AI & THE BIG DATA MOVEMENT

EXECUTIVE AI & BIG DATA WORKSHOP

Session 1

4/22/2019

COGNITRO ANALYTICS
DATA EMPOWERING DECISIONS

About the Speaker

Dr. Amjad Zaim
CEO,
Cognitro Analytics

- Data scientist with experience across healthcare, telecom, banking, retail, security and government.
- 15+ years of experience in leading two US-based analytics & BI startups providing data-driven solutions and services in the US and internationall/.
- Founder of the VIB (Vision, Intelligence and Bioinformatics) research center at the University of Texas, leading a team of scientists and establishing cross-collaboration with the business community.
- Featured amongst the top 38 Big Data experts in the 2016 in June issue of the Huffington Post.
- Holds two Masters, and MBA and a PhD in Biomedical Engineering from the University of Toledo in Ohio

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Banking Executive Magazine

-Survival of the Fittest I & II
-Data Quality A commonly Overlooked Risk

Informs Analytics Magazine

-Fraud Detection: An Illusive Goal
-Overcoming the analytics myopia within an organization

Big Data Trends: 38 Top Experts on the Biggest Trends

Information Management

- Predictive Banking: A Transformation within Reach

Arab Health Magazine

- Analytics Governance in the community wide of healthcare

..... And Our Team Has Been Creating Lots of Analytics Buzz in the Media

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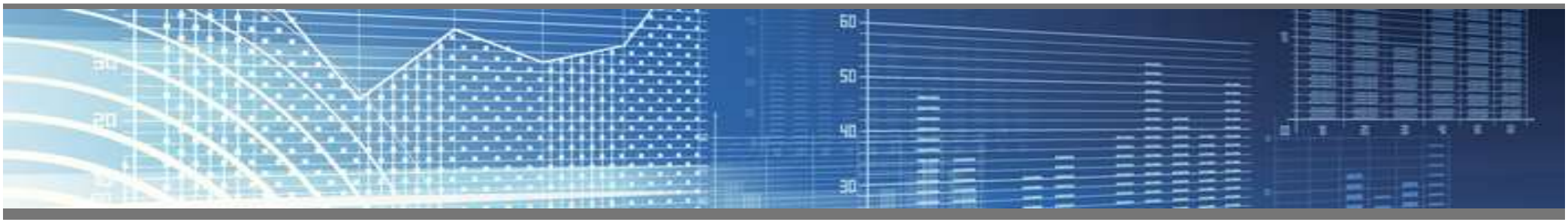
DATA EMPOWERING DECISIONS

Workshop Topic

- Big Data in the News
- IOT and the Evolution of Big Data
- Demystifying Big Data, Data Science and AI
- Big Data…Big Impact
- The UN Embraced Big Data to Achieve Its Millennium Goals
- Big Data & AI Driving the Development of National Statistics



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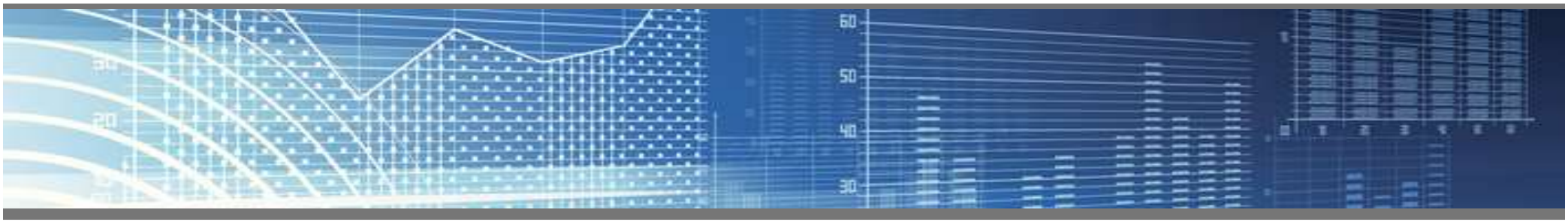

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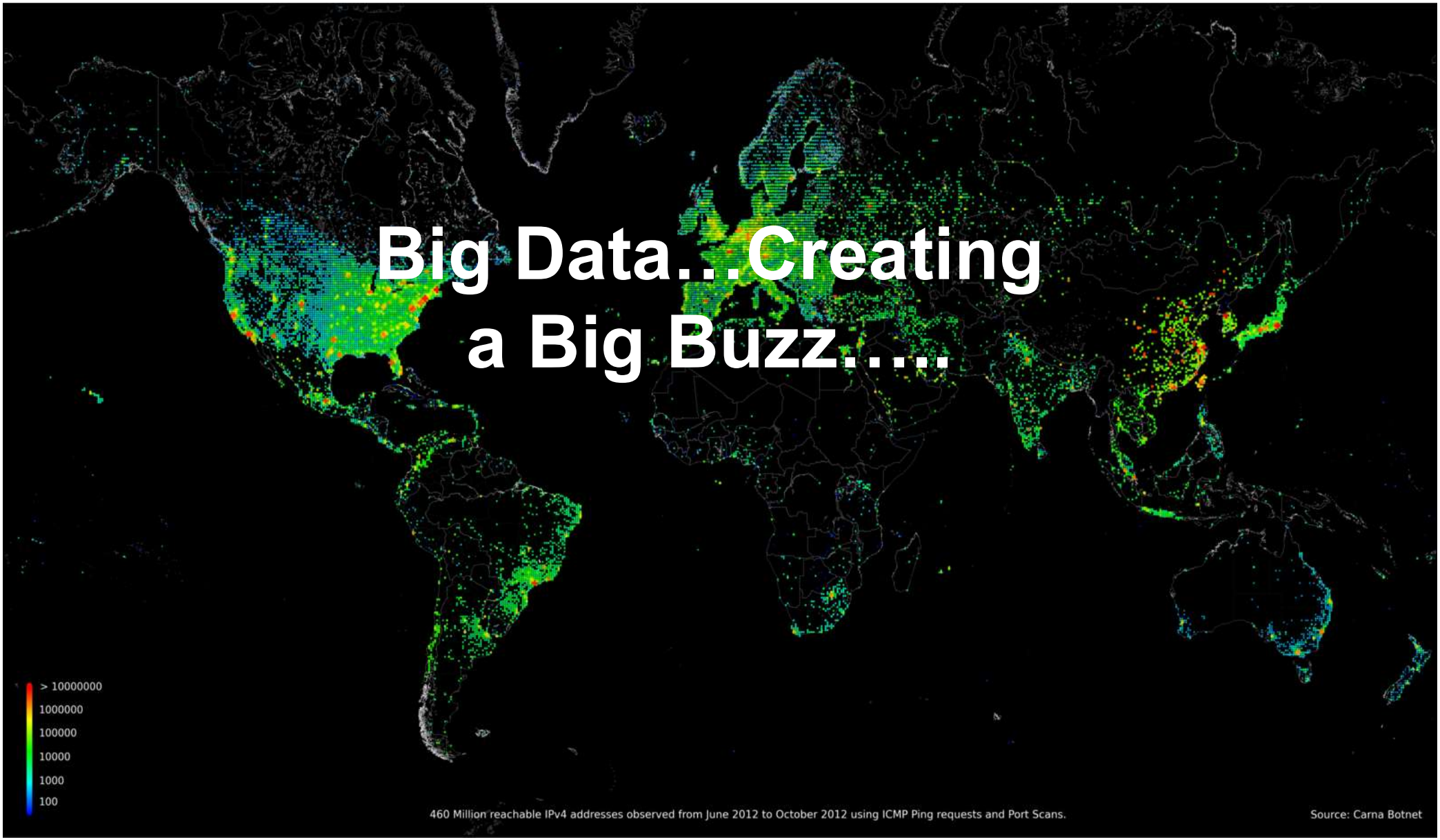
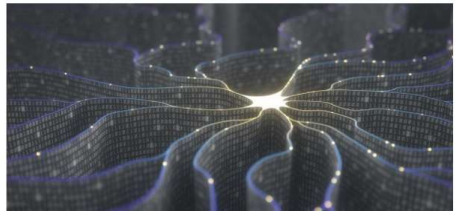


Analytics & AI in The Business & Technology News

How Artificial Intelligence Enables the Economics of Abundance

Your Money Helps Fight Crime: Using AI To Fight Terrorism, Trafficking And Money Laundering

Rebecca Sadwick, CONTRIBUTOR
FULL BIO
Opinions expressed by Forbes Contributors are their own.



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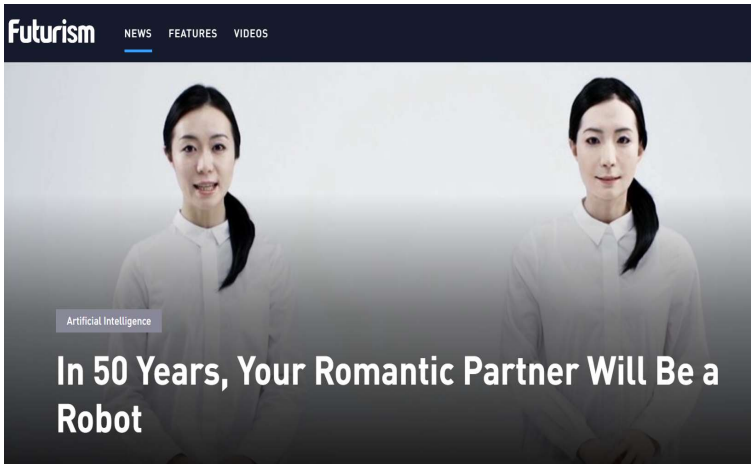
Analytics & AI in The "Controversial" News



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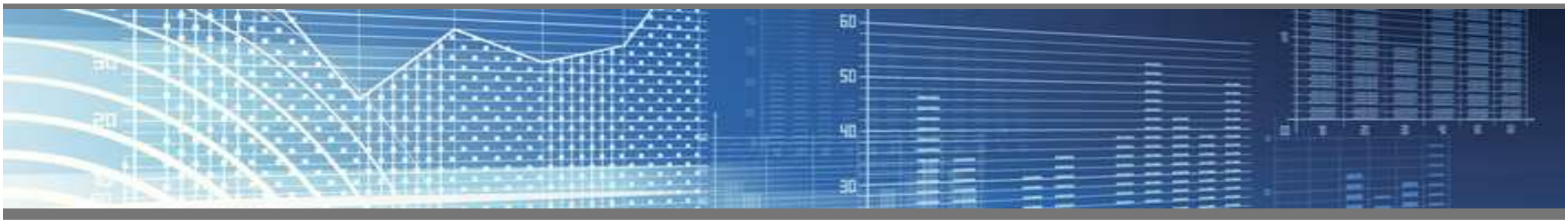

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DATA EMPOWERING DECISIONS

Modern electronic devices constantly generate data (IOT)

12+ TBs of tweet data everyday

25+ TBs of log data everyday

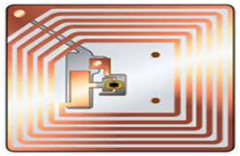
76 million meters in 2009… 200M by 2014

4.6 billion camera phones worldwide

? TBs of data everyday

100s of million of GPS enabled devices sold annually

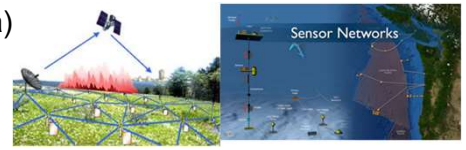
2 billion people on the Web by the end of 2010



30 billion RFID tags today

(1.3B in 2005)

Scientific instruments
(collecting all sorts of data)



Sensor technology and networks
(measuring all kinds of data)

Name	Symbol	Approximate Value for Reference	Actual Value
Byte			8 bits [Store one character]
Kilobyte	KB	About 10^3	2^{10} = 1,024 bytes
Megabyte	MB	About 10^6	2^{20} = 1,024 KB
Gigabyte	GB	About 10^9	2^{30} = 1,024 MB
Terabyte	TB	About 10^{12}	2^{40} = 1,024 GB
Petabyte	PB	About 10^{15}	2^{50} = 1,024 TB
Exabyte	EB	About 10^{18}	2^{60} = 1,024 PB
Zettabyte	ZB	About 10^{21}	2^{70} = 1,024 EB
Yottabyte	YB	About 10^{24}	2^{80} = 1,024 ZB

