ENERO 31, 2023

FUNDAMENTOS DE BIG DATA

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Qué es BigData

Nuevo enfoque para entender los datos, dar valor y tomar decisiones, a partir de la descripción de datos (estructurados, no estructurados o semi estructurados) analizados desde un punto de vista no relacional (costo, tiempo, recursos), utilizando herramientas de supercómputo nativo o en la nube.

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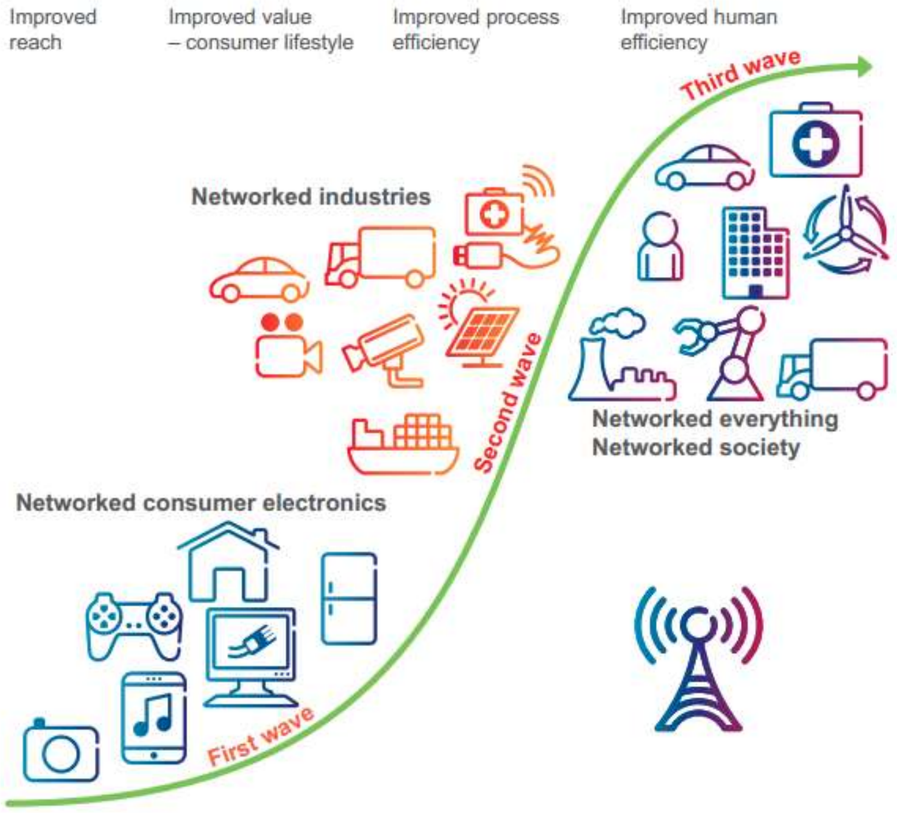
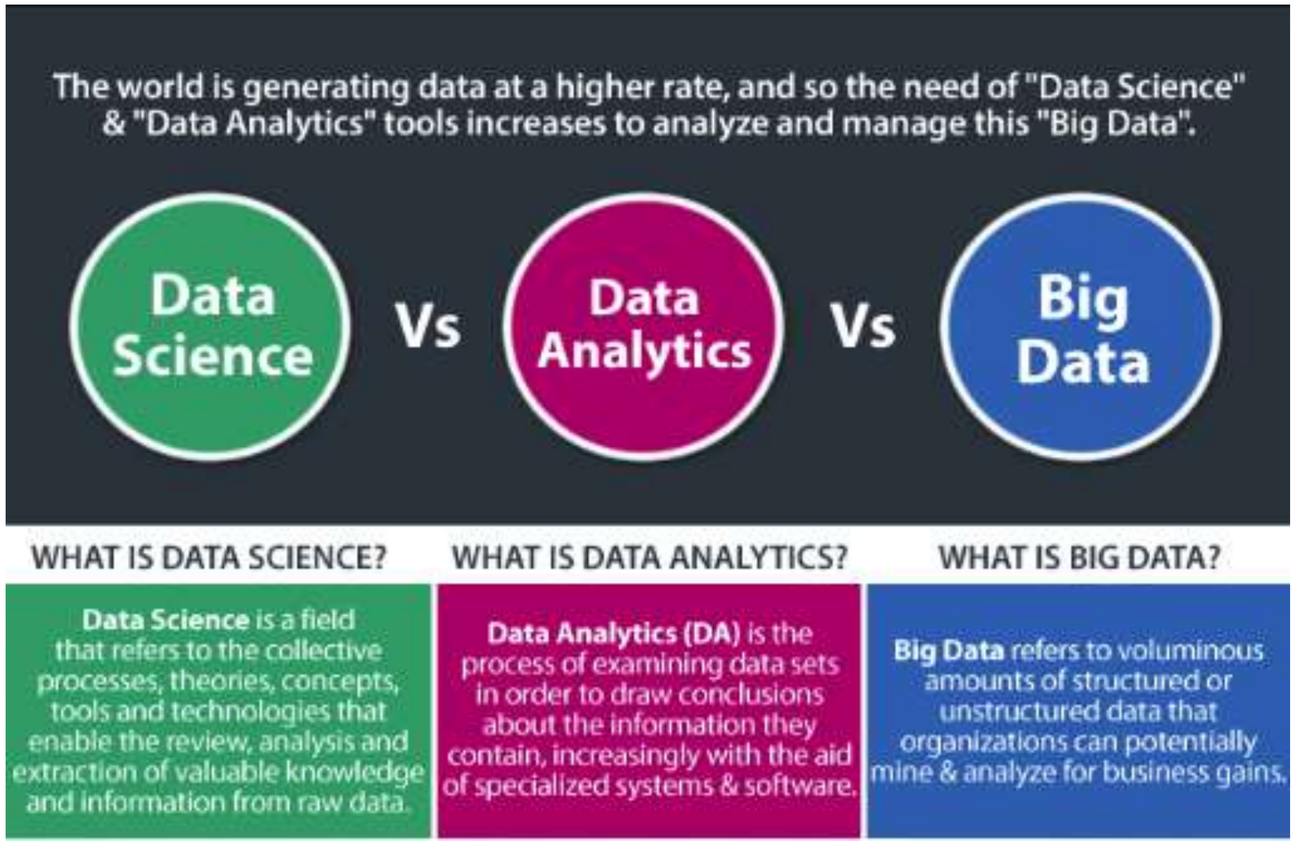
La relación del Big Data con otras tecnologías



The three waves of connected device development.

- **Gran masa**
- **Diversidad**
- **Almacenamiento**
- **Seguridad**
- **Tomar decisiones y responder**

Qué es BigData



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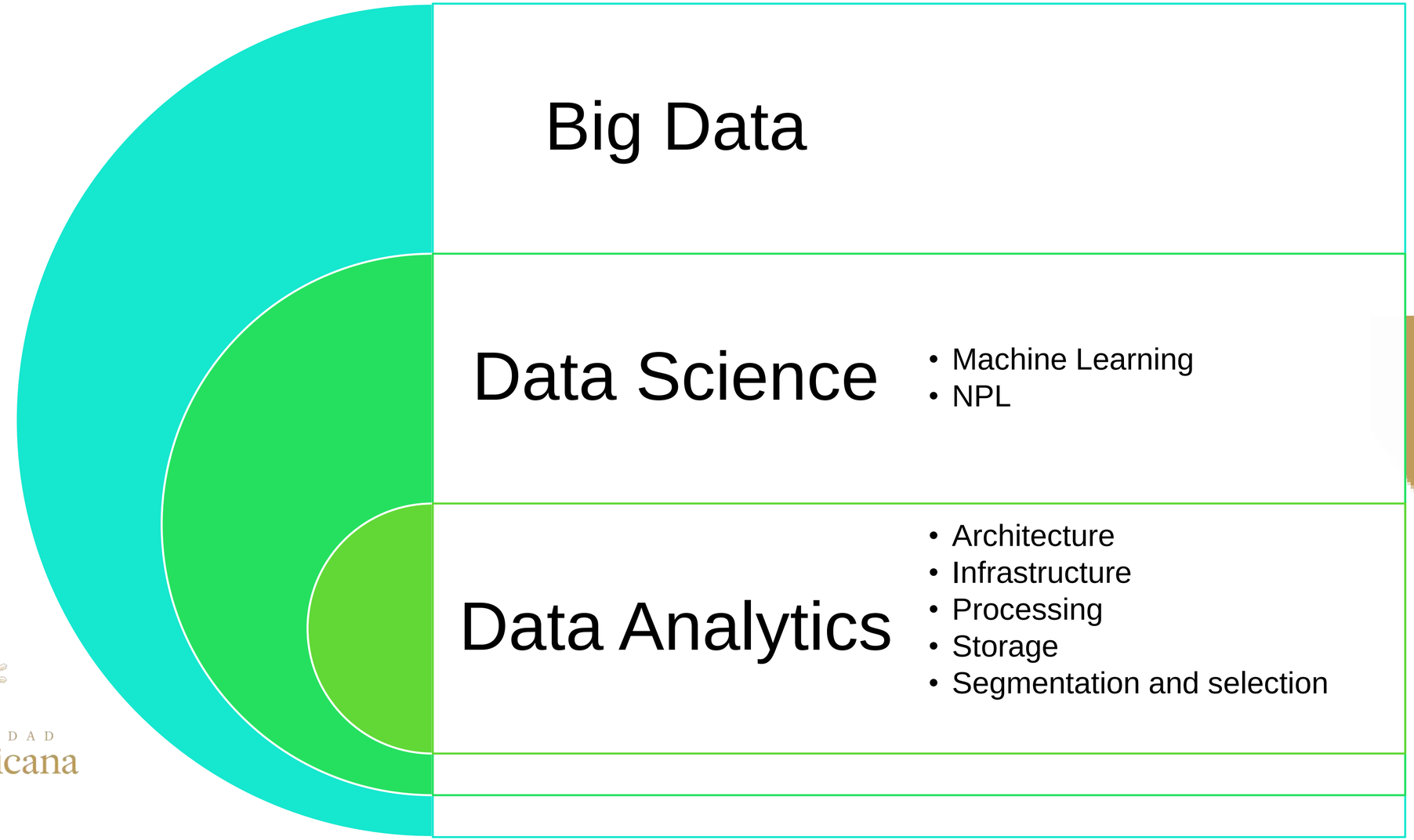
Qué es BigData



