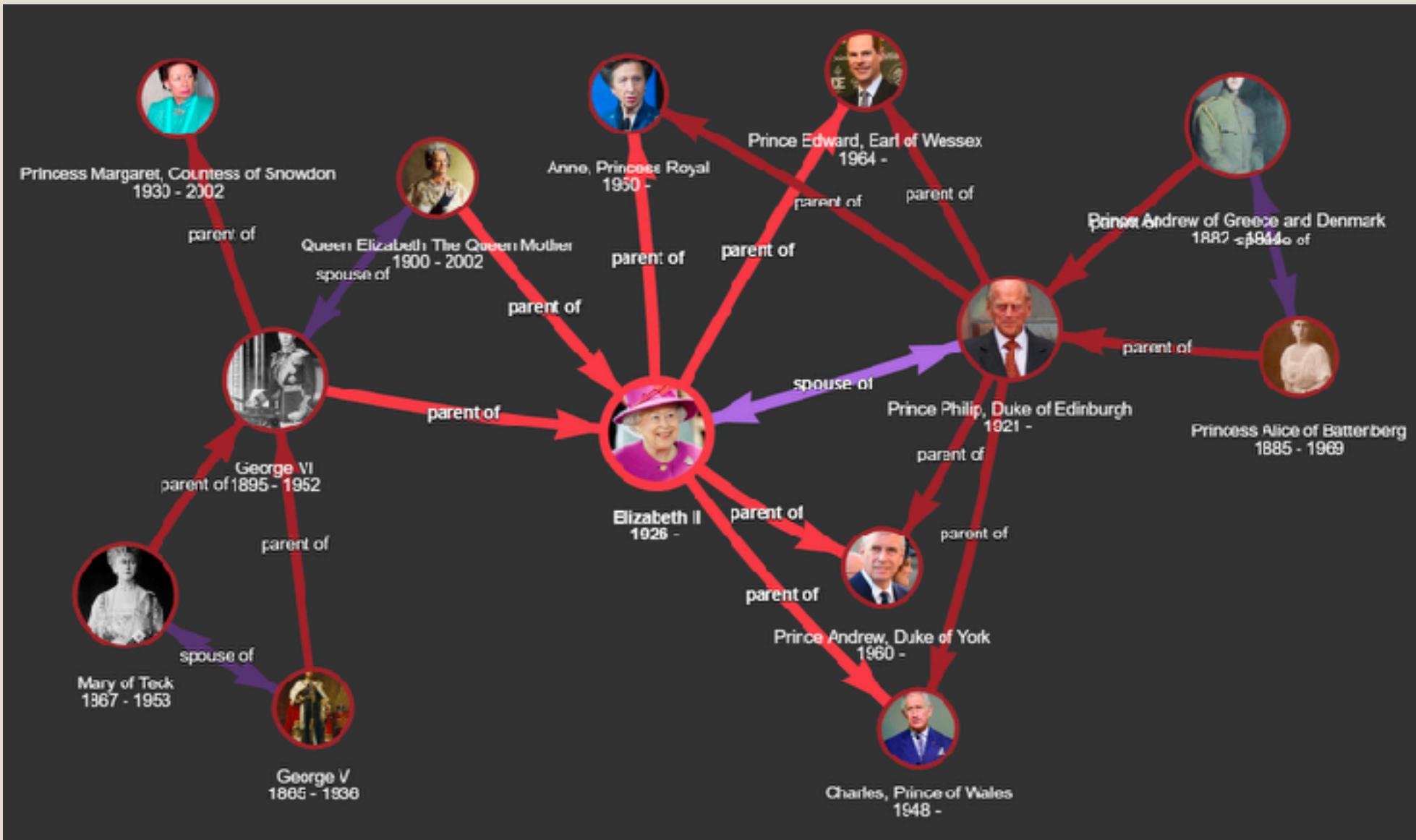
What is Natural Language Processing(NLP)?



