CODE

Commercially Empowered
Linked Open Data
Ecosystems in Research

Unleashing Semantics of Research Data

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PROGRAMME

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The dark side of research data

- Terrabytes of research data available, but
  - ... with varying quality
  - ... with contradicting facts
  - ... with missing data
  - ... labour intensive to compare

> *There is increasing concern that most current published research findings are false...* Ioannidis, 2005

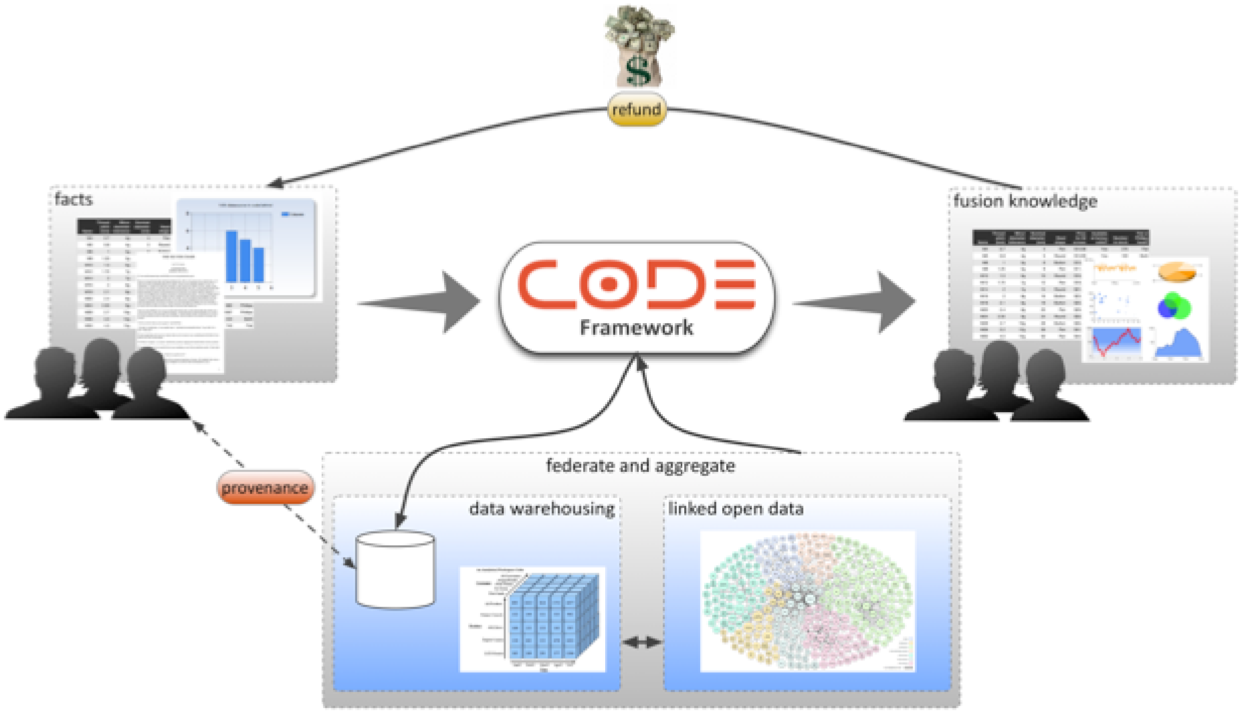
> *Dozens of individual published experiments report effectiveness improvements, and often claim statistical significance...* Armstrong et al., 2009

Global vision of CODE: „The Linked (Open) Science Cloud“

- Research data available in various formats:
  - Research paper (e.g., catalogues such as Mendeley)
  - Primary research data (e.g., evaluation campaigns)
  - Retrievable data (e.g., “ACM bubble” in Linked Data cloud)
  - Embedded data (e.g., exposed by microdata / -format)