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Qué es BigData, 10 V’s

Qué es Big Data

Google BigQuery

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Qué es necesario

Infraestructura

Fuente(s) de datos

Modelo matemático

Big Data, generalidades

- Los motores de BD tradicionales no pueden tratar altas cantidades de datos, ni reaccionar inmediatamente a ellos. Almacena **datos no relacionales y relacionales**.

- Esquemas de consulta:

1. **Key-value**
2. **Columnal**
3. **Documental**
4. **Gráfos**

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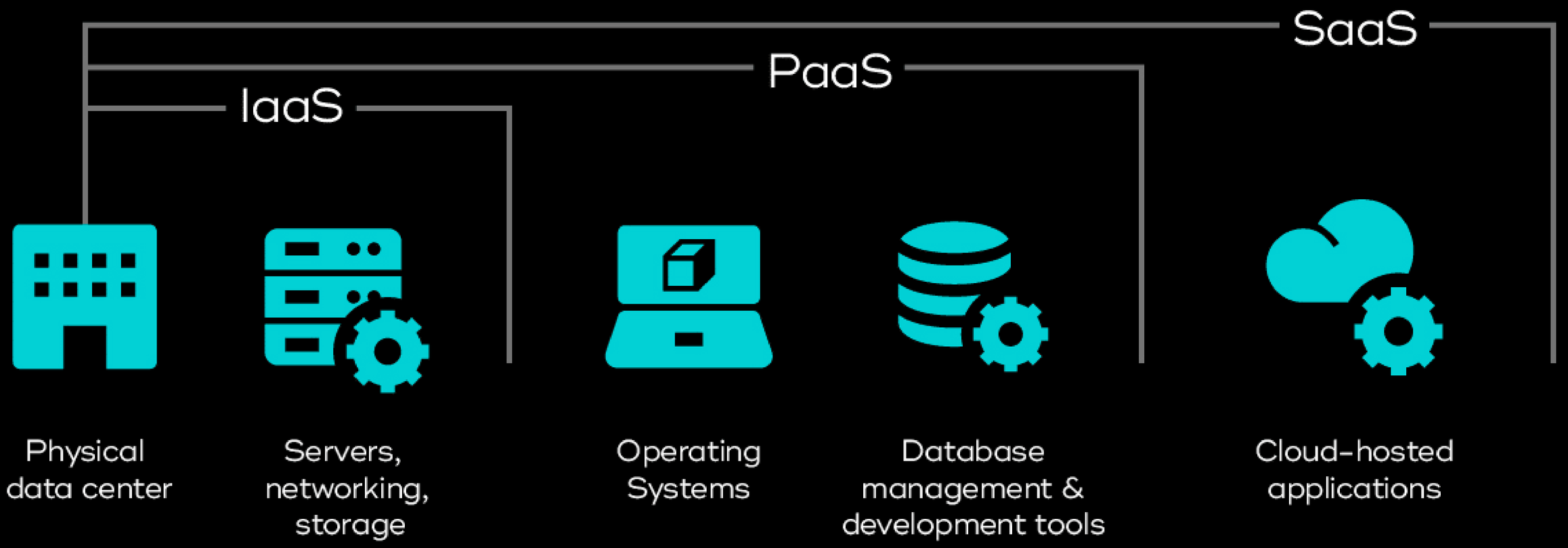
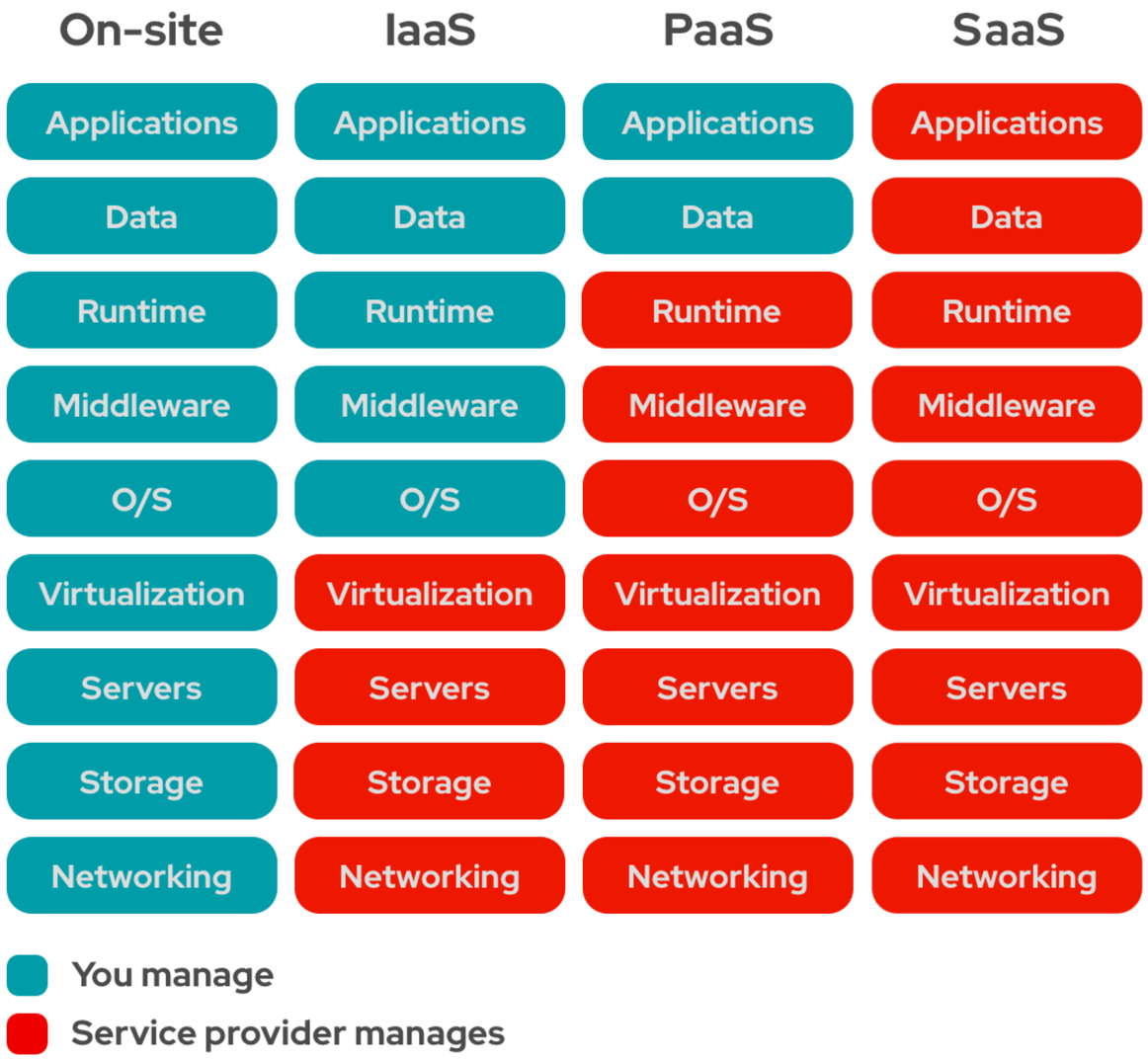
Cloud Computing Overview



