Modul 3

Introduction to Data Science

Data Science Program

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Outline

- Data Science Challenges
- Data Science Workflow
- Data Science Roles
- Group Assignment

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WHAT IS DATA SCIENCE

What is it?

- Is it a Role or Position?
- Is it a Process?
- Is it a problem / challenge ?

Correlations to this term :

- Big Data
- Data Driven
- Machine Learning
- AI
- Distributed computing

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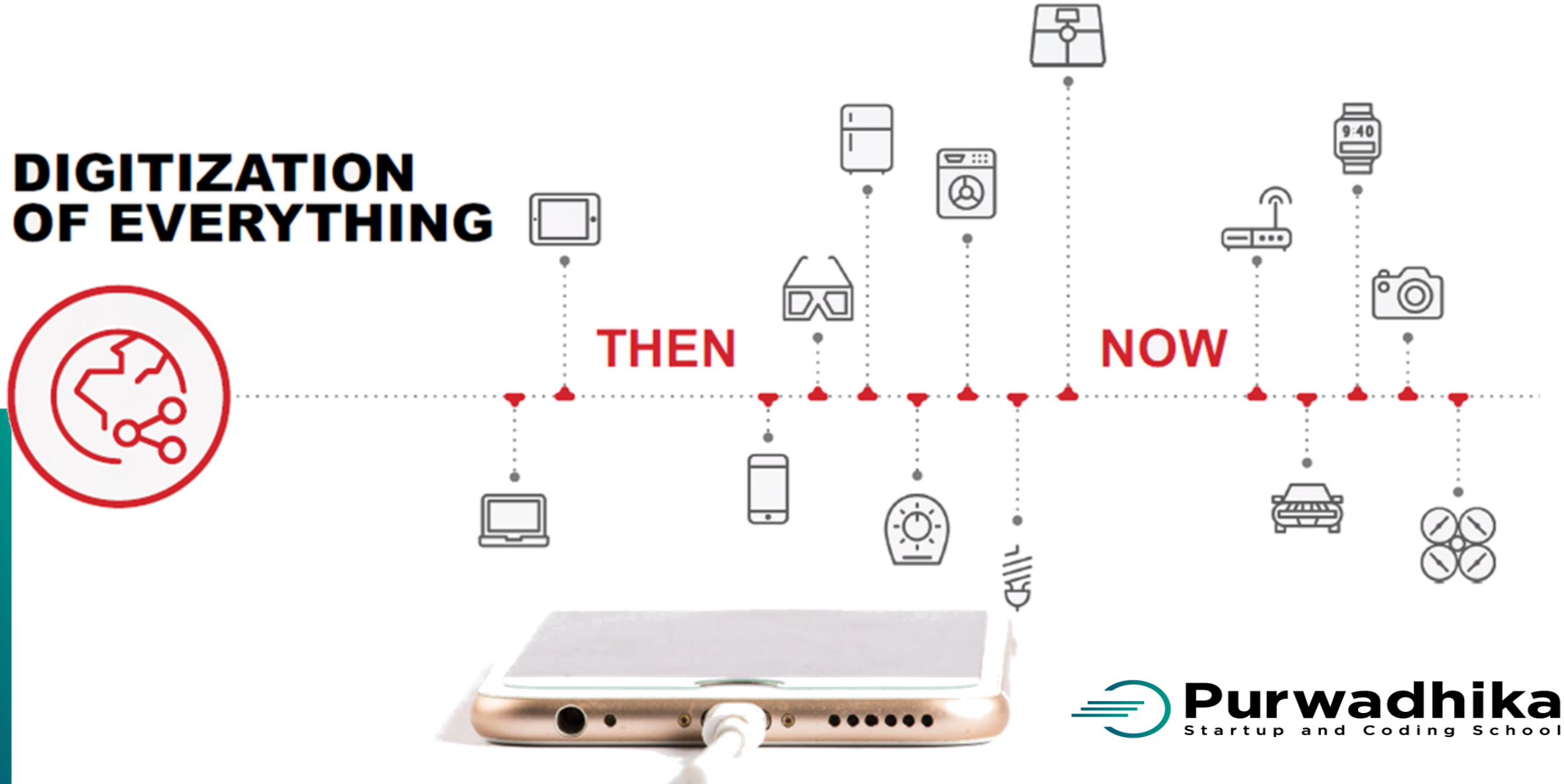
THE RISE OF INTERNET



