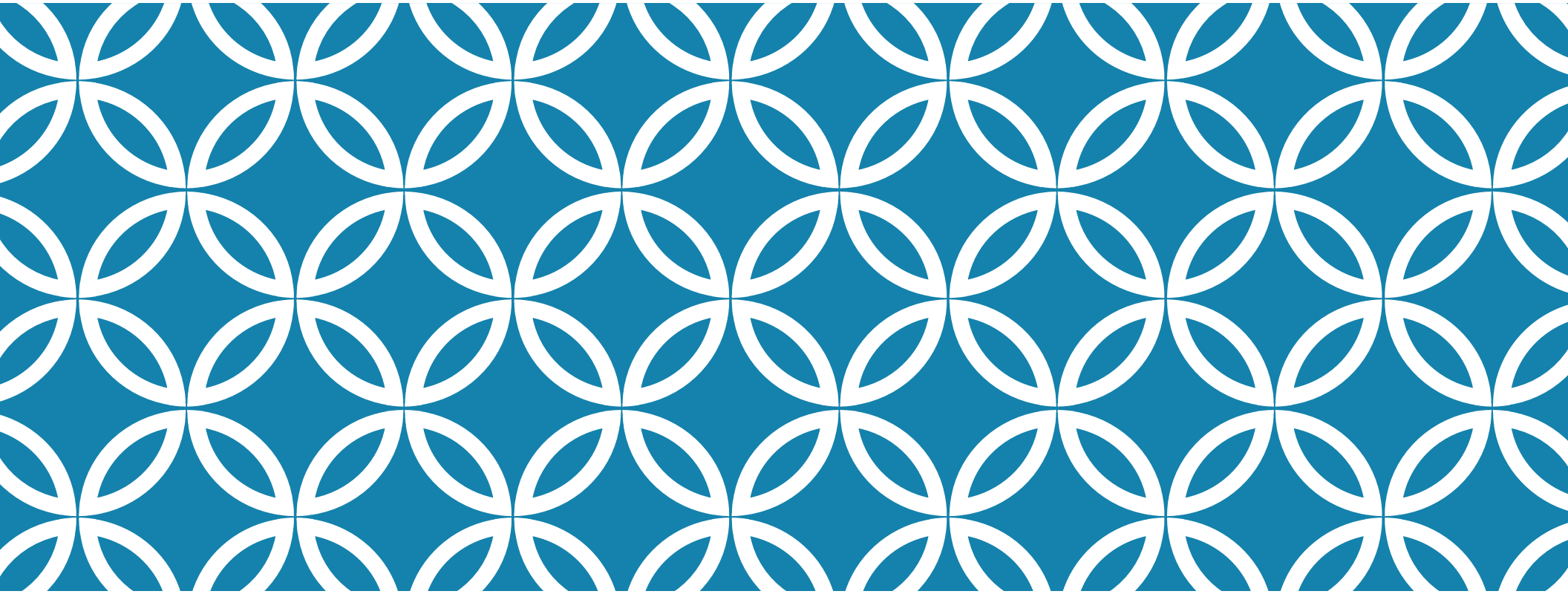

INTRODUCTION TO BIG DATA

Fábio Nogueira

BRIEF CURRICULUM

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Graduated in Electrical Engineering (UFCG)

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Areas:

- Distributed Systems
- Middleware
- Component and Service Orientation
- Autonomic Computing

