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Challenges and Opportunities with Big Data

Agenda

- ✓ What is the **Big Data**?
- ✓ **Application** of the Big Data
- ✓ **3 Vs** of the Big Data
- ✓ The Big Data analysis **pipeline**
- ✓ **Challenges**

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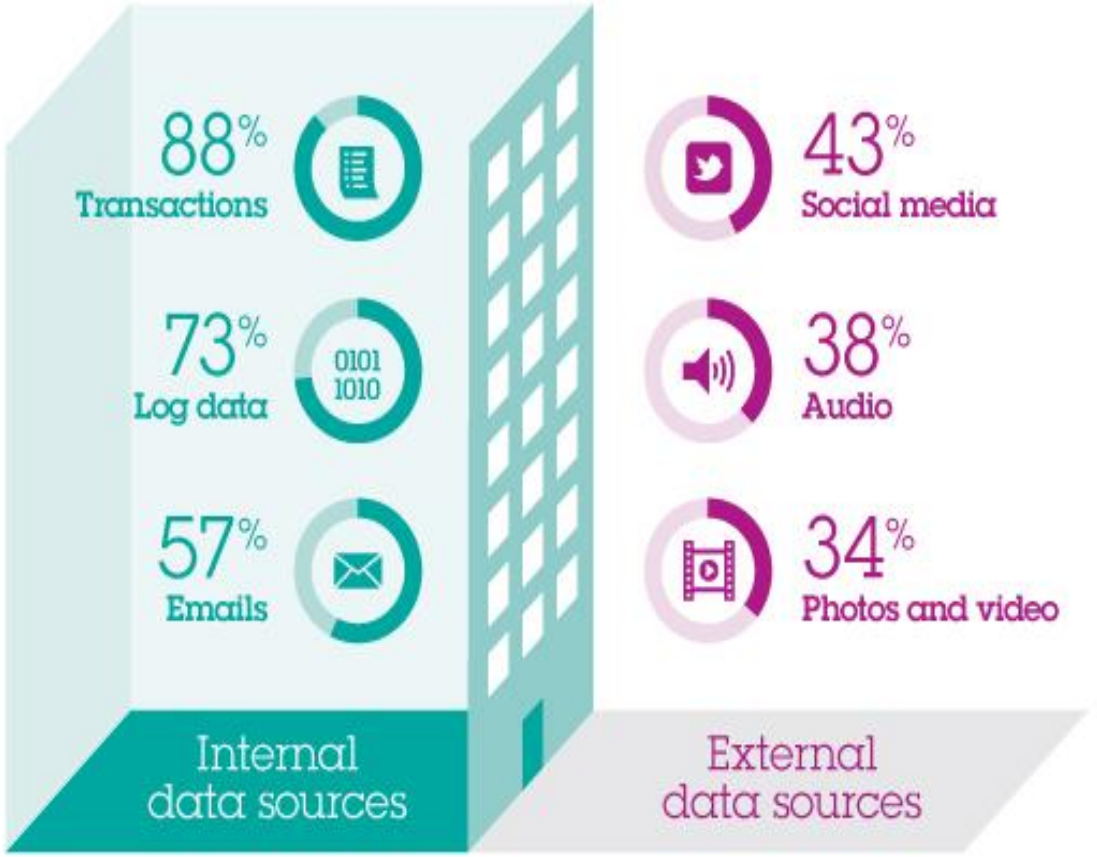
Big Data

Every day, we create **2.5 quintillion bytes of data** — so much that 90% of the data in the world today has been created in the **last two years alone.**



Source: IBM Big Data And Analytics Hub

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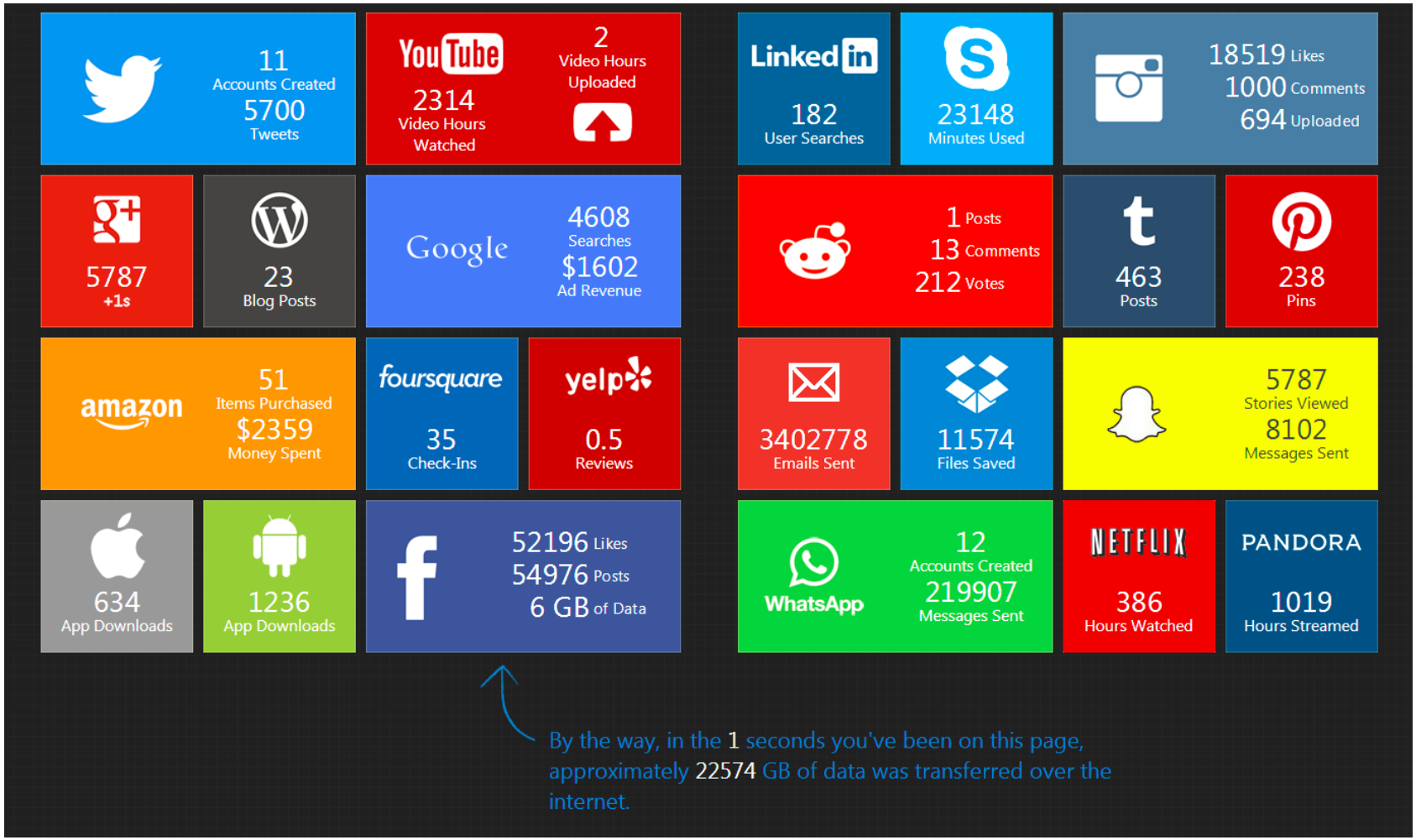
How much data is generated in social media in 1 second ?