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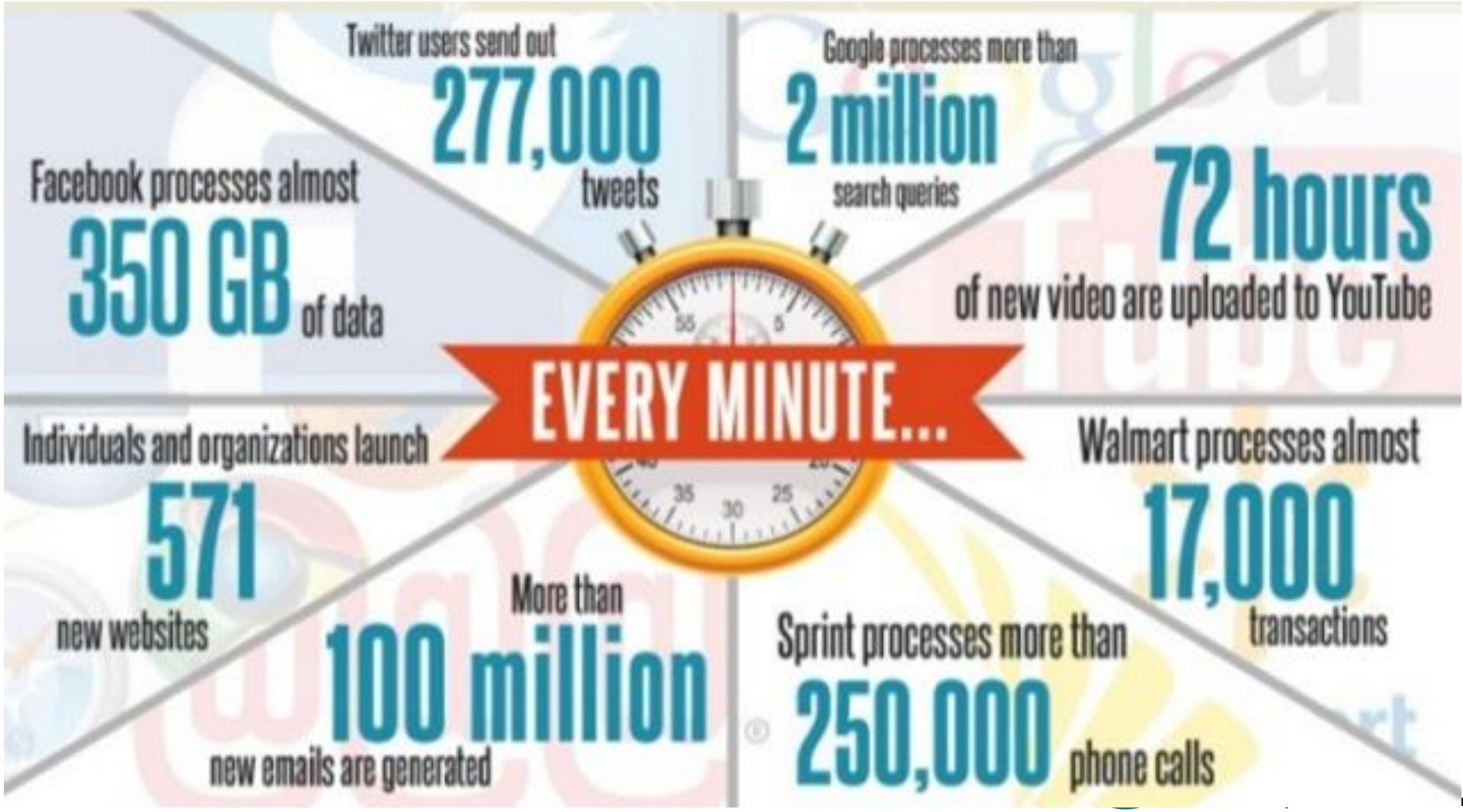
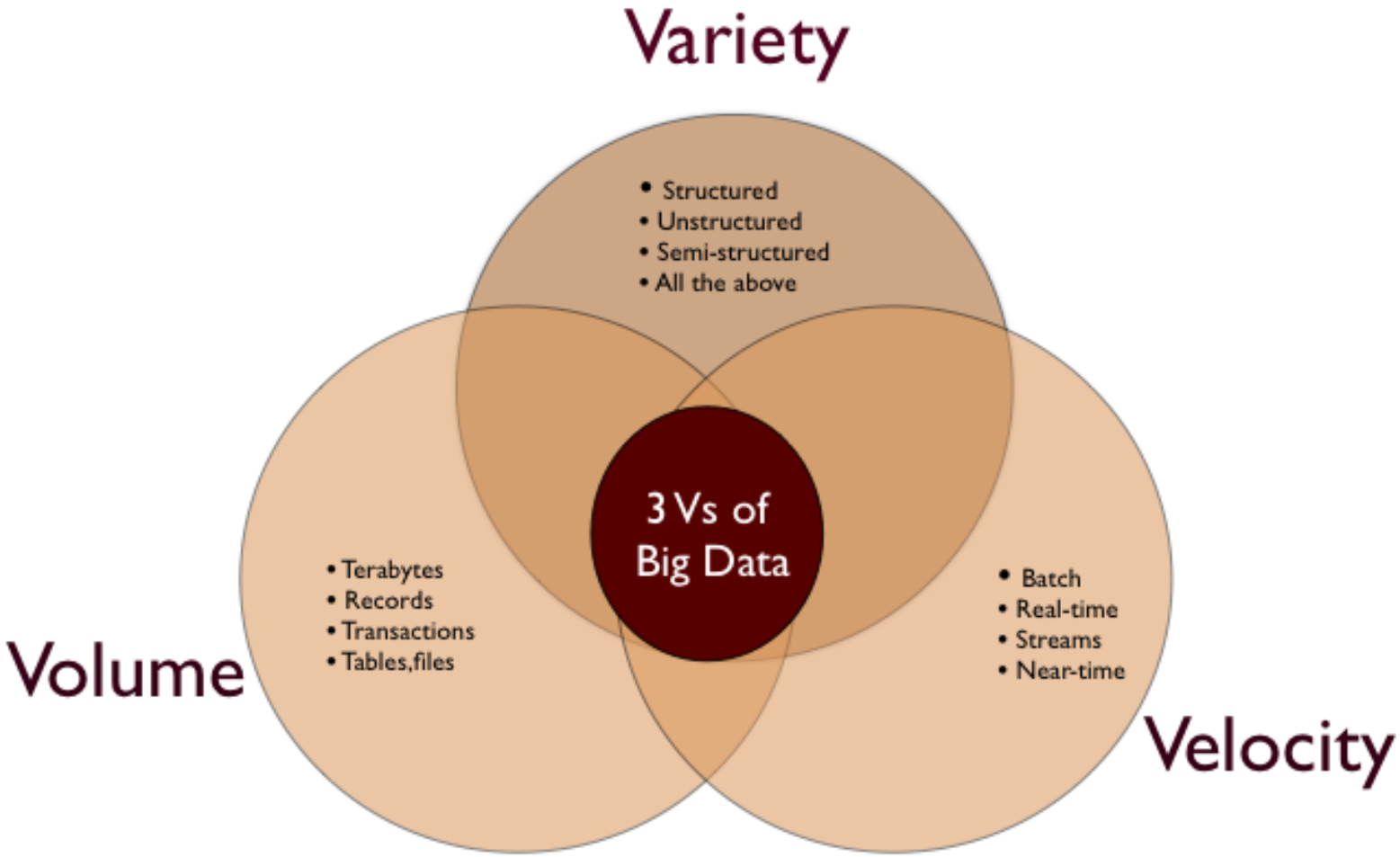


BIG DATA : 3V



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MULTI DISCIPLINARY

We need to understand the PROBLEM

1. How the management think
2. How the customer think
3. How the market shifts

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THE QUESTIONS

“Kami mau pasang iklan, tapi tidak tahu channel mana yang paling efektif”

