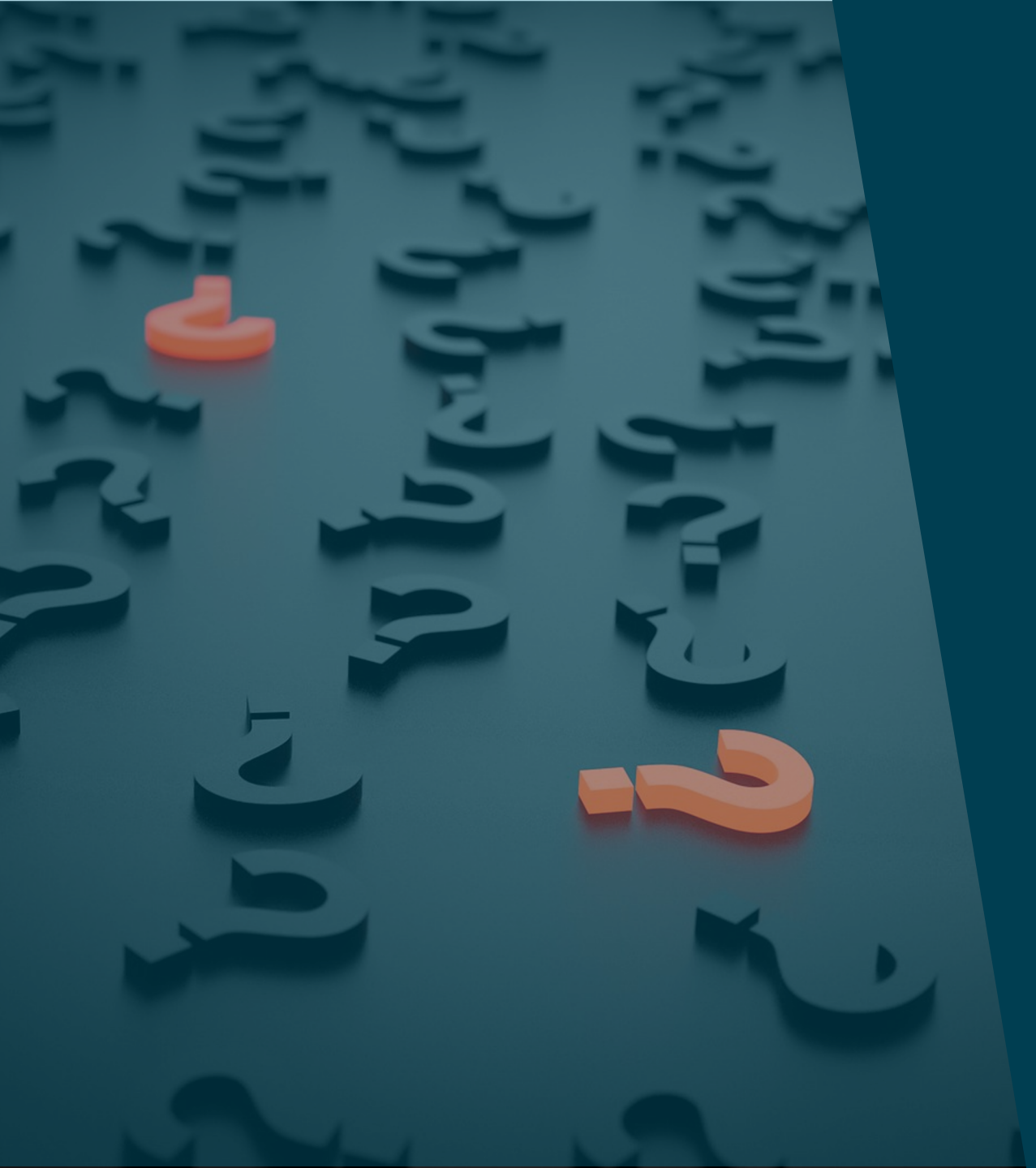

Insufficient Facts Always Invite Danger:

Combat them with a Logical Model

Michael Grove · Founder, VP Engineering· @mikegrovesoft

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Introductions

Mike Grove
Founder and VP of Engineering, Stardog

Areas of focus: AI, Semantic technology, graph databases, knowledge graphs

“

More data beats clever algorithms, but **better data beats more data**.

Peter Norvig

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“

More data beats clever algorithms,
but ~~better data~~ **knowledge** **beats more data**.

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Data + Context = Knowledge

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Mars Climate Orbiter

- Second mission under the Small Spacecraft Technology initiative
- Designed to study Mars' climate
  - Importantly, distribution of water
- $330mm to design, build, launch
- 10 month flight time