IaaS, Infrastructure as a Service
PaaS, Platform as a Service
SaaS, Software as a Service

Escenarios de cómputo en la nube



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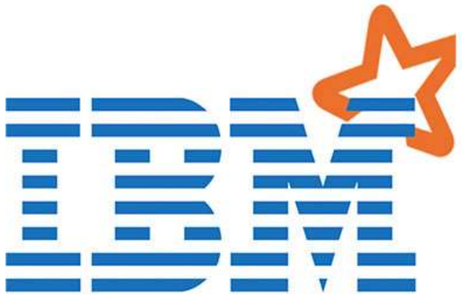
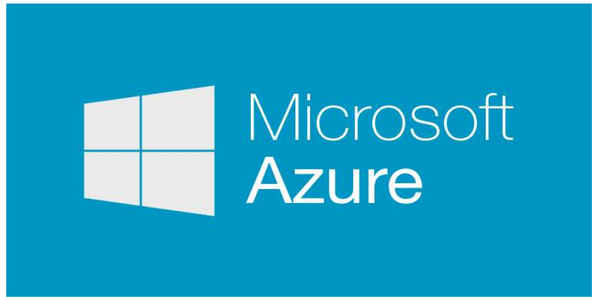
Tecnologías líderes Big Data engine

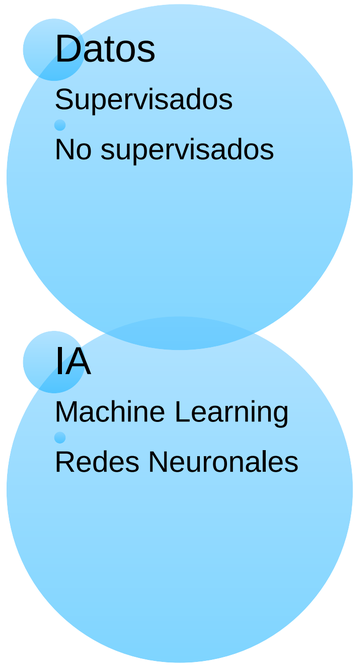




Qué se puede hacer con BigData

La nube consumía software, la nube ahora consume datos e integrando software desde donde se puede obtener información inteligente:

Análisis retrospectivo
Análisis en tiempo real
Análisis predictivo
App Inteligentes SaaS



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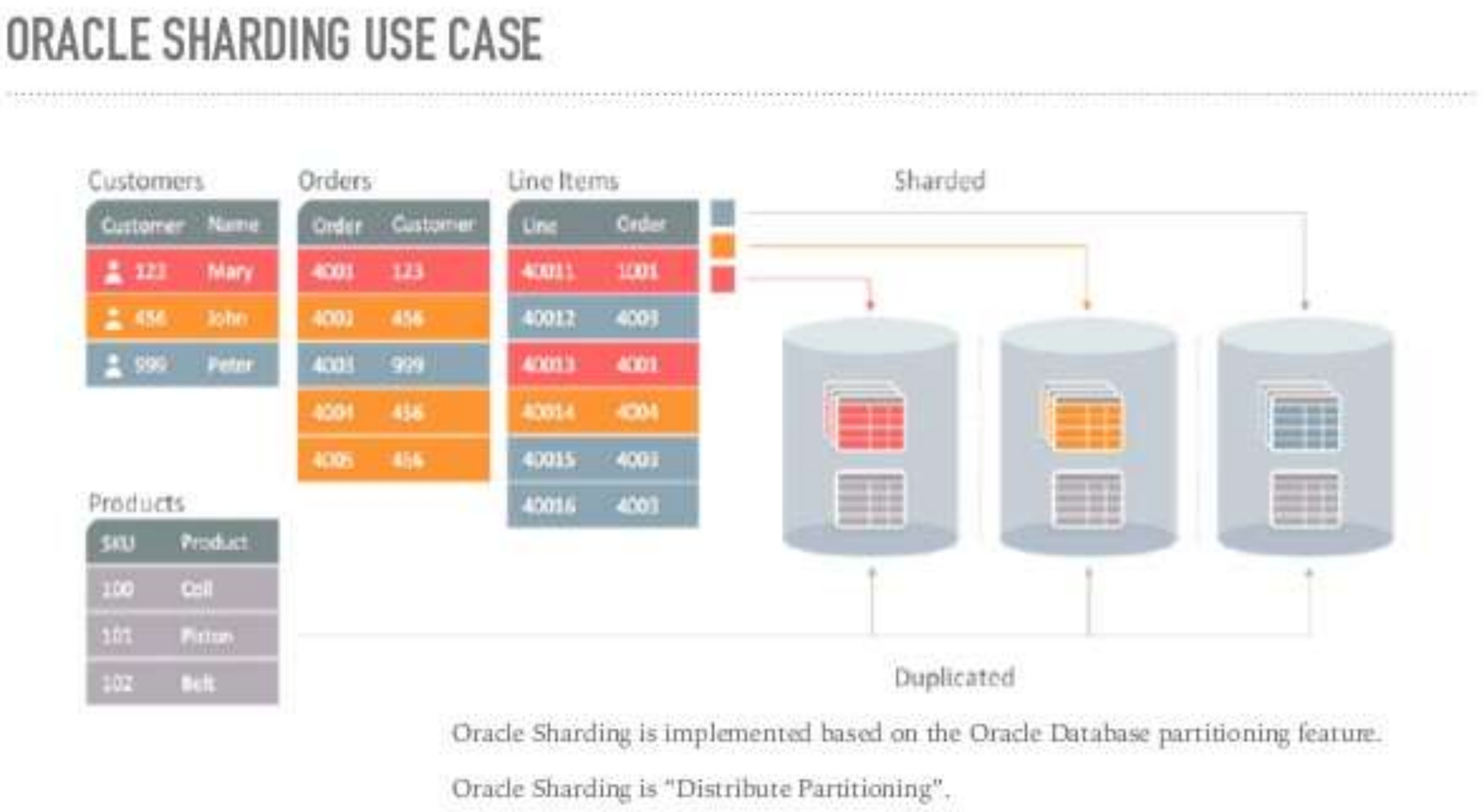
Queue adicional y backup

- Sharding



Algo de historia

- Big Data fue precedido por Google (mapreduce), Amazon (Dynamo) y Software Open Source (Hadoop, MongoDB, Cassandra, RabbitMQ, etc)

- RDBMS tienen funciones específicas donde las relaciones entre los datos toman valor único

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Propiedades deseadas de un BD

1. Robustes y tolerancia a fallas
2. Baja latencia y actualizaciones
3. Escalabilidad
4. Generalización
5. Extensabilidad
6. Queries ad-hoc
7. Mantenimiento mínimo
8. Debugabilidad
9. Problemas de Arq. Incremental (nuevas funciones)

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ESSENTIAL DIGITAL HEADLINES

OVERVIEW OF THE ADOPTION AND USE OF CONNECTED DEVICES AND SERVICES

GLOBAL OVERVIEW

TOTAL POPULATION	UNIQUE MOBILE PHONE USERS	INTERNET USERS	ACTIVE SOCIAL MEDIA USERS
7.91 BILLION	5.31 BILLION	4.95 BILLION	4.62 BILLION
URBANISATION	vs. POPULATION	vs. POPULATION	vs. POPULATION
57.0%	67.1%	62.5%	58.4%

9

SOURCES: UNITED NATIONS; U.S. CENSUS BUREAU; GOVERNMENT BODIES; GSMA INTELLIGENCE; ITU; GW; EUROSTAT; CNNIC; APJII; CIA WORLD FACTBOOK; COMPANY ADVERTISING RESOURCES AND EARNINGS REPORTS; OCDH; TECHRASA; KEPIOS ANALYSIS. **ADVISORY:** SOCIAL MEDIA USERS MAY NOT REPRESENT UNIQUE INDIVIDUALS. **COMPARABILITY:** SOURCE AND BASE CHANGES.

