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VIRTUAL SOLUTION SPOTLIGHT

Accelerate Data Innovation with Enterprise Knowledge Graphs

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TDWI Presentation:

The Role of Enterprise Knowledge Graphs for Uncovering New Data Insights

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Needed: Speed & Agility in Gaining Insights

Looking for an edge, data-driven organizations require shorter, more repeatable paths to data insights

- New perspectives based on complete views of relevant data
  - 29% call this a priority data integration objective
- Taking advantage of expansion in diverse data assets
  - Uncovering insights that lead to business innovation
- Driving data science and business analytics; 43% say their top objective

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New Perspectives on Business Relationships

Organizations seek clarity though data to understand important customer, partner, and other business relationships

- **Context:** Information that is critically related to events, transactions, market competition, or fraud and abuse
- **Avoiding surprises**: Without good understanding of relationships, organizations can be blindsided
- **Innovation and resilience**: Discovery of potential for new products and services, and how to adjust to the unexpected (e.g., in supply chains)

Discovery & Analysis of Data Relationships

- **Analytics and AI/ML**: Data scientists, analysts, and data-savvy users need the ability to search for, uncover, and analyze data relationships
  - Data volume and complexity are challenges
- **Actionable analytics**: Understanding data relationships and how they connect to business relationships increases relevance and contextual understanding
  - Traditional query and reporting can miss their discovery and significance

TDWI research:

- **76%:** Making it easier and faster to find and discover data relationships is a critical part of surveyed organizations' data strategy
- **42%** say streamlining analysis of new data sets is a priority

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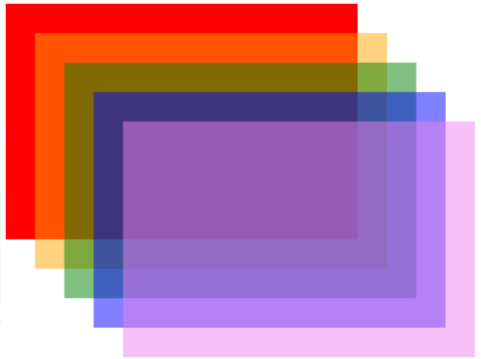
Challenges Faced Analyzing Data Relationships

- **Traditional BI/DW not delivering enough value**
  - Value of data outside structured and transformed sources (DW) not realized
  - Gaining “complete views” demands more than just access to more data; 61% struggle
- **Data distribution in silos, and data volume**
  - 38% say silos make access too difficult; 41% want better analysis of data relationships across sources
- **Unproductive data access, analytics, and development**
  - Difficult, especially for nontechnical users, to work with technical metadata to find and analyze diverse data in their language; lack of agility

Growing Importance of the Semantic Layer

- **What is it?**
  - Semantic layer (virtualization) offers a business representation of data above technical metadata, freeing users of technical complexity
  - Maps complex data and metadata to familiar business terms and concepts (e.g., products or customers)
  - Can contain shared, reusable business logic for hierarchies, measures, calculations
- **Interest in semantic modernization**
  - 33% want to increase use of semantic layer (including data catalog); 19% want to modernize by incorporating descriptive, semantic knowledge



Semantic Layer's Importance for Users

- Layer enables access and analysis of broader selection of data without becoming mired in technical complexity (table names, data models and types)
  - Virtualization for federated queries to distributed sources
  - Security and governance can be applied in layer
- Users can work within context of their business using common business terms
- Greater consistency and completeness for more users and across more sources
  - 34% not satisfied with current state

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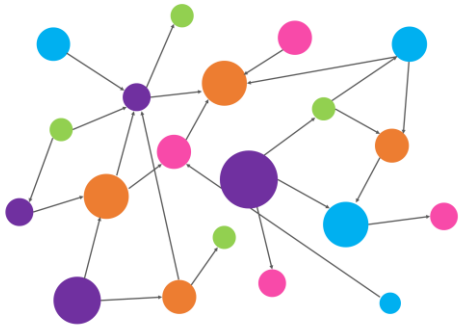
Knowledge Graphs: Enriching Semantic Layer

To discover, analyze, and visualize complex data relationships, organizations need better models and systems