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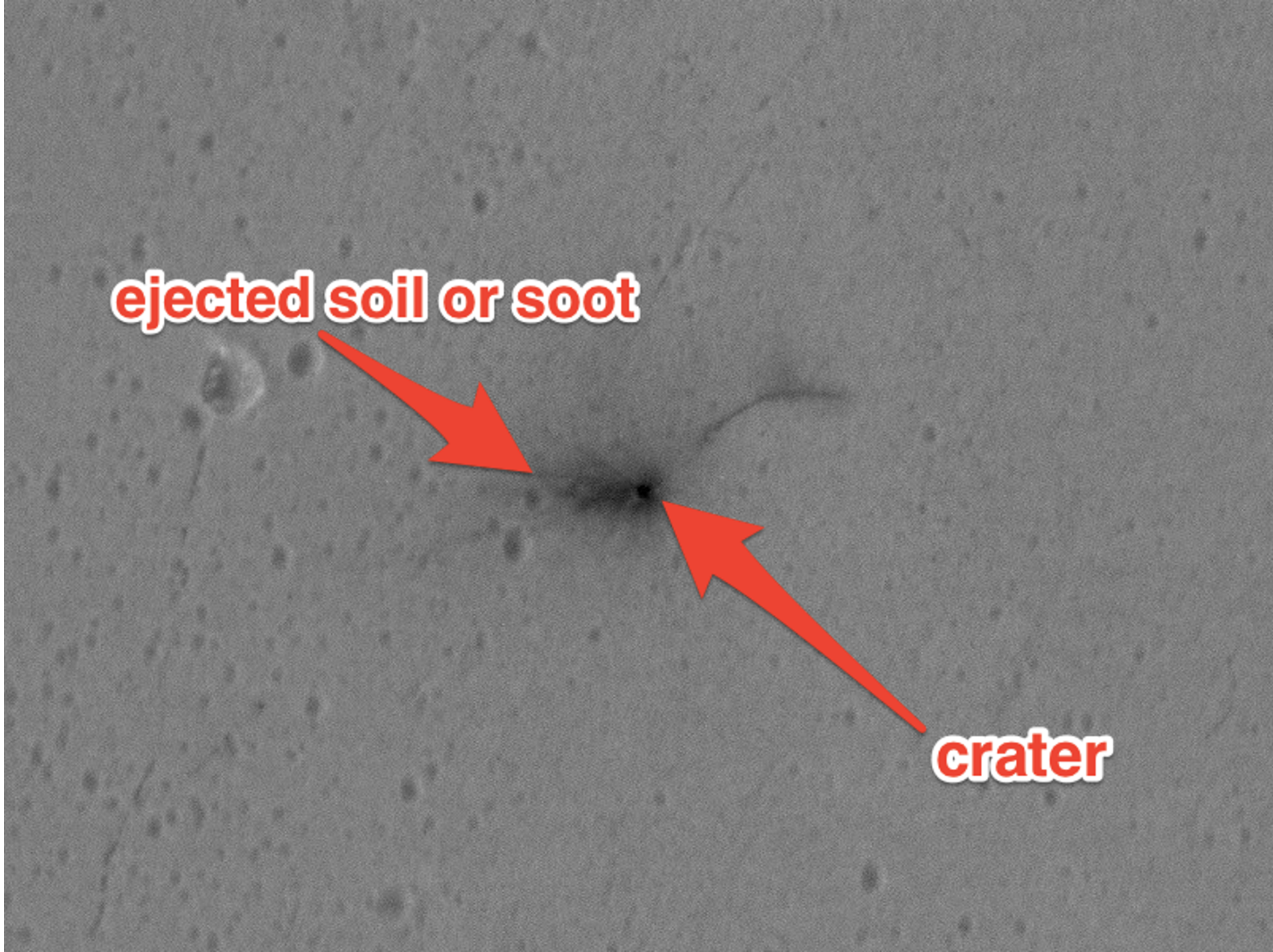
“Unintentionally Deorbited”



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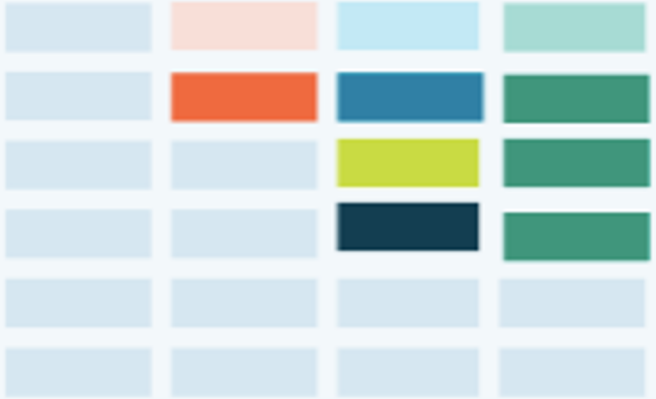
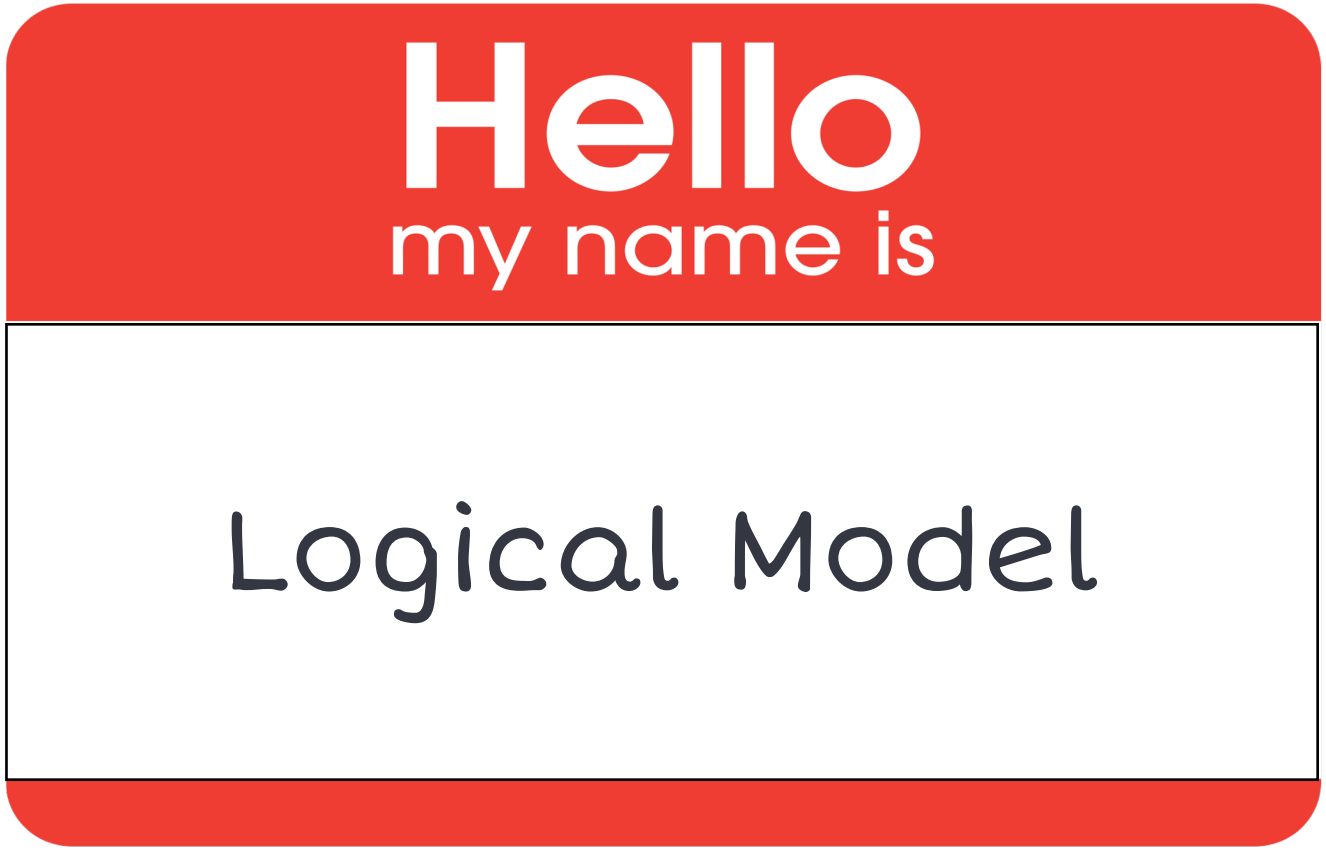
Context is missing with traditional technology...