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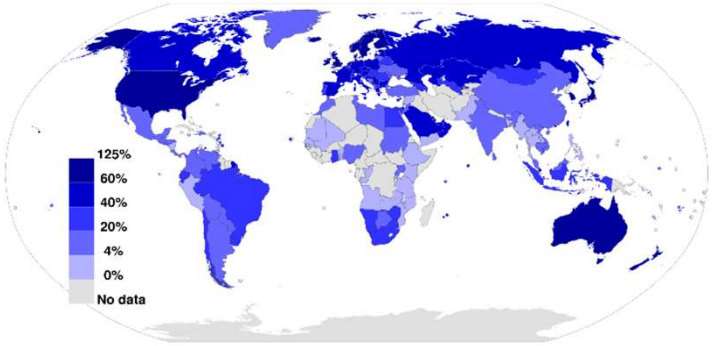
Data Volume is Growing Exponentially



Zettabytes

Estimated Global Data Volume:

2011: 1.8 ZB

2015: 7.9 ZB

Doubles

The world's information doubles every two years

Over the next 10 years:

10 Times

The number of servers worldwide will grow by 10x

50 Times

Amount of information managed by enterprise data centers will grow by 50x

75 Times

Number of "files" enterprise data center handle will grow by 75x

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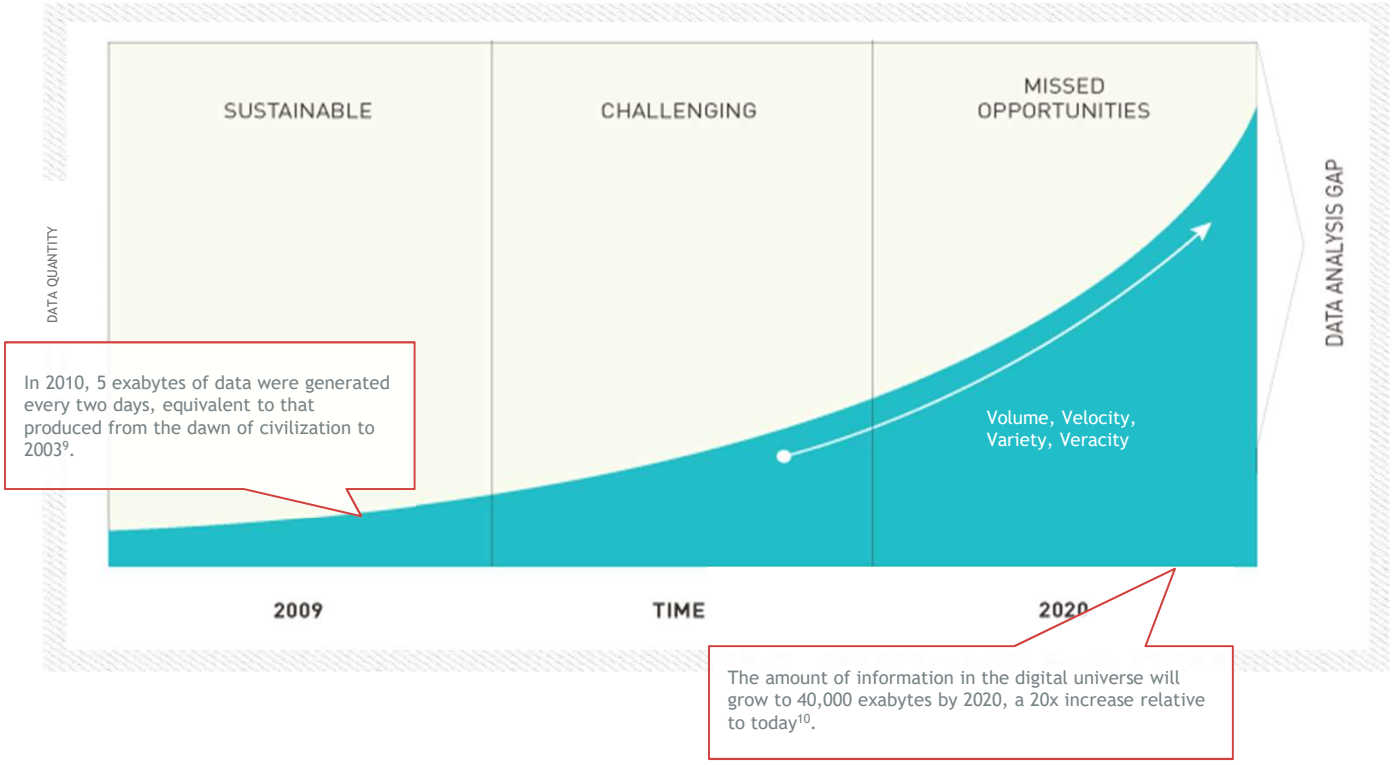
The increasing data velocity, variety, and volume is creating a data analysis gap in the market



- The progress and innovation is no longer hindered by the ability to collect data
- But, by the ability to manage, analyze, summarize, visualize, and discover knowledge from the collected data in a timely manner and in a scalable fashion

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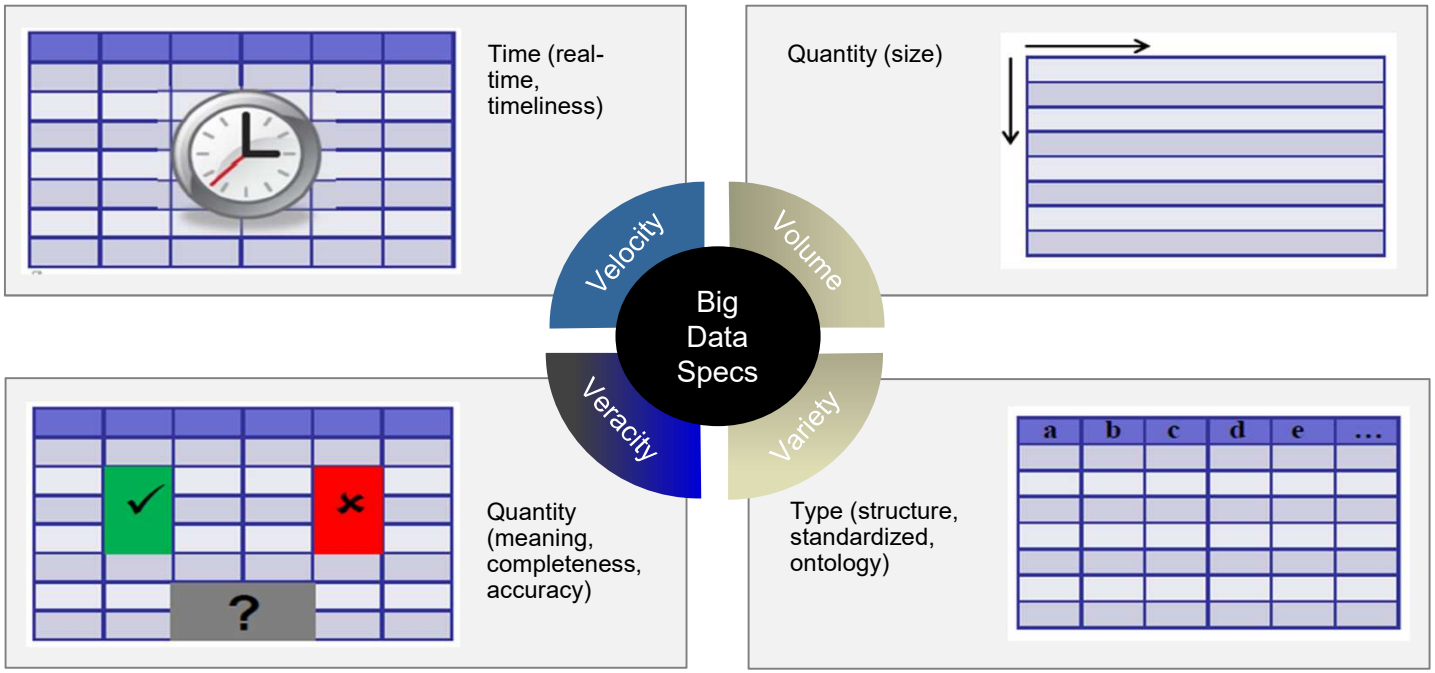
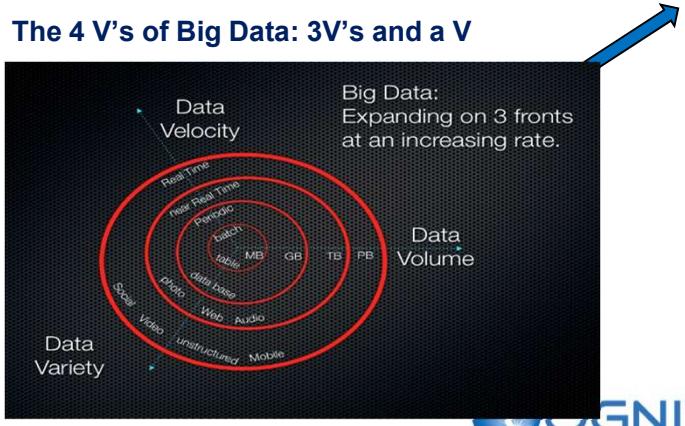
DATA EMPOWERING DECISIONS

Characteristics of Big Data

Data Drive 4V's



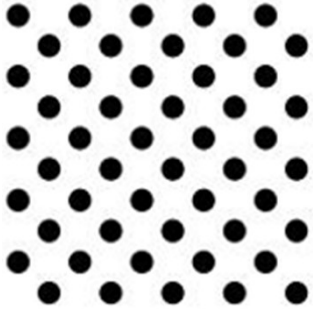
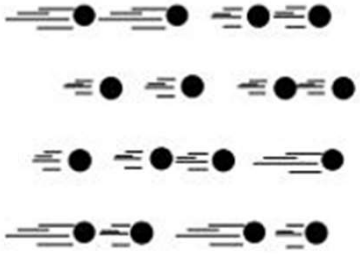
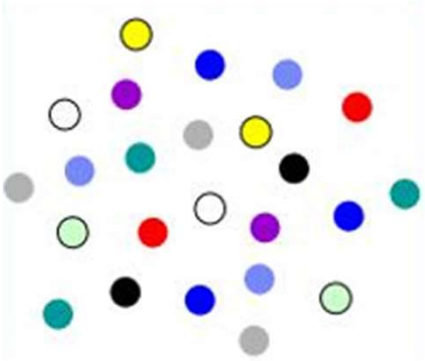
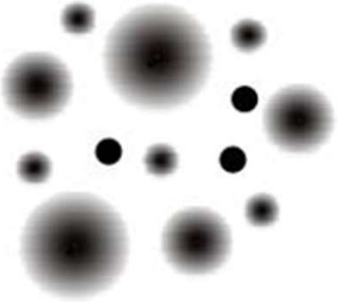
The 4 V's of Big Data: 3V's and a V



Veracity

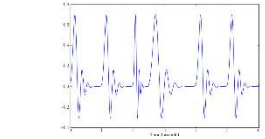
- Accuracy
- Consistency
- Uniqueness
- Relevance
- ...