“Ada beberapa produk kami yang tidak laku, walau review sangat bagus”

“Kredit nasabah kami banyak yang macet”

“Stock barang selalu habis/terlalu banyak”

“Kami tidak tahu seberapa efisien sales person kami”

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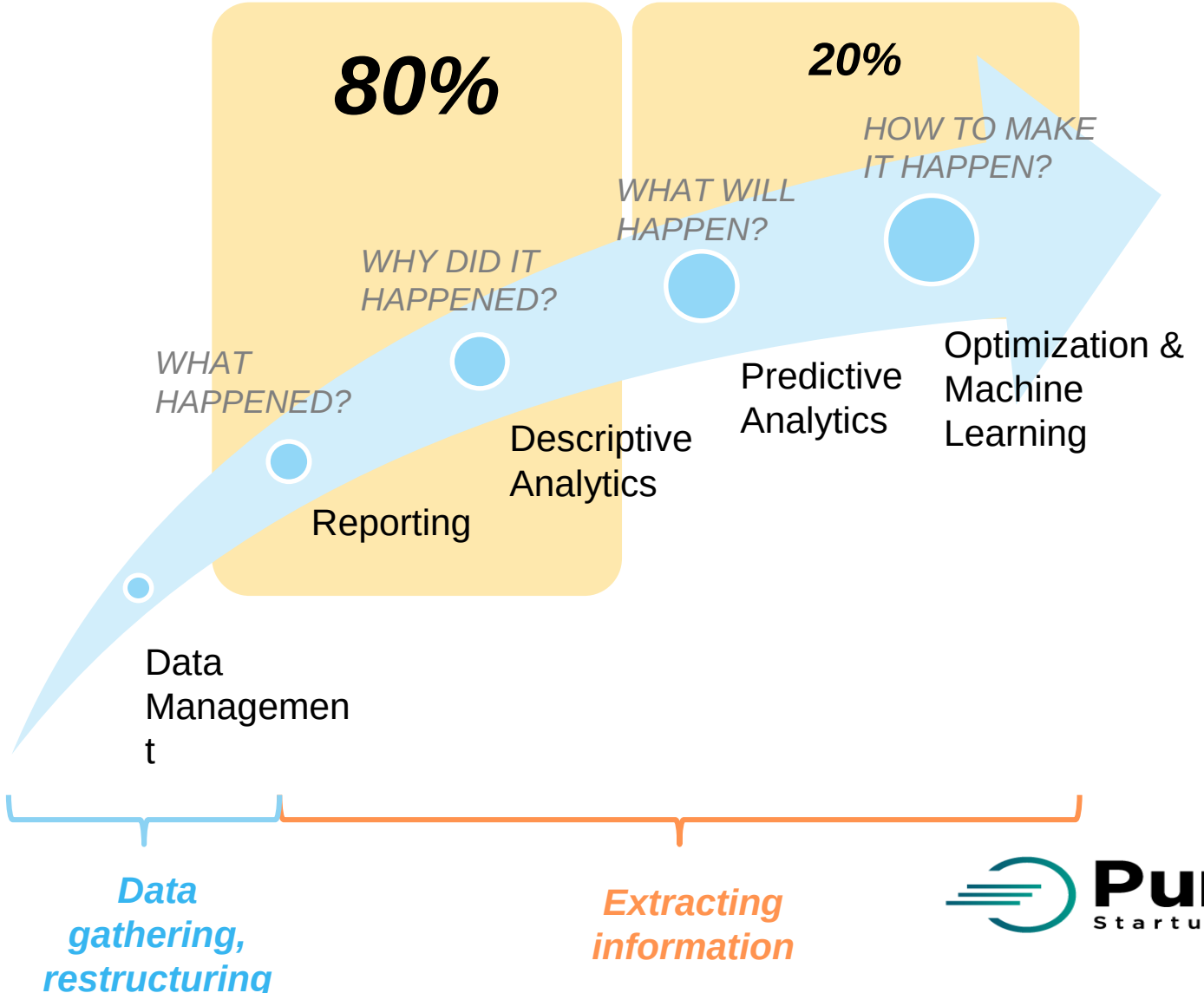
DATA SCIENCE CHALLENGES