Business use case - Sentiment Analysis



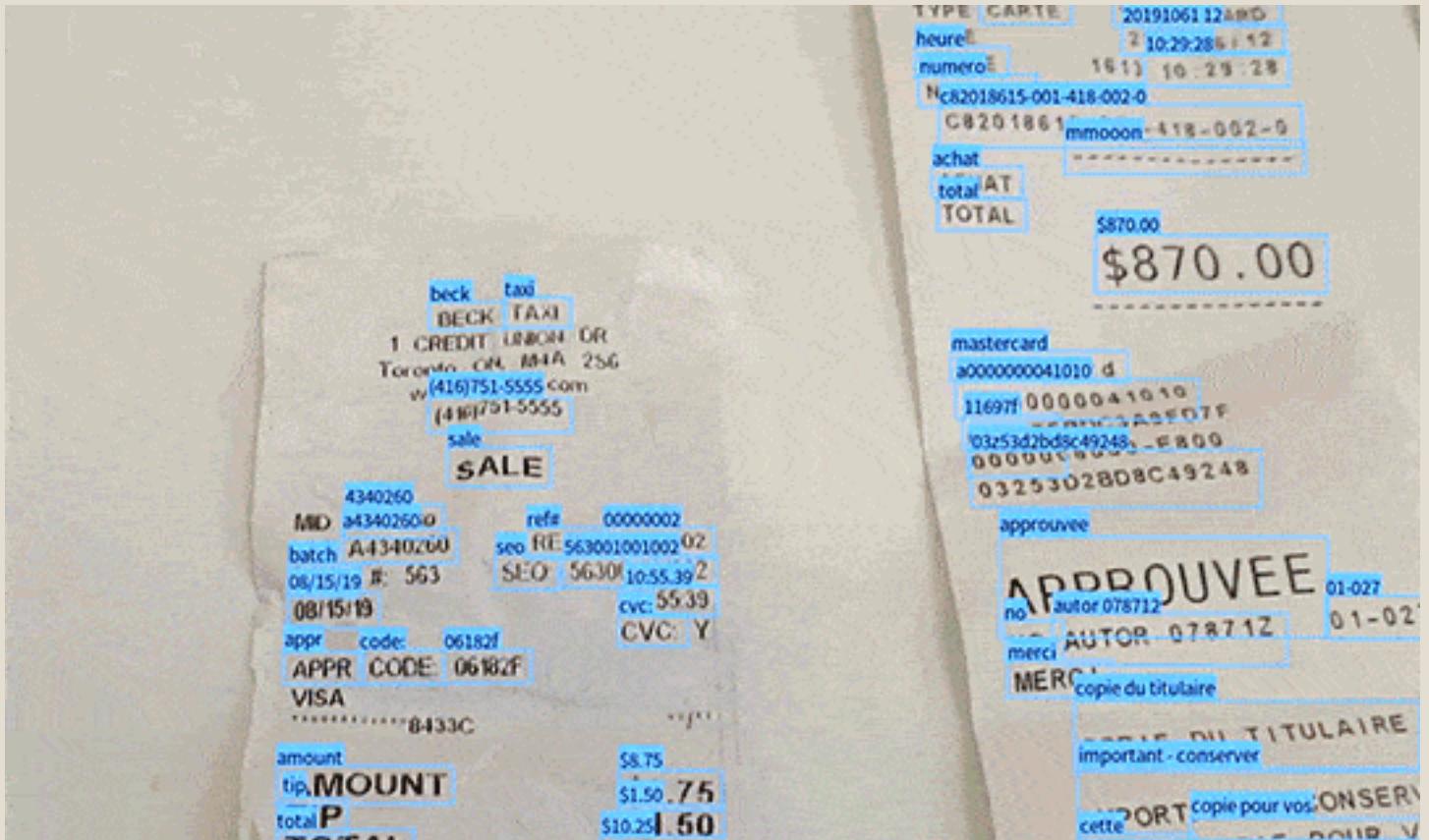
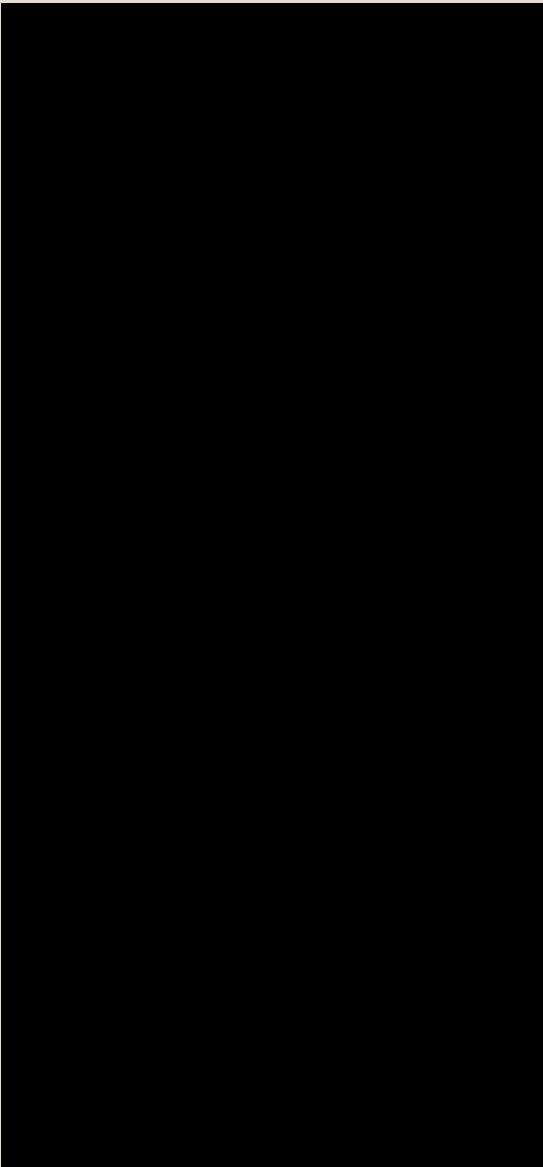
Business use case - Knowledge Graph