- **Knowledge graphs:** Capturing explicitly how data sets relate to each other and to higher-level entities (e.g., people, places, and things)
  - Accelerating understanding of connections in context of the business
  - Flexibility to see different relationships
- **Semantic network of real-world entities**
  - Abstraction shields users from SQL complexity
  - Graph databases for storing knowledge graphs; 19% using, 23% planned



Knowledge Graphs, Catalogs, and Governance

- **Knowledge graphs can enhance data catalogs**
  - Only 12% are very satisfied with current data catalogs; 37% somewhat satisfied and 30% looking for major improvement
- **TDWI research:** 19% want to modernize by incorporating descriptive, semantic knowledge about diverse and descriptive data
  - Capturing deeper info about how data sets are used and related; more complete than just metadata
- **Data governance:** Knowledge graphs can clarify understanding of data use and sensitive data exposures (e.g., PII) in distributed environment

Poll Question #1

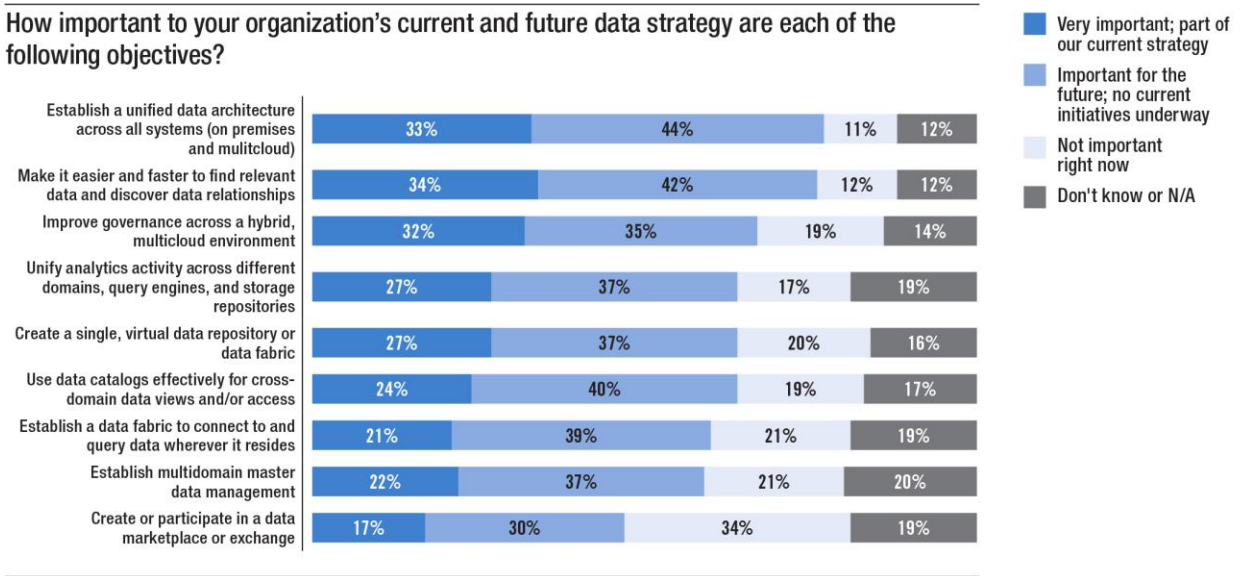
- What is your biggest challenge in enabling users to discover, analyze, and visualize more complex data relationships?
  - We have too many distributed data silos with no semantic layer to enable faster and easier data access
  - Users cannot write complex SQL statements; they depend on expert developers
  - Working with metadata is too low level; it is difficult to map to higher-level business entities and definitions
  - Discovery of and views of data relationships are not consistent or repeatable; they are not easily shared
  - We need more experience, skills, and training

K Graphs, Semantic Layer, and Data Fabrics

- **Data fabric:** Using knowledge about data and data relationships to connect disparate data
  - For data discovery, access, integration, and governance/security
  - Keeping users above complexity
- **Knowledge graphs**: Key to understanding connections and relationships
- **Using a virtual semantic layer across distributed data**: Important with hybrid multicloud environments becoming common
- **Goal of adaptability:** Away from rigid, monolithic legacy architectures

Data Strategies for Distributed Data: Critical

- **Data fabrics:** 21% very important to current strategy, 39% for future
- **Data relationships:** 76% say important to make it easier and faster
- **Top of mind:** Strategies for unifying architecture



Source: TDWI Q4 2021 Best Practices Report research. Based on answers from 358 respondents.