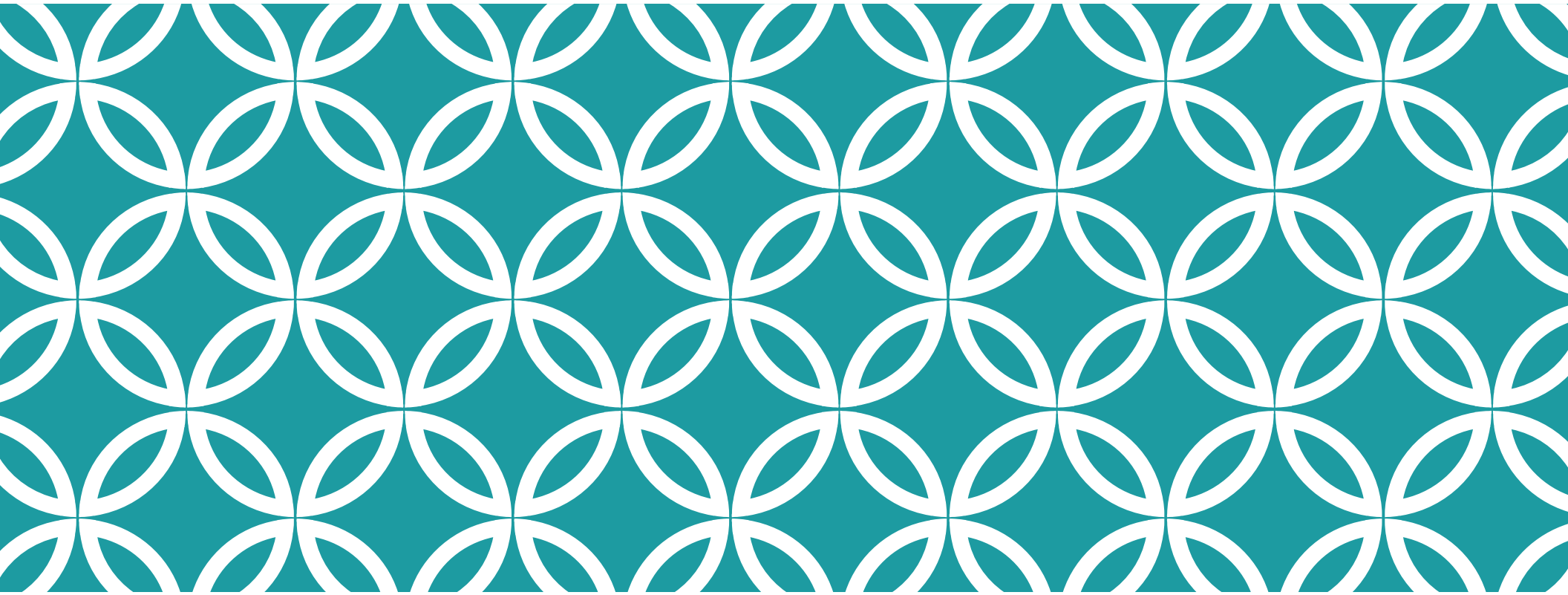
AGENDA

Big Data

Data Analytics in Big Data

Apache Hadoop

Apache Spark



BIG DATA

CONTEXT

"The data-driven world will be **always on, always tracking, always monitoring, always listening** and **always watching – because it will be always learning.**"

Data Age 2025: The Digitalization of the World

CONTEXT

NSA scandal: what data is being monitored and how does it work?

Everything you need to know about data gathering from internet companies by the US National Security Agency

● **NSA has direct access to Google, Facebook and Apple**

What is the scandal?

The US's National Security Agency (NSA), its wiretapping agency, has been monitoring communications between the US and foreign nationals over the internet for a number of years, under a project called Prism. Some of the biggest internet companies, from Apple to Google to Yahoo, are involved. The US government confirmed the existence of the scheme and its application on Thursday night.

What data is being monitored?