Source: "digitalinformationworld.com – Social Media in Real-Time

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Application Of Big Data

Smarter Healthcare

Homeland Security

Traffic Control

Manufacturing

Multi-channel sales

Telecom

Trading Analytics

Search Quality

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Our future? ☺

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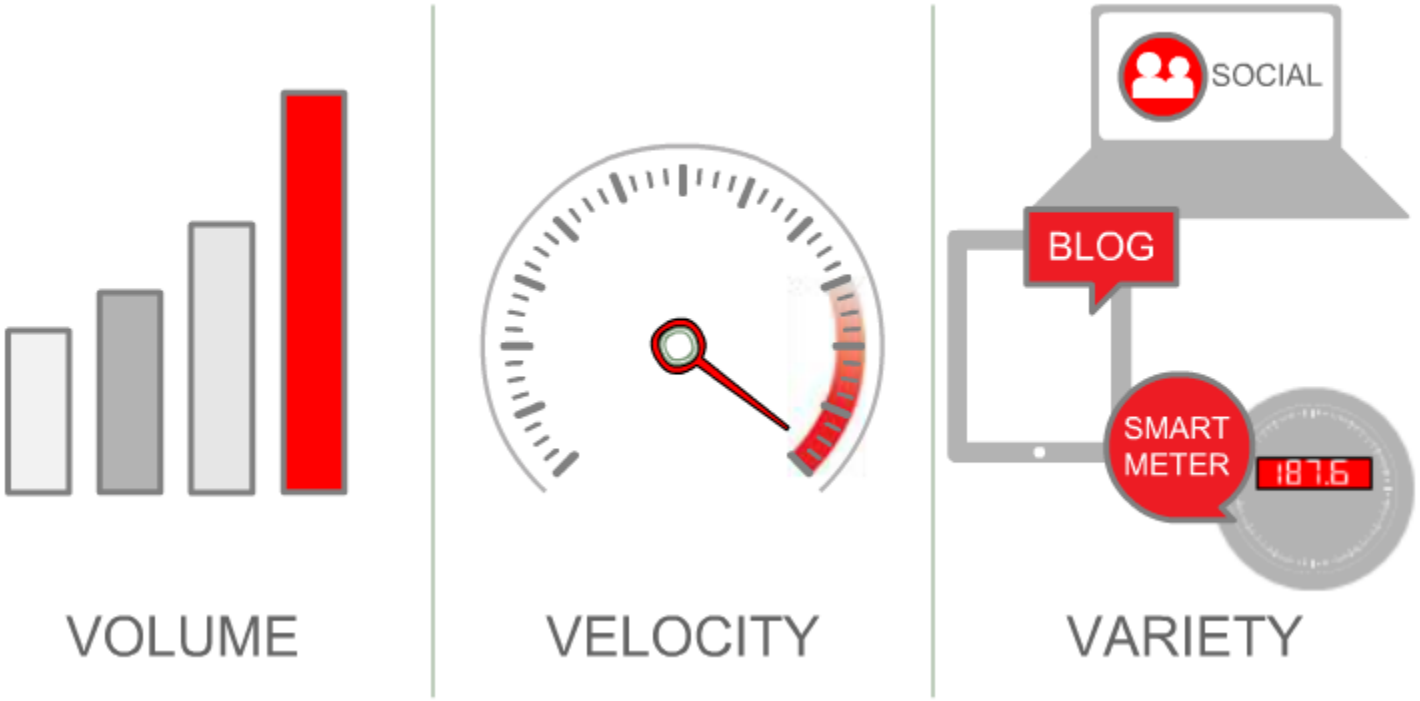
Big data spans three dimensions:



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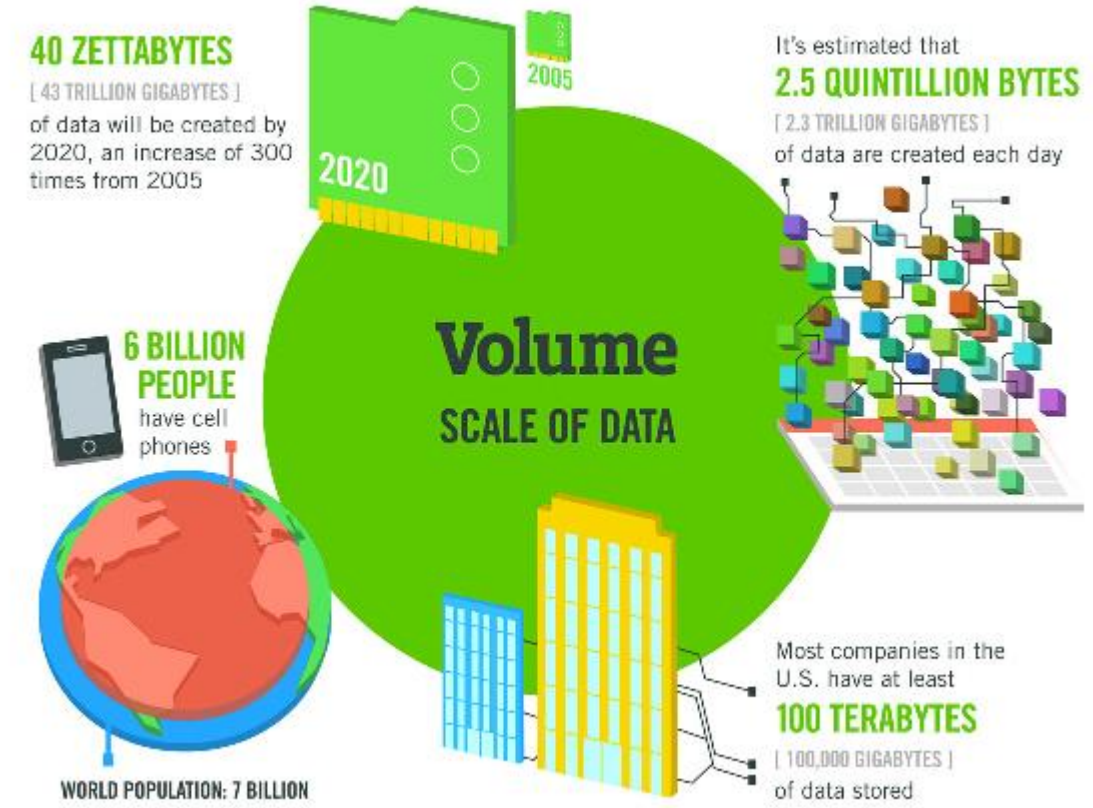
Volume