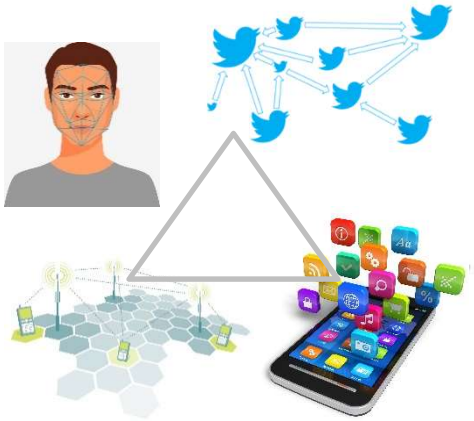
Characteristics of Big Data

Volume	Velocity	Variety	Veracity
			
Data at Rest	Data in Motion	Data in Many Forms	Data in Doubt
Terabytes to exabytes of existing data to process	Streaming data, milliseconds to seconds to respond	Structured, unstructured, text, multimedia	Uncertainty due to data inconsistency & incompleteness, ambiguities, latency, deception, model approximations

Examples of the 4 Vs of Big Data

Volume	Velocity	Variety	Veracity
Data at Rest	Data in Motion	Data in Many Forms	Data in Doubt
Internet Browsing Data **Video Image from Street Cameras**	**Health Sensors Data (ECG)** **Weather & Satellite Data**	**Multidimensional connected data** **(twitter, phone usage, location, Image Data)**	**How Much Do You Trust the Data** **Sensor Error** **Manual Data Entry** **No Data Audit !**





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DATA EMPOWERING DECISIONS

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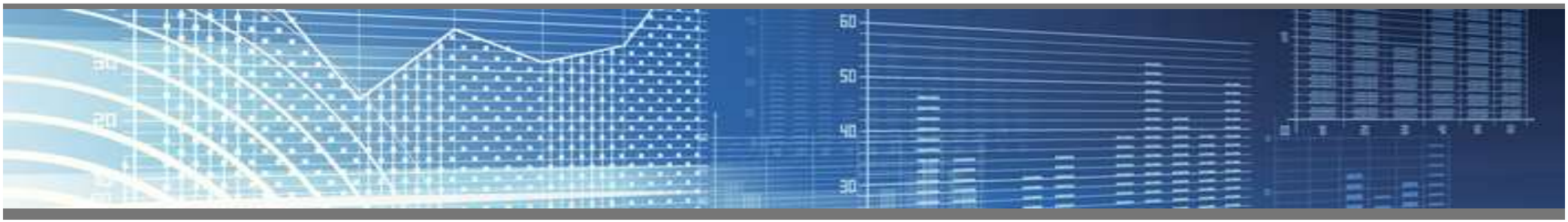

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Demystifying Big Data, Data Science and AI

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No Really.. What Is Big Data !

"Big data is an umbrella term used to characterize the growing amounts of data that may be analyzed to reveal insights that were previously unknown"

"World Bank's Erick Fernandes, opening the first Big Data for Agriculture Roadshow in East Africa in Nairobi, on Wednesday May 24th"

Defining 'big data' depends on who's doing the defining

When does data become big? AWS, IBM and research firms each have their own definitions.

By Brandon Butler
Senior Editor, Network World | MAY 10, 2012 7:00 AM PT

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AI & THE BIG DATA MOVEMENT

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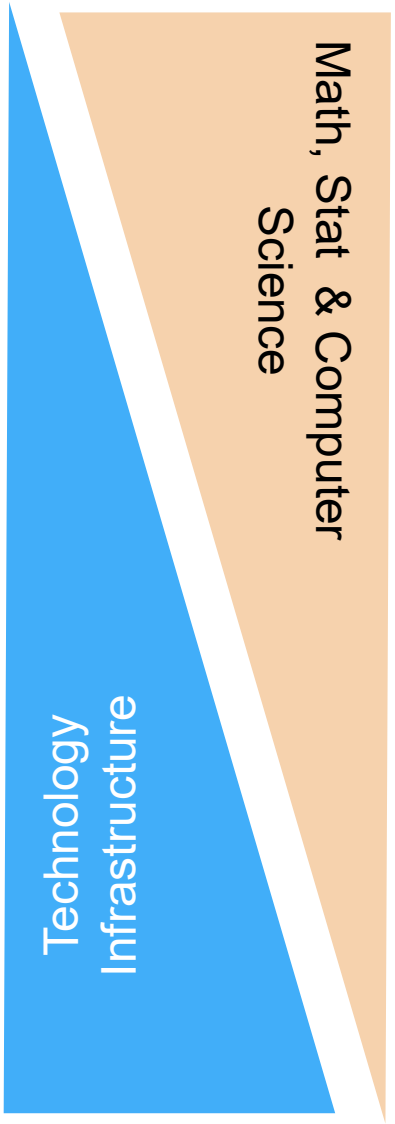
From Big Data to Small Data

Big Data

Small but Golden Data (insights)

Data Science Vs. Big Data Vs. Data Analytics



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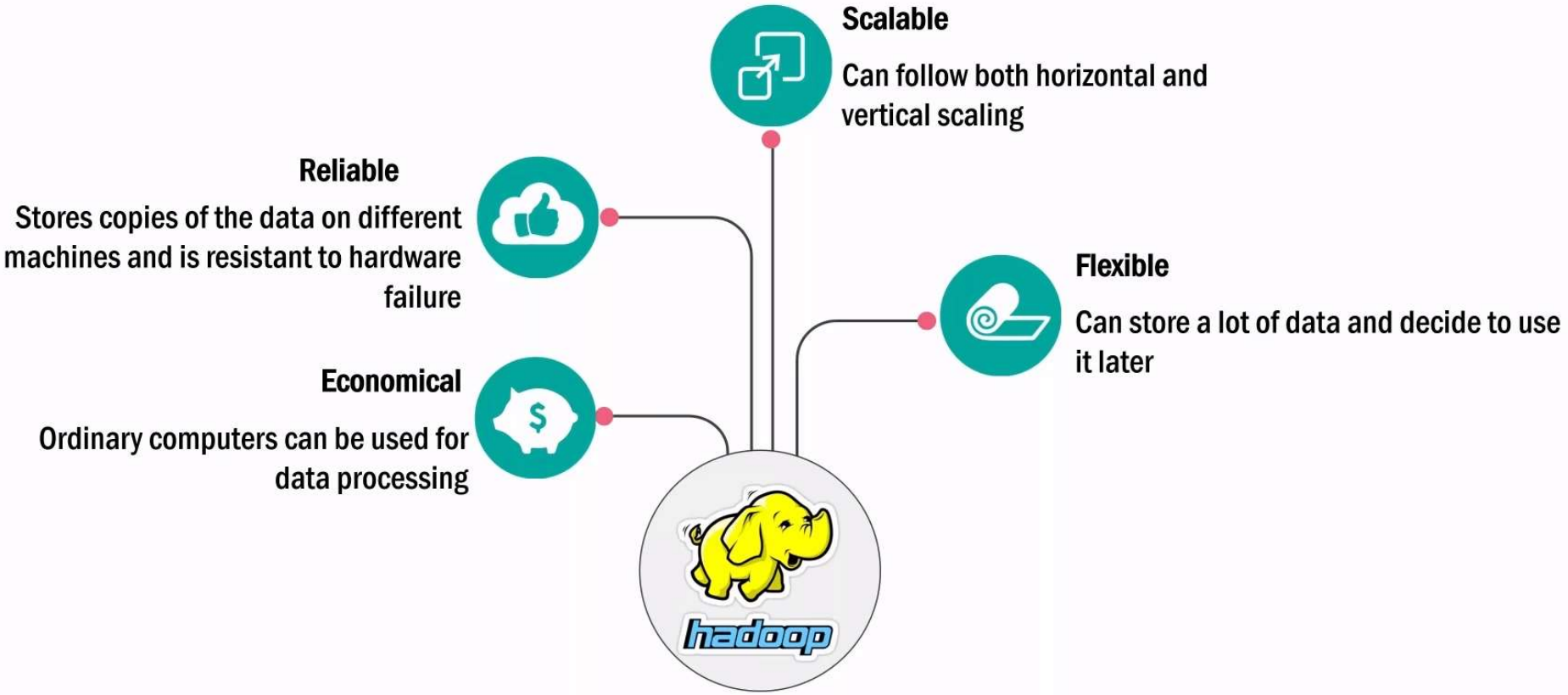
Key Characteristics of "Hadoop" Data Lake



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Data Science: Reconstructing Intelligence from Data

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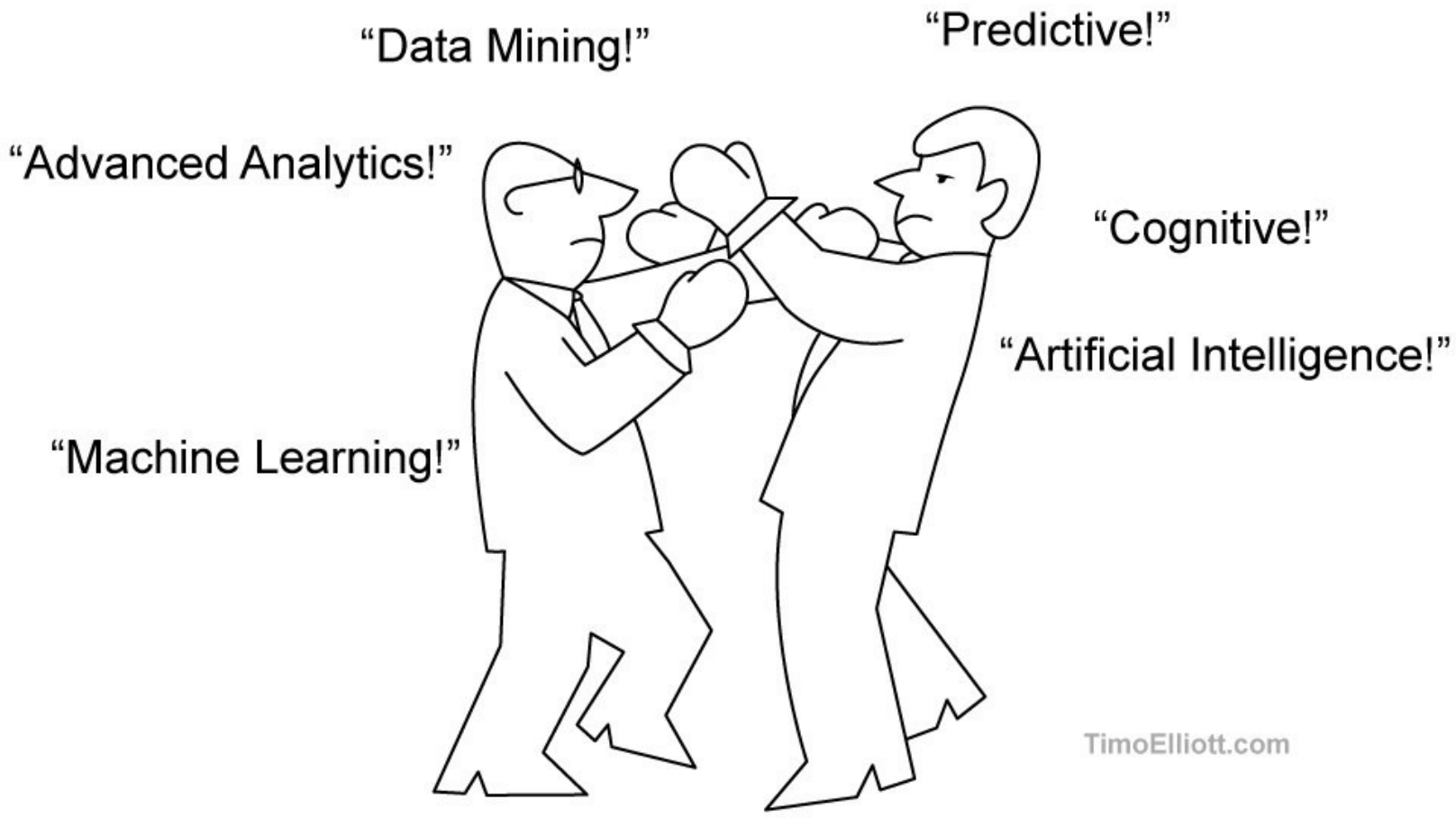
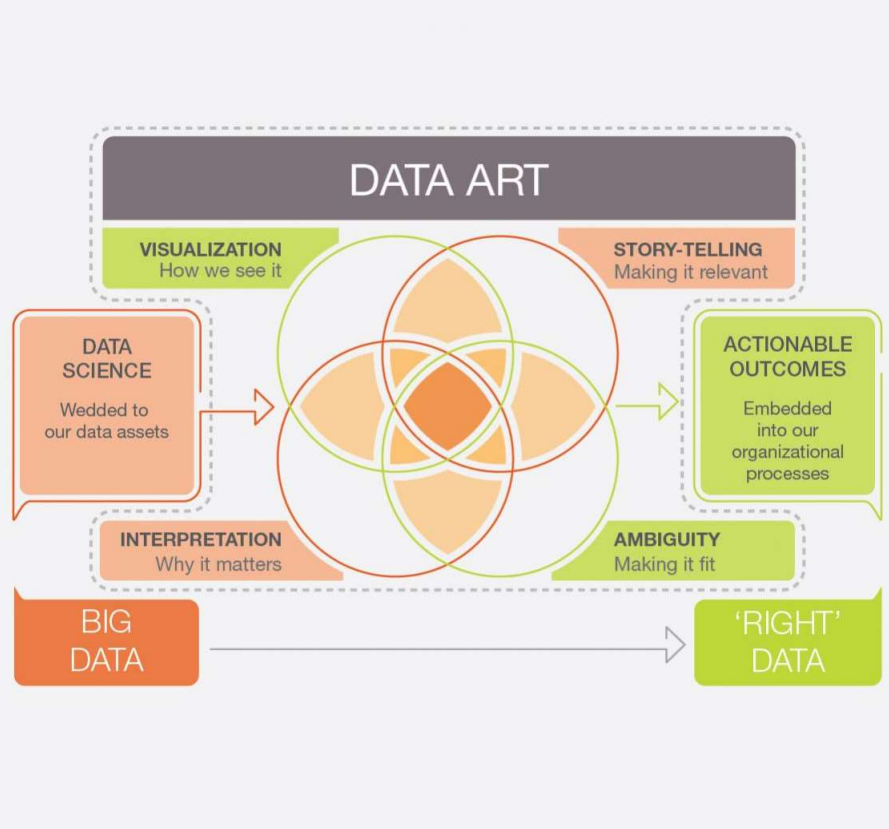
Data Science: Data Mining Vs. Predictive Analytics