Business use case - Topic Detection



Business use case - OCR/DLA



Business use case - Explanation

Why text analytics matters in healthcare

Complications,
incidental findings
during procedures

Key findings on daily
post-op wound checks

Character of chest pain

Lung exam: Wheezing?
Crackles?

Social hx notes for
discharge planning

Procedure and op notes
Progress notes
Chief complaint
History of present illness
Physical exam
Assessment and Plan
Cardiology reports: echo,
stress test, EKG
Radiology reports
Pathology reports
Discharge summaries
Consults

Duration of
presenting
symptoms

Working
diagnoses

Ejection fraction, wall
mobility

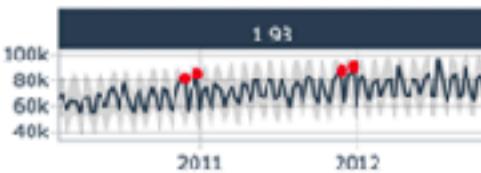
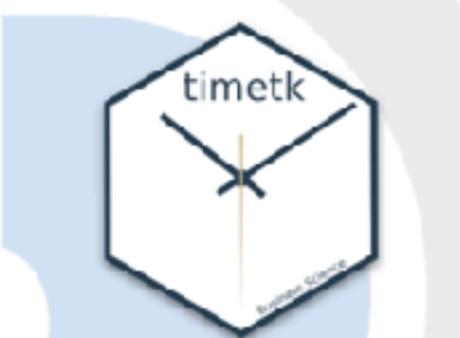
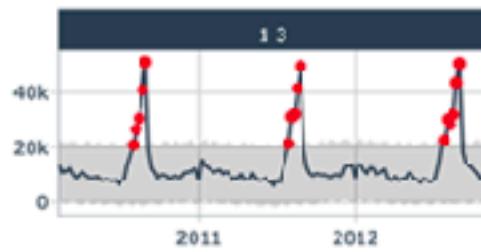
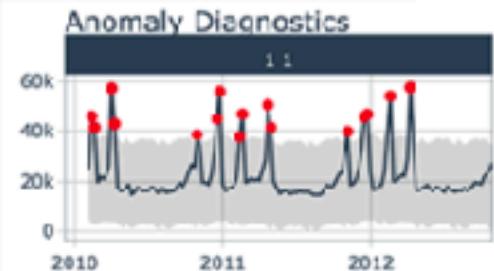
Baseline EKG: ST
segment depression, in
which leads? Old Q
waves?