So where do I get it?



This Sounds Familiar

- Adding context to data is not a new idea!
- Static ER diagrams
- Data dictionaries, glossaries are a new fad
  - These are usually static too
  - Often in Excel…
- Other approaches have tried, like MDM
  - Context is hard coded; single version of the truth
  - Very fit for purpose, limited reusability or flexibility



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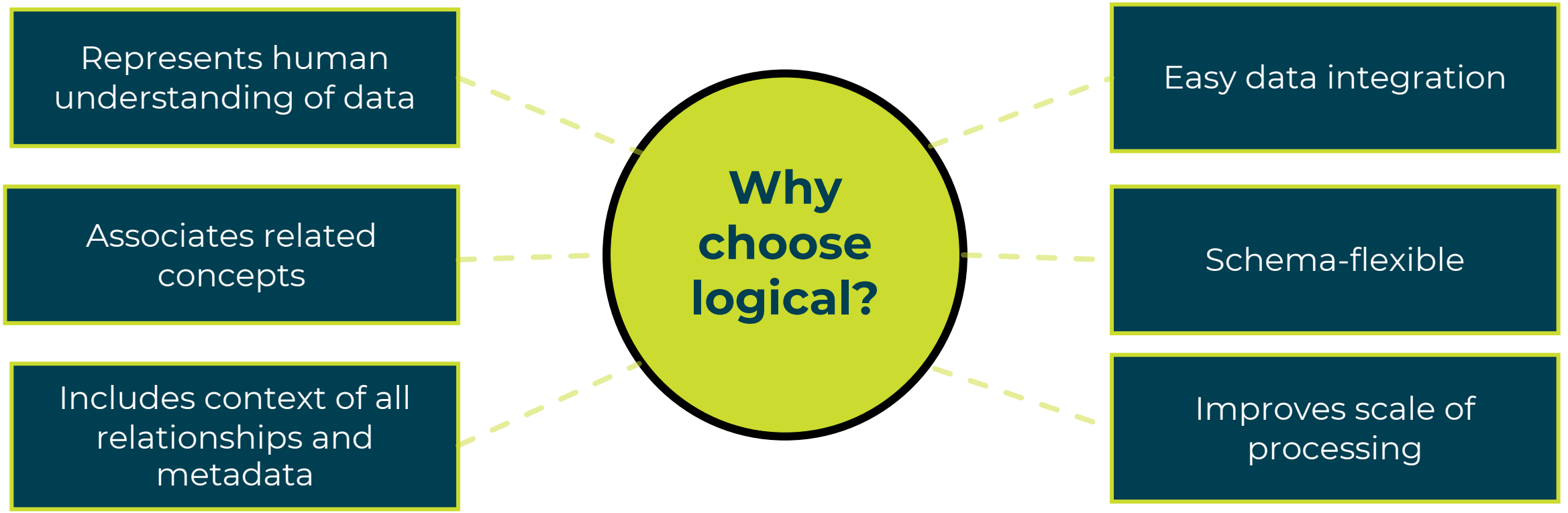
Benefits of a logical model



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“

Wait a second, isn’t this s********?

The Audience

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“

Each [Enterprise Application] comes with its own data model, which forces developers to build, test, and manage custom code that’s necessary to map and translate data across different systems. **Instead of accelerating digital transformation, this process slows innovation and leads to brittle integrations.**

Cloud Information Model (CIM) website

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Modeling in 60 seconds*

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Modeling 101

- Starts with 3-5 key concepts & their relationships
- A little modeling goes a long way
  - Over-specification hinders reuse
- Layered
  - Start very generic
  - Definitions extended and refined over time
- Naming reflects the real world
  - Model will be your lingua franca for data
  - Should match what domain experts say/think