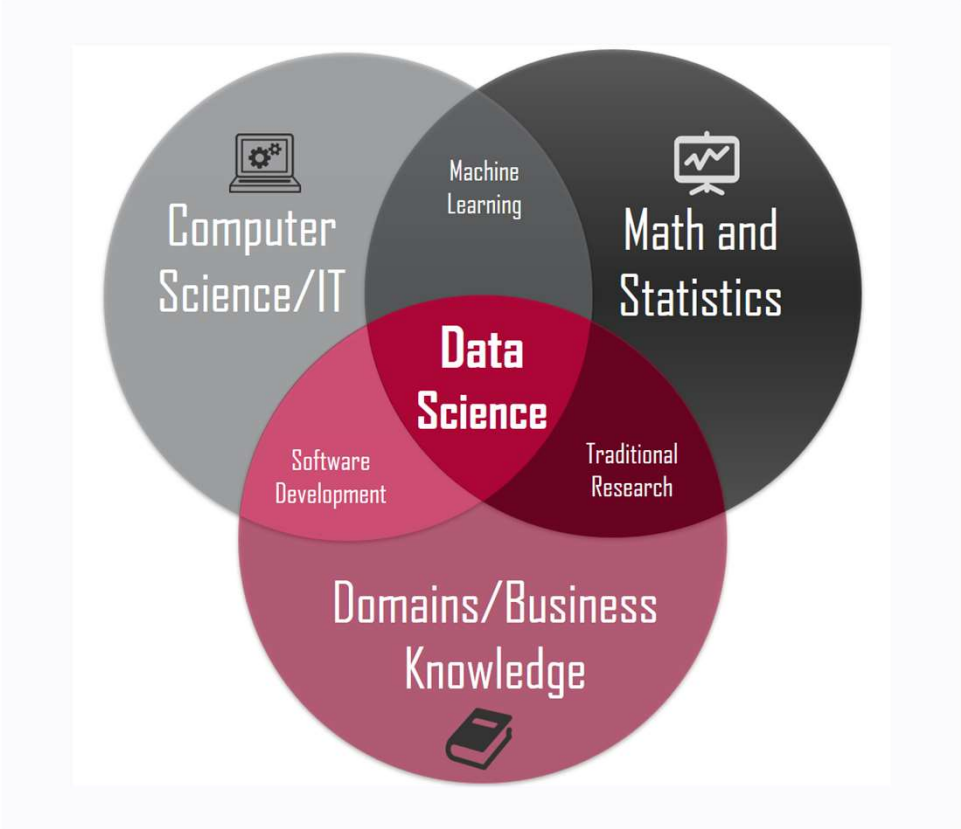


Data Science… & Data Art?

Analytics Intuition (Experience, Success & Failure)



Analytics Skills (Academia & Research)



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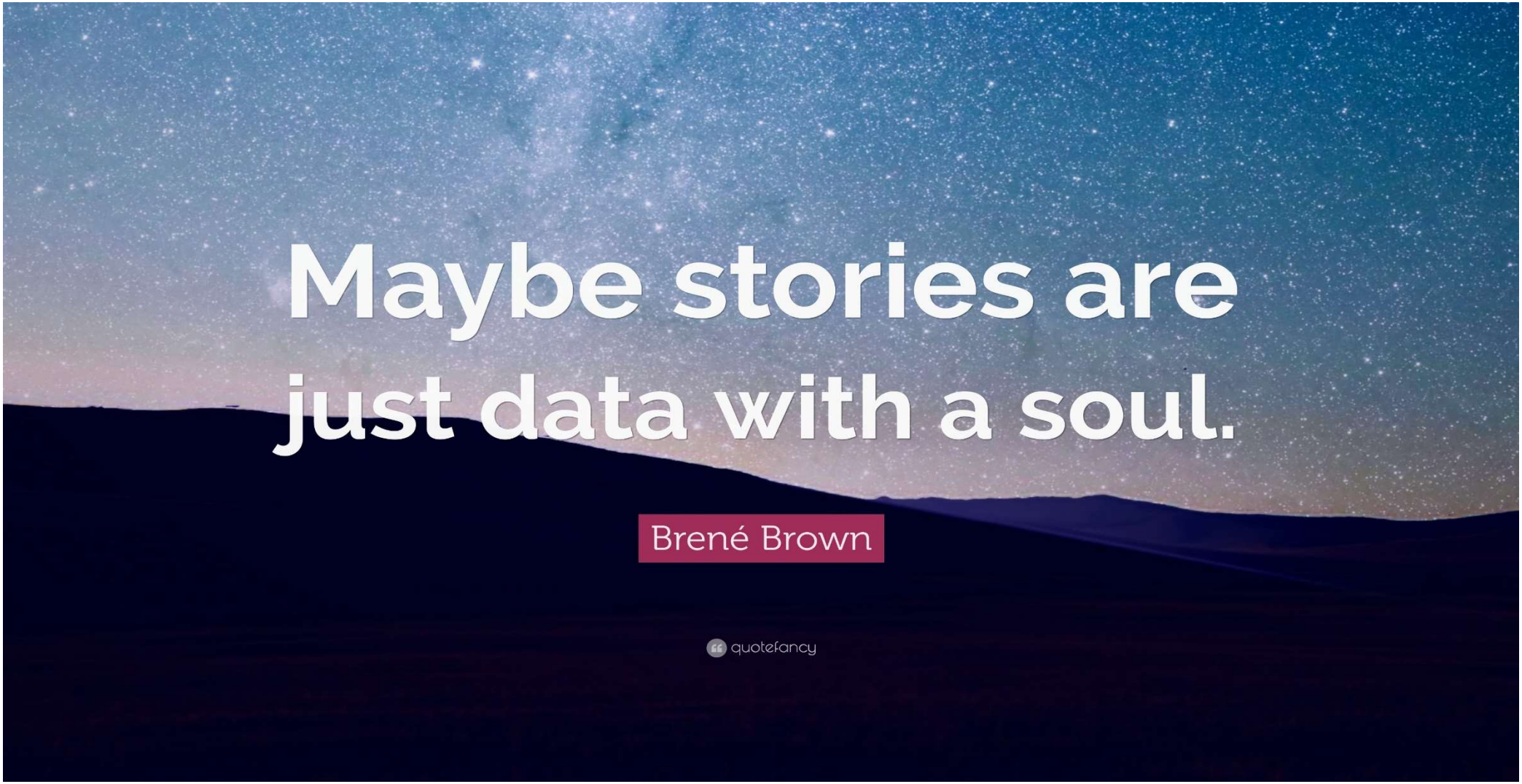

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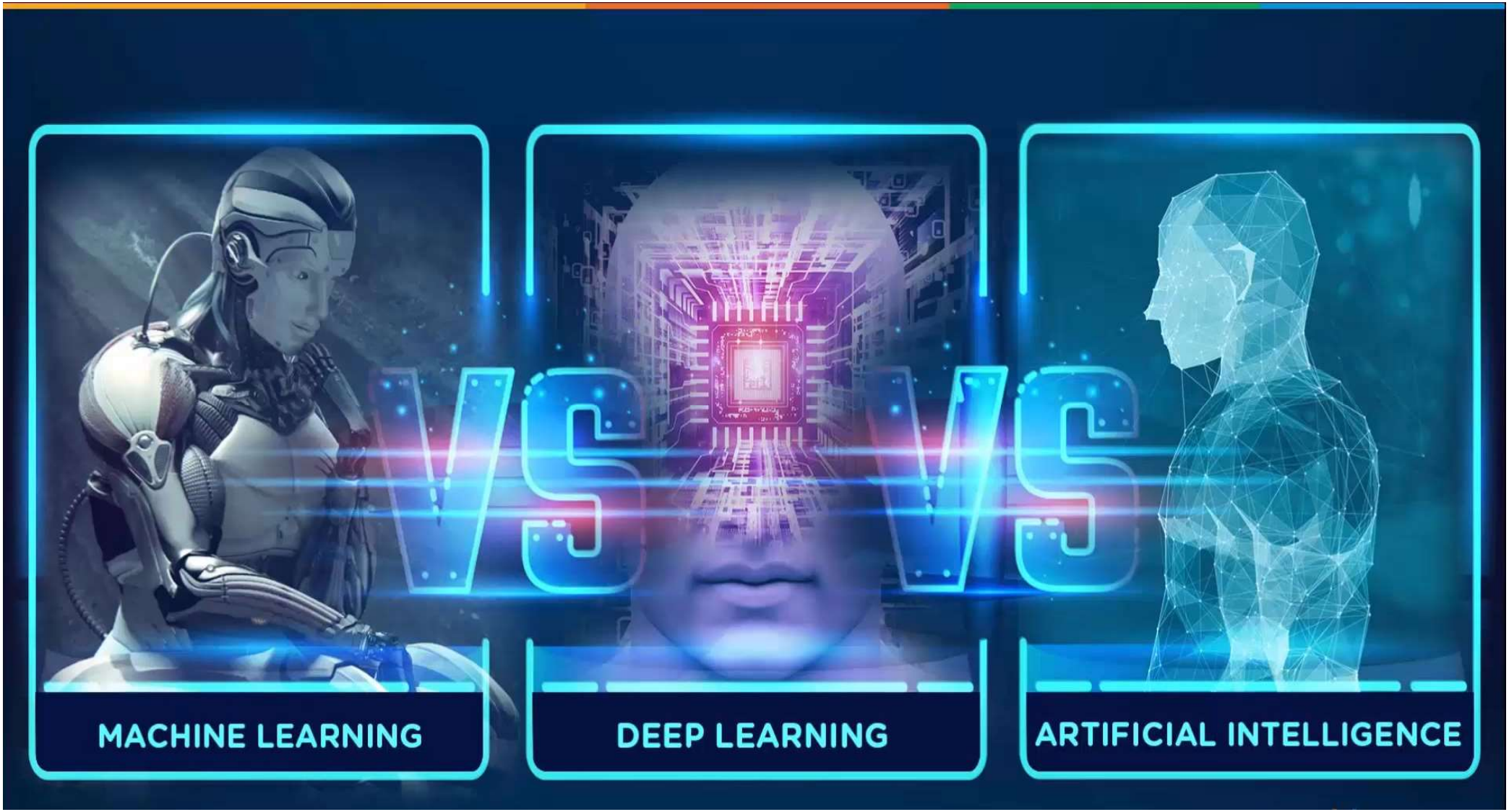
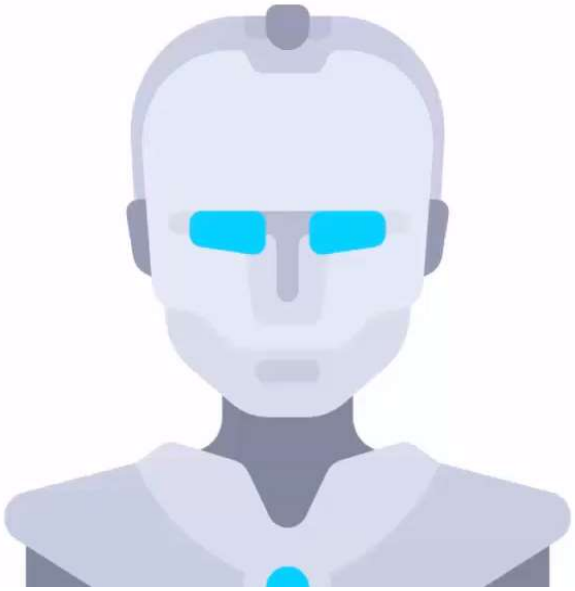