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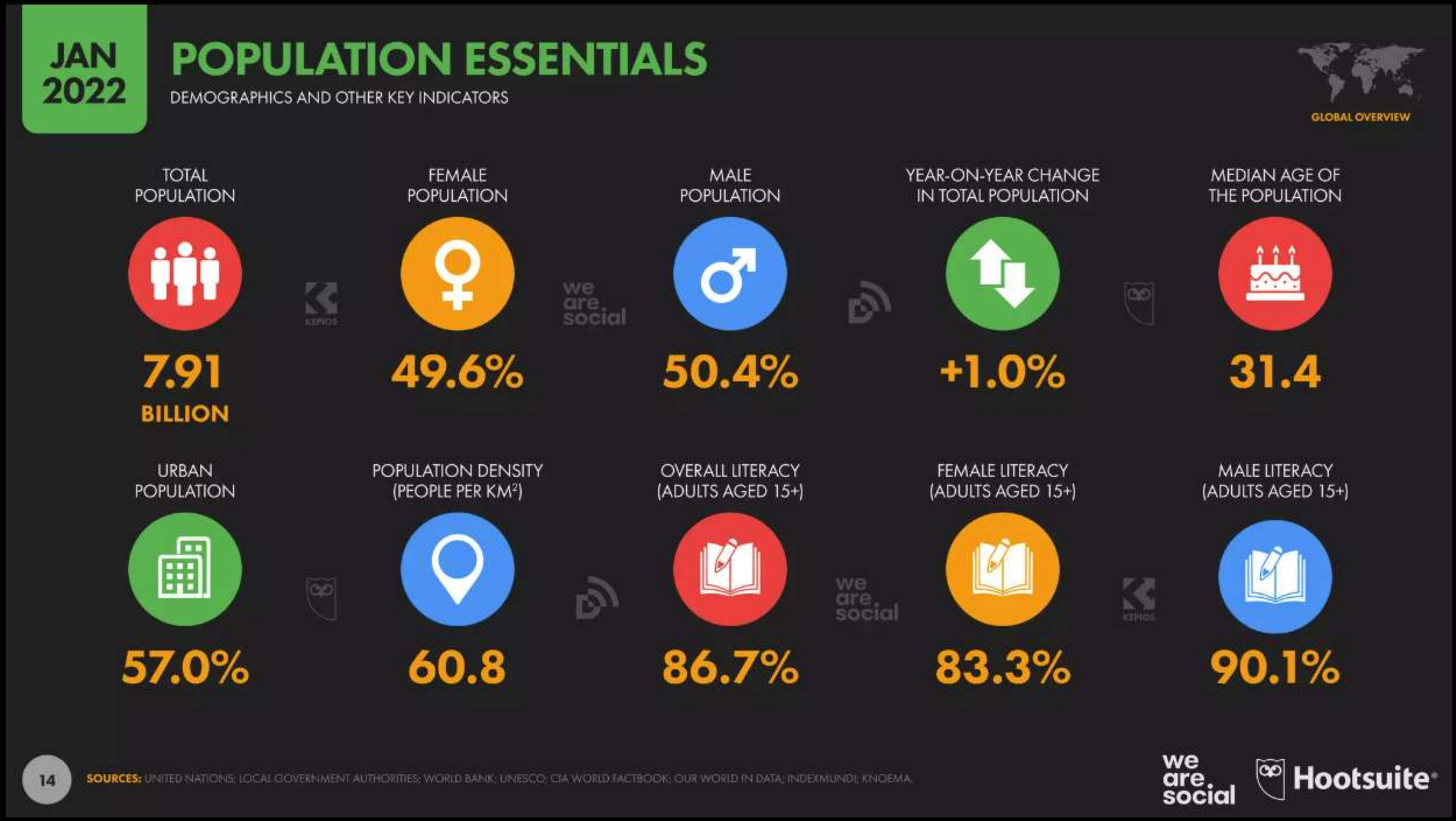
JAN 2022
POPULATION ESSENTIALS
DEMOGRAPHICS AND OTHER KEY INDICATORS
GLOBAL OVERVIEW
TOTAL POPULATION
7.91 BILLION
FEMALE POPULATION
49.6%
MALE POPULATION
50.4%
YEAR-ON-YEAR CHANGE IN TOTAL POPULATION
+1.0%
MEDIAN AGE OF THE POPULATION
31.4
URBAN POPULATION
57.0%
POPULATION DENSITY (PEOPLE PER KM²)
60.8
OVERALL LITERACY (ADULTS AGED 15+)
86.7%
FEMALE LITERACY (ADULTS AGED 15+)
83.3%
MALE LITERACY (ADULTS AGED 15+)
90.1%
14
SOURCES: UNITED NATIONS; LOCAL GOVERNMENT AUTHORITIES; WORLD BANK; UNESCO; CIA WORLD FACTBOOK; OUR WORLD IN DATA; INDEXMUNDI; KNOEMA.
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JAN 2022 DEVICE OWNERSHIP

PERCENTAGE OF INTERNET USERS AGED 16 TO 64 WHO OWN EACH KIND OF DEVICE

GLOBAL OVERVIEW

ANY KIND OF MOBILE PHONE

96.6%

YEAR-ON-YEAR CHANGE

-0.5% (-50 BPS)

SMART PHONE

96.2%

YEAR-ON-YEAR CHANGE

-0.4% (-40 BPS)

FEATURE PHONE

8.8%

YEAR-ON-YEAR CHANGE

-2.2% (-20 BPS)

LAPTOP OR DESKTOP COMPUTER

63.1%

YEAR-ON-YEAR CHANGE

-2.0% (-130 BPS)

TABLET DEVICE

34.8%

YEAR-ON-YEAR CHANGE

+1.5% (+50 BPS)

GAMES CONSOLE

20.3%

YEAR-ON-YEAR CHANGE

-5.1% (-110 BPS)

SMART WATCH OR SMART WRISTBAND

27.4%

YEAR-ON-YEAR CHANGE

+17.6% (+410 BPS)

TV STREAMING DEVICE

15.5%

YEAR-ON-YEAR CHANGE

+7.6% (+110 BPS)

SMART HOME DEVICE

14.1%

YEAR-ON-YEAR CHANGE

+14.6% (+180 BPS)

VIRTUAL REALITY DEVICE

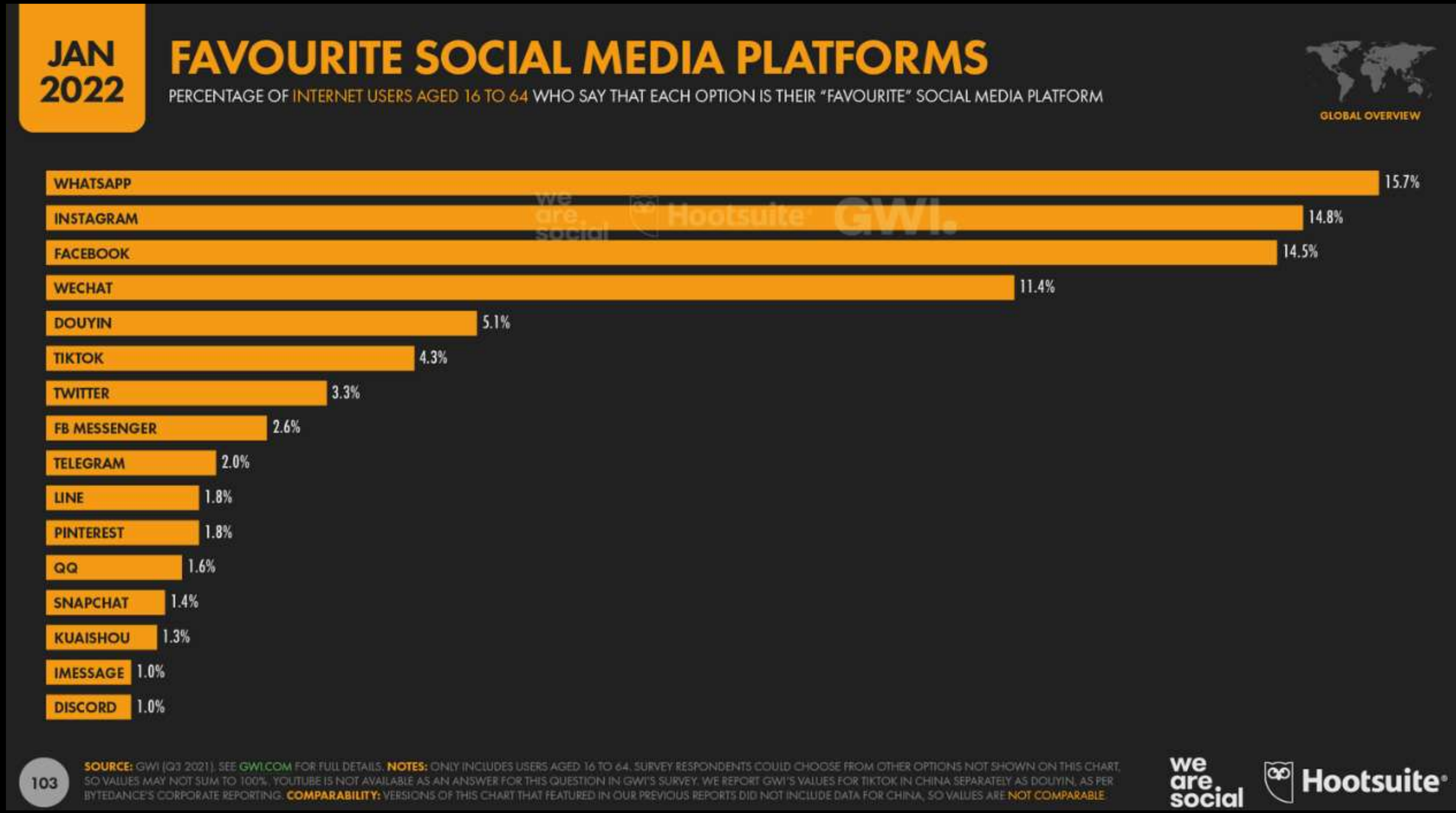
4.8%

YEAR-ON-YEAR CHANGE

+9.1% (+40 BPS)

17

SOURCE: GWI (Q3 2021). FIGURES REPRESENT THE FINDINGS OF A BROAD GLOBAL SURVEY OF INTERNET USERS AGED 16 TO 64. SEE GWI.COM FOR FULL DETAILS.
NOTE: PERCENTAGE CHANGE VALUES REFLECT RELATIVE CHANGE. "BPS" VALUES SHOW THE CHANGE IN BASIS POINTS, AND REFLECT ABSOLUTE CHANGE.