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In Closing: Recommendations

- ✓ Evaluate use of knowledge graphs to deepen understanding of data relationships and enhance complete views of business
- ✓ Accelerate analytics with consistent, repeatable access to data relationships
- ✓ Develop data strategy for distributed environments; develop semantic layer for data fabrics
- ✓ Expand knowledge of data beyond metadata; apply to data governance

Poll Question #2

- What is your current level of use and interest in knowledge graphs?
  - We are currently developing and using knowledge graphs
  - We are not using them currently, but we have plans to use them in the future
  - We are interested, but we have no plans to use them at this time
  - We are not sure knowledge graphs will work for our projects
  - Don’t know or not applicable

Discussion Topics and Questions

- Knowledge graphs:
  - What are some use cases? What kind of problems do they solve that existing BI and analytics technologies struggle with?
  - Can knowledge graphs work with major existing BI and analytics tools?
  - What are skills and training requirements?
- How do knowledge graphs improve data catalogs, semantic layers, and requirements such as data governance?

More Discussion Topics and Questions

- Data fabrics, data virtualization, data mesh, and more are hot topics in many organizations:
  - What are some important ways in which knowledge graphs and semantic layers and network address distributed environments
- Organizations are trying to gain more value from big data: high volume, diverse, and high-velocity data
  - How can knowledge graphs and semantic layers accelerate value?
- What some tips for getting started with projects?

Thank You

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Accelerating Analytics and AI with Enterprise Knowledge Graphs

Navin Sharma
VP, Product

STARDOG

COMPANY OVERVIEW

Stardog: Enterprise Knowledge Graph Platform

Highlighted Customers

Our Mission: Unite Data, Unleash Insight.

Stardog's **Enterprise Knowledge Graph platform** connects disparate data by leveraging business meaning and real-world context.

We help **customers across many industries** create a reusable semantic layer for dynamic data delivery.

> "Our primary objective is to provide data at a higher quality and relieve the heavy lifting up front so our data scientists can actually work with the data."
>
> —Head of IT Research, Top Global Pharma

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capsifi
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BOSCH
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EXFO
Schneider Electric
CIS Center for Internet Security® Creating Confidence in the Connected World.

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What we'll cover today

1. Why a Knowledge Graph powered Semantic Layer is needed to power the last mile!
2. Making it real: An enterprise data fabric for Life Sciences
3. Keeping it real: Live Demo showcasing an insurance use-case
4. Q&A

“Despite 70 percent of organizations citing that they want to be more data-driven now, **95%** still struggle with operational challenges around data and analytics and **88%** continue to be hindered by legacy technologies.”

The ‘Data and Analytics in a Digital-First World’ IDC report.