Source: McKinsey Global Institute, Twitter, CISCO, Gartner, EMC, SAS, IBM

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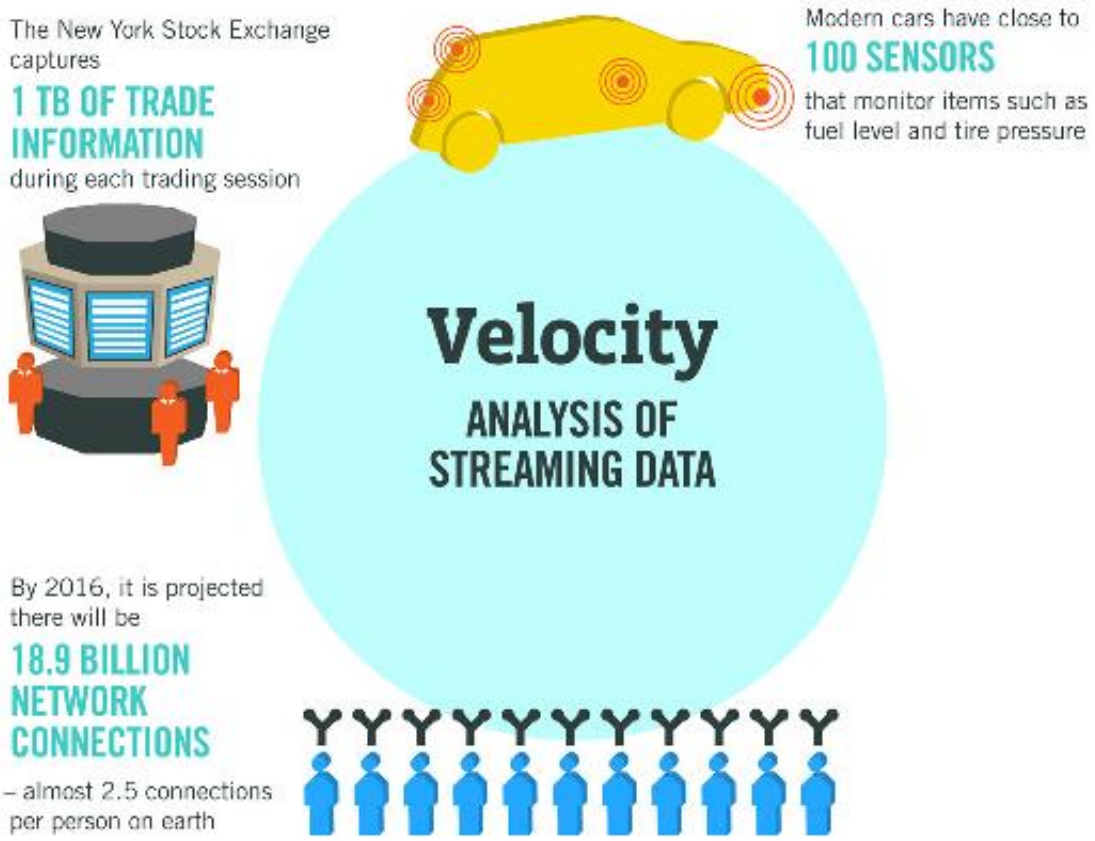
Velocity



Source: McKinsey Global Institute, Twitter, CISCO, Gartner, EMC, SAS, IBM

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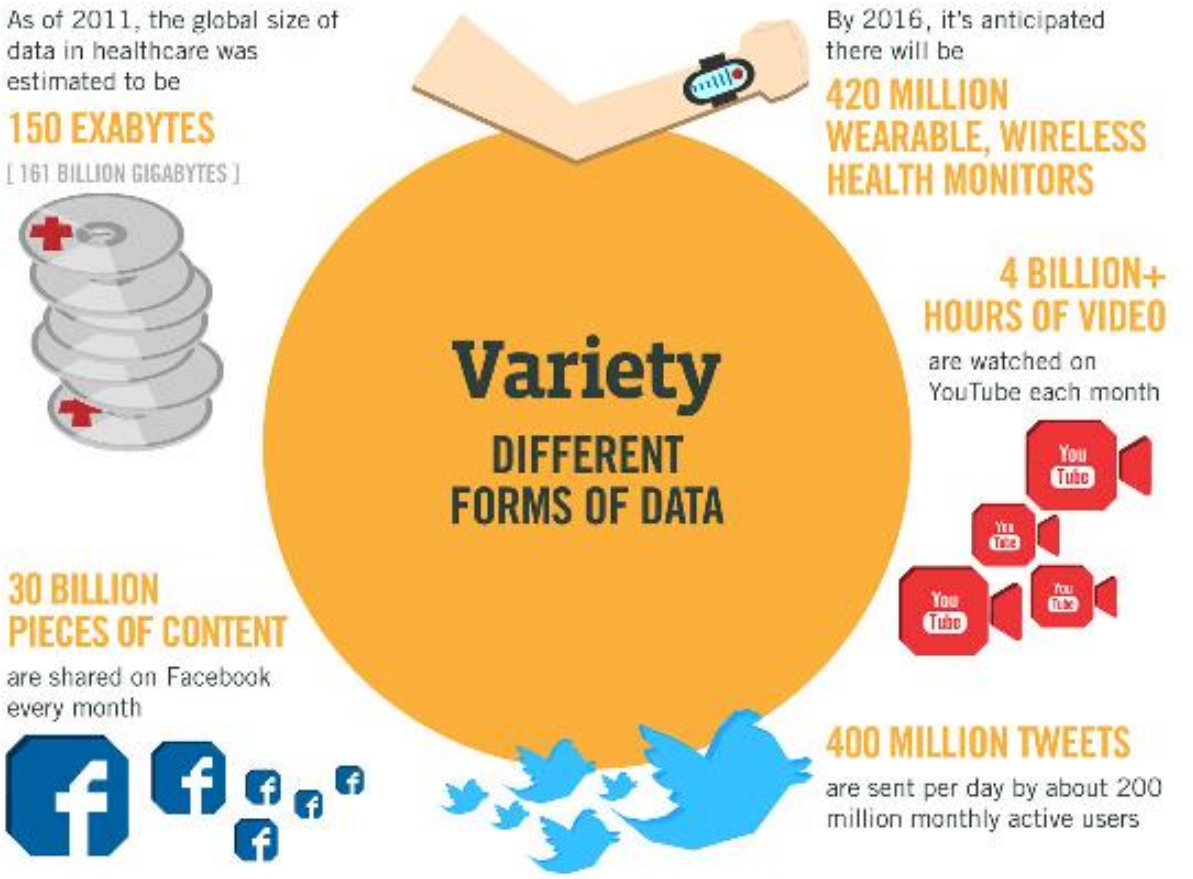
Variety