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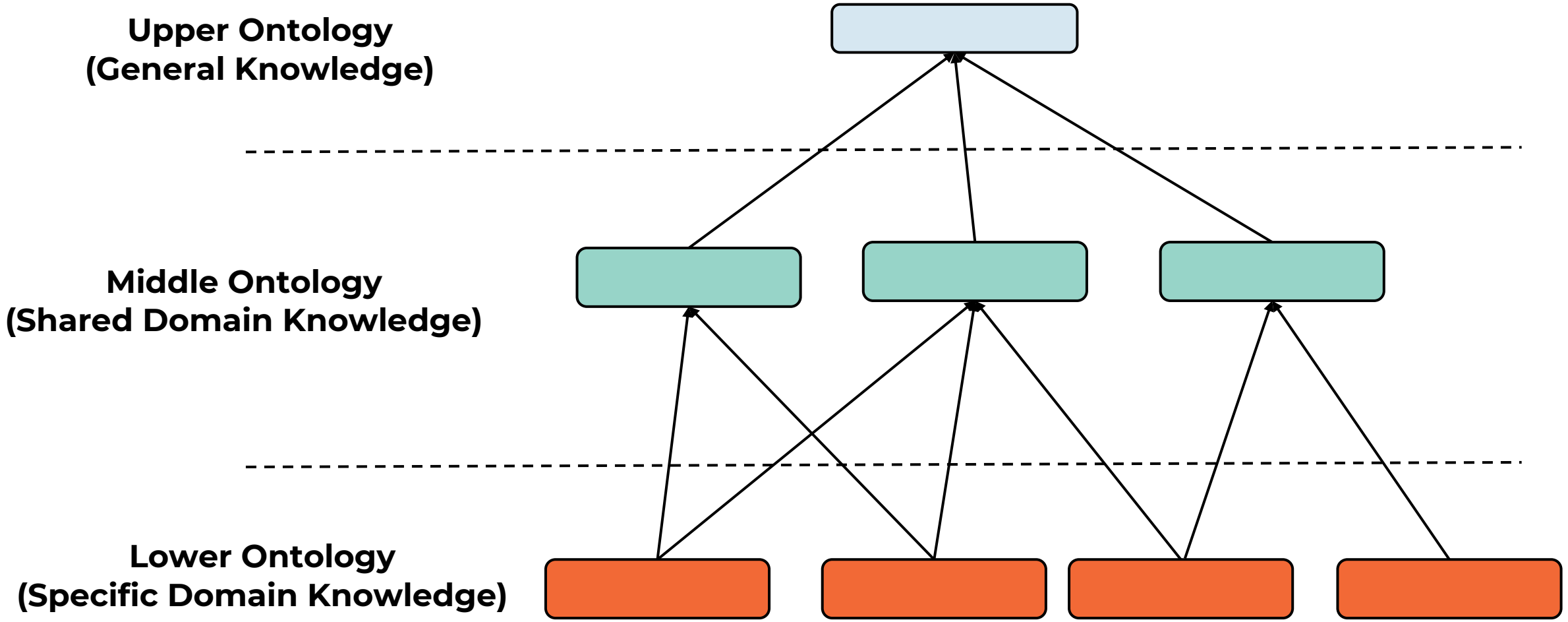
Everybody loves (layer) cake!



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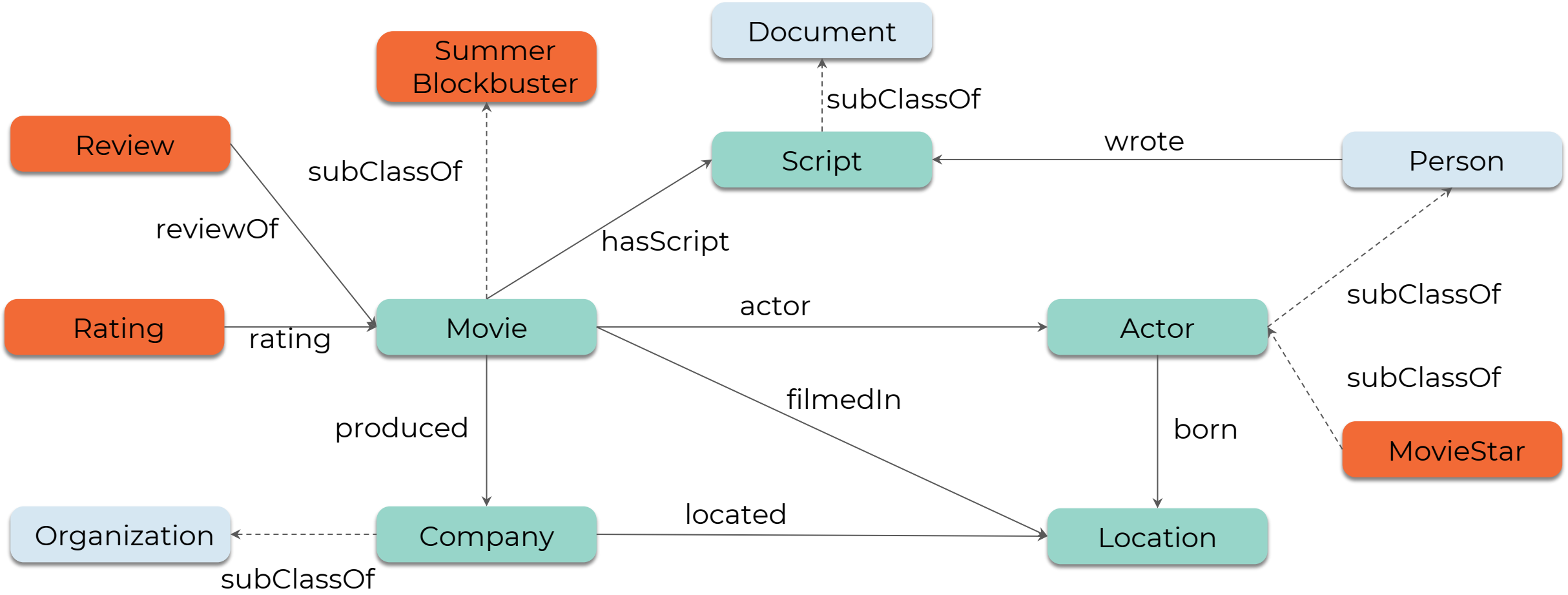
Movie Data Model (abridged)



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Everybody's doing it

- Basics: DC, SKOS, FOAF
- Finance: FIBO
- Manufacturing: ISO 15926, IOF
- HCLS: SNOMED, NCIt, CDISC, MeSH, FAIR
- All the Things: SUMO
- Web: schema.org