JAN 2022
FAVOURITE SOCIAL MEDIA PLATFORMS
PERCENTAGE OF INTERNET USERS AGED 16 TO 64 WHO SAY THAT EACH OPTION IS THEIR "FAVOURITE" SOCIAL MEDIA PLATFORM
GLOBAL OVERVIEW
WHATSAPP 15.7%
INSTAGRAM 14.8%
FACEBOOK 14.5%
WECHAT 11.4%
DOUYIN 5.1%
TIKTOK 4.3%
TWITTER 3.3%
FB MESSENGER 2.6%
TELEGRAM 2.0%
LINE 1.8%
PINTEREST 1.8%
QQ 1.6%
SNAPCHAT 1.4%
KUAISHOU 1.3%
IMESSAGE 1.0%
DISCORD 1.0%
103
SOURCE: GWI (Q3 2021). SEE GWI.COM FOR FULL DETAILS. NOTES: ONLY INCLUDES USERS AGED 16 TO 64. SURVEY RESPONDENTS COULD CHOOSE FROM OTHER OPTIONS NOT SHOWN ON THIS CHART, SO VALUES MAY NOT SUM TO 100%. YOUTUBE IS NOT AVAILABLE AS AN ANSWER FOR THIS QUESTION IN GWI'S SURVEY. WE REPORT GWI'S VALUES FOR TIKTOK IN CHINA SEPARATELY AS DOUYIN, AS PER BYTEDANCE'S CORPORATE REPORTING. COMPARABILITY: VERSIONS OF THIS CHART THAT FEATURED IN OUR PREVIOUS REPORTS DID NOT INCLUDE DATA FOR CHINA, SO VALUES ARE NOT COMPARABLE
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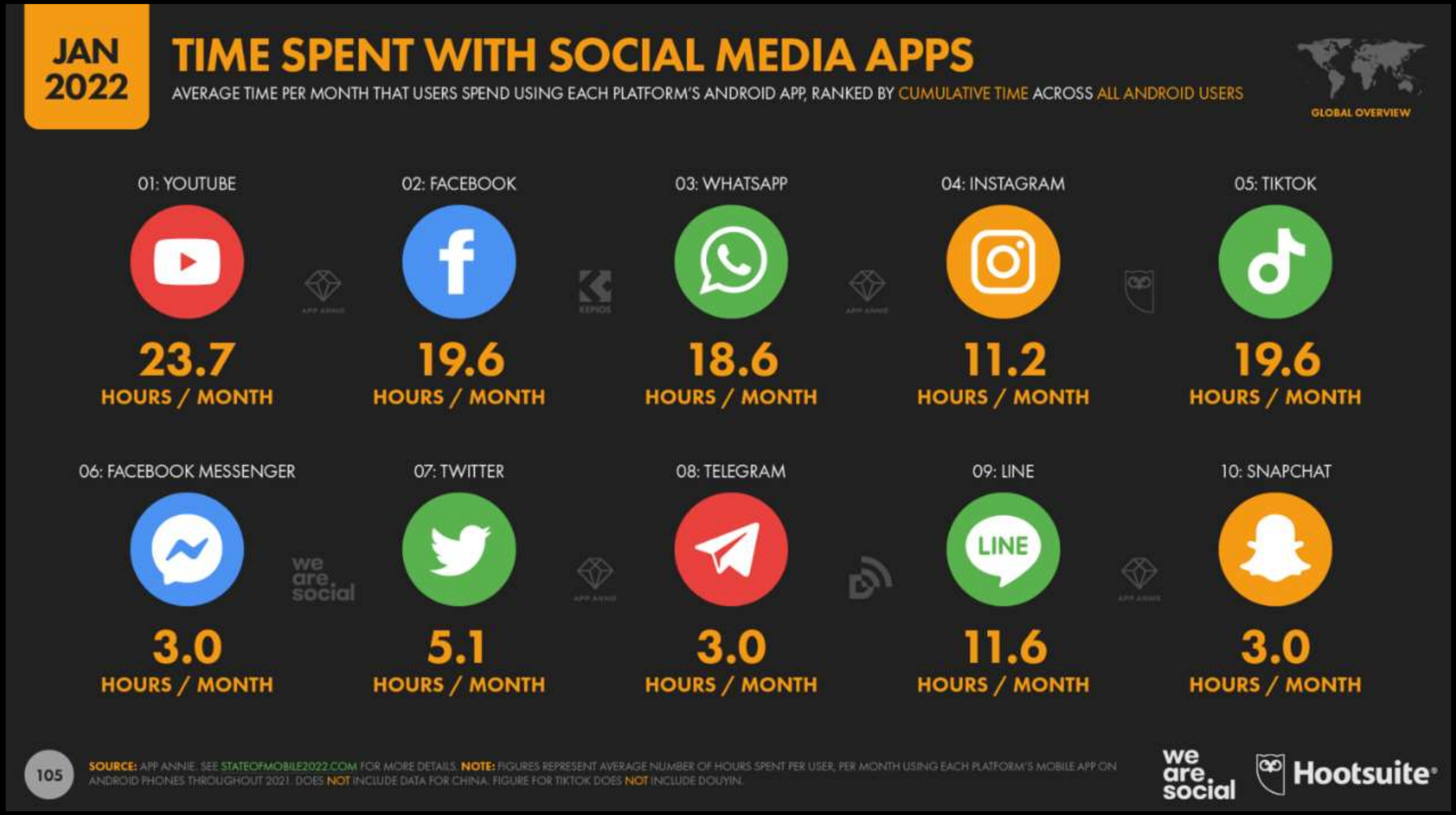
JAN 2022
TIME SPENT WITH SOCIAL MEDIA APPS
AVERAGE TIME PER MONTH THAT USERS SPEND USING EACH PLATFORM'S ANDROID APP, RANKED BY CUMULATIVE TIME ACROSS ALL ANDROID USERS
GLOBAL OVERVIEW
01: YOUTUBE
23.7
HOURS / MONTH
02: FACEBOOK
19.6
HOURS / MONTH
03: WHATSAPP
18.6
HOURS / MONTH
04: INSTAGRAM
11.2
HOURS / MONTH
05: TIKTOK
19.6
HOURS / MONTH
06: FACEBOOK MESSENGER
3.0
HOURS / MONTH
07: TWITTER
5.1
HOURS / MONTH
08: TELEGRAM
3.0
HOURS / MONTH
09: LINE
11.6
HOURS / MONTH
10: SNAPCHAT
3.0
HOURS / MONTH
105
SOURCE: APP ANNIE. SEE STATEOFMOBILE2022.COM FOR MORE DETAILS. NOTE: FIGURES REPRESENT AVERAGE NUMBER OF HOURS SPENT PER USER, PER MONTH USING EACH PLATFORM'S MOBILE APP ON ANDROID PHONES THROUGHOUT 2021. DOES NOT INCLUDE DATA FOR CHINA. FIGURE FOR TIKTOK DOES NOT INCLUDE DOUYIN.
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INSTAGRAM REELS AUDIENCE OVERVIEW

THE POTENTIAL AUDIENCE THAT MARKETERS CAN REACH WITH AD PLACEMENTS IN INSTAGRAM REELS

GLOBAL OVERVIEW

POTENTIAL AUDIENCE THAT META REPORTS CAN BE REACHED WITH ADS IN INSTAGRAM REELS	INSTAGRAM REELS AD REACH AS A PERCENTAGE OF INSTAGRAM'S TOTAL ADVERTISING REACH	INSTAGRAM REELS ADVERTISING REACH AS A PERCENTAGE OF TOTAL POPULATION AGED 13+	PERCENTAGE OF THE INSTAGRAM REELS AD AUDIENCE THAT META REPORTS IS FEMALE	PERCENTAGE OF THE INSTAGRAM REELS AD AUDIENCE THAT META REPORTS IS MALE
675.3 MILLION	45.7%	10.9%	46.1%	53.9%

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KEPIOS

151

SOURCE: META'S ADVERTISING RESOURCES. ADVISORY: AUDIENCE FIGURES MAY NOT REPRESENT UNIQUE INDIVIDUALS, AND MAY NOT MATCH EQUIVALENT FIGURES FOR THE TOTAL ACTIVE USER BASE.
NOTES: FIGURES USE MIDPOINT OF PUBLISHED RANGES. META'S ADVERTISING RESOURCES ONLY PUBLISH GENDER DATA FOR "FEMALE" AND "MALE".