Potentially, everything. The PowerPoint slide about Prism says it can collect "email, chat (video, voice), videos, photos, stored data, VoIP [internet phone calls], file transfers, video conferencing, notifications of target activity - logins etc, online social networking details" and another category called "special requests".

https://bit.ly/2N8CwIM

https://bit.ly/2PFUFiX

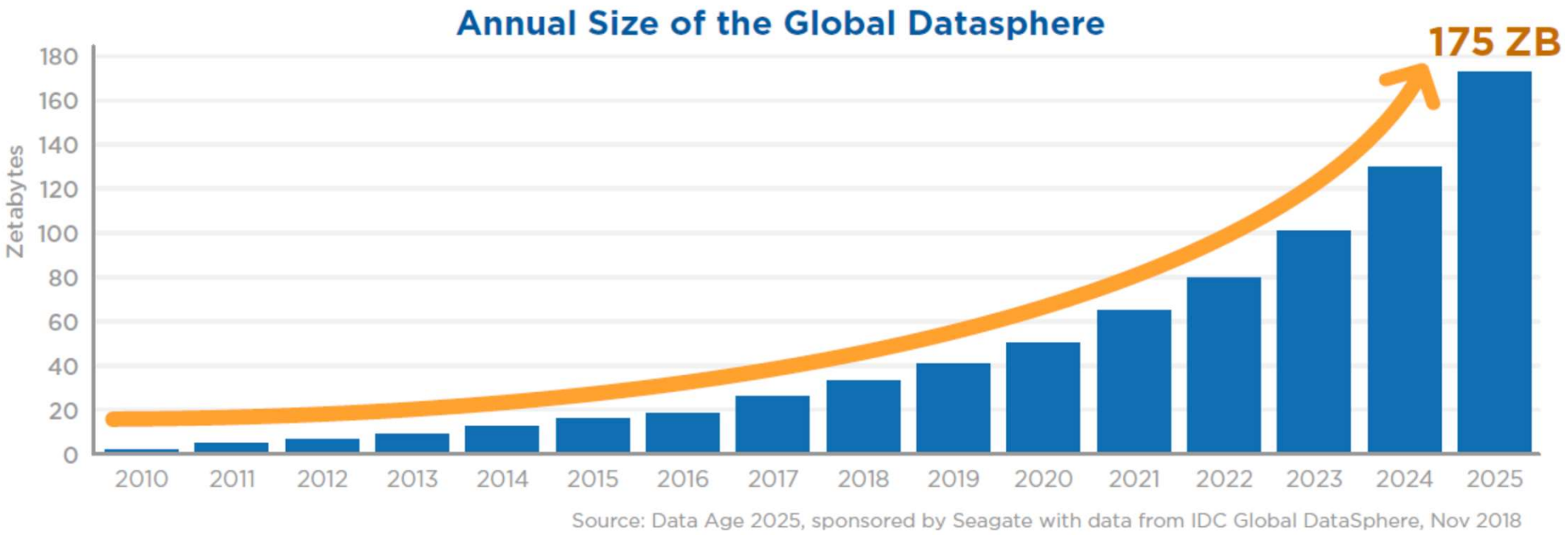
WHAT IS BIG DATA?

Laney's 3Vs model [1]