Inference Engines

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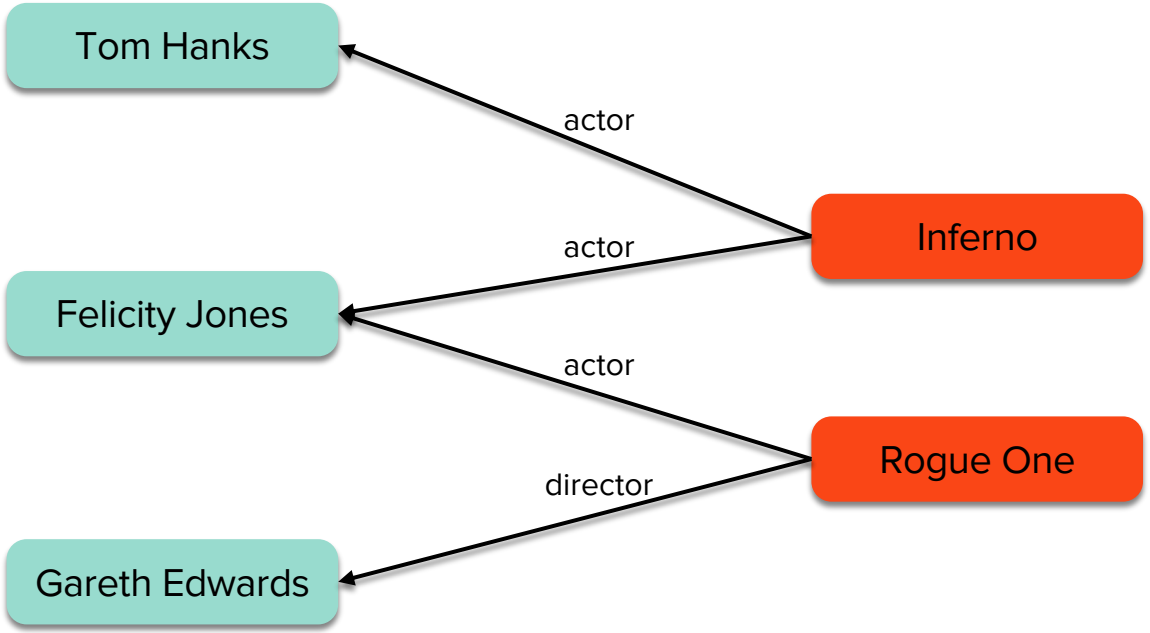
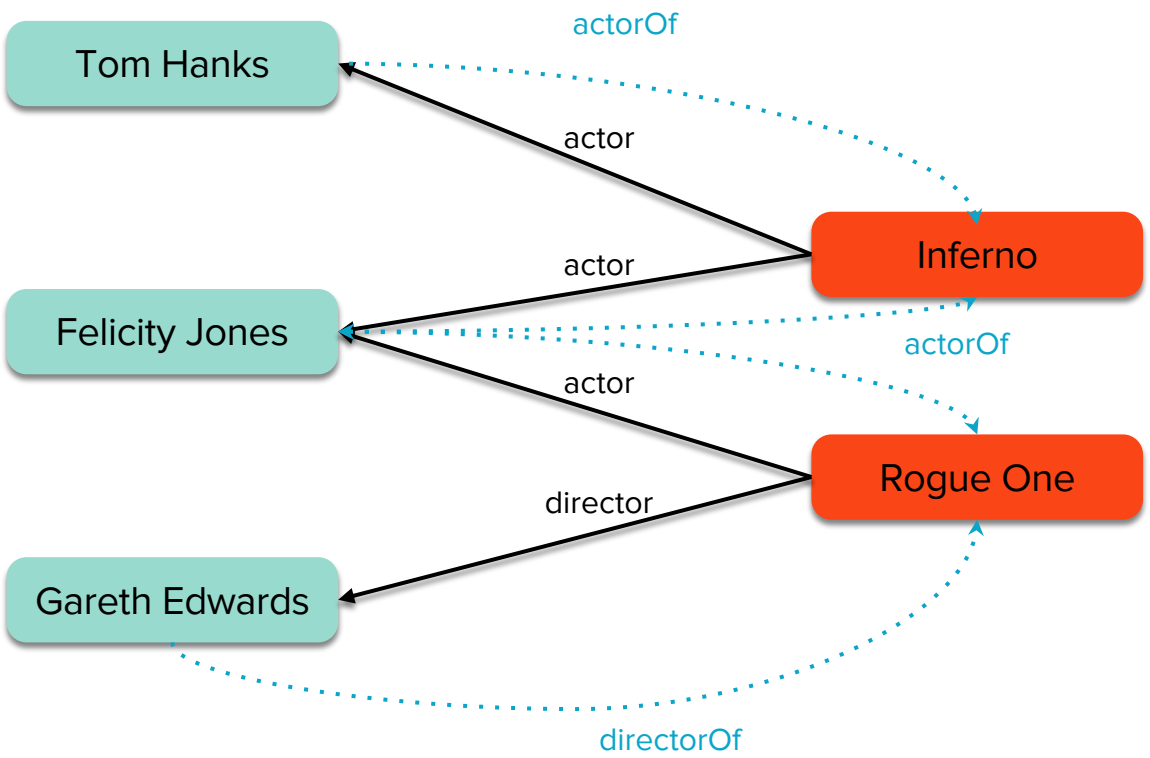
What is the power of inferencing?

- Make the implicit, explicit
  - Uses declarative definitions of the domain
  - Perform deductive inference, verify correctness automatically
- Formally define your business logic, **without** writing code
- Independent of how data is stored
- **Stardog's Inference Engine has been cited over 11,000 times.**

How Inference Engines Work



How Inference Engines Work




```
actorOf    inverseOf  actor
directorOf inverseOf  director
```