Artificial Intelligence , Machine Learning & Deep Learning

Artificial Intelligence

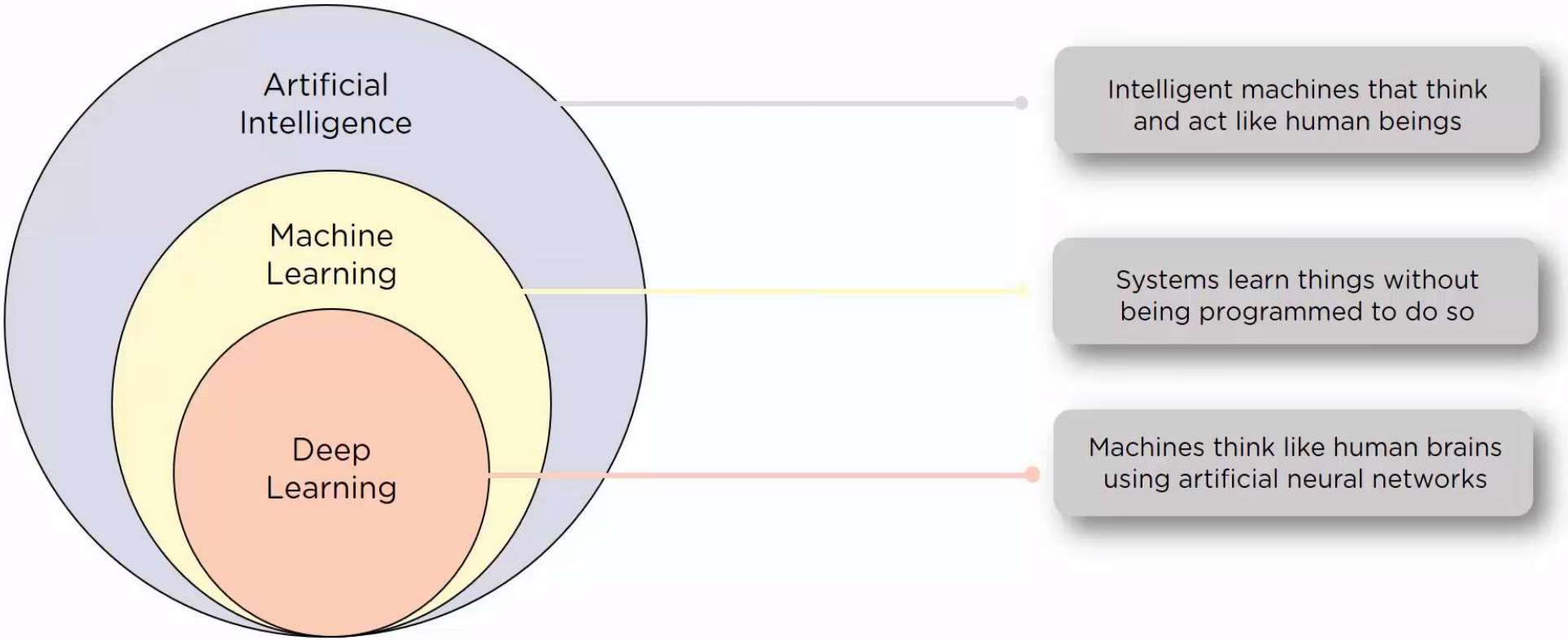
AI develops computer systems that can accomplish tasks that require human intelligence



- Interacts with humans using their natural language
- Learn from their mistakes and adapt to new environments
- Provides more accurate results
- Learns from the data, and automates repetitive learning

Artificial Intelligence , Machine Learning & Deep Learning

AI with Machine Learning and Deep Learning



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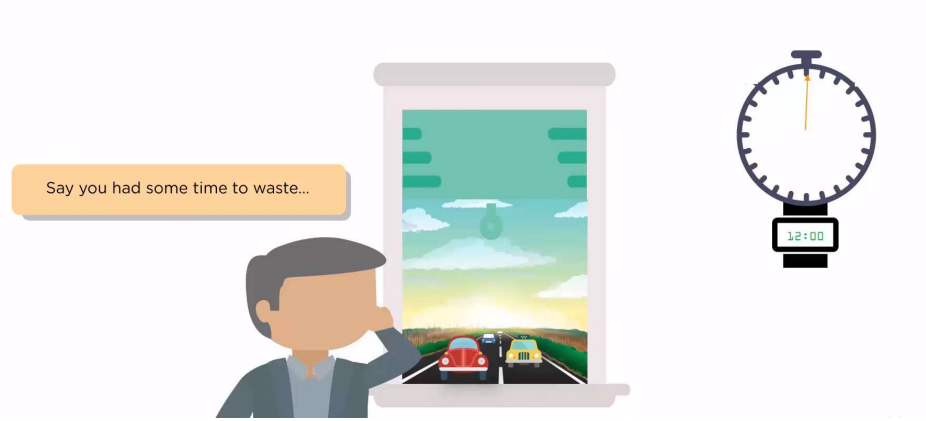
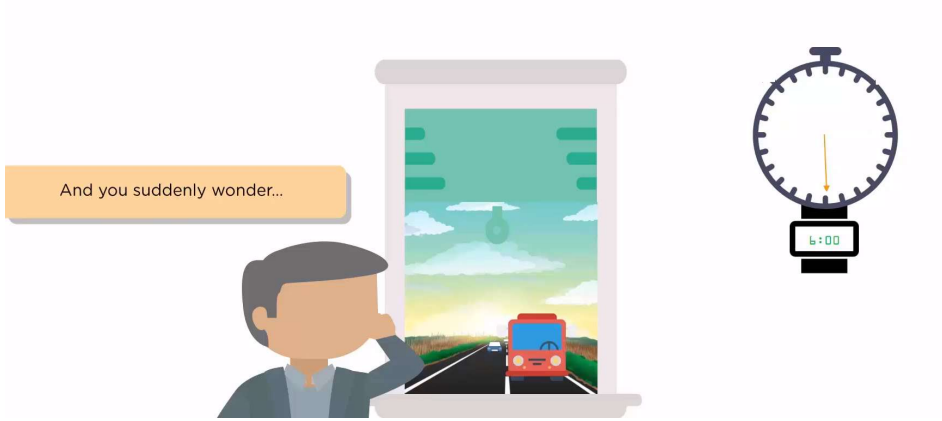
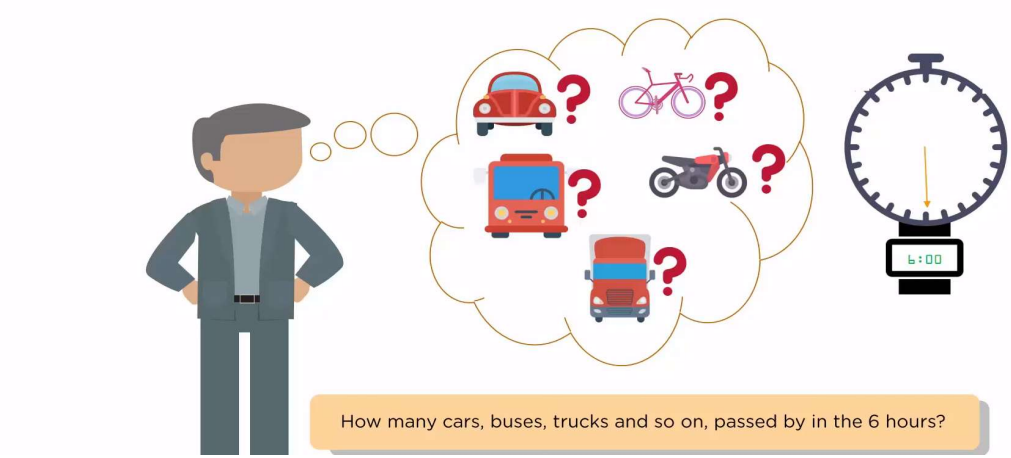
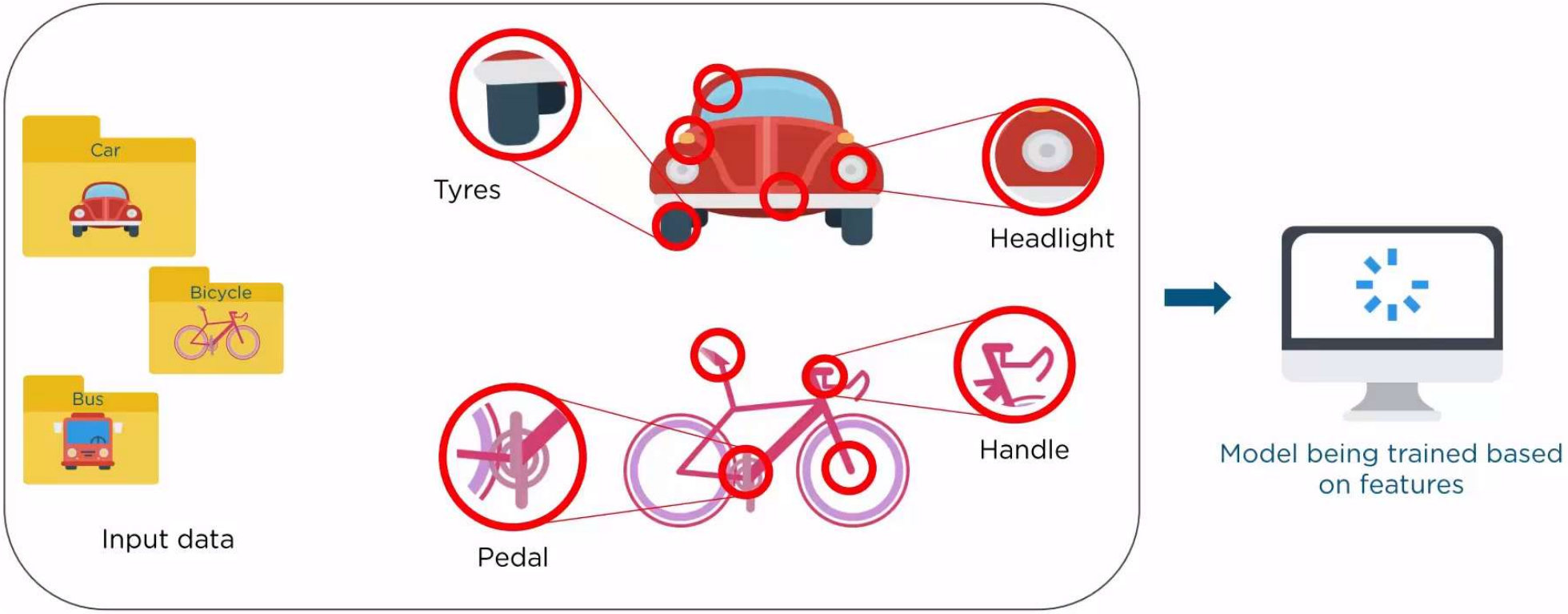