Source: McKinsey Global Institute, Twitter, CISCO, Gartner, EMC, SAS, IBM

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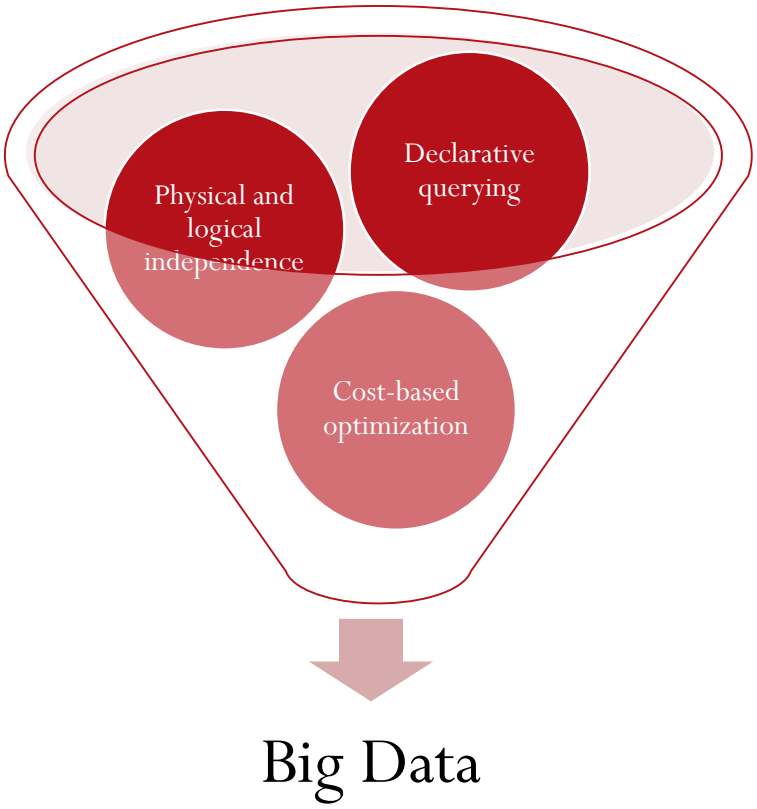
What has been Achieved…



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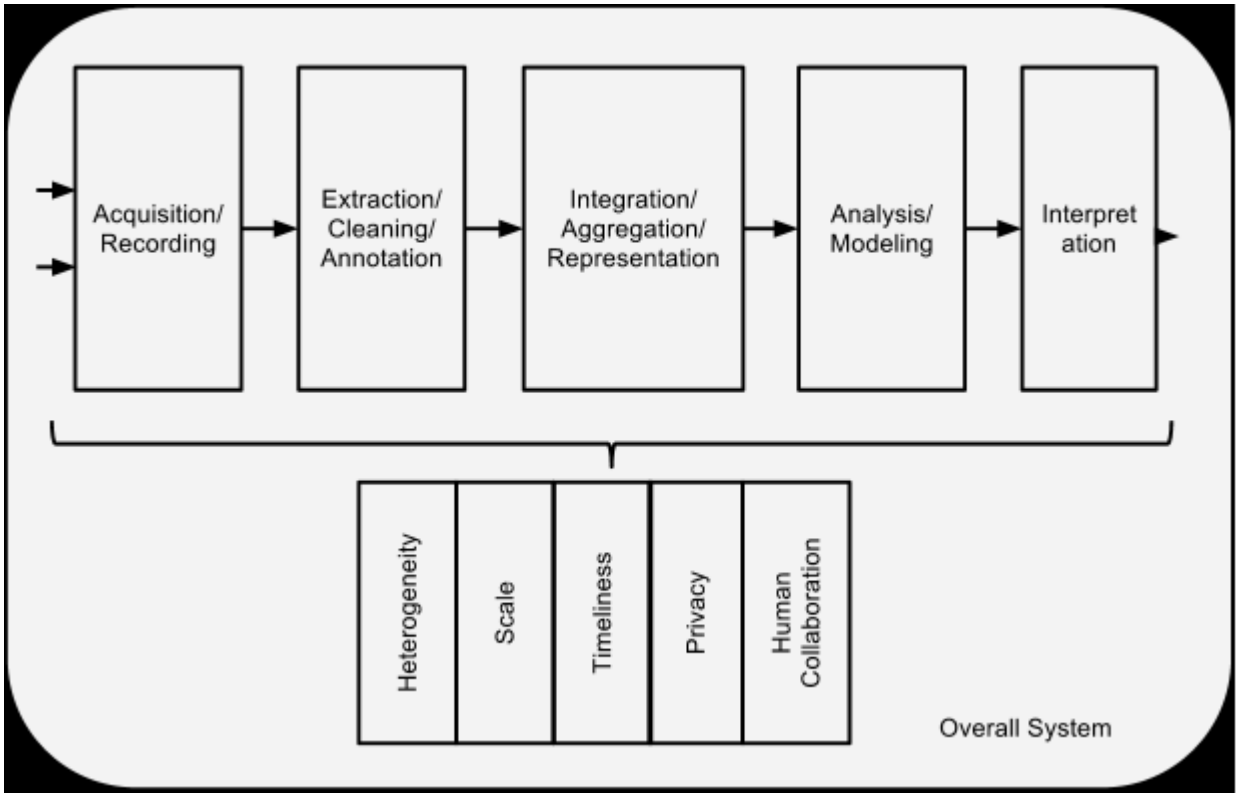
Phases and challenges in the Big Data Analysis Pipeline



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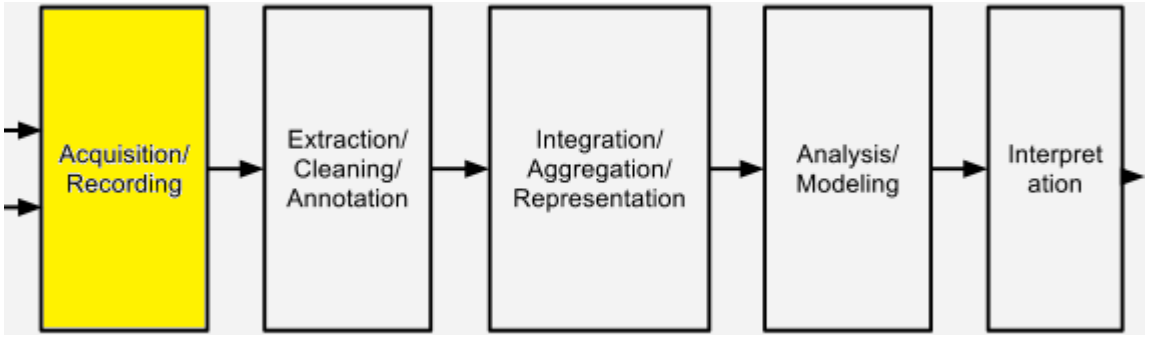
The Big Data Analysis Pipeline



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Data Acquisition and Recording

- What data to **keep**?
- What to **discard**?
- How to filter out the data **on the fly**?
- What is right **metadata**?