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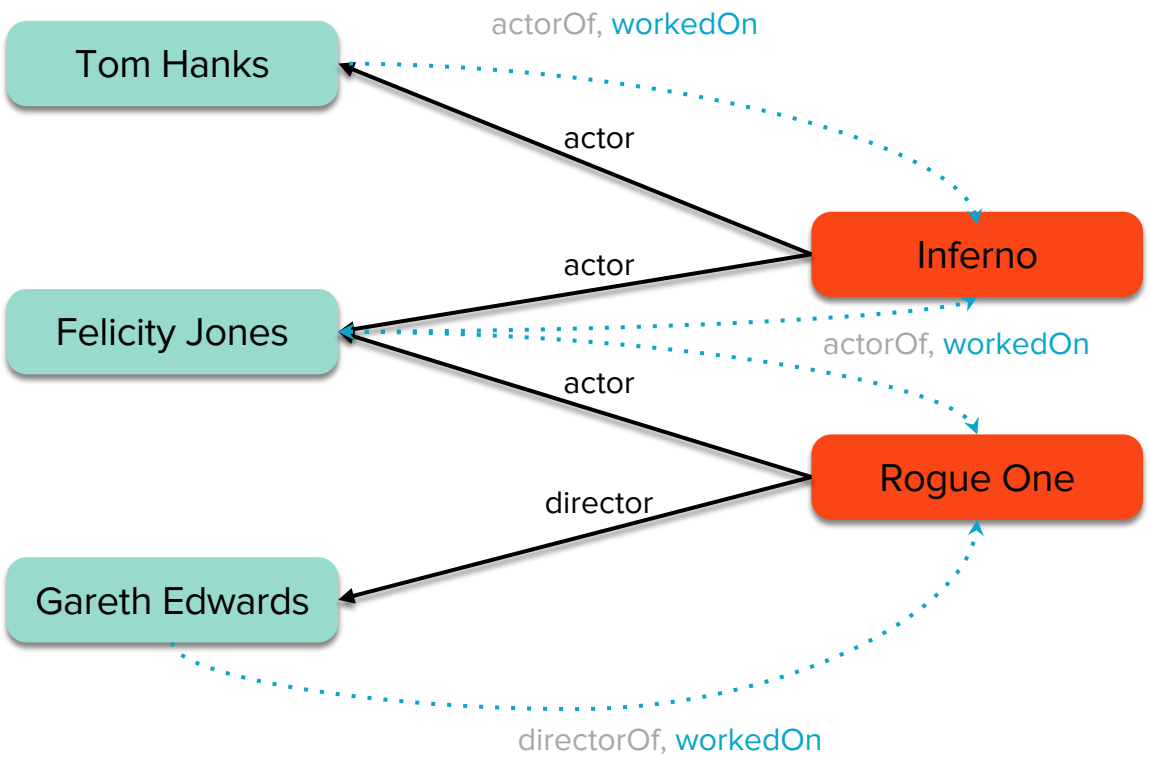
How Inference Engines Work




```
actorOf    inverseOf  actor
directorOf inverseOf  director
```

```
actorOf    subPropertyOf workedOn
directorOf subPropertyOf workedOn
```

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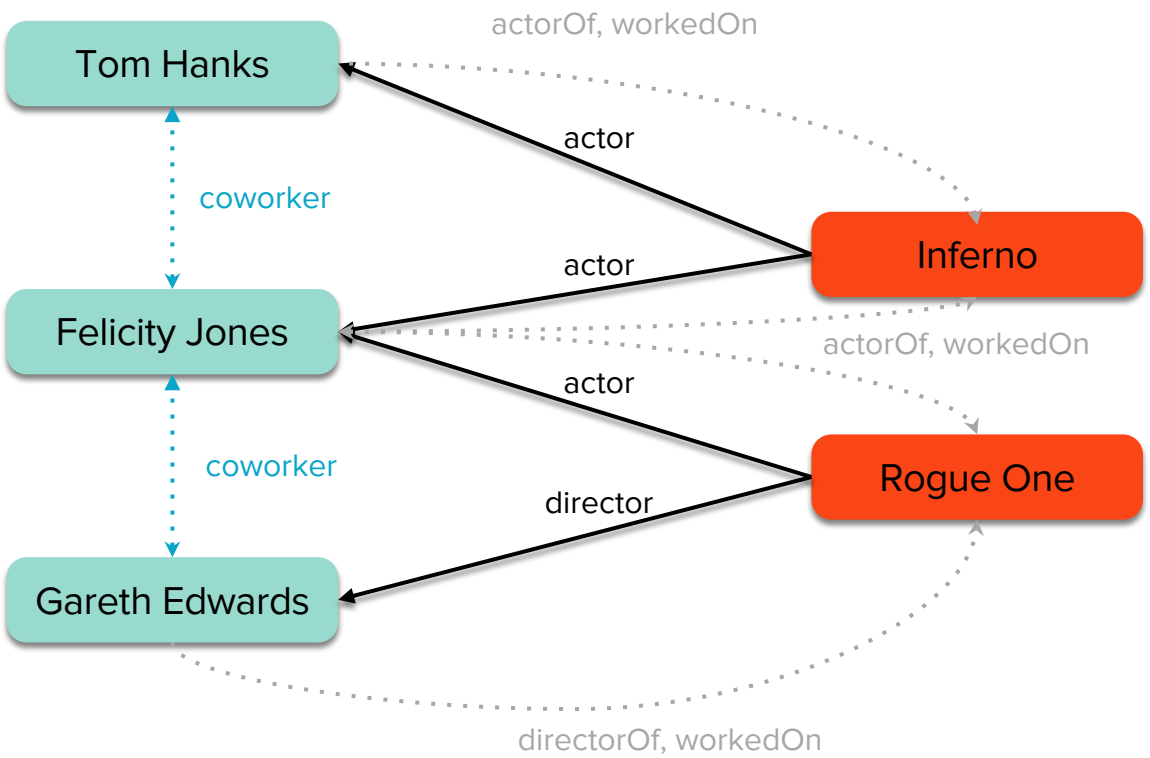
How Inference Engines Work




```
actorOf    inverseOf  actor
directorOf inverseOf  director
```

```
actorOf    subPropertyOf workedOn
directorOf subPropertyOf workedOn
```

```
coworker propertyChain
    (workedOn [inverseOf workedOn])
```