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DATA SCIENCE WORKFLOW

DATA SCIENCE WORKFLOW

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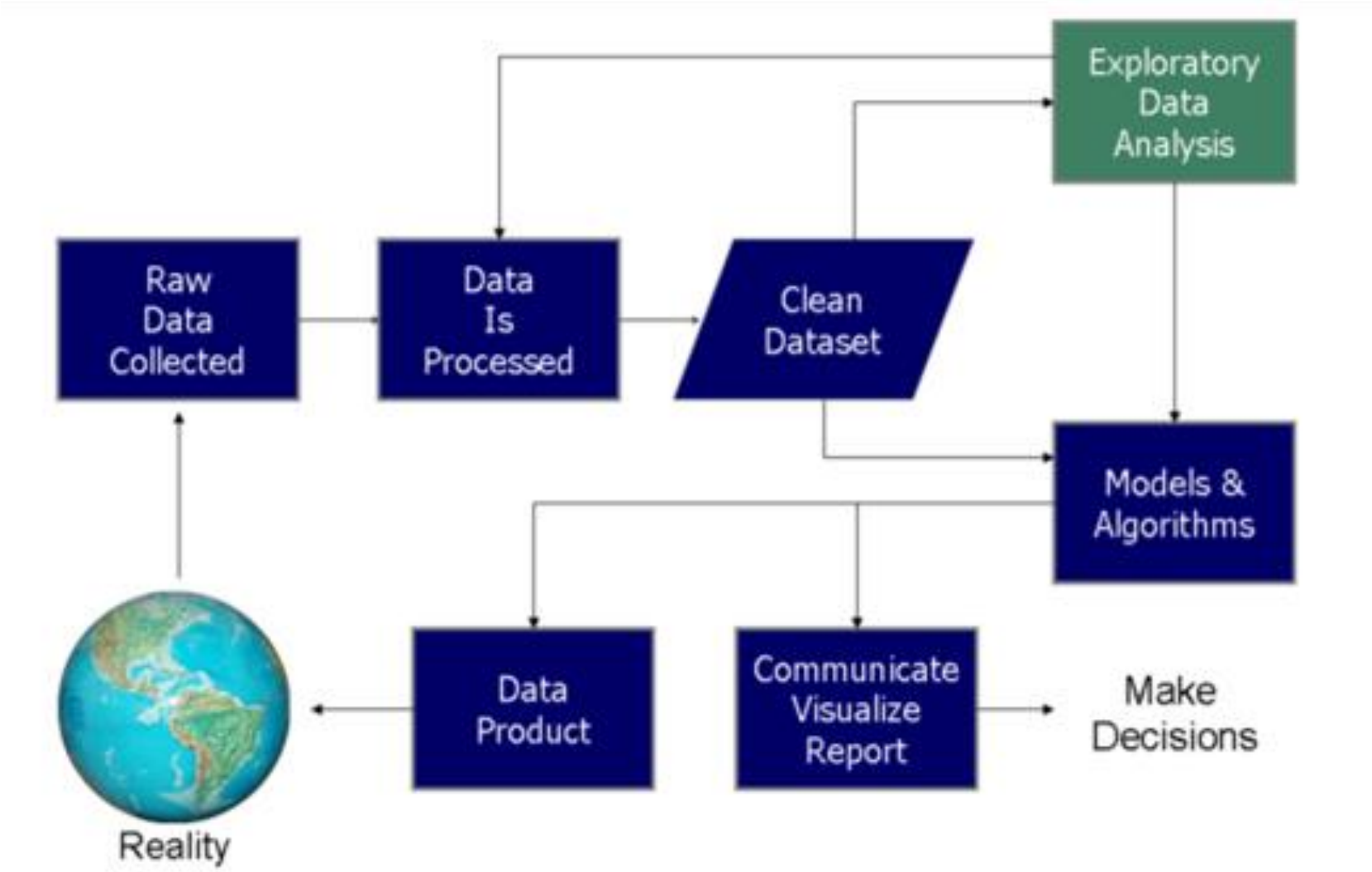
DATA SCIENCE WORKFLOW



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DATA SCIENCE WORKFLOW

Ask Questions

- Who are the customers?
- Why are they buying our product?
- How do we predict if a customer is going to buy our product?
- What is different from segments who are performing well and those that are performing below expectations?
- How much money will we lose if we don’t actively sell the product to these groups?

DATA SCIENCE WORKFLOW

What needs to be considered :

- Data Sources
- Data Location
- Data Format
- Data Types
- Acquisition Methods
- Data Privacy

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DATA SCIENCE WORKFLOW

Data Sources :

- Users Profile
- Users Activity/Transaction
- Enterprise ressources
- World trends/activity

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DATA SCIENCE WORKFLOW

Data Location

- Inter Department
- Across Department
- External Data
- Public Data

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DATA SCIENCE WORKFLOW

Data Format

- Hard copy
- Digital Documents
- Database
- Streams 

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DATA SCIENCE WORKFLOW

Data Types

- Numerical
- Text
- Image
- Audio
- Video

DATA SCIENCE WORKFLOW

Data Access

- Data warehousing
- REST API
- Web scraping

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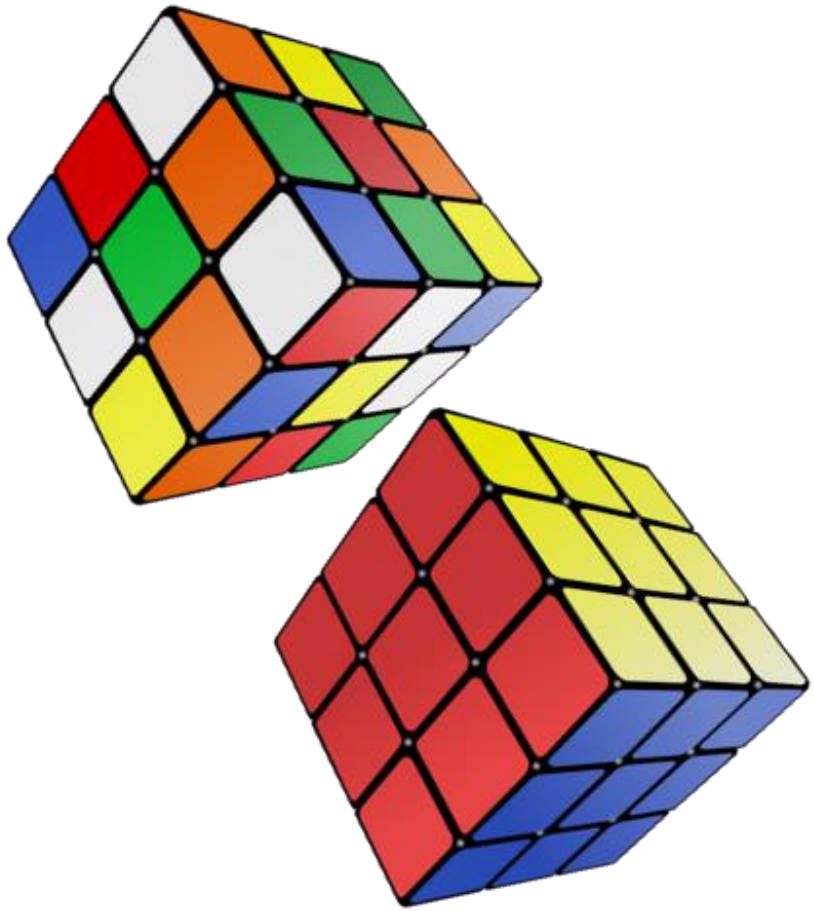
DATA SCIENCE WORKFLOW

Data Privacy

- User Consent : User needs to give consent for any usage purposes
- Data Privacy Law :
  - EU General Data Protection Regulation
  - RUU Perlindungan Data Pribadi