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Necesidades Globales de datos:

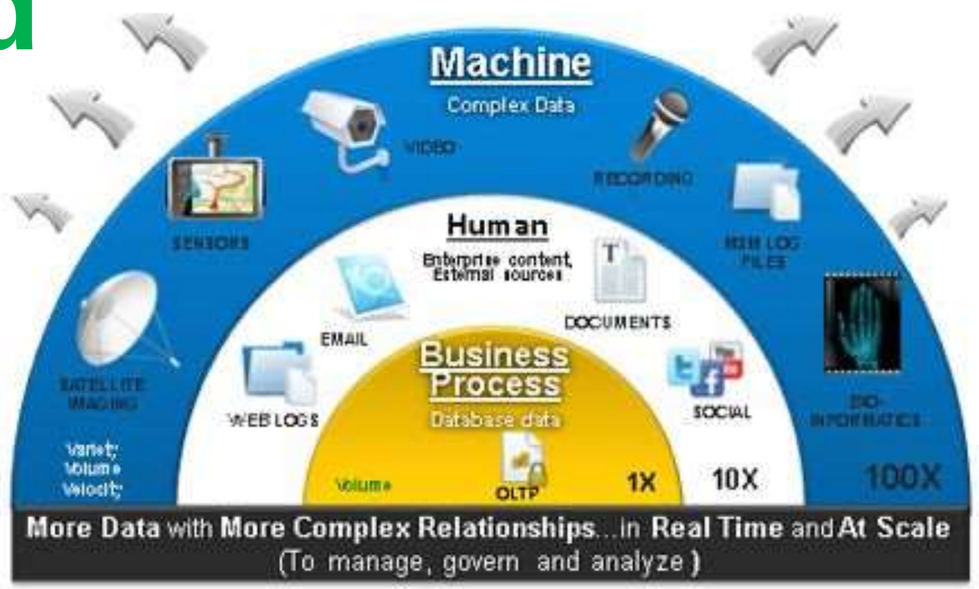
1. Crecimiento de logs exponencial
2. Crecimiento de demanda
3. Crecimiento de popularidad
4. Mayor inteligencia

¿Existe una correlación entre el nivel de vida de un país medido por el ingreso econoómico de su población, edad y el acceso a internet?

https://global-internet-map-2022.telegeography.com/
https://datareportal.com/reports/digital-2022-global-overview-report

Data sources types in Big Data

1. **Structured**
2. **None structured**
3. **Semi-structured**



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Structured Data

- **Big mass**
- **Diversity**
- **Storage**
- **Security**
- **Decision Support Systems and Answers Recovery**

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None Structured Data, Organizations

- **80 -90% world wide data**
- **Images, videos, email, searches, text, pdfs, etc.**
- **V =** $\frac{\Delta X}{\Delta t}$

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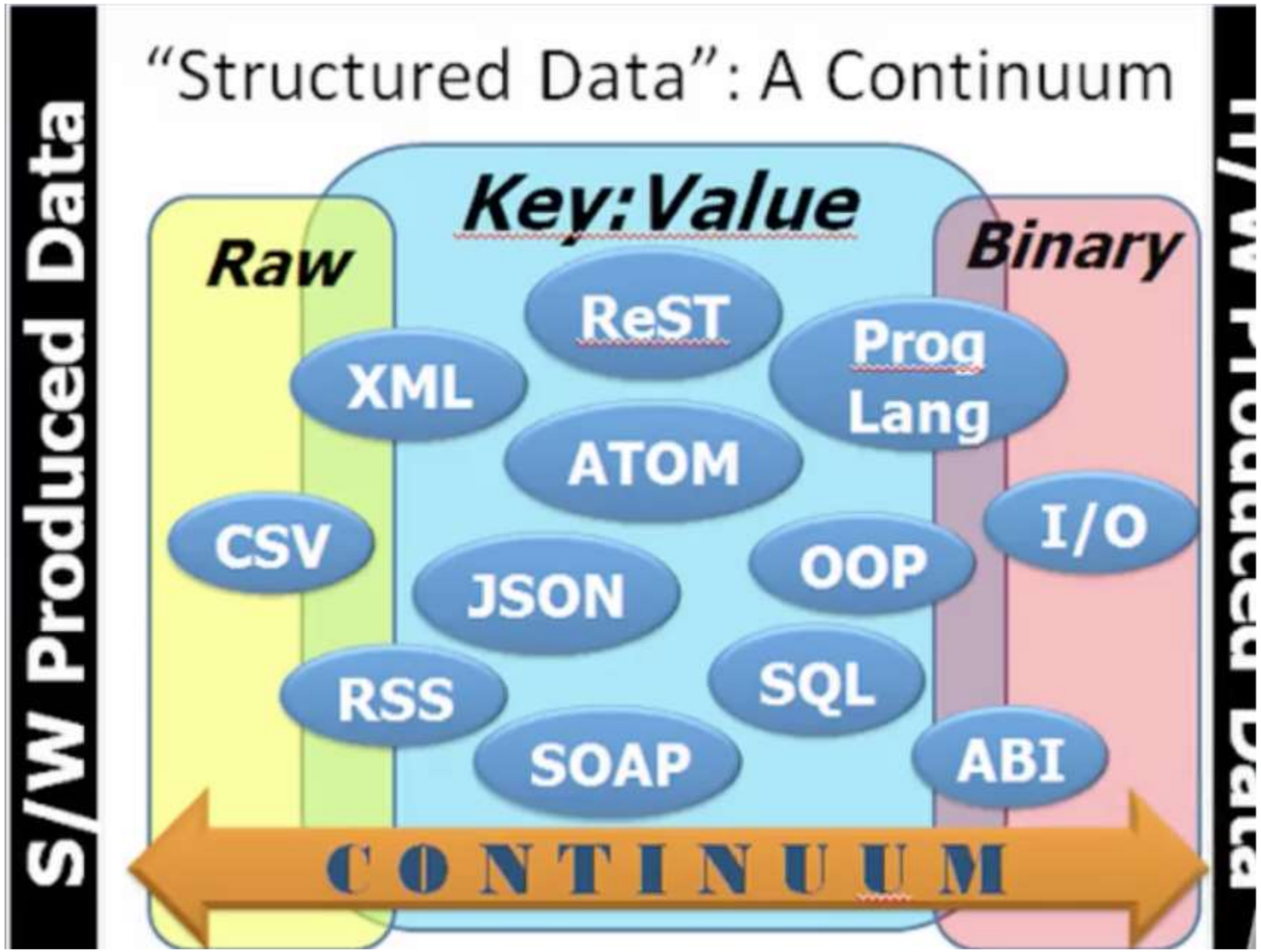
Data schemas, samples



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Structured Data, **Organizations**

Past stored in SILOS

- Unconnected stored islands
- Hindered stored and connect silos for pattern recognition
- Outdated and unsynchronized

RDMS (Highly structured data) – SILOS → Value

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Structured Data, Organizations

Using pattern recognition a organizations can use it for:

1.- Detect correlated products

2.- Estimated demand

3.- Dapture fraudulent actions

Commerce+Open Data+Analytics→Better predictions (Business Intelligence)