Artificial Intelligence , Machine Learning & Deep Learning

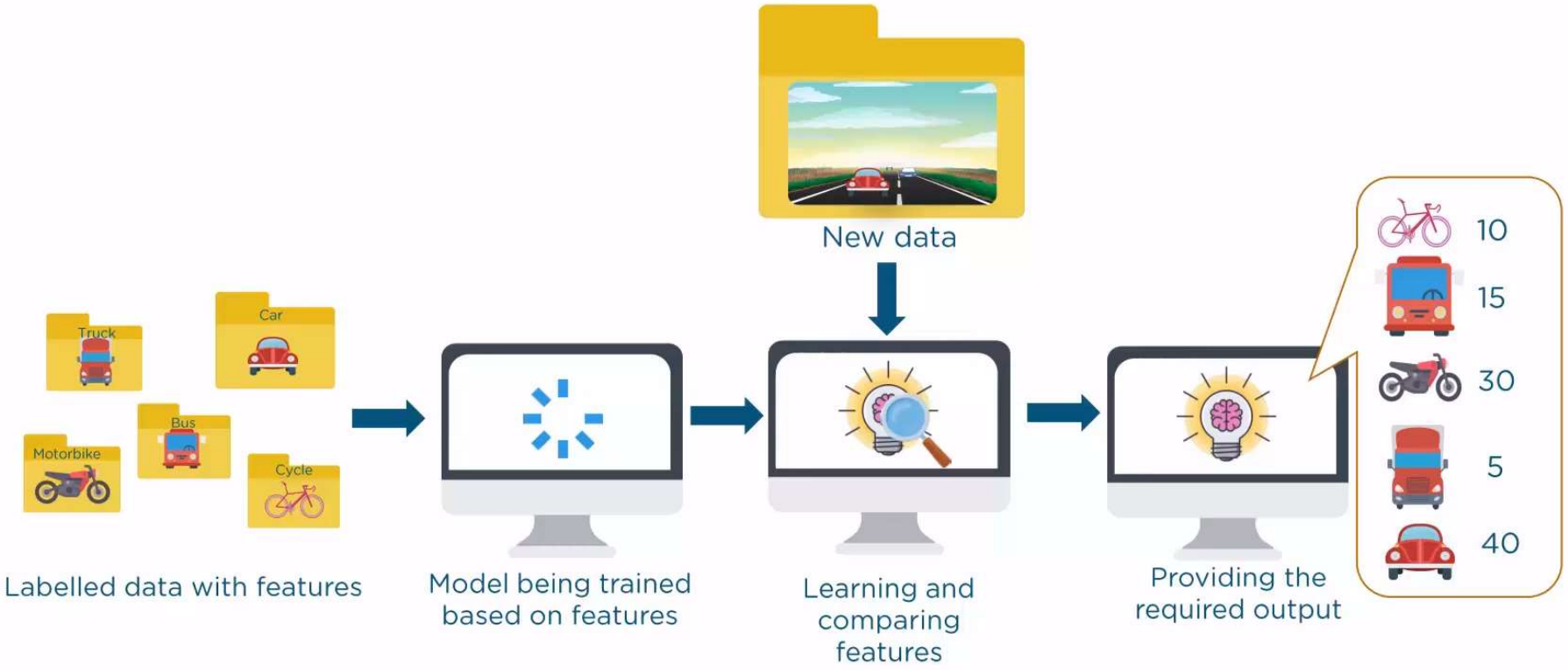
Machine Learning



The labelled input data with the important features highlighted

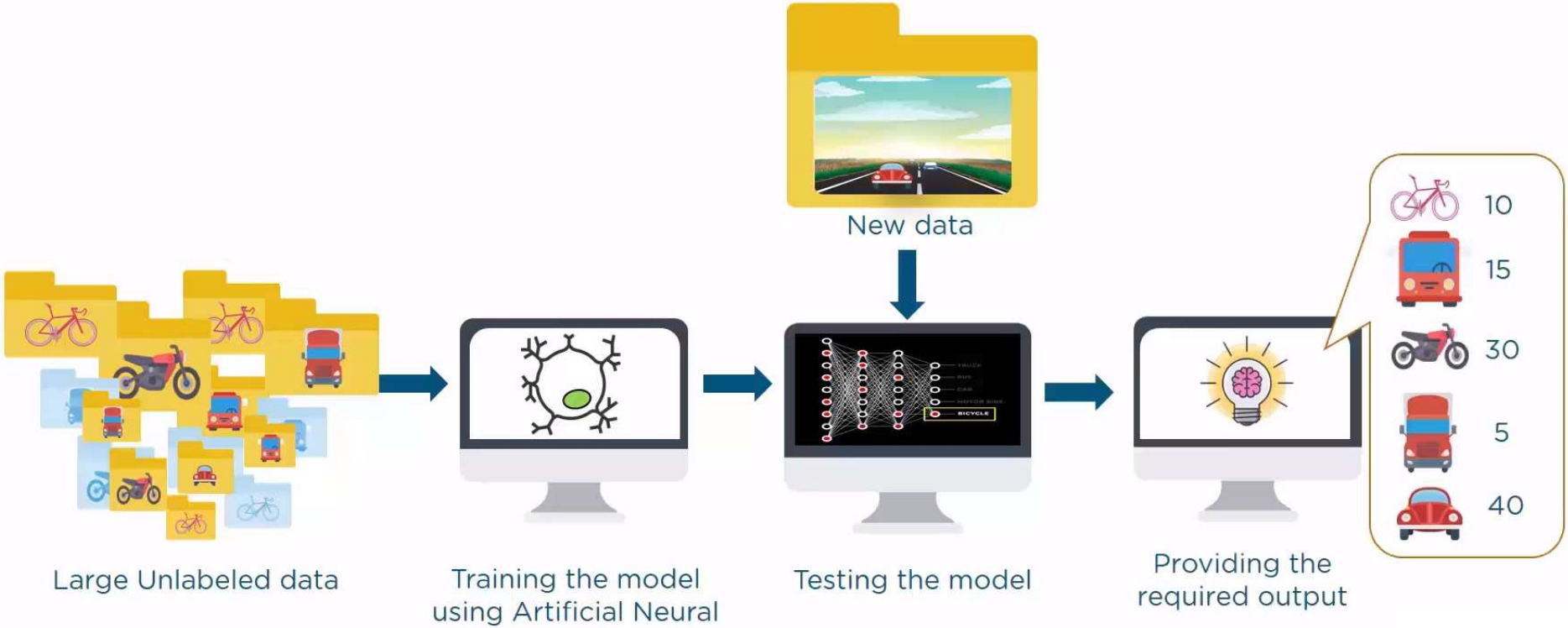
Artificial Intelligence , Machine Learning & Deep Learning

Machine Learning



Artificial Intelligence , Machine Learning & Deep Learning

Deep Learning



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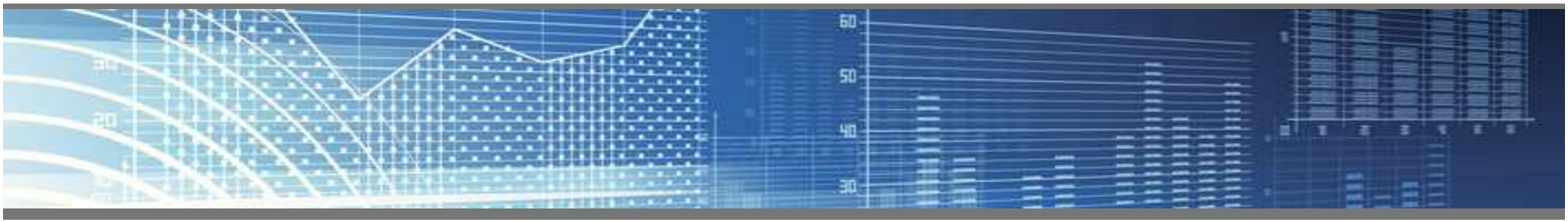

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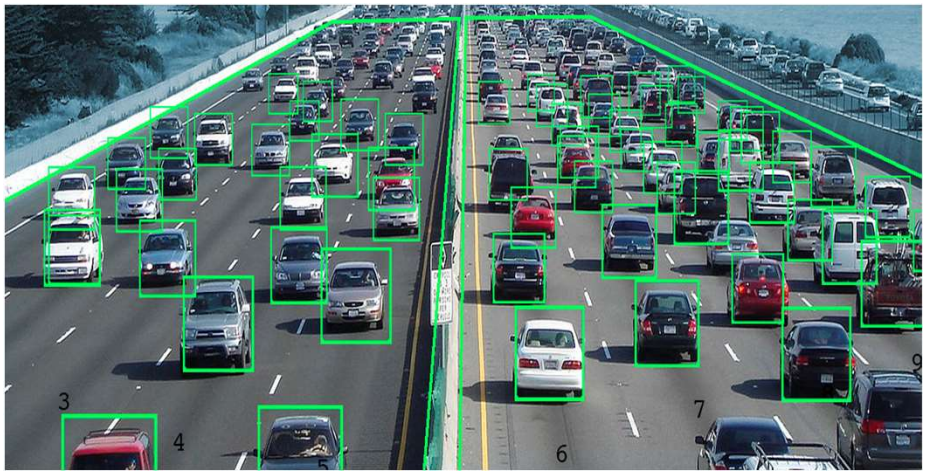
BIG Data …



BIGGER IMPACT

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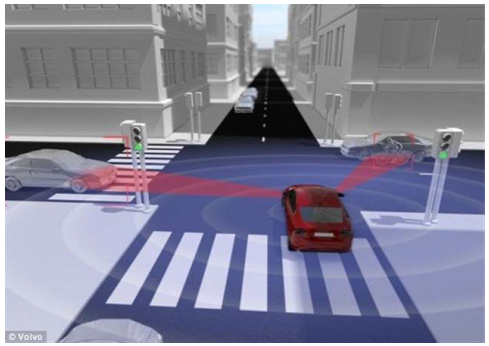
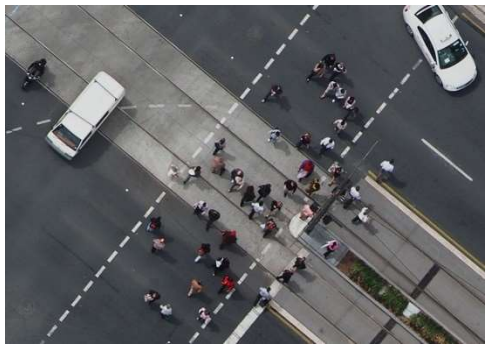
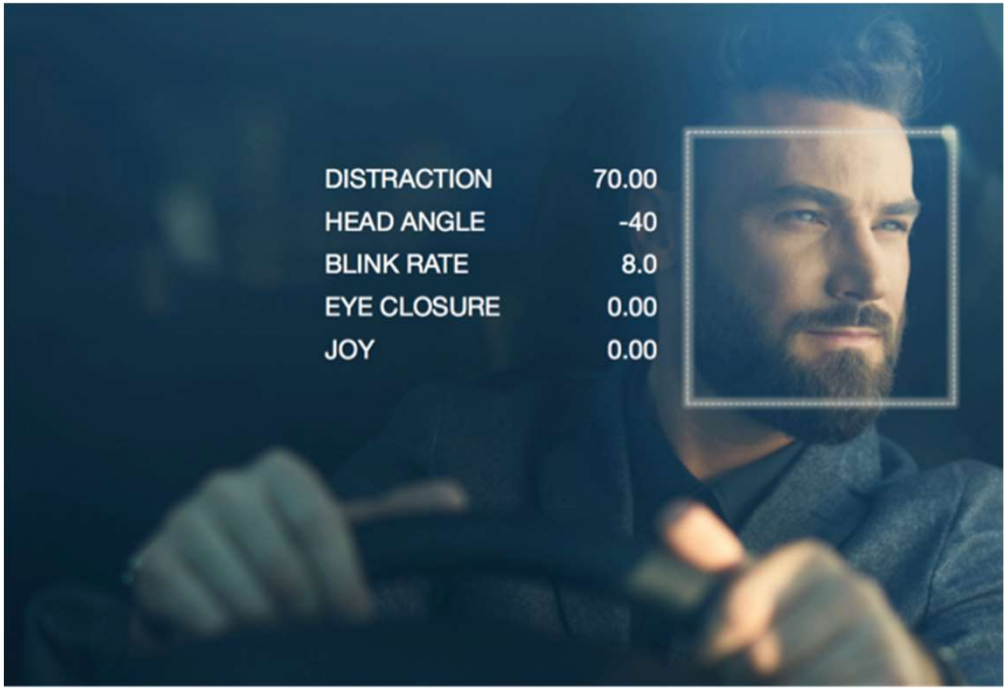
Smart Transportation & Road Safety Depend on AI