DATA SCIENCE WORKFLOW



Structured Data

Vs

Unstructured Data

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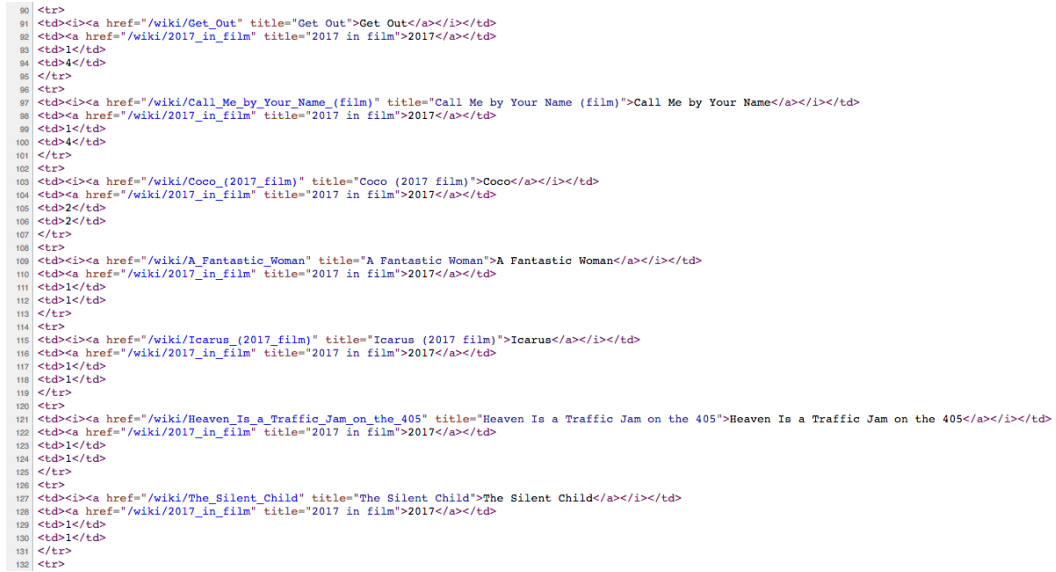
DATA SCIENCE WORKFLOW

Data preparation

- Data cleansing
  - Format normalization
  - Typing inconsistency
- Handling NULL values
- Handling outliers
- Feature Selection/Engineering



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Time-and-Materials 28
Time and Material 26
TM 25
Frim Fixed Price 24
Cost Plus Fixed Fee 23
firm fixed price 22
Cost Plus Award Fee 21
Firm Fixed 21
Firm-Fixed Price 20

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DATA SCIENCE WORKFLOW : DATA ANALYSIS AND VISUALIZATION

DATA ANALYSIS

- Always aim to answer the problem definition
- Identify
  - Variations
  - Correlations
  - Trends
  - Outliers

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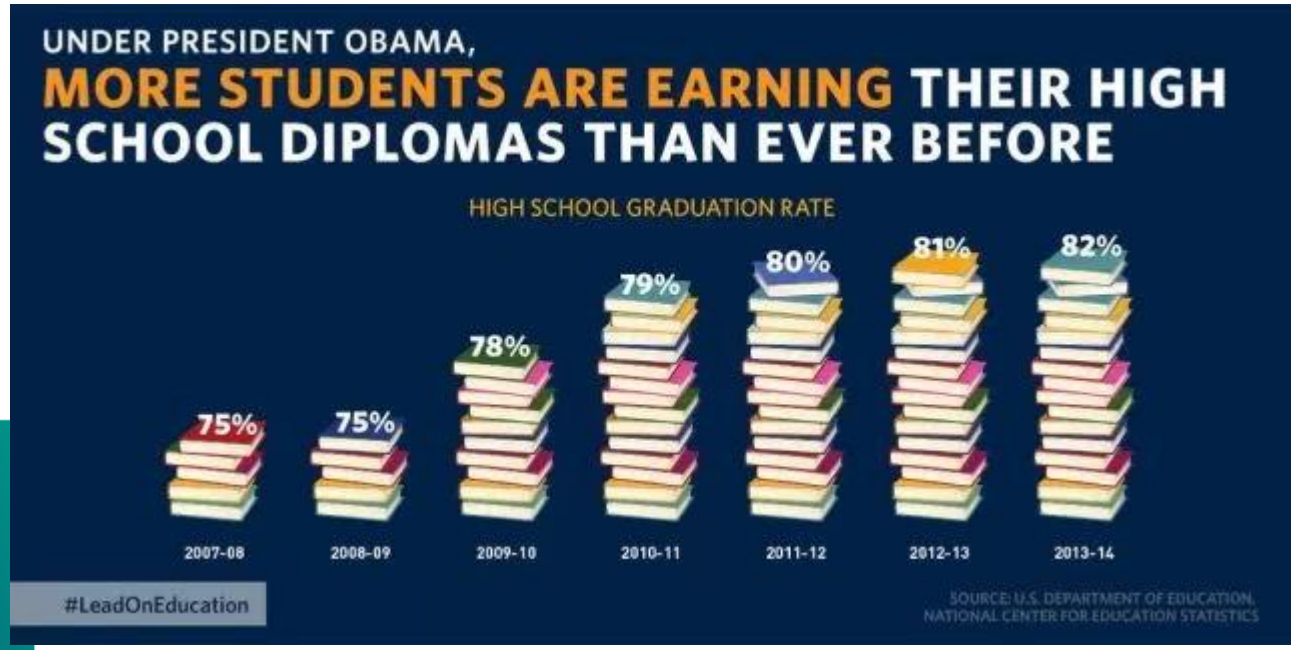
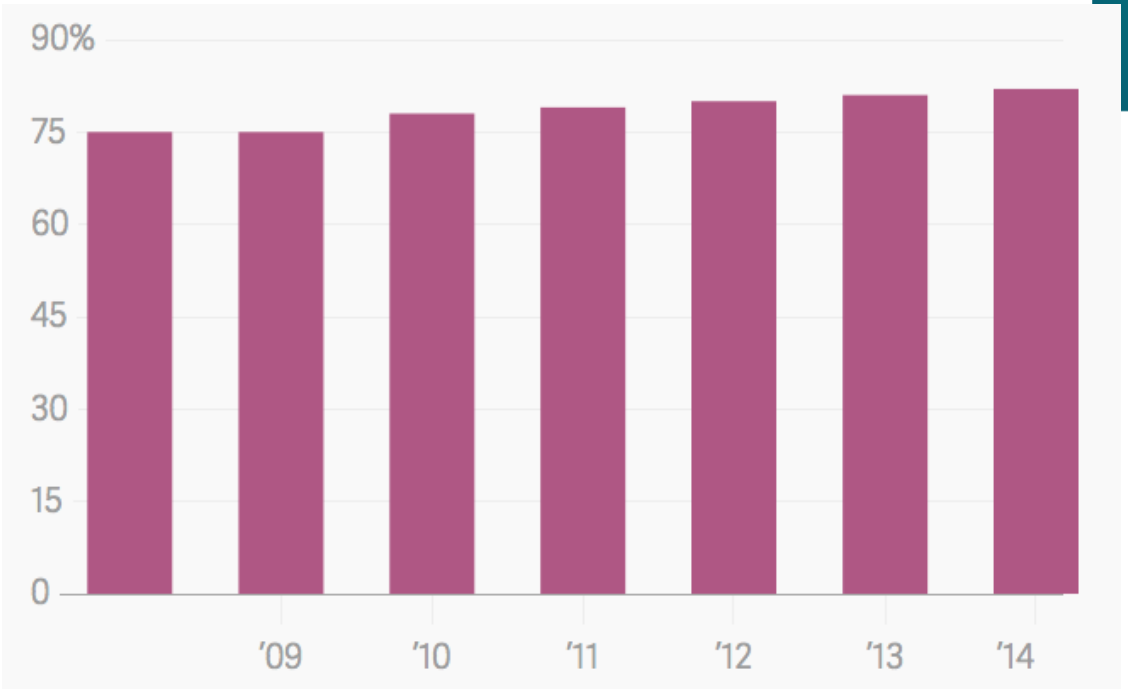
DATA SCIENCE WORKFLOW : DATA ANALYSIS AND VISUALIZATION