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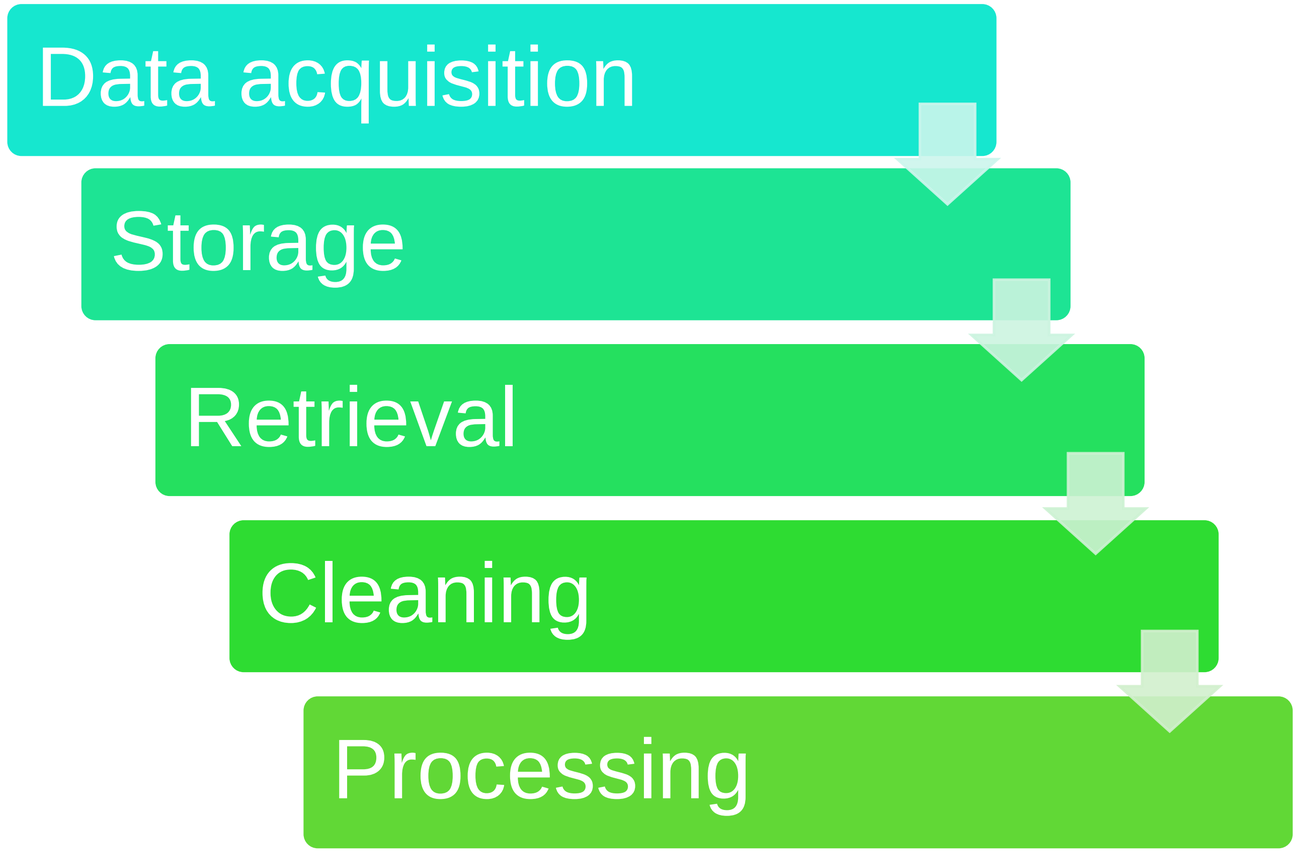
Semi- Structured Data

16 PB data per year
1 mile per driver route
optimized, savings 50 mdd

250 millions clients, 10000 stores
2.5 PB per hour
New products, customize recommendations, predictive support

None-Structured Data, work path



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For all data workload

ETL data
(Extract, Transform and Load)

To integrate different sources and loaded it into:
Data Warehouse-Data Lake-Data Mart

4 key properties of a data transaction

Atomicity

All changes to data are performed as if they are a single operation

Consistency

Data is in a consistent state when a transaction starts and when it ends.

Isolation

The intermediate state of a transaction is invisible to other transactions. As a result, transactions that run concurrently appear to be serialized.

Durability

After a transaction successfully completes, changes to data persist and are not undone, even in the event of a system failure.

None Structured Data, NoSQL

1. Graph Data Base.– used to find connections between data sets (Neo4j)
2. Key Value Pairs.- access and process data with key value pairs (Cassandra)