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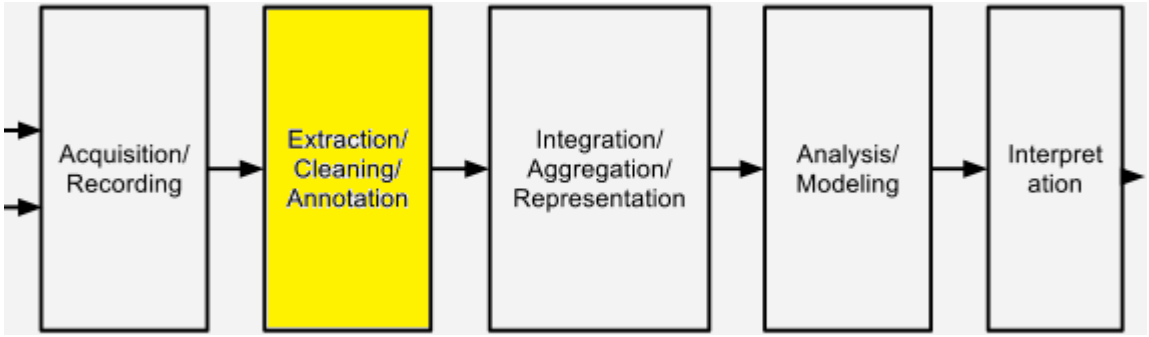
The Big Data Analysis Pipeline



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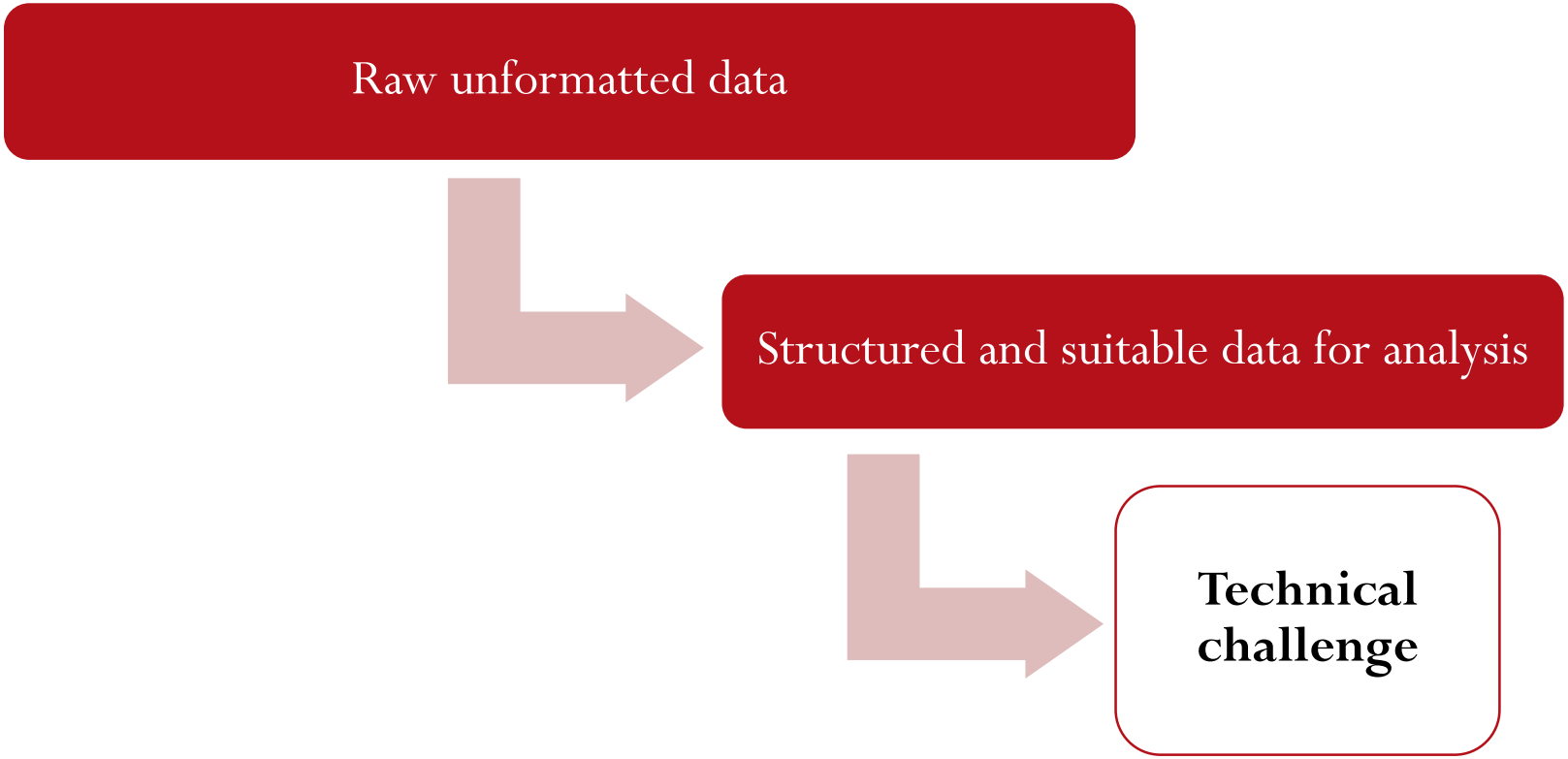
Information Extraction and Cleaning