Smart Driving Depends on AI

Emotion recognition technology to monitor driver state and identify dangerous driving behavior



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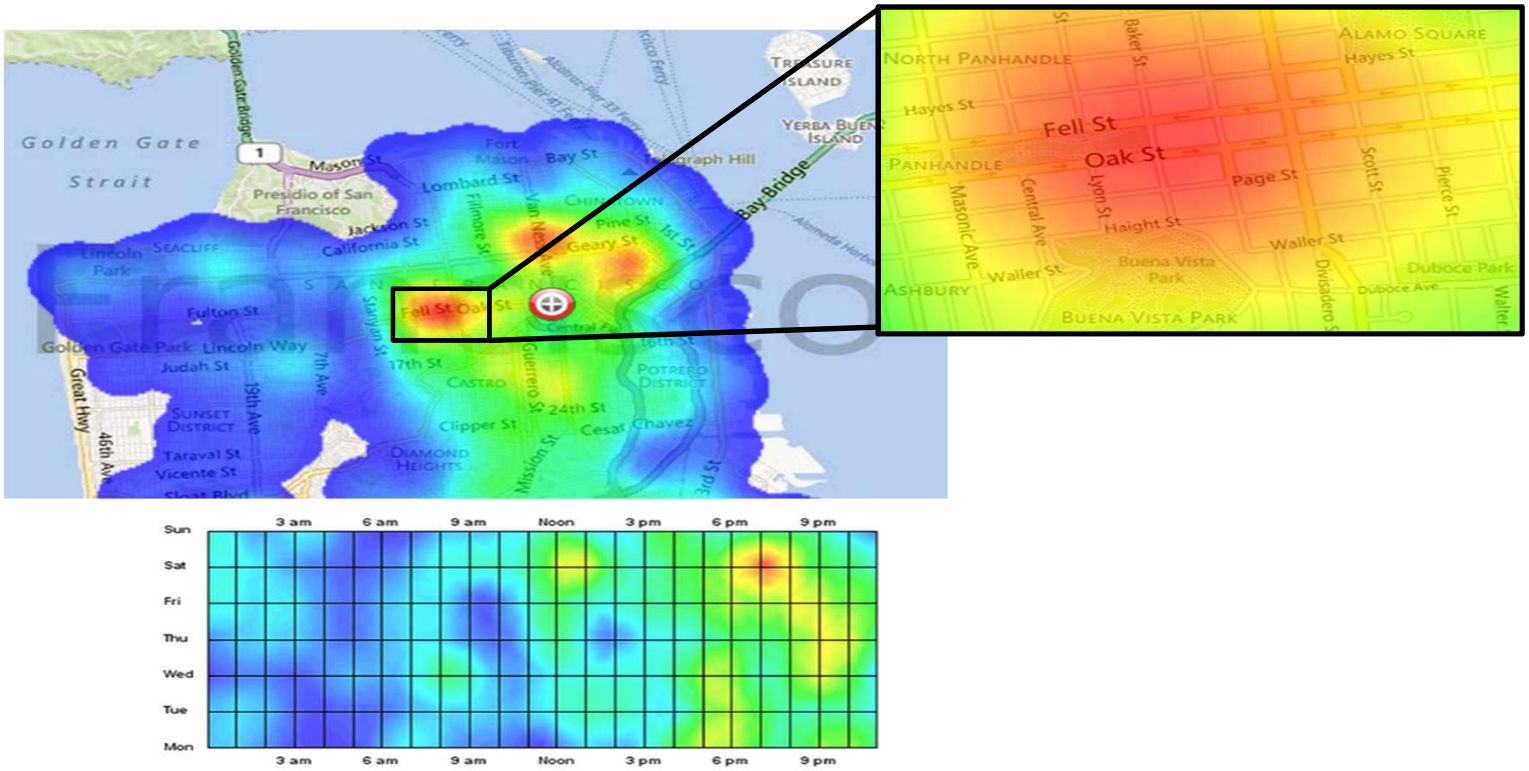
Smart Policing Depends on AI

San Francisco Police Fights Crimes with AI

Geospatial Hotspots



Predicting the likelihood of crime based on phone usage and telecom location data

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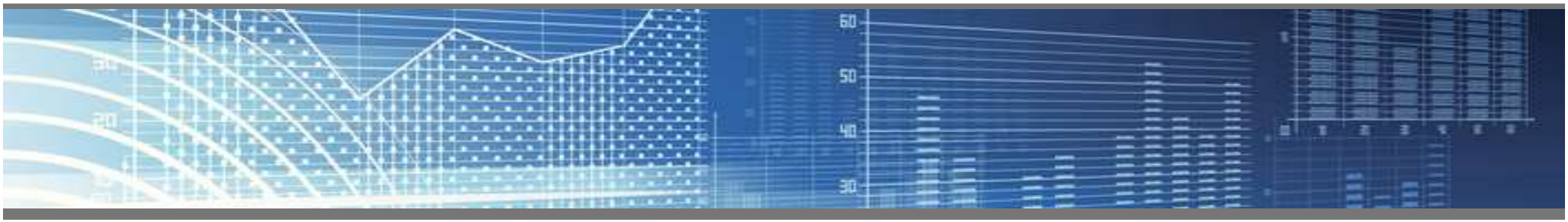

The UN Embraced Big Data to Achieve Its Millennium Goals

BigData UN Global Working Group

HOME TASK TEAMS MEETINGS INVENTORY

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Let's Play Connect the Dots

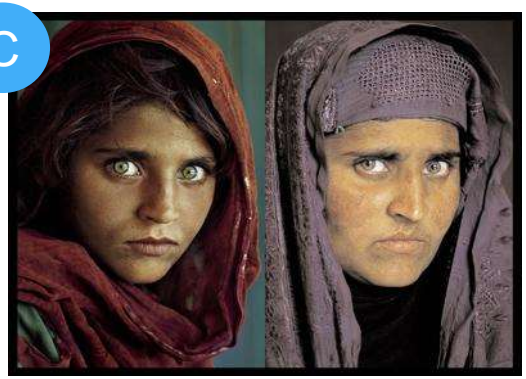
How Does the UN Works to Achieve the Millennium Goals through Analytics ?

A

B

C

C



D

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F

G

twitter

COGNITRO ANALYTICS
DATA EMPOWERING DECISIONS

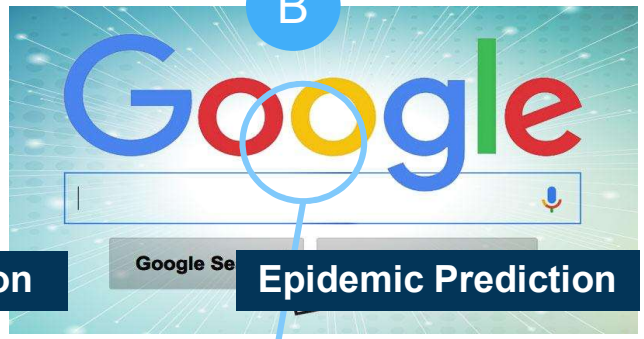
Let's Play Connect the Dots

How Does the UN Works to Achieve the Millennium Goals through Analytics ?

A

Poverty Prediction

B



Epidemic Prediction

C

C

People Tracking

Illiteracy Prediction

Disaster Prediction

D

Sentiment Prediction

Inflation Prediction

E

Maternal Healthcare

F

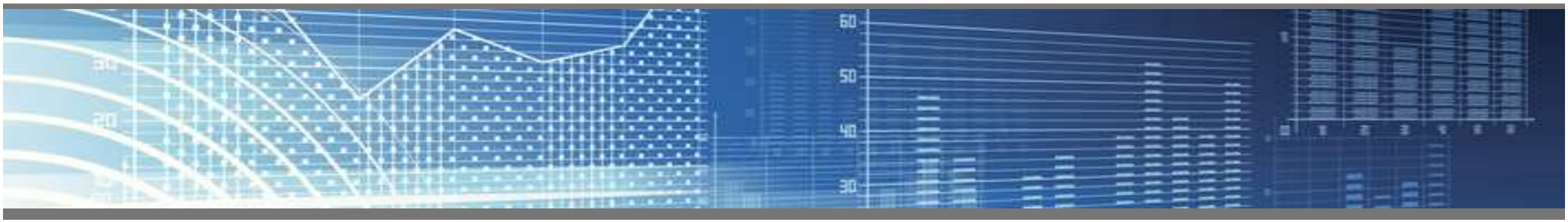
G

twitter

COGNITRO ANALYTICS
DATA EMPOWERING DECISIONS

Workshop Topic

- Big Data in the News
- IOT and the Evolution of Big Data
- Demystifying Big Data, Data Science and AI
- Big Data…Big Impact
- The UN Embraced Big Data to Achieve Its Millennium Goals
- Big Data & AI Driving the Development of National Statistics



Big Data & AI Driving the Development of National Statistics

The Role of National Statistical offices

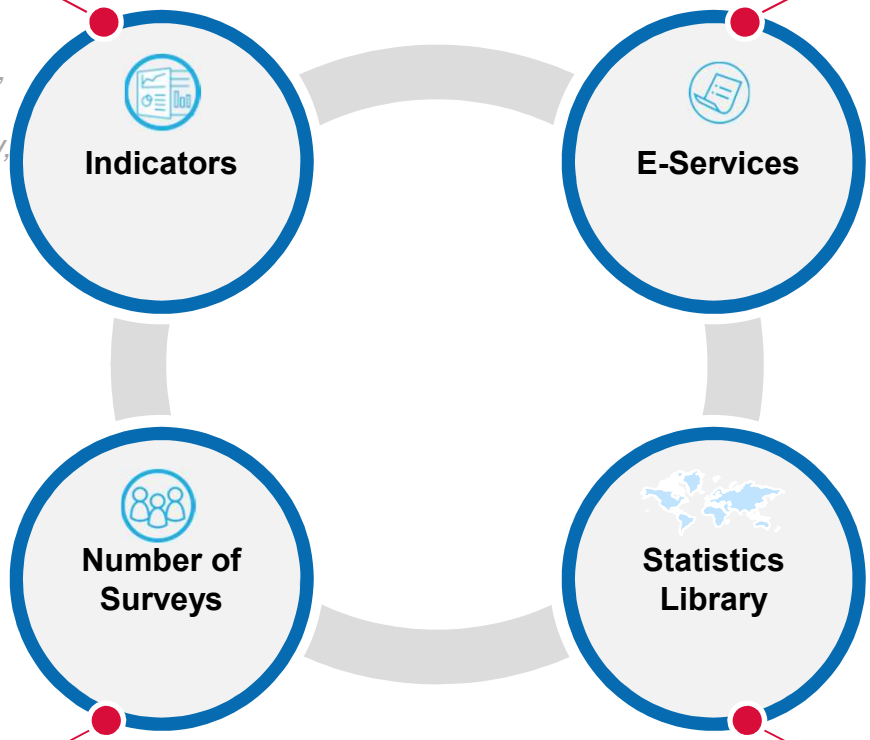
NON-EXHAUSTIVE

National Indicators

Provide an internationally comparable, statistically rigorous data, indices and census on the population, the economy, labour market, and others
Owners of 2030 Indicators

Surveys

Collects data through a number of surveys which include:
Economic and Households
GDP Surveys
Haj and Umrah Survey



E-Services

Statistical Applications,
Interactive Survey Systems
Geographic Information Systems