Prior end of life
discussions

Business use case - Anomaly Detection

Anomaly Detection

Visualize, wrangle, and preprocess time series data



Business use case - Writing

The expectant Labor Day arrived at finally, we cantake a break finally. The seldom several days holidays, I want to play a fully enjoy.

The first day, I'm going to Yiwu. I by train, Setout from Shanghai, by way of Jiaxing and Hangzhou. The scenery in the journey is very beautiful, There is many hills, But not how many waters, My happpy mood did not therefore suffer the influence, Because I'm not to like the water very much, Especially big river.

Keep in mind the strange and pleased mood, I arrived Yiwu. The many people says, Yiwu become famous because of small merchandise, I approve very much now, However the night that I like it. I live the neighborhood in hills, Air is very good, But there is a lot of insectual. The sunlight is very strong there sevral days, Usually in the daytime of time, I sleeping in house, The nightfall go to play. Very quick a week passde by. The holidays be over, I felt not how happy, But I hope that I can to breathe the air on the hills again. Expect the labor day of the next year.The expectant Labor Day arrived at finally, we cantake a break finally. The seldom several days holidays, I want to play a fully enjoy.

The first day, I'm going to Yiwu. I by train, Setout from Shanghai, by way of Jiaxing and Hangzhou. The scenery in the iourney is very beautiful.

- GRAMMAR

fully → **full**

Fully seems to be the wrong part of speech for this context.

② Learn more



- The - Change preposition

- is - Change the verb form

- waters - Change the wording

- happy - Correct your spelling

- therefore - Add the comma(s)

- pleased - Replace the word

- says - Change the verb form

Business use case - Writing

人工智能诗歌写作平台

The screenshot shows a user interface for an AI poetry writing platform. At the top, there are four circular icons labeled "AI作诗" (AI Poetry), "AI藏头诗" (AI Chantou Poem), "AI填词" (AI Fill-in-the-Word), and "AI对联" (AI Couplet). Below these are four options: "五言绝句" (Five-character绝句), "五言律诗" (Five-character Lushi), "七言绝句" (Seven-character绝句), and "七言律诗" (Seven-character Lushi). A search bar at the bottom left contains the text "露水" (Dew), and a green button on the right says "作诗" (Write Poem). Below the search bar, a list of "热门" (Hot) terms includes: 春江, 夏荷, 秋菊, 咏梅, 松柏, 柳絮, 白鹭, 归雁, 寒蝉. A message "作诗耗时: 1456ms" indicates the processing time. On the right, a button "换一首" (Change Poem) is visible. The main content area displays a poem titled "七绝·露水" (Seven绝·露水) with the text:
一片清光万里同，秋来无处不相逢。
夜深只有嫦娥见，犹在瑶台月影中。

<https://www.aichpoem.com/#/shisanbai/poem>

Business use case - NLG

麦克风 在线合成配音

test

亲爱的顾客朋友：
下午好！欢迎光临惠客隆超级购物中心！
为答谢广大顾客朋友对我商场的支持与厚爱，惠客隆全体员工将为您营造一个良好的购物环境，让您踏着时尚的步伐，伴着优美的乐曲，体验时尚与潮流的脉搏，感受我们真诚的服务。我们始终以优良的商品、优惠的价格和最佳的服务满足您的需求。如果您对我们的商品和服务有任何的意见和建议，欢迎您到服务台咨询。惠客隆全体员工愿您满怀希望而来，满载喜悦而归。谢谢！