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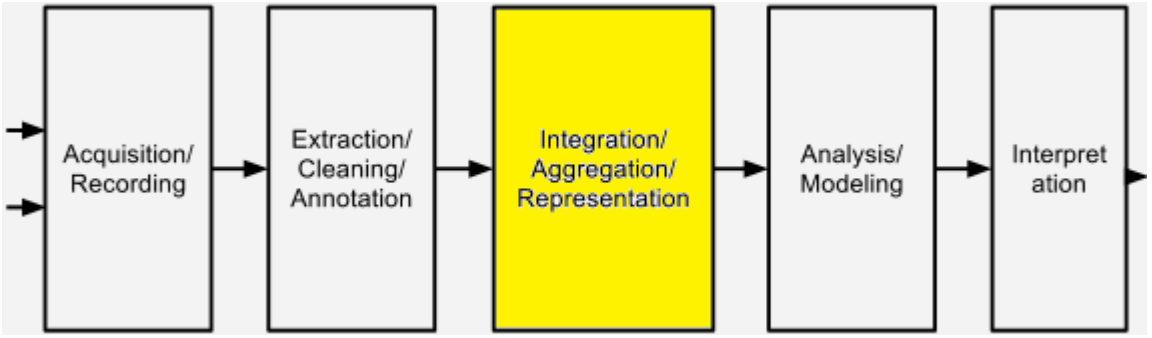

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Data Integration, Aggregation, and Representation

- How to combine **heterogeneous** data?
- How to select a **suitable database** design?

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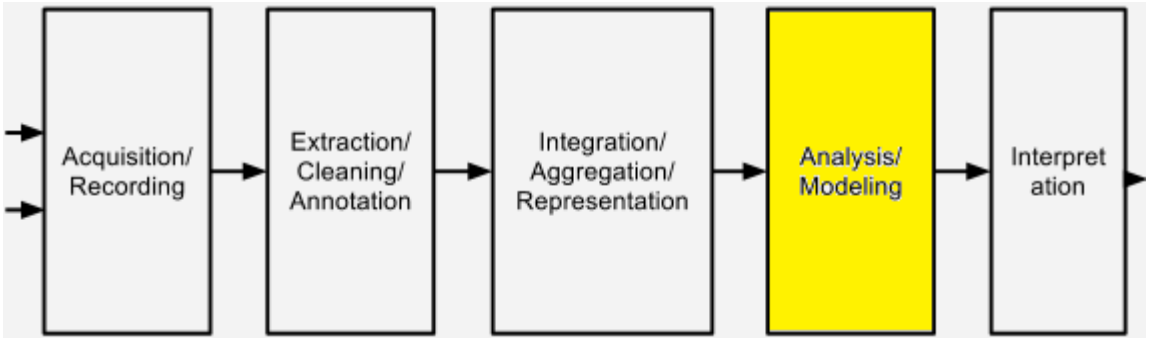
The Big Data Analysis Pipeline



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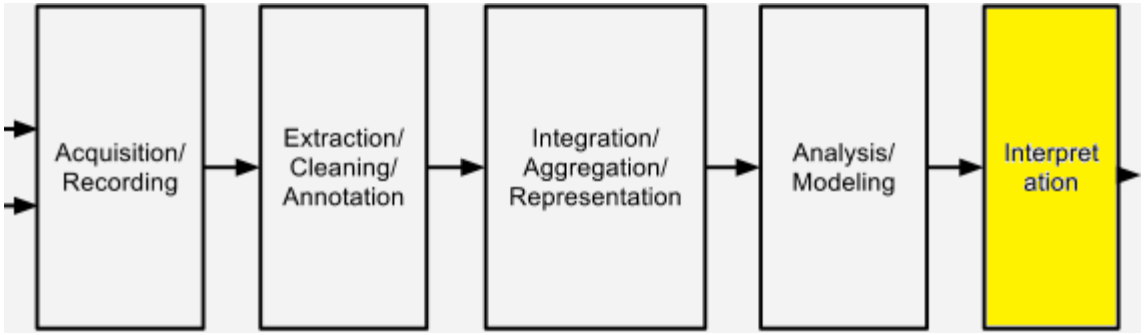
Query Processing, Data Modeling, and Analysis

- Querying and mining Big Data are fundamentally **different** from traditional statistical analysis.

- **Information redundancy** can be explored for:
  - missing data,
  - to crosscheck conflicting cases,
  - to validate trustworthy relationships,
  - to uncover hidden relationships and models.

- Lack of coordination between database systems with analytics packages (e.g. statistical analyses).

The Big Data Analysis Pipeline



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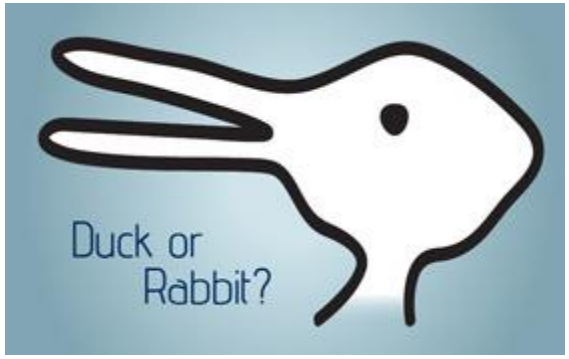
Interpretation

- **Simplify** life of analyst.
- Necessity of **provenance** data to repeat the analysis with different assumptions, parameters, or data sets.



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Challenges in the Big Data Analysis Pipeline

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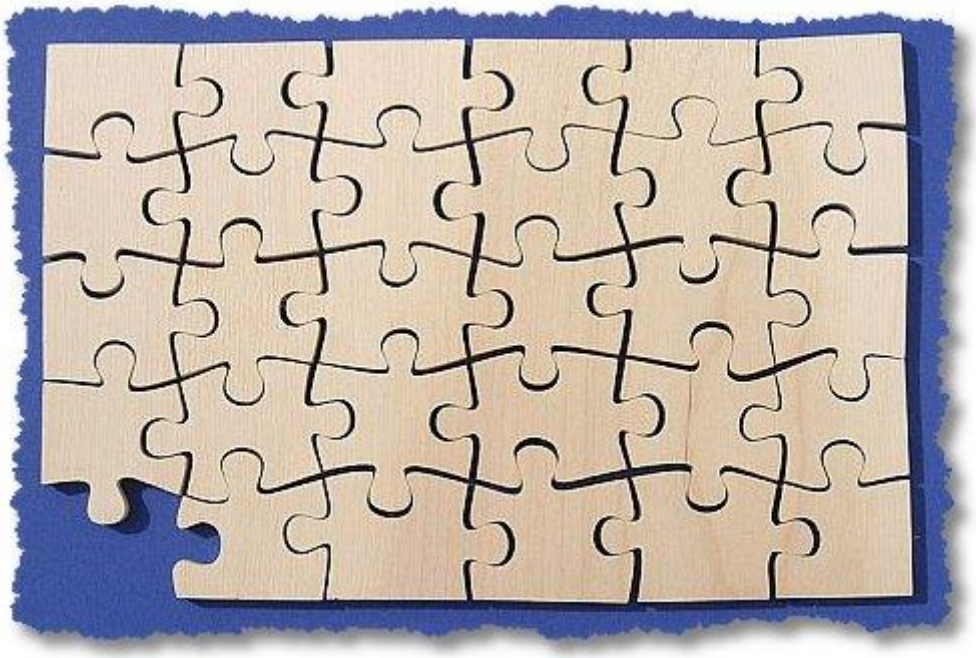
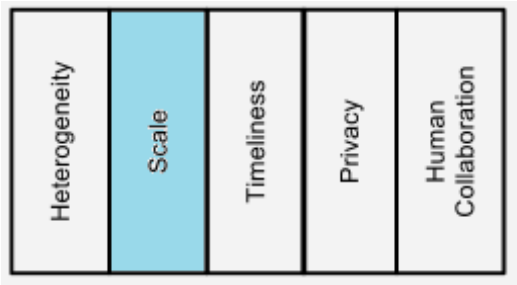
Heterogeneity and Incompleteness