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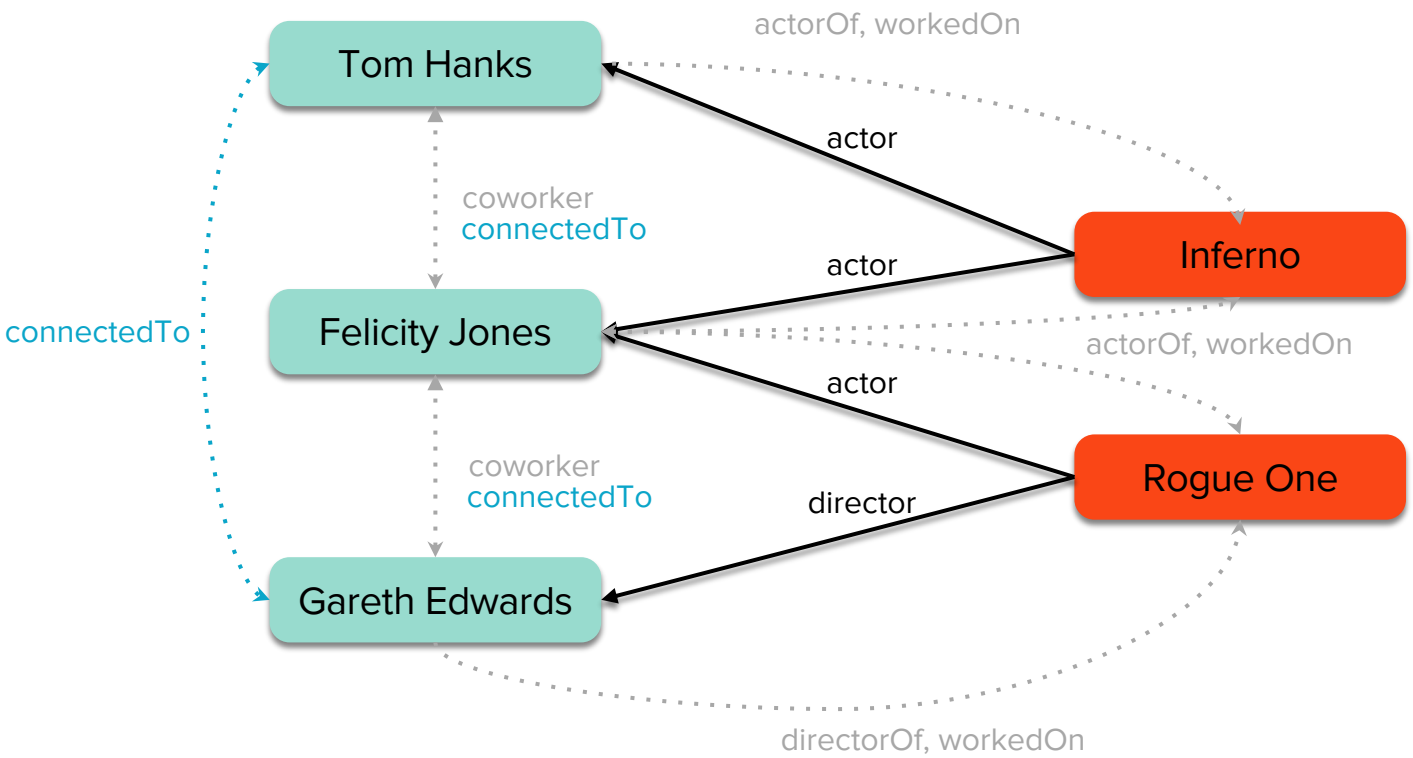
How Inference Engines Work




```
actorOf    inverseOf  actor
directorOf inverseOf  director
```

```
actorOf    subPropertyOf workedOn
directorOf subPropertyOf workedOn
```

```
coworker propertyChain
    (workedOn [inverseOf workedOn])
```

```
coworker   subPropertyOf connectedTo
connectedTo a TransitiveProperty
```

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Winning with Knowledge

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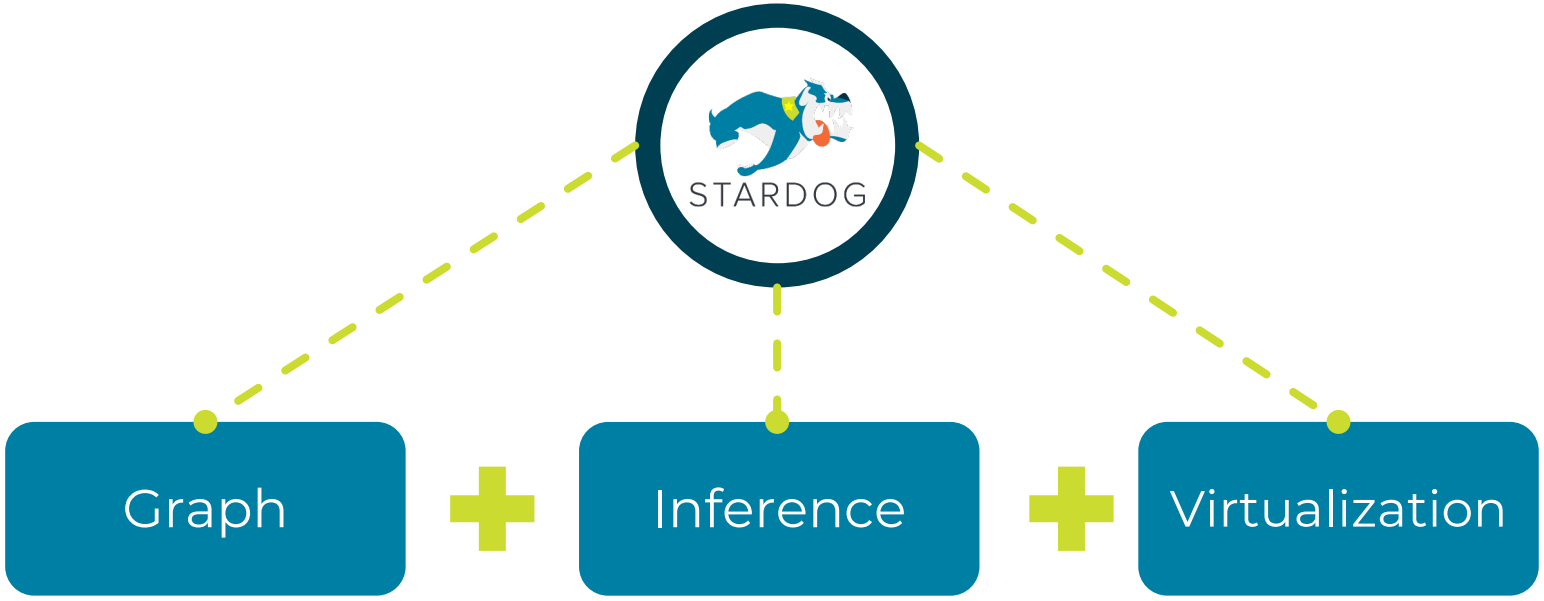
Stardog is the leading enterprise knowledge graph platform



Graph is the best format to showcase relationships between highly connected data.