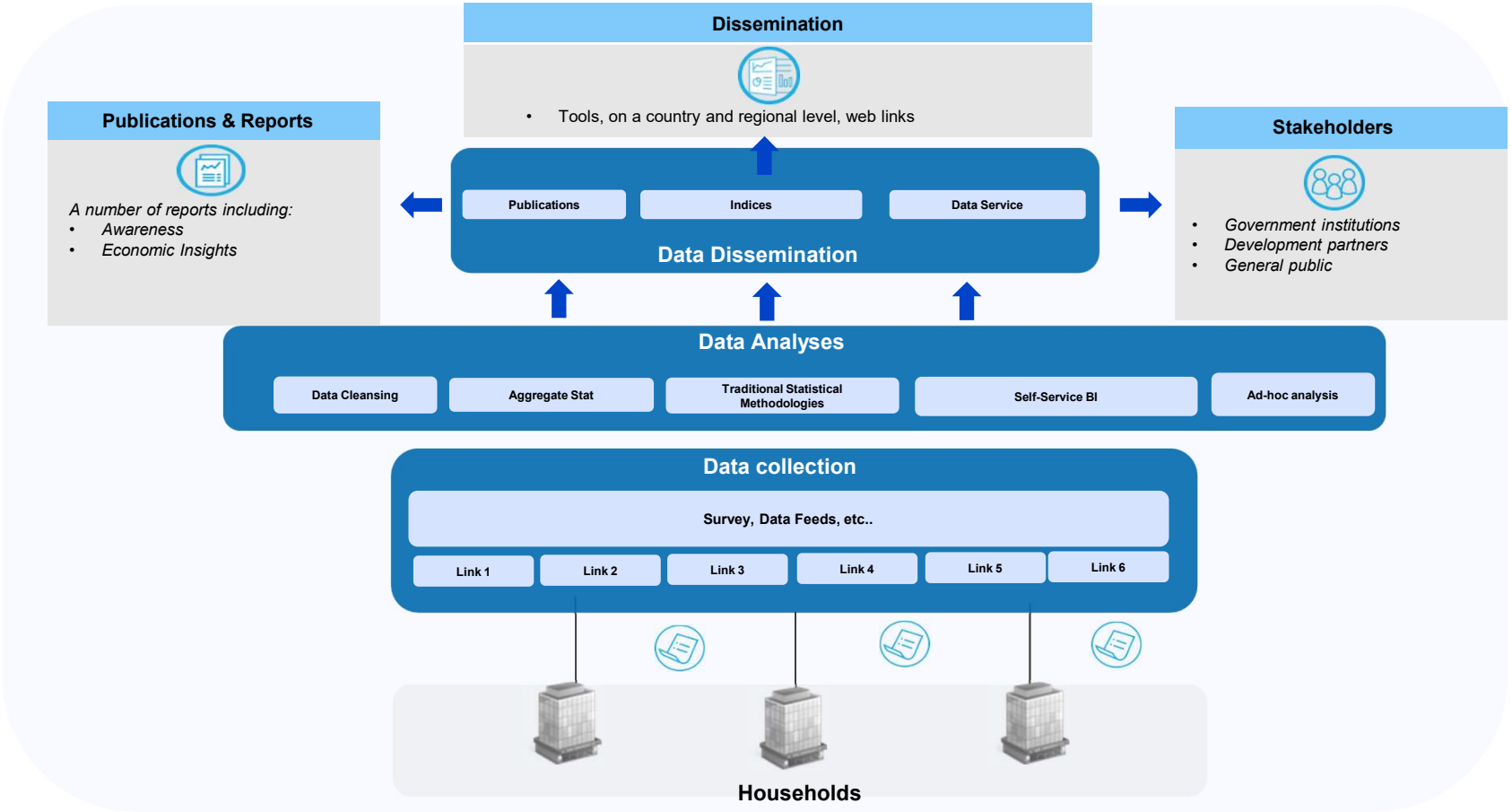
Indices

Enable tracking of multiple indices including:
Prices Index, Foreign Trade, Population, Social Statistics,

Big Data & AI Driving the Development of National Statistics

Traditional National Statistics

Illustrative

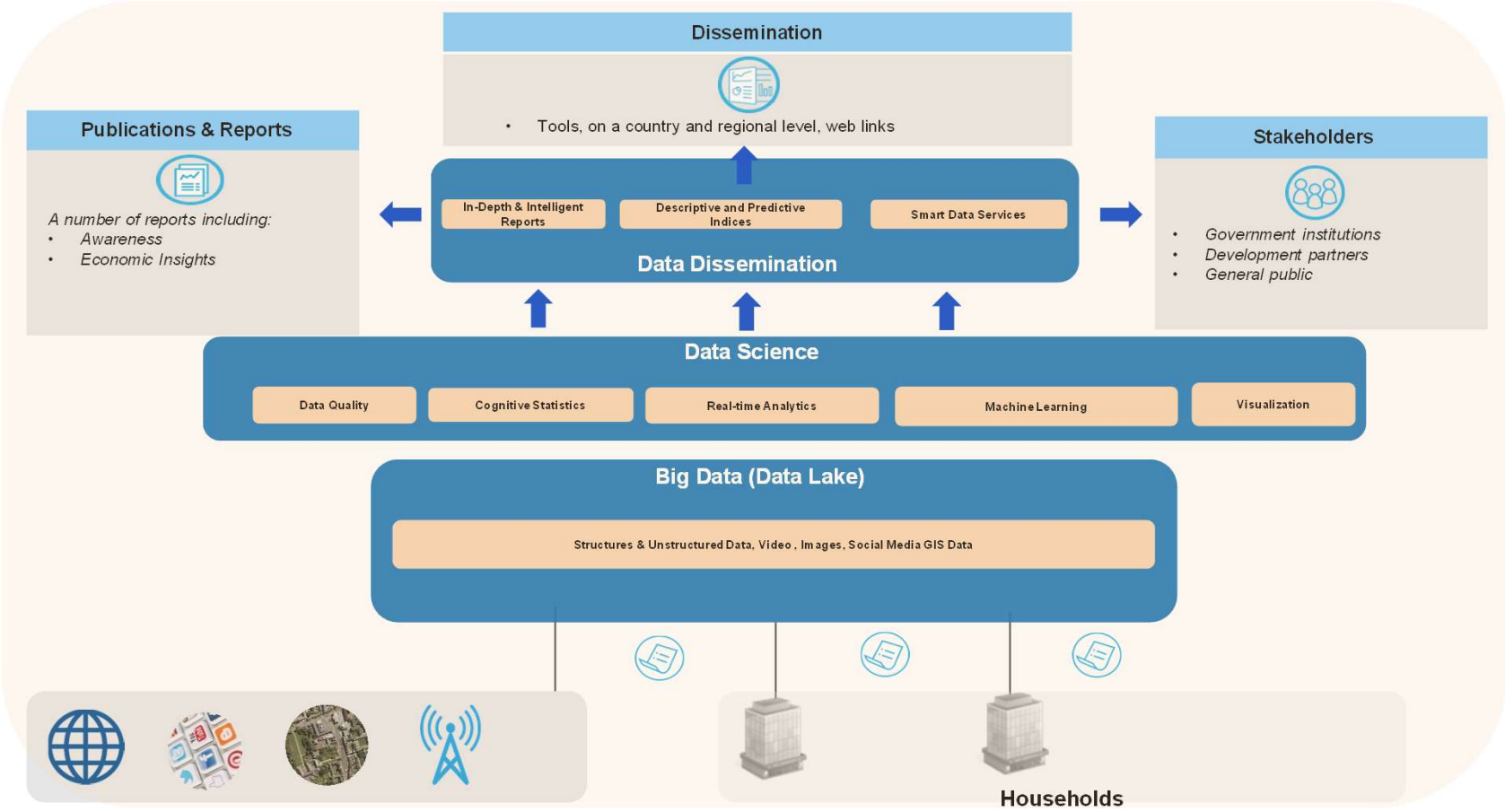


COGNITRO ANALYTICS
DATA EMPOWERING DECISIONS

Big Data & AI Driving the Development of National Statistics

Smart National Statistics

Illustrative

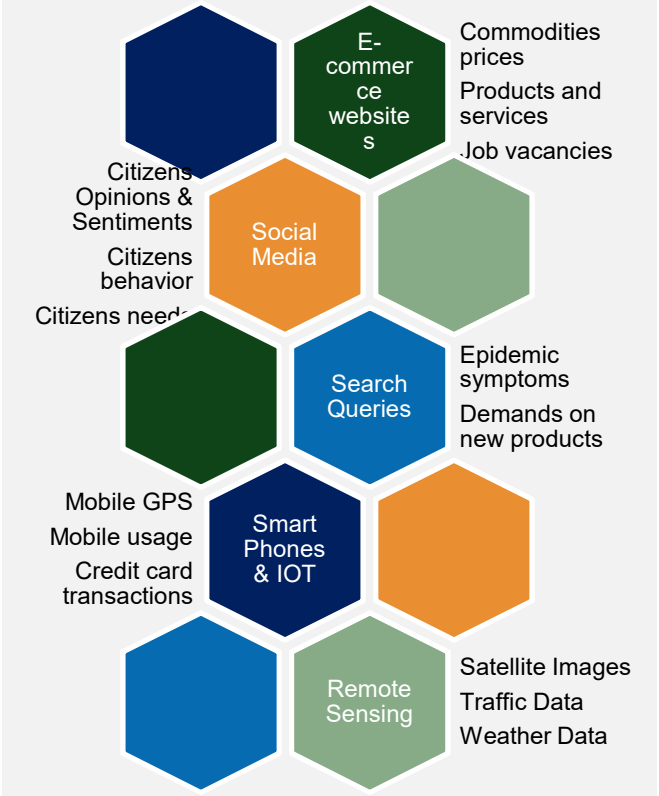


COGNITRO ANALYTICS
DATA EMPOWERING DECISIONS

Major Challenges

Illustrative

Big Data



Big Challenges

- **Data at Scale**
  - Volume : too much data
  - Velocity : too fast data
  - Variety too diverse data
- **Data Ownership**
  - Who can share?
  - What to share?
- **Data Ambiguity**
  - Unintelligible Data
  - Non-usable
  - What to expect?
- **Data Ambiguity**
  - Unintelligible Data
  - Non-usable
  - Actionability
- **Data Quality**
  - Garbage-In Garbage-Out
  - Good today. Vs. Perfect tomorrow

The Australian Bureau of Statistic has been successful in modernizing its NSO and was able to harness the full power of big data for its core mission

Australian Bureau of Statistics

Overview of GASTAT

Harness diverse sources of Big Data to create a richer, more dynamic and focused statistical picture of Australia.

Replace traditional data sources with a range of Big Data sources.

Explore opportunities to use Big Data to produce new statistical solutions

A skilled workforce able to interpret information needs

Advanced tools and infrastructure to manage large, complex data sets

A diverse pool of government, private and open data sources

Safe and appropriate public access to microdata sets and statistics

Strong multidisciplinary partnerships

Data Monetization: Non-Technological Barriers

Each party must be transparent in their motivation, policies, and regulatory constraints regarding data collection, storage , retention, sharing and publications		**Transparency**
Rights of data access, utilization, dissemination, has to be well understood, protected and maintained throughout the entire processing and dissemination		**Privacy**
Encourage broad data sharing whilst protecting the rights and interests of data subjects and data owners via controls to maintain data provenance, sharing and publication		**Accountability**
Protection against possible leakage, hacking and malpractice to safeguard the data has to be ensured at the environment level as well as the data record level		**Security**
Clear intent and responsibility of data usage, sharing, exchange, has to be documented, communicated and enforced form the legal prospective		**Compliance**
The collaborative usage of data demonstrates a fair value exchange between data providers (e.g., data subjects and/or data owners) and data consumers		**“Fair” Value Exchange**

Big Data & AI Driving the Development of National Statistics

Real-time or Near Real-time,

Automated, little efforts

Actionable Insight

Repeatable and Replicable

Web-Scrapping CPI Index

Telco-Based Population Census

Text-Messages Illiteracy Index

Social-Media Unemployment Index

Aerial-Image Poverty Index

Satellite Images for Vegetation Index

COGNITRO ANALYTICS
DATA EMPOWERING DECISIONS

Big Data & AI Driving the Development of National Statistics

Area	Data Type	Analytics	Potential Provider	Measure
ECommerce (التجارة الالكترونية)	Web Data	Web Scrapping & Text Mining	Souk.com	CPI Index
Tourism (السياحة)	Online Reservations	Text Mining	Trip Advisor	Competitiveness Index
Census (التعداد السكاني)	Telco and Mapping Data	Image Classification and location analytics	STC & Mobily	Micro and Macro Population
Police Enforcement	Telco Data & Weather data	Predictive Scoring	STC & Mobily	Incidents
Labor market سوق العمل	Web Data	Web Scraping and Text Mining	Bayt.com	Job Vacancies & Unemployment Index