



Introduction to Data Exploration

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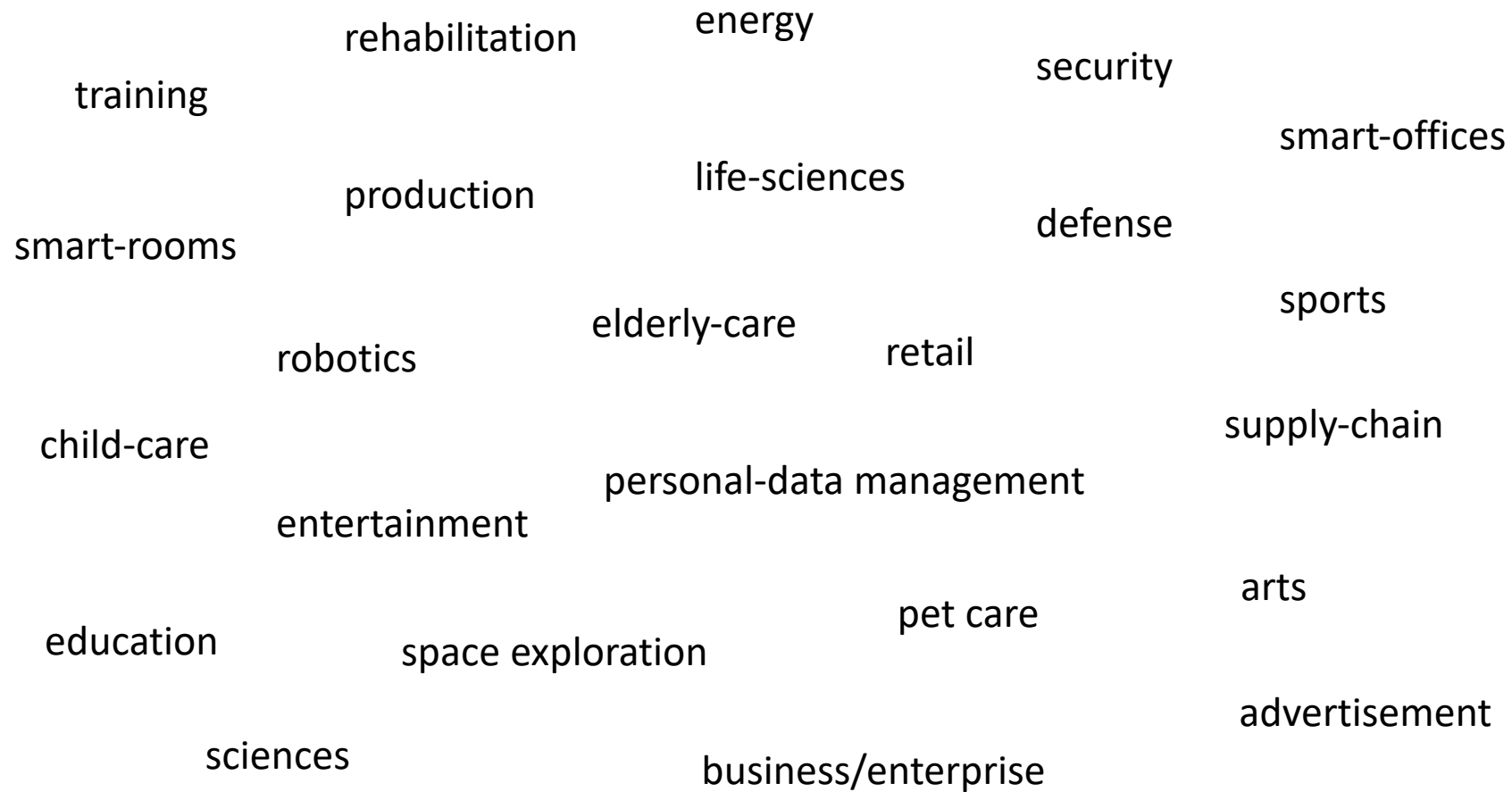
Objectives



Objective

Explain what are the
data challenges

We are living in a data-rich world...