- Data from **different sources**/platforms.
- Data **formats** are **different.**
- Data **missing** due to security, privacy, or other reasons.



Challenges in the Big Data Analysis Pipeline



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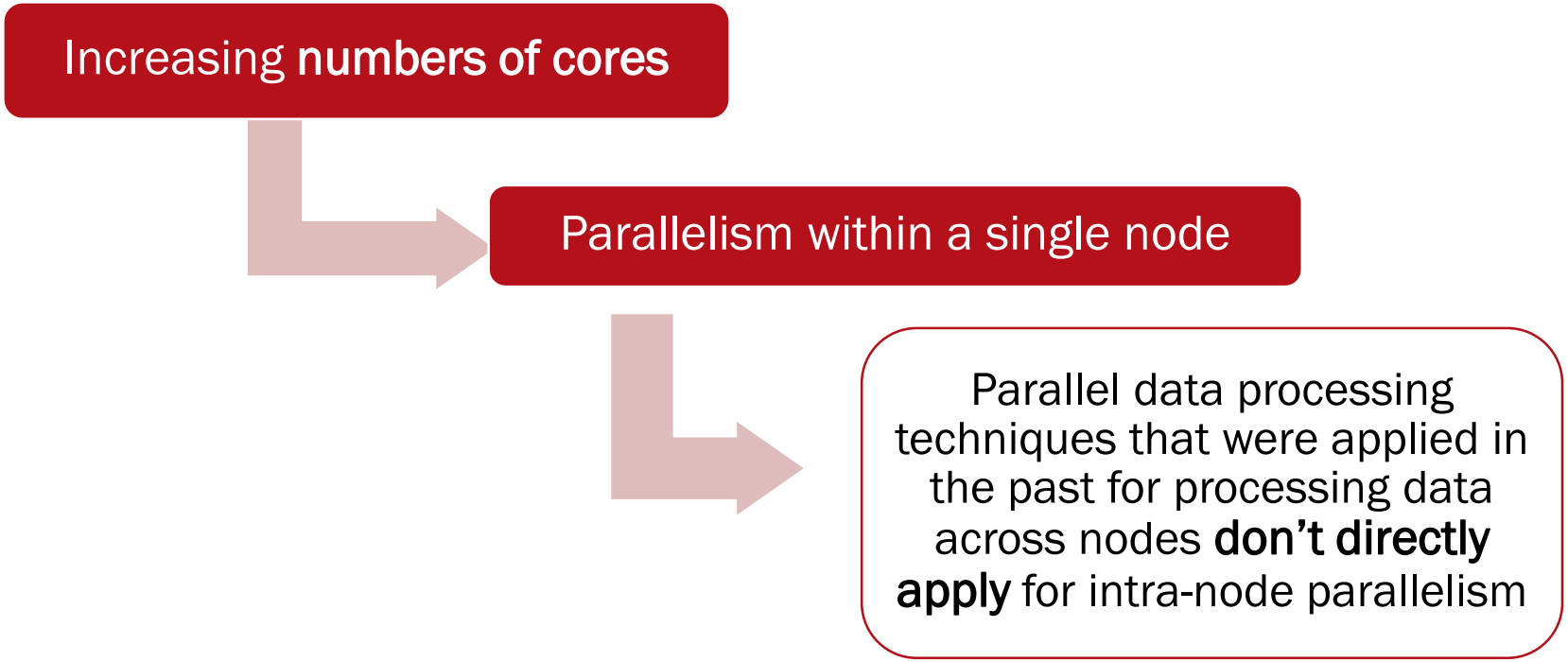
Scale

Data *volume* is **scaling faster** than *compute resources*.

Dramatic shift:



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Challenges in the Big Data Analysis Pipeline

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Timeliness

A **full analysis** of data is **not feasible** in real-time.

Source: http://monicaec.com/red-flags-warning-signs-of-potential-credit-card-fraud/

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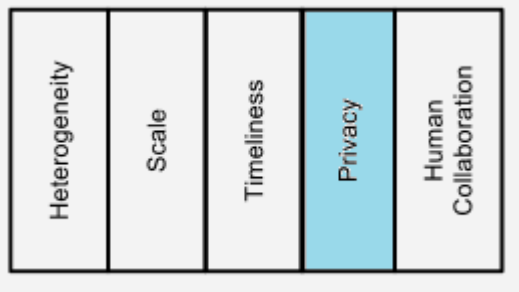
Challenges in the Big Data Analysis Pipeline