Our AI-powered Inference Engine makes real-world context machine-understandable.

Our patented virtualization technology accesses data remotely and ensures data is always up-to-date.

Stardog provides a flexible foundation for data-driven operations

Access any data
Link structured, semi-structured and unstructured using Stardog Connectors

No copying required
Virtualization accesses data remotely so data is always up to date

Generate better insight
Use proprietary analytics features or link to popular BI platforms

Flexible data management
Associate related data without transformation using our Inference Engine

Faster to launch
Easily incorporate new data and gather real-time insight to inform business decisions

SpringerMaterials Accelerates Research With Intelligent Search

To meet user needs, Springer needed a flexible and dynamic data infrastructure that allowed easy iterations and updates within existing data while also providing context embedded within search results to end-users.

By unifying their data in a knowledge graph, Springer created a single declarative model to bring all the connections between the content into a unified view. Researchers have a single, unified view of data covering more than 290,000 materials resulting in fast and accurate searches.

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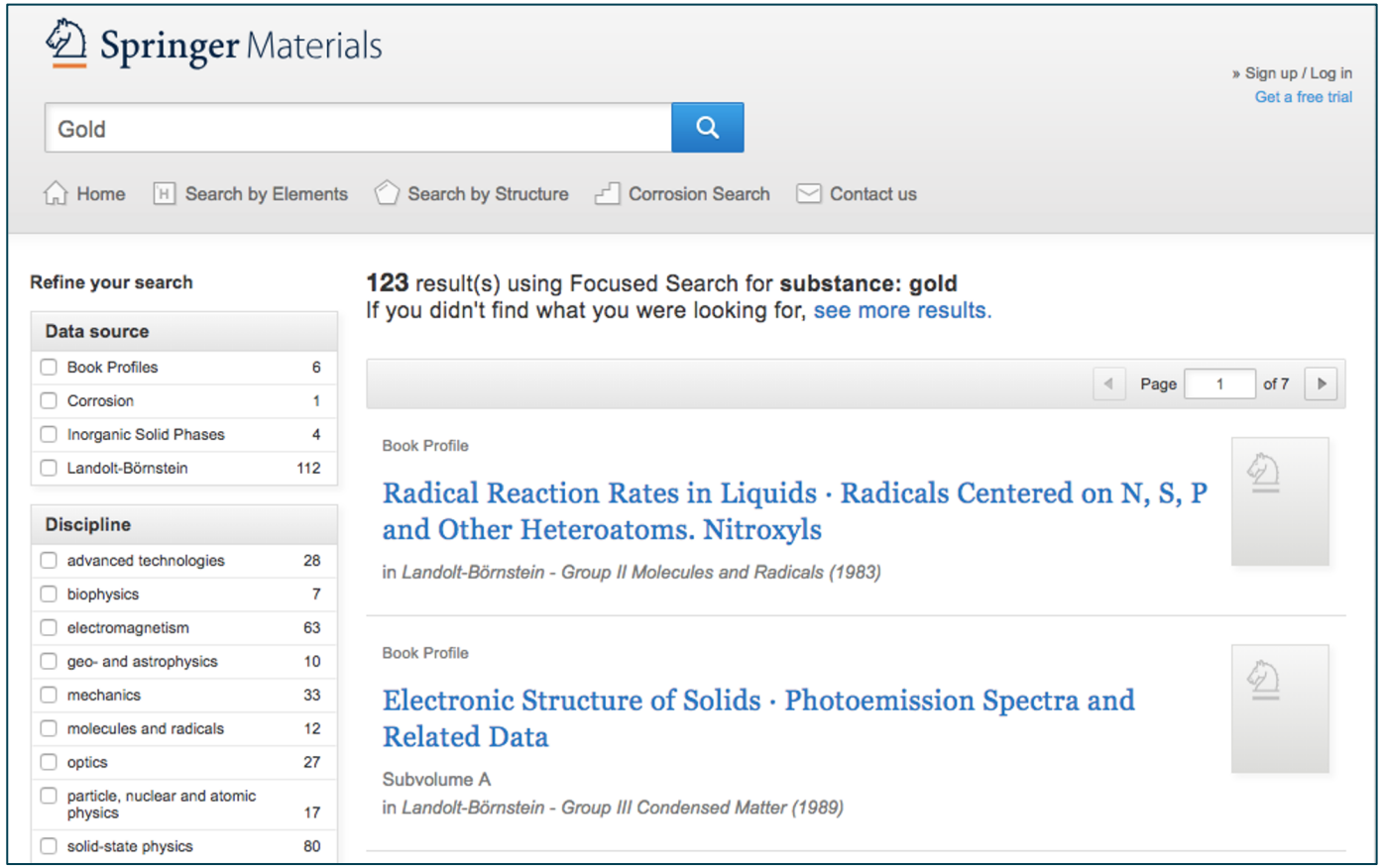
SPRINGER NATURE

Stardog's knowledge graph provides data context and infrastructure flexibility



- On-the-fly interpretation of search context and users' intent
- Adaptive ranking of results based on search context
- Entity-based search and explore capabilities
- Reverse search to find substances based on property values
- Smart light-weight inference on substance and property identifiers
- Plug and play integration of external knowledge models
- Dynamically created landing pages

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SPRINGER NATURE

“

What made the difference was a simple search on SpringerMaterials. We typed the term "titanium dioxide" along with "transport properties" in the search box. The number of results was far less than using a general search engine. Crucially, the results gave the student **the information they had been looking for**. In fact, almost **every result from this one search was relevant to the project**. The student went away able to begin work, when before they hit a dead end.

Testimonial

Learn more

The Data Variety Challenge: Why a Schema Flexible Model Works

Learn how knowledge graphs provide a schema-flexible solution based on modular, extensible data models that evolve over time to create a comprehensive and unified solution.

Visit www.stardog.com/resources.

Graph Data Model Tutorial

Learn how Stardog combines a logical data model, graph, and reasoning to help you unify your data. Learn the basics of how to apply our graph data model to your business needs.

Visit www.stardog.com/tutorials.

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Thanks!

Mike Grove
@mikegrovesoft | @StardogHQ

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