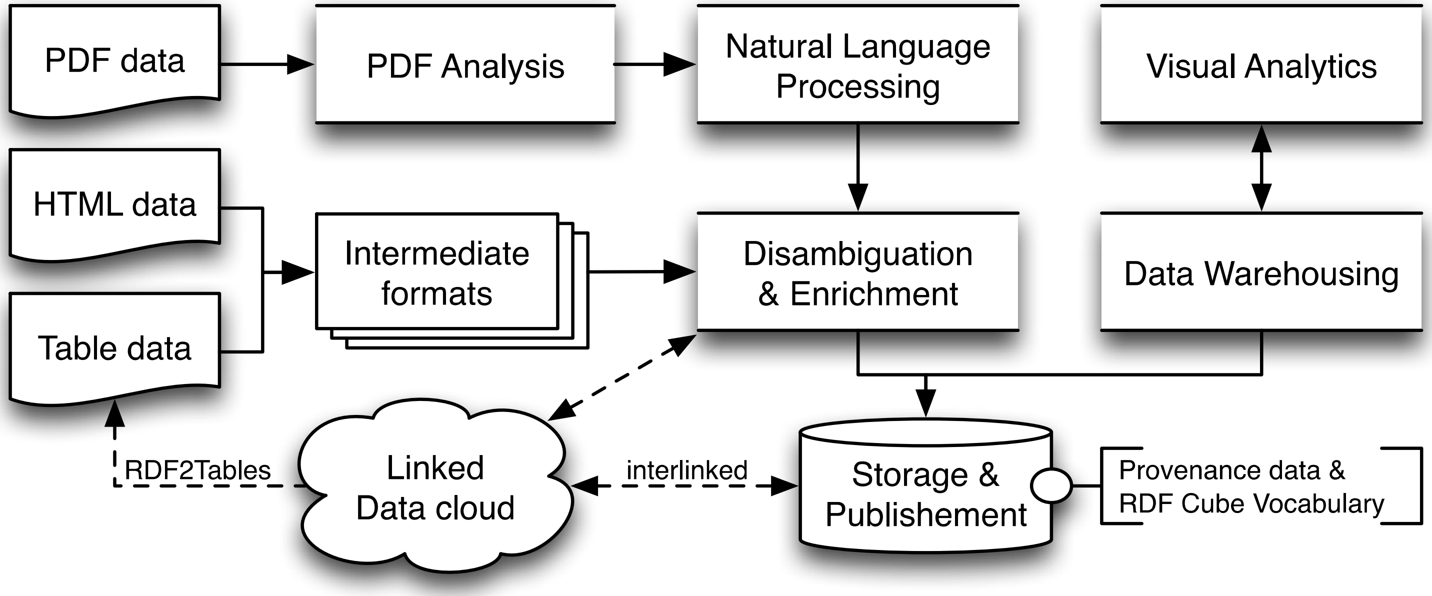
- Key-features of the ecosystem:
  - Knowledge extraction via atomic processing parts
  - Marketplace concepts lead to crowdsourcing
  - Integration of provenance fosters value-creation chains
  - Concepts of Linked Data enable a sophisticated data warehouse like retrieval

The long way to knowledge: The CODE view



13 TB of research data encapsulated in PDF, 3 M. users for crowdsourcing

Lifting of primary research data



...following stages of the „Big Data pipeline“ as well as observations of Labrinidis and Jagadish.

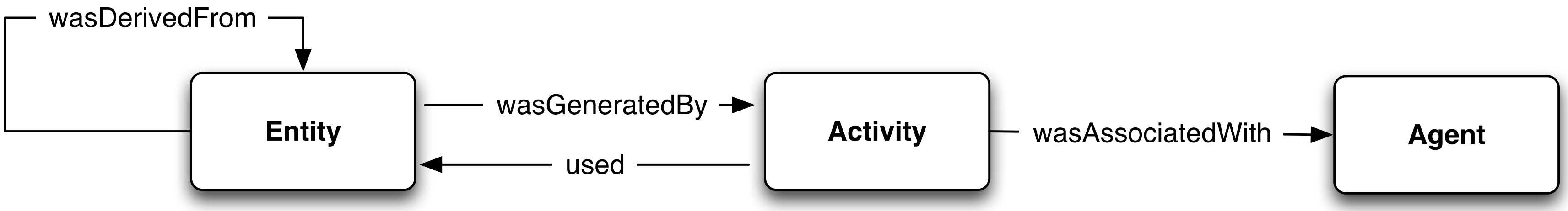
Really Big Data?
The classical "Vs" approach

- **Volume**
  - Explicit facts from research papers exposed as data warehouse
  - Interaction of peers with data (e.g., citing)
- **Velocity**
  - Real-time production (e.g., sensor data)
  - Batch-like production (e.g., conferences)
  - Single publication (e.g., white paper)
- **Variety**
  - Unstructured data (e.,g., PDF documents)
  - Semi-structured data (e.g., Excel spreadsheets)
  - Structured data (e.g., exposed in a Blog via Dublin Core)

Why provenance matters? The „semantic“ V(alue)

Mitchell and Wilson, 2012

- Every portions of data exposes indirect provenance
- Provenance chains enable mature interaction:
  - Tracing abilities
  - Quality estimation of the underlying data
  - “What interaction made the data worthy?”



Issues that we face...

- Exposing data portions via recent international W3C standards
  - Data warehousing: RDF Cube Vocabulary
  - Provenance: PROV-O Ontology

- Efficient internal storage:
  - (Big Data) Benchmarking must take place to ensure scalability
  - Interconnection between both data models requires efficient structures

How CODE could support Big Data Benchmarking

- CODE framework (already) offers services…
  - … to lift and interlink primary research / evaluation data
  - … to perform visual analysis on this data
  - … to manage time-dependent data

- Marketplace concepts for community engagement

> “In theory, there is no difference between theory and practice; in practice there is.
>
> - Chuck Reid, Yogi Berra

Thank you for your attention!

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