正在播放，试听音效只显示前100字符



试听 0/900字

完成并合成样音

参数配置

更多模板>>

配音模板：超市迎宾-舒缓-促销配音

背景音乐：经典唯美抒情音乐4

朗读速度：慢 默认 快

主播音量：小 默认 大

配乐音量：小 默认 大

价格说明：0~100字3元；101~200字8元；201~300字10元；301~1000字12元；

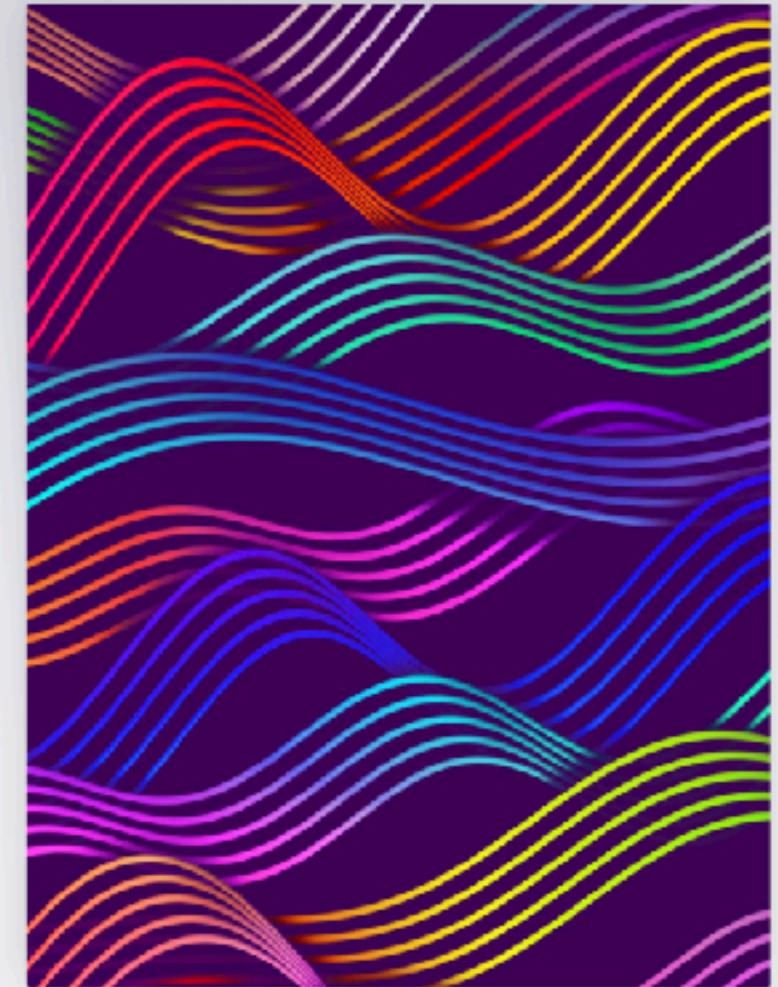
Business use case - Music

MuseNet

We've created MuseNet, a deep neural network that can generate 4-minute musical compositions with 10 different instruments, and can combine styles from country to Mozart to the Beatles. MuseNet was not explicitly programmed with our understanding of music, but instead discovered patterns of harmony, rhythm, and style by learning to predict the next token in hundreds of thousands of MIDI files. MuseNet uses the same general-purpose unsupervised technology as GPT-2, a large-scale transformer model trained to predict the next token in a sequence, whether audio or text.

April 25, 2019

6 minute read, 16 minute listen



<https://openai.com/blog/jukebox/>

<https://openai.com/blog/musenet/#try>

Q&A