- Volume
- Velocity
- Variety

VOLUME

DIGITAL AGE 2025



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VOLUME

Measuring data

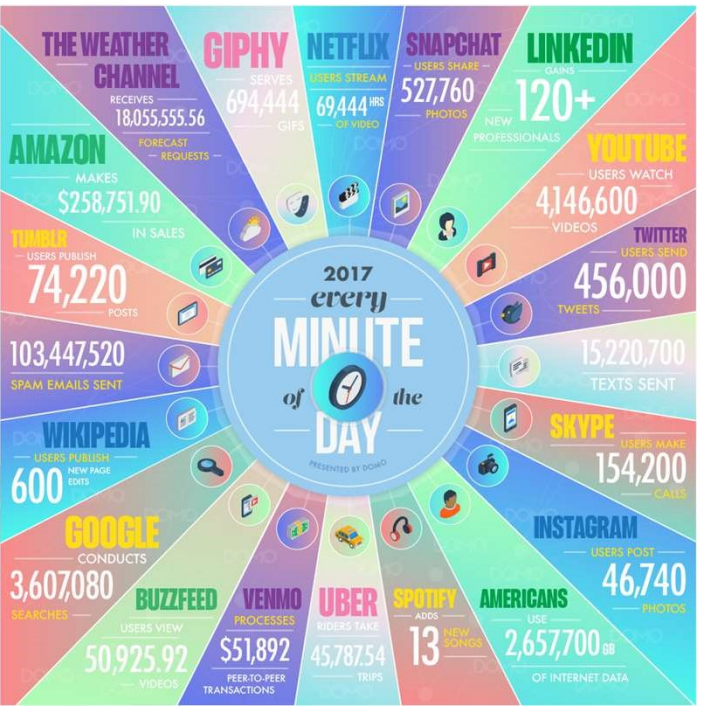
Abbreviation	Unit	Value	Size (in bytes)
b	bit	0 or 1	1/8 of a byte
B	bytes	8 bits	1 byte
KB	kilobytes	1,000 bytes	1,000 bytes
MB	megabyte	$1{,}000^2$ bytes	1,000,000 bytes
GB	gigabyte	$1{,}000^3$ bytes	1,000,000,000 bytes
TB	terabyte	$1{,}000^4$ bytes	1,000,000,000,000 bytes
PB	petabyte	$1{,}000^5$ bytes	1,000,000,000,000,000 bytes
EB	exabyte	$1{,}000^6$ bytes	1,000,000,000,000,000,000 bytes
ZB	zettabyte	$1{,}000^7$ bytes	1,000,000,000,000,000,000,000 bytes
YB	yottabyte	$1{,}000^8$ bytes	1,000,000,000,000,000,000,000,000 bytes

VELOCITY

DATA NEVER SLEEPS REPORT

2017

http://bit.ly/2lw0mD9



2018

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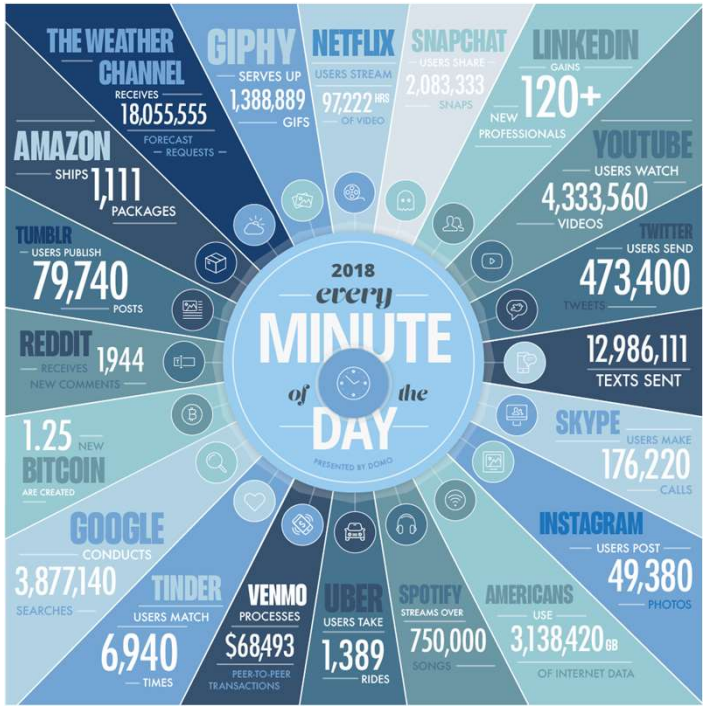