→Layers for Value Big Data

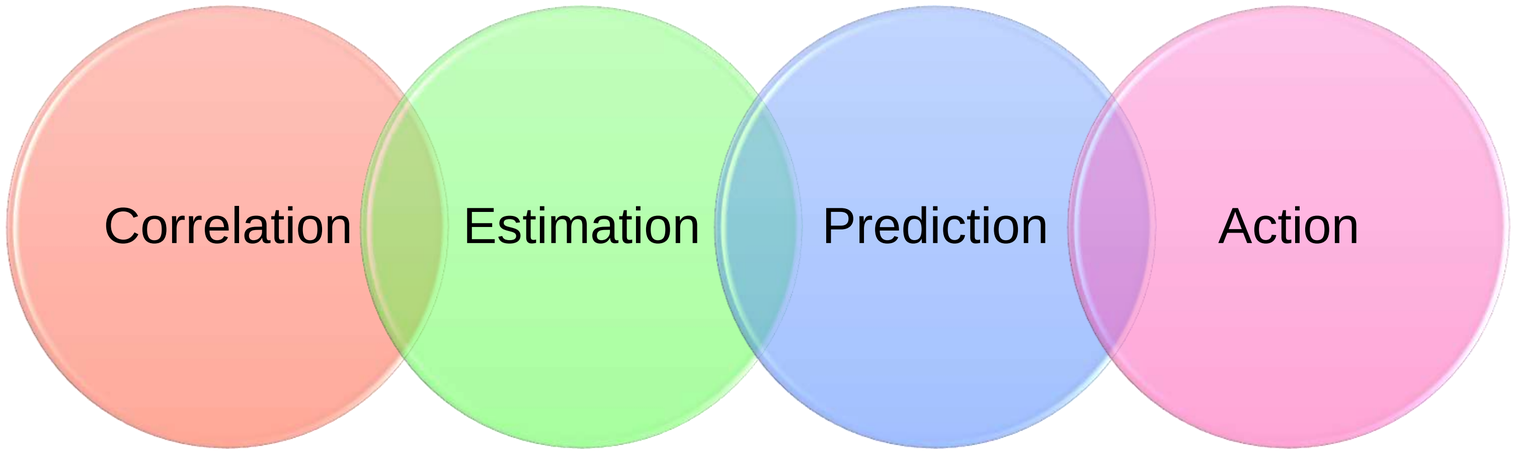
→Retrival and Storage

→Pre-processing

→Analysis

12 TB/day representative data to sentiment analysis for a product or service (crisis mappers)

None Structured Data, NoSQL
Flow decision making



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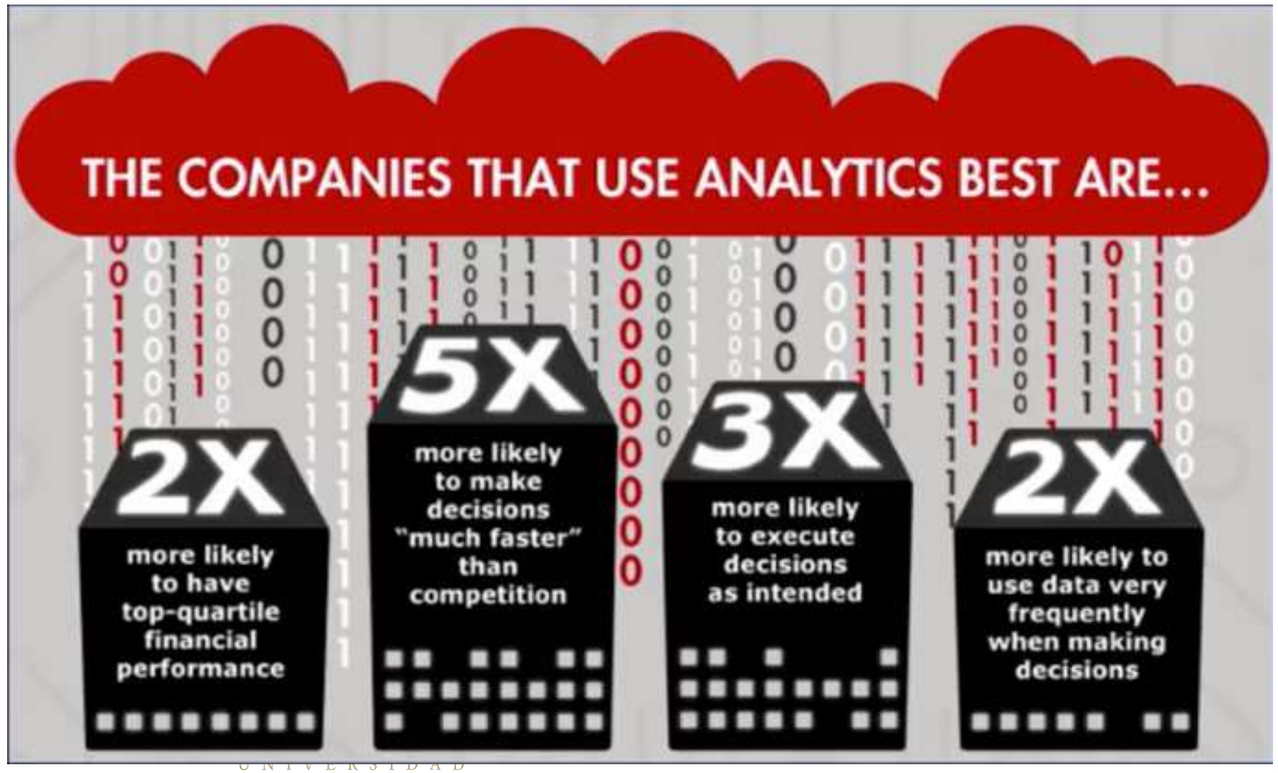
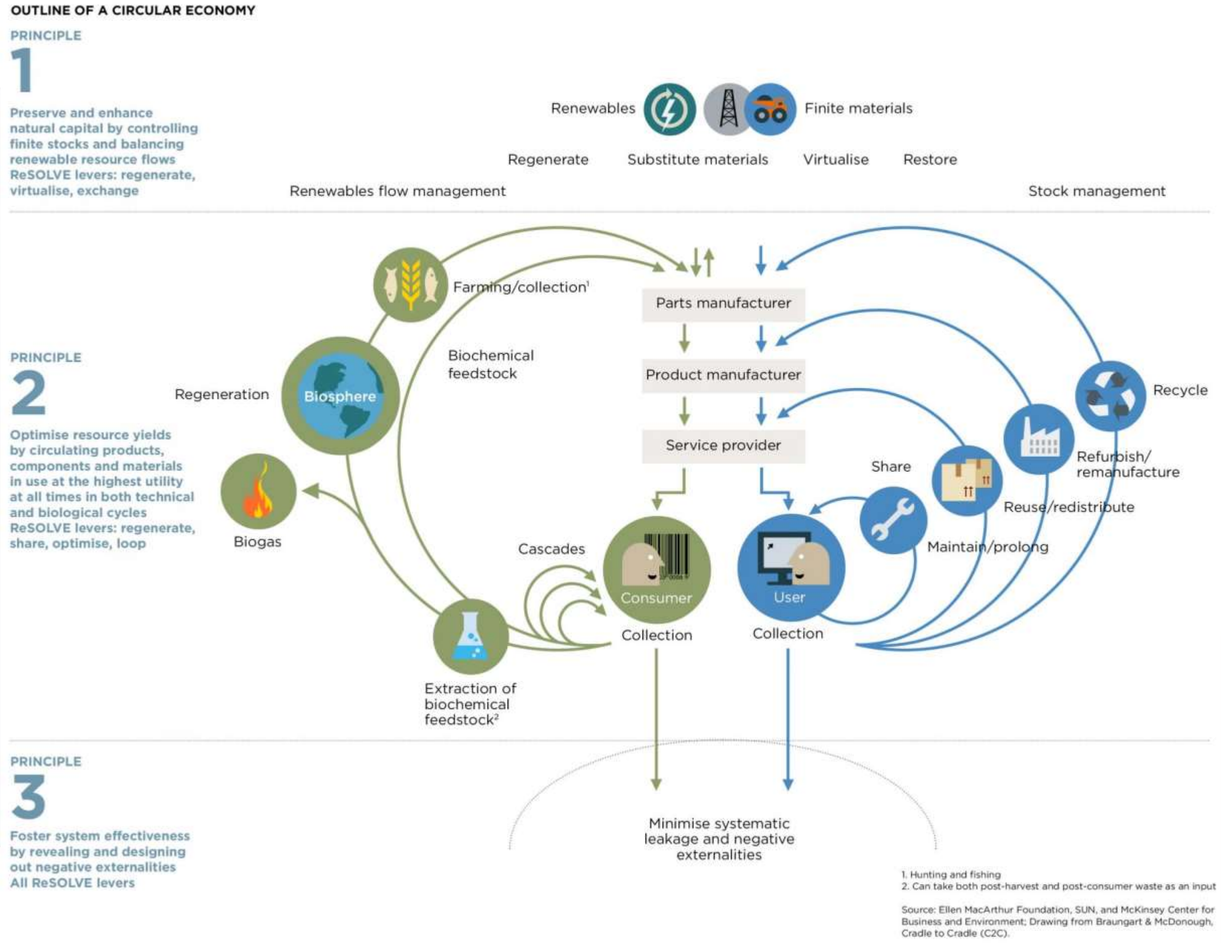
Strategical Big Data growth, new economical system approach





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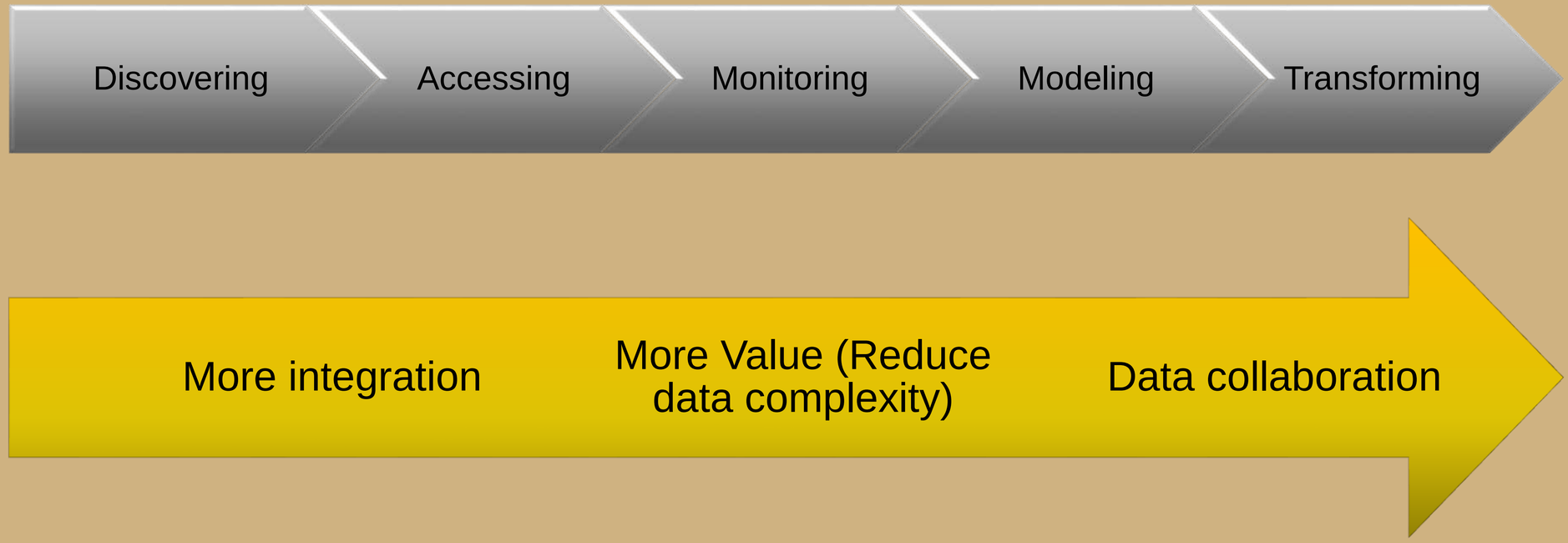
Data integration Process



Activity 2:

1. Read the appropiate article according the assignated team.
2. Answer the questiones asignated to the article.
3. Every team must prepare and present a 5 minute resume

Team 1

- Link

Team 2

- Link

Team 3

- Link

Team 4

- Link

Team 5

- Link

Questions Team 1:

1. Does the Reels are changing the consumer experiences and it reflect a new data Vs value?
2. Wich one’s and how?
3. What trends (3) do you identify after Covid-19 over data user production?
4. Are those data commonly Structured, NoStructured or SemiStructured? Explain, why?

Questions Team 2:

1. What are the relations between Data Analytics and Business Intelligence (3)?
2. What are the relations between Data Science and Business Intelligence (3)?
3. How do you explain this for a new user or Company who wants to be involved in BI?
4. How could they start with it?

Questions Team 3:

1. For the 12 data keypoint, how many of them are affeted by AI?
2. In conclusion, the D&A should be focused on people or metaverse? Explain, why?
3. How do you resume this article in one paragraph?
4. Does geopolitics are changing data production and consumtion?

Questions Team 4:

1. How do you represent graphically the relation between Data Science-ML-AI?
2. How do you explain the role of Big Data in Data Science, ML and AI?
3. Describe three agrees, and three disagrees about the article’s content
4. According the study case: “Self-driving car”. Do you agree with the ML, AI and Data Science descriptions? Explain, What is the Big Data role in this case according 10 V’s?

Questions Team 5:

1. Does Data Scientist and Data Engineer would do the same job? Explain, why?
2. Define five key skills that make difference between Data Scient and Data Engineer
3. Does DASCA is leading changing the employment bases for Data Scientist and Data Engineers?
4. How has been involved the Big Data in this new industrial revolution called 4.0?