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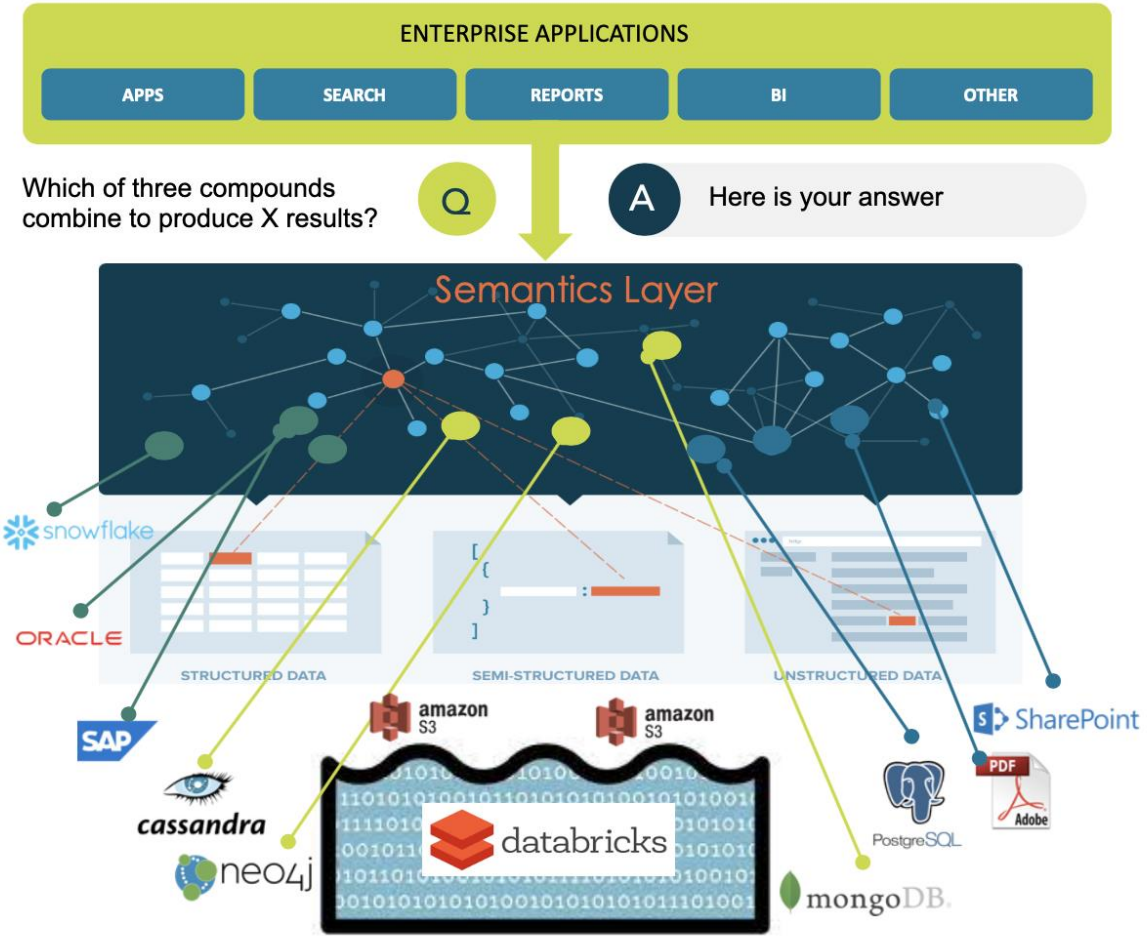
Points of friction remain when it comes to sharing data & knowledge broadly

	Challenges	Opportunities
Data Culture	Focus on Big Data; Data Collection; Data Centralization; Control in the hands of specialists	**Focus on Wide Data; Data Connections; Federated Data; Data Sharing**
Data Model	Tightly coupled and shaped by the underlying data storage infrastructure; IT-driven	**Semantic layer** abstracted from the data structure that represents business meaning & enables **data harmonization & linkage**
Data Integration	ETL/ELT Pipelines with physical copies	**Data Virtualization** limits data sprawl, complex data pipeline development & enables access to real-time data for faster decisions.
Data Interrogation	Pre-defined queries limited to processing data within a single database	Enable **Search-driven data exploration & complex query processing across heterogeneous environments**
Data Intelligence	Technical Metadata cataloged separately for passive analytics	Metadata linked to semantic model enables **inferred relationships** to drive **intelligent recommendations**

D&A ecosystem must include:

A Knowledge Graph powered semantic layer as a giant leap forward in closing the last mile towards democratization.