2019

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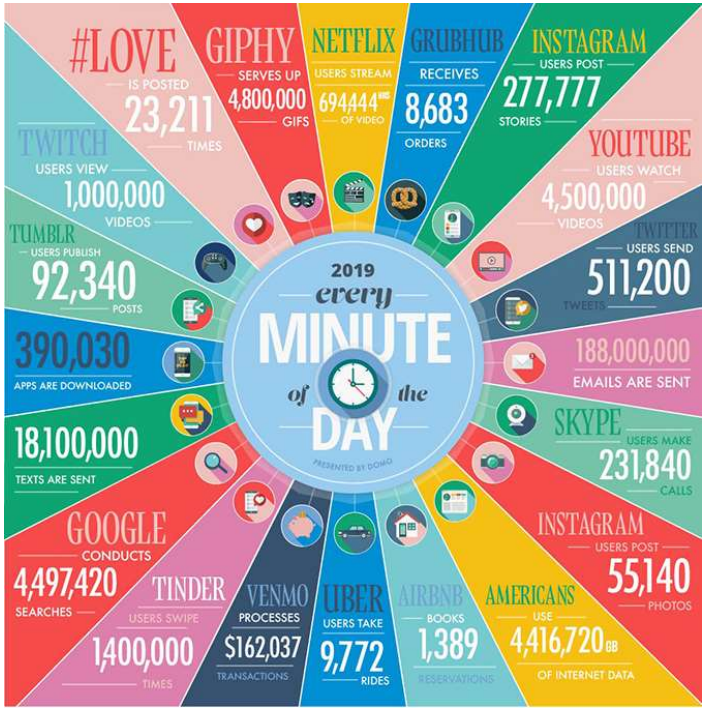


VARIETY

Data formats

Non-aligned data structures

Inconsistent data semantics

https://bit.ly/36lDvgi

4VS MODEL

"…big data technologies describe a new generation of technologies and architectures, designed to economically extract **value** from very large **volumes** of a wide **variety** of data, by enabling the high-**velocity** capture, discovery, and/or analysis"

- Extracting Value from Chaos (IDC)

5VS MODEL

"…dealing effectively with *Big Data* requires one to create ***value*** against the ***volume, variety*** and ***veracity*** of data while it is still in motion (***velocity***), not just after it is at rest"

- Understanding big data: Analytics for enterprise class hadoop and streaming data

"TO INFINITY AND BEYOND!"