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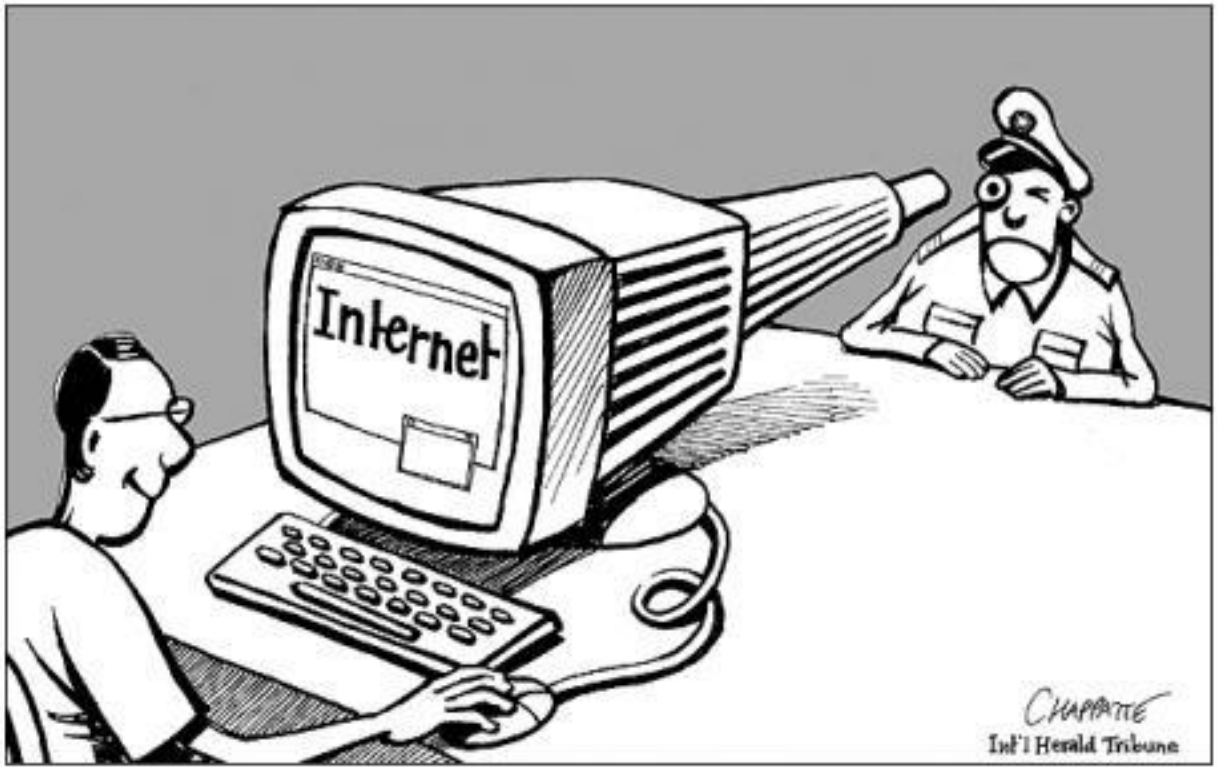
Privacy



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Challenges in the Big Data Analysis Pipeline

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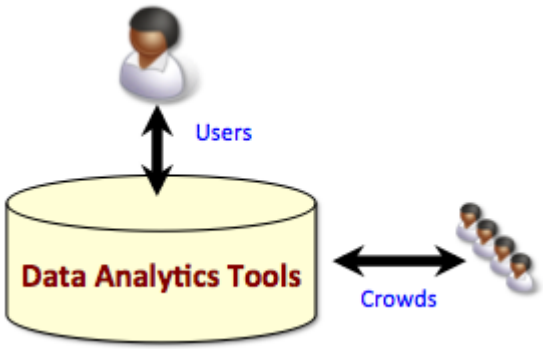
Human collaboration

WIKIPEDIA
The Free Encyclopedia



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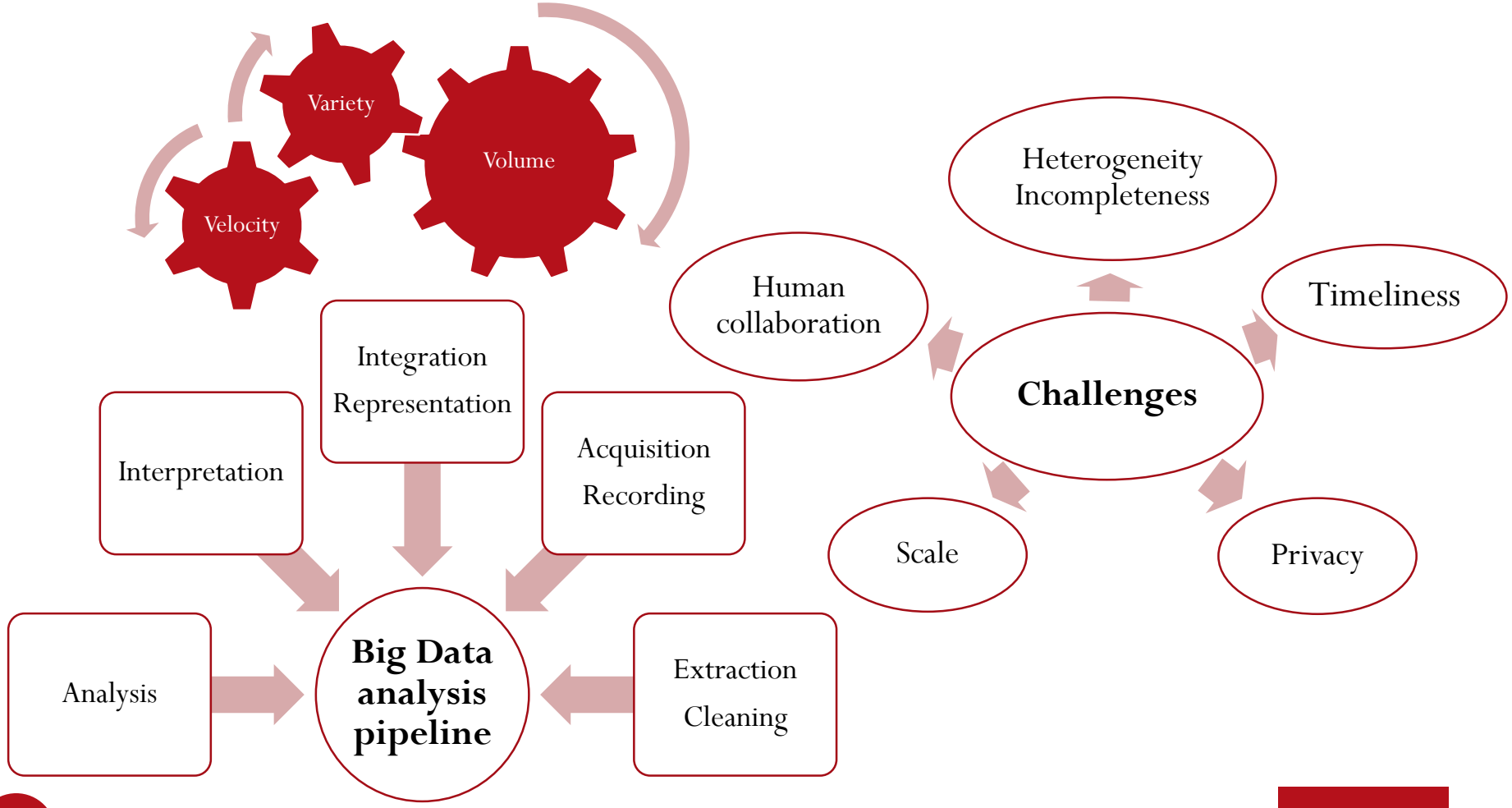
Conclusion

Objective: many technical and ethnical **challenges** must be **addressed before** this potential can be realized fully.



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THANK YOU FOR YOUR ATTENTION ANY QUESTIONS