DATA Visualization

- Know the audience
- Visualization is all about perception

DATA SCIENCE WORKFLOW : DATA ANALYSIS AND VISUALIZATION





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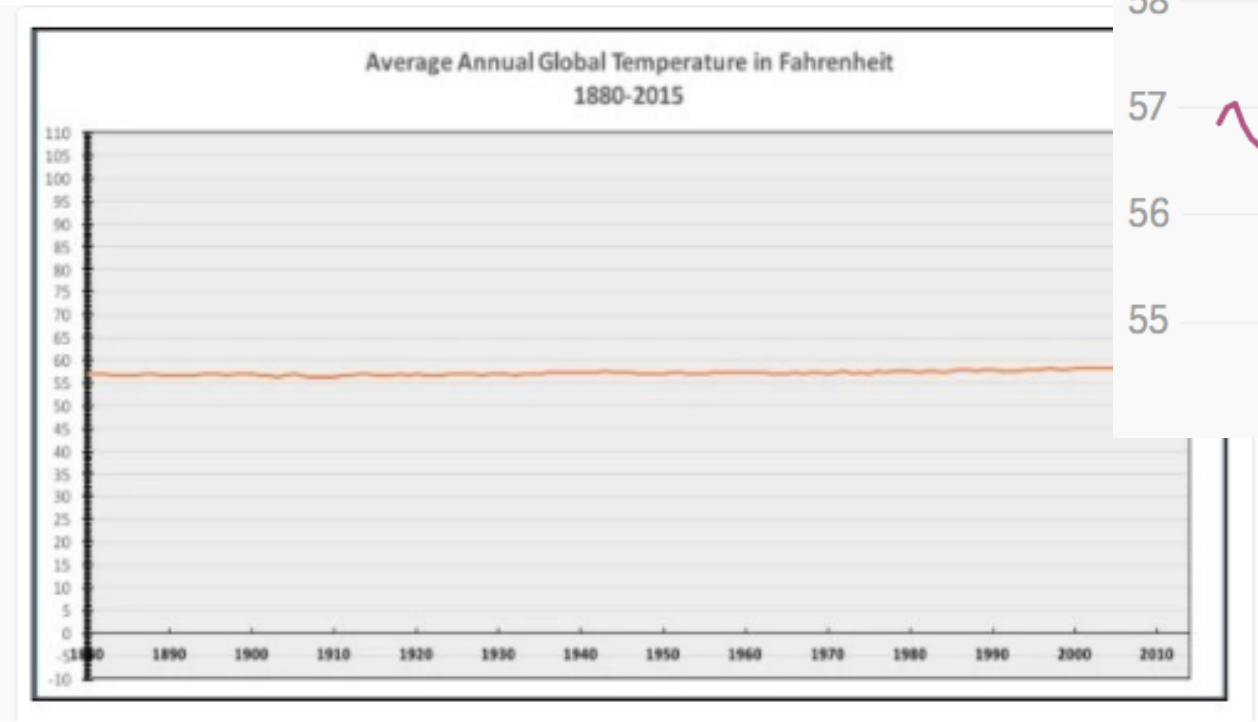
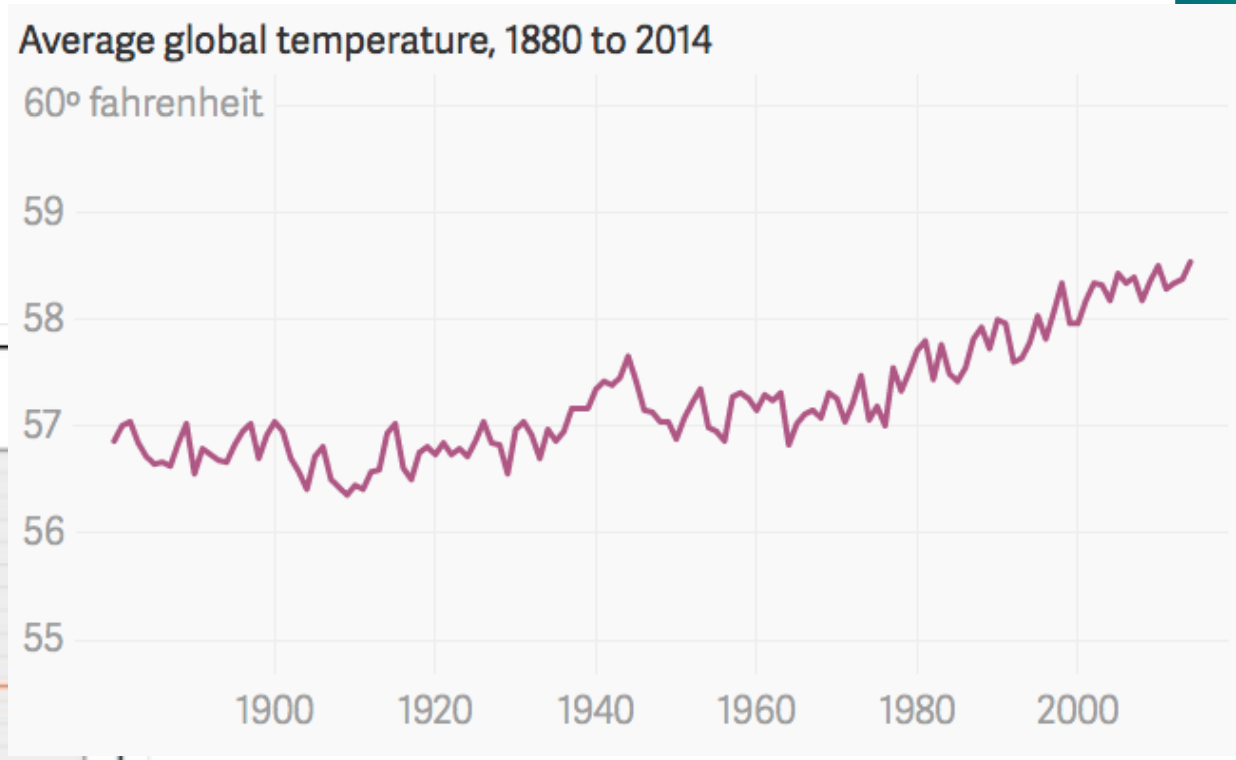
DATA SCIENCE WORKFLOW : DATA ANALYSIS AND VISUALIZATION