Vision

Verification

Validation

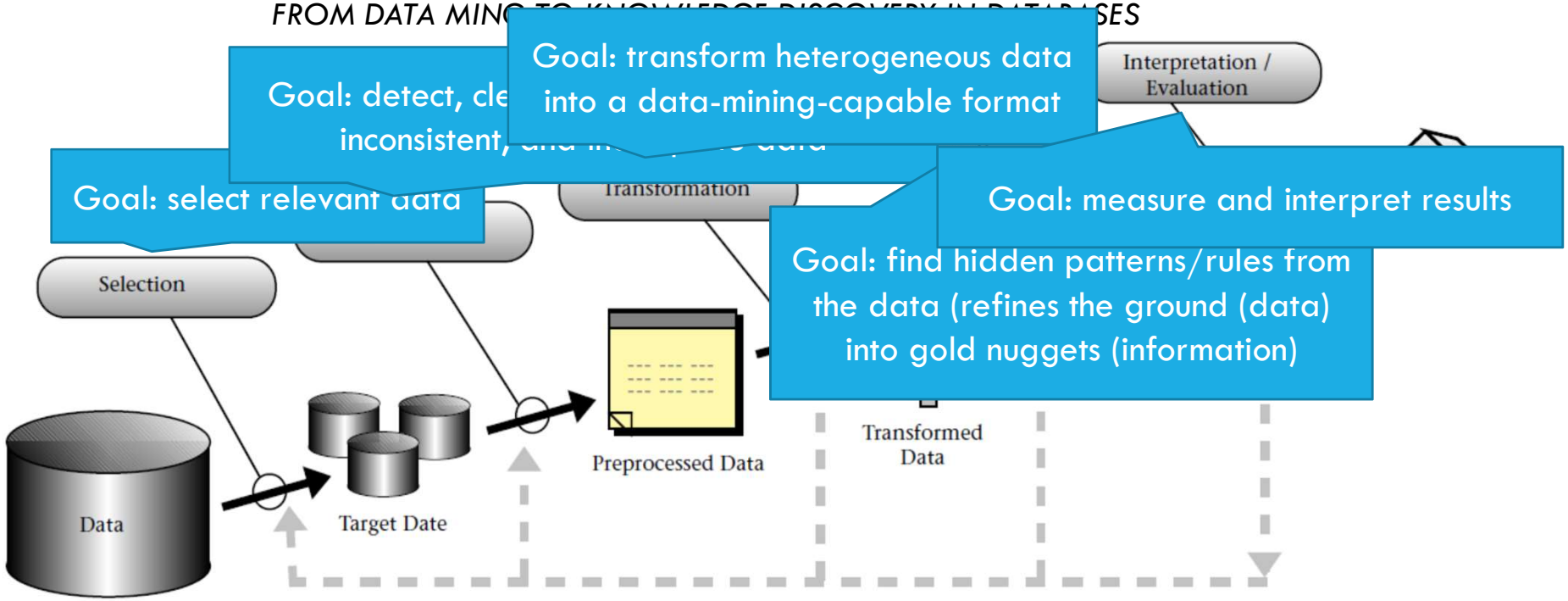
Vocabulary

Vagueness

…

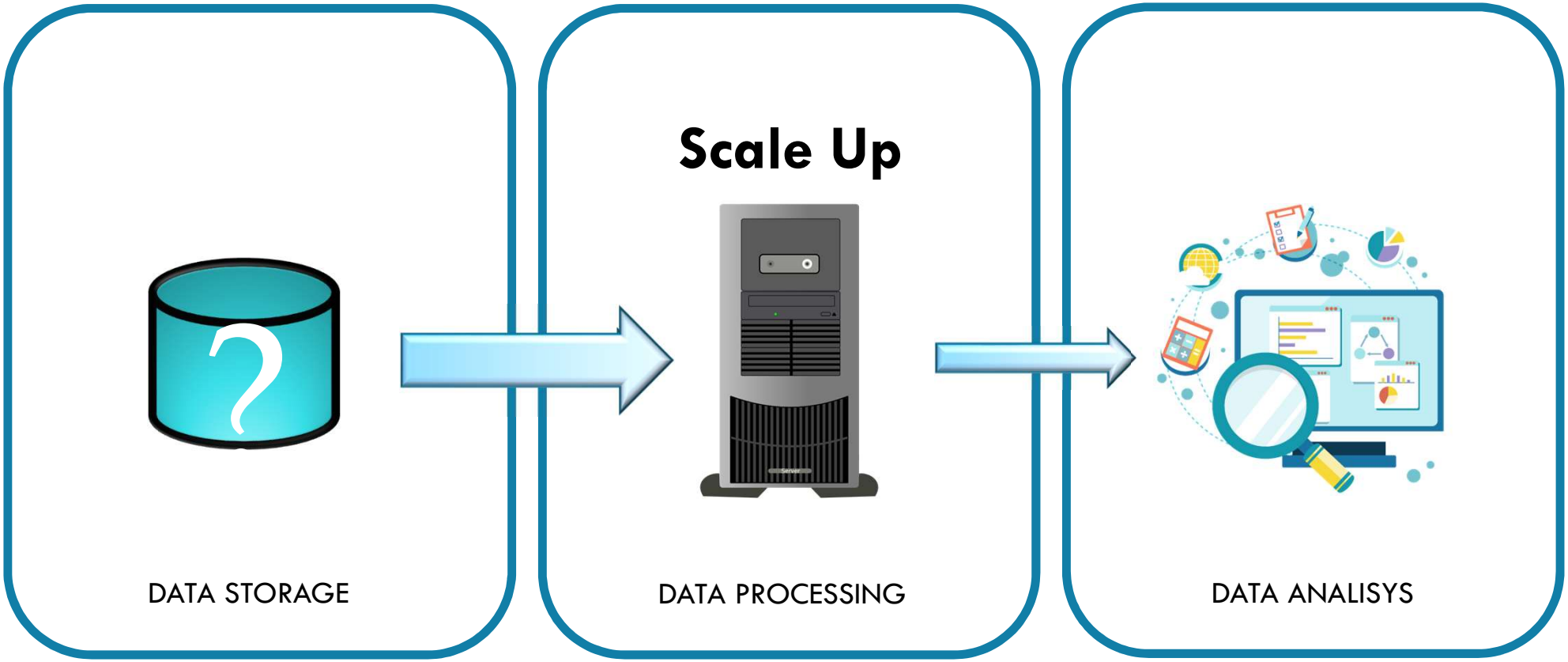
BIG DATA ⇒ BIG CHALLENGES