A word cloud of various sectors and applications, including:

- rehabilitation
- energy
- security
- smart-offices
- life-sciences
- defense
- sports
- supply-chain
- arts
- advertisement
- business/enterprise
- space exploration
- sciences
- education
- entertainment
- child-care
- robotics
- elderly-care
- retail
- personal-data management
- pet care
- smart-rooms
- production
- training

How can we make **SENSE** from the **REAL WORLD** data

Data Challenges

INS

(I)mprecision
(N)oise
(S)parsity

3Vs

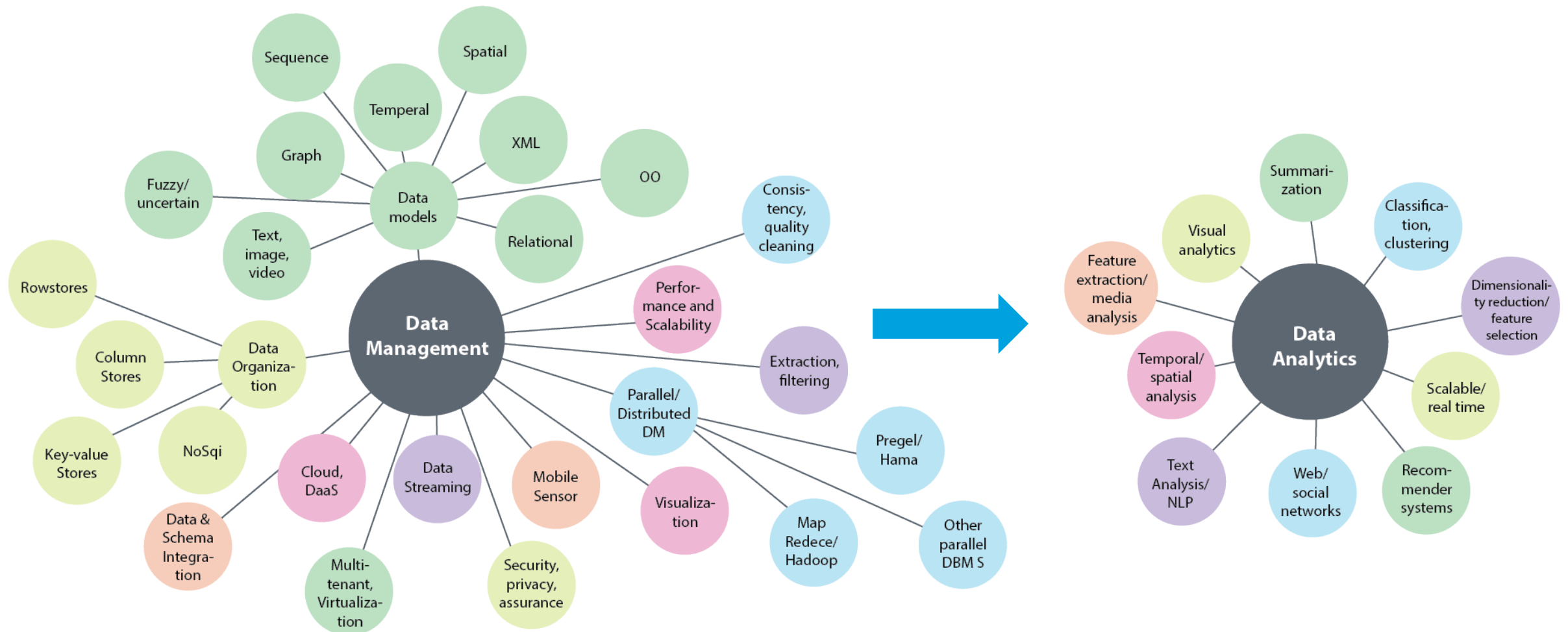
(V)olume
(V)elocity
(V)ariety

HMLE

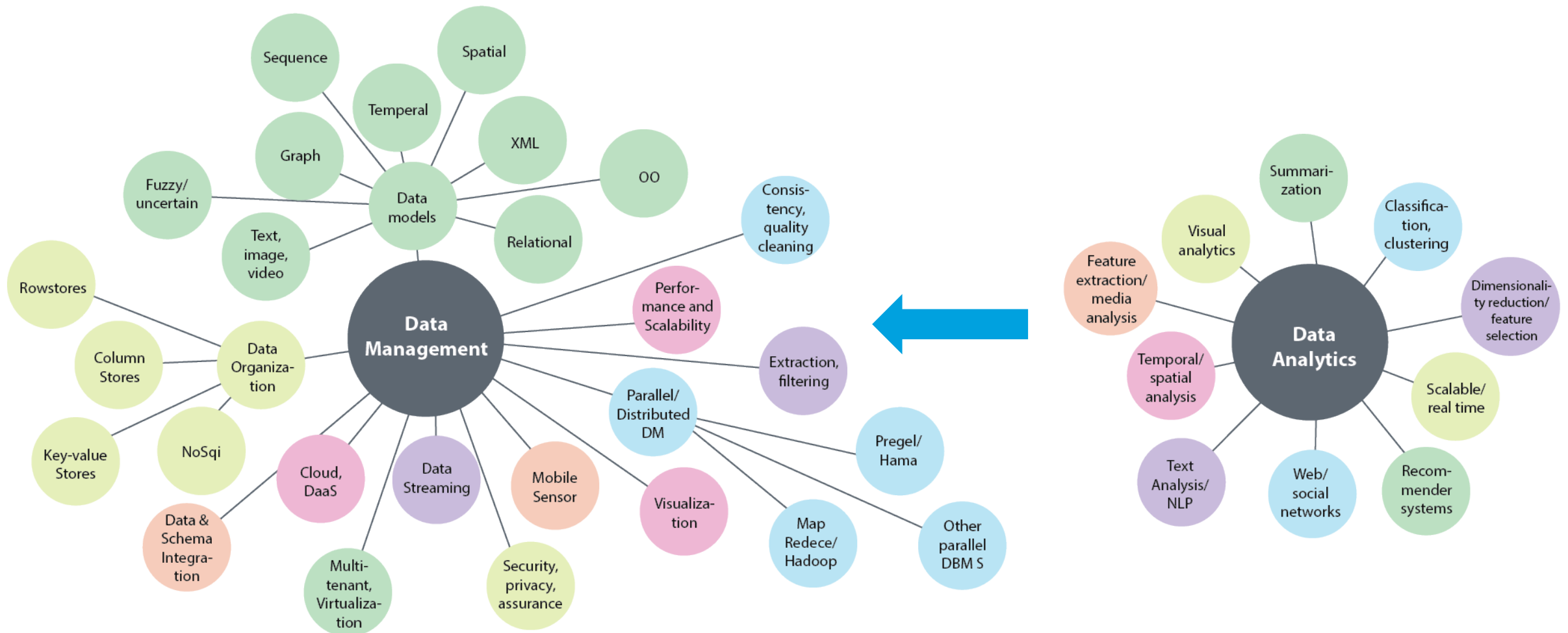
(H)igh-dimensional
(M)ulti-modal
Inter-(L)inked
(E)volving

Human Challenges: for many applications
the final consumer is **HUMAN**

Data management/mining techniques for supporting scalable, real-time, analysis and exploration



Most data in the real world are imprecise, multi-modal, and subjective



Therefore, data exploration systems need to support both...

...effective data manipulation

- **Filtering**: Projection, selection
- **Integration**: Join, nearest neighbor joins
- **Set operations**: Union and Intersection

...effective data analysis/retrieval

- **Feature extraction**
- **Similarity search**
(top-k, range, skyline, nearest-neighbor)
- **Clustering**, partitioning
- **Aggregation**, summarization
- **Classification**, latent analysis
- **Preference-driven** retrieval