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DATA SCIENCE ROLES

Data Scientist

Activities

- Data cleansing and Preparation
- Evaluating statistical models
- Build ML Model

Tools

- R
- Python
- Matlab
- Stata
- SQL
- Spark

Skills and Talents

- Statistical theories and methodologies
- Database systems
- Programming skills

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DATA SCIENCE ROLES

Data Engineer

Activities

- Data Integration
- Product Development (Dashboard, API)
- Scalability and Automation

Skills and Talents

- Programming skills
- Database system and modelling
- IT Infrastructure and Cloud environment

Tools

- Database systems: SQL, NoSQL
- Python, Node
- Google Cloud Platform, Amazon AWS
- Distributed System

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DATA SCIENCE ROLES

Business Analyst

Activities

- Framing the problem
- Data Exploration
- Presenting Analysis insights

Skills and Talents

- Business and Domain knowledge
- Communication
- Database query language

Tools

- Dashboard
- Visualization tools :Tableau, QlikView
- Open Refine
- Powerpoint and Excel

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DATA SCIENCE ROLES

Domain Expert

Activities

- Framing the problem
- Provides Consultation to the real world problems

Skills and Talents

- Business and Domain knowledge
- Communication

Tools

- (depends on the field)

DATA SCIENCE ROLES

Other roles

- Database Admin : Query/Prepare data to be processed/analyse
- Data Architect : Design information archtect
- Statistician :
- Developer