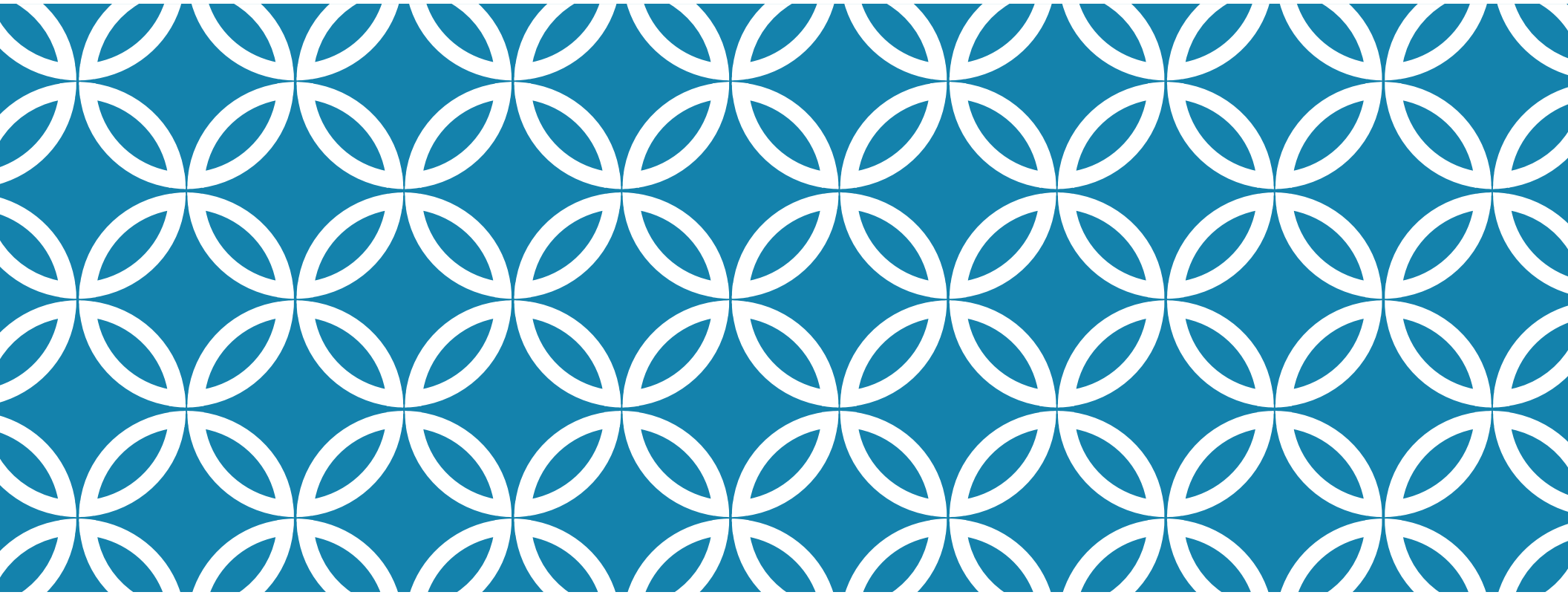
KNOWLEDGE DISCOVERY IN DATABASES (KDD)



Data collection and storage | Data Processing | Data Analysis | Evaluation

BUT, BIG DATA = BIG CHALLENGES





QUESTIONS???