DATA SCIENCE ROLES

Keep it lean, grow as you go

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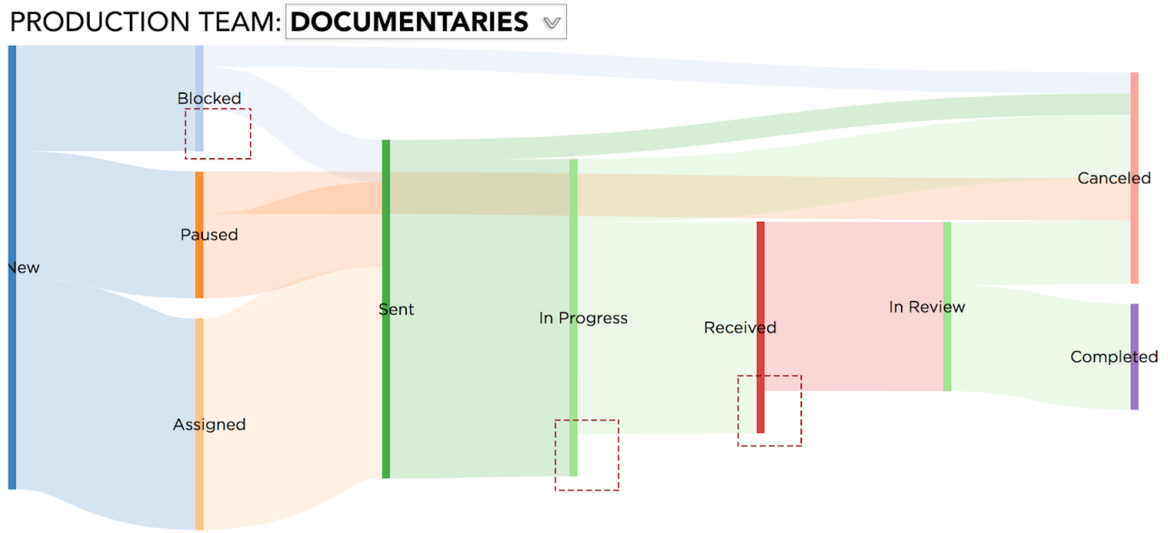
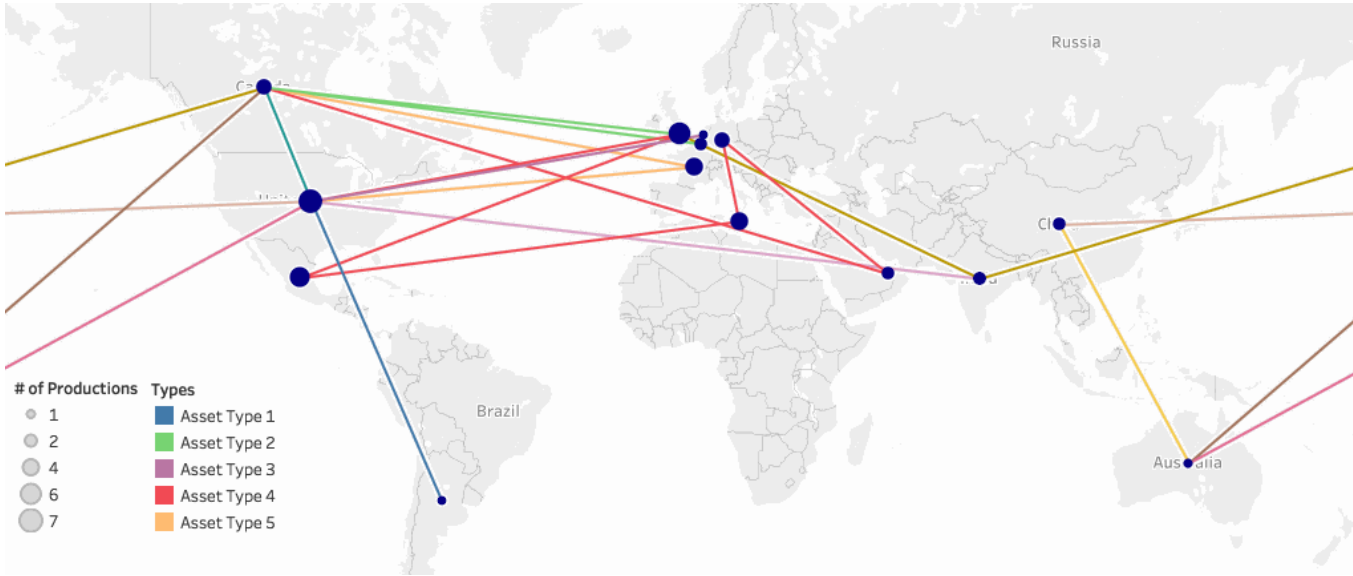
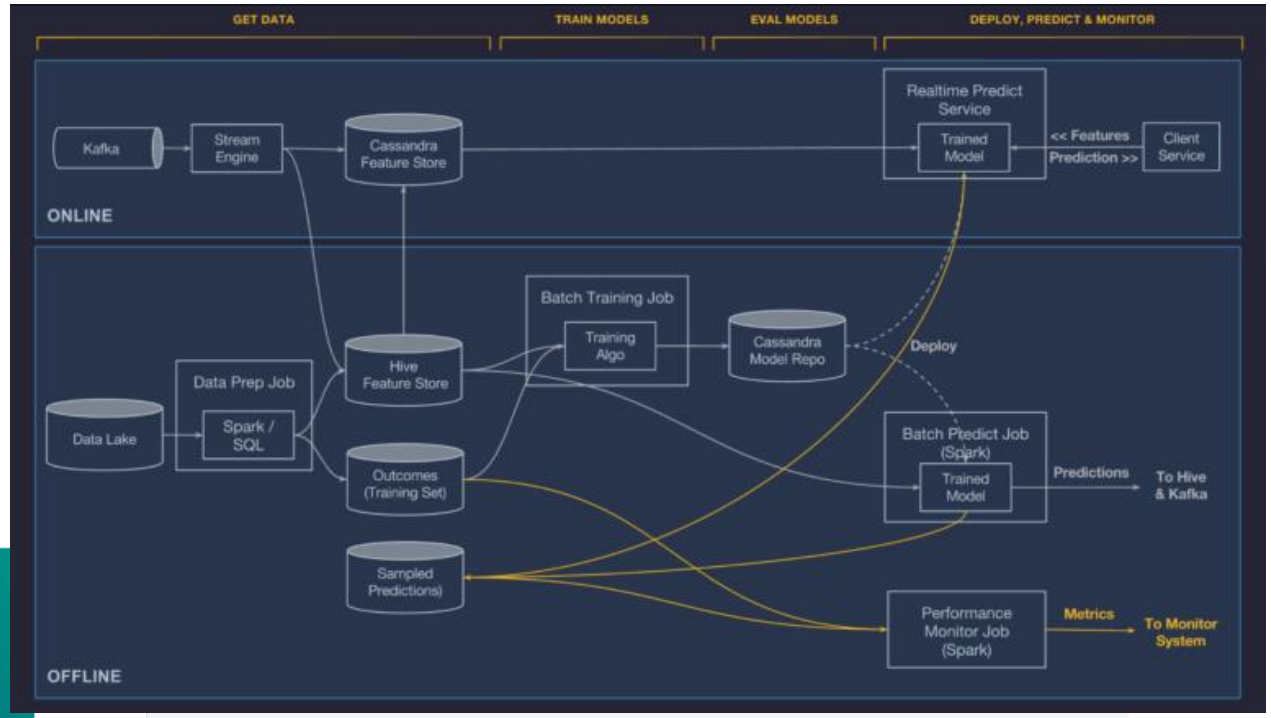
USECASE : NETFLIX

- Pre-production cost estimation
  - Location
  - Crews
  - Schedule
- Shooting schedules
- Post-Production assets progression
- Prioritazion of location





Study Case : **UberEATS** estimated time of delivery model



Michelangelo: Uber's Machine Learning Platform

Machine Learning Workflow:

- Manage data
- Train models
- Evaluate models
- Deploy models
- Make predictions
- Monitor predictions

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ASSIGNMENT

Challenge :

Unilever akan mengeluarkan varian shampo baru. Direksi meminta bantuan kepada tim Data Science untuk memberikan rekomendasi spesifikasi varian tersebut.

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ASSIGNMENT

PROBLEM IDENTIFICATION :

Define the problem, identify the questions

- What is the problem ?
- Who is having the problem ?
- When is it happening ?
- Where is it happening ?
- What are the expected output?
- What have happened in the past?

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ASSIGNMENT

Plan the data driven Process!

- **Data Acquisition :**
  What data do I need, and how to access them?

- **Data Preparation :**
  Define the ideal data format, and ways to prepare them

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ASSIGNMENT

Plan the data driven Process!

- **Data Acquisition :**
  What data do I need, and how to access them?

- **Data Preparation :**
  Define the ideal data format, and ways to prepare them

- **Data Analysis :**
  What insigths do you need, and how to analyse them?

- **Data Visualization:**
  How and to whom do you share your insights

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