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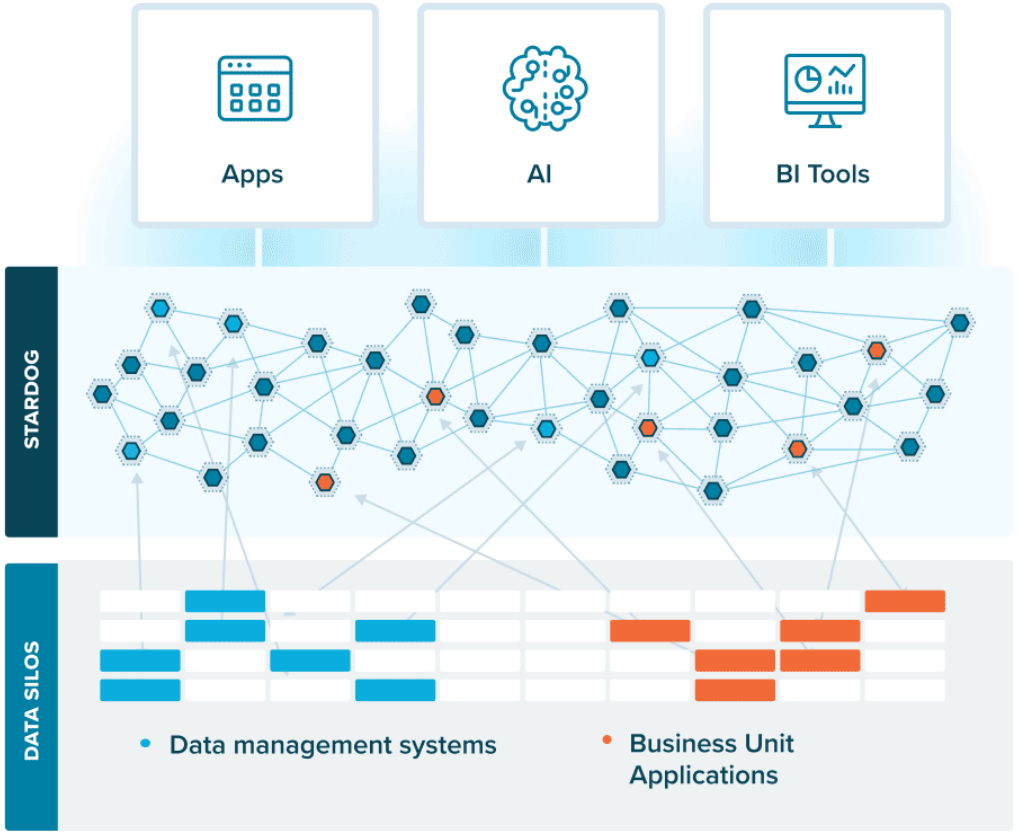
In a **data fabric** approach, one of the most important components is the development of a **dynamic, composable and highly emergent knowledge graph** that reflects everything that happens to your data. This core concept in the data fabric enables the other capabilities that allow for dynamic integration and data use case orchestration

Gartner – How to Activate Metadata to Enable a Composable Data Fabric

What is an Enterprise Knowledge Graph?

A flexible, semantic data layer for answering complex queries across data silos.

- Unifies data and metadata using semantics and inferencing
- Evolves as your Data Fabric evolves
- Delivers context-enriched data to existing systems and workflows



Real Life Example: Current State Challenges

Lack of broad availability of internal and external data for decision making by critical stakeholders

RESEARCH

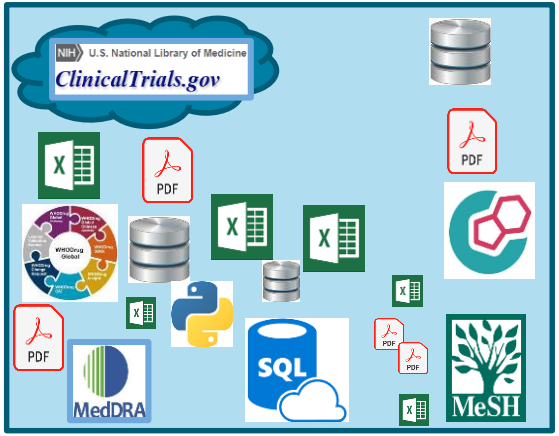
Average of X mo for Target identification & validation

Duplication of effort across internal teams and CROs

CLINICAL DEVELOPMENT

Trial design and execution cycle time can be faster (X months)

High trial costs without sufficient positive outcomes



COMMERCIAL

Missing omni channel framework (C360)

Limited coordination between Salesforce and other channels

Over reliance on Sales heavy operations

REGULATORY

Takes too long to get regulatory approvals

Geographic Planning

SAFETY

Need for scaling Signaling efforts of Drug Safety team to handle growth

Adverse event investigation is very manual (data from multiple sources)

Future State Powered By Knowledge Graph on top of the Lakehouse

Convert data into easily accessible Knowledge for faster, better decision making by stakeholders

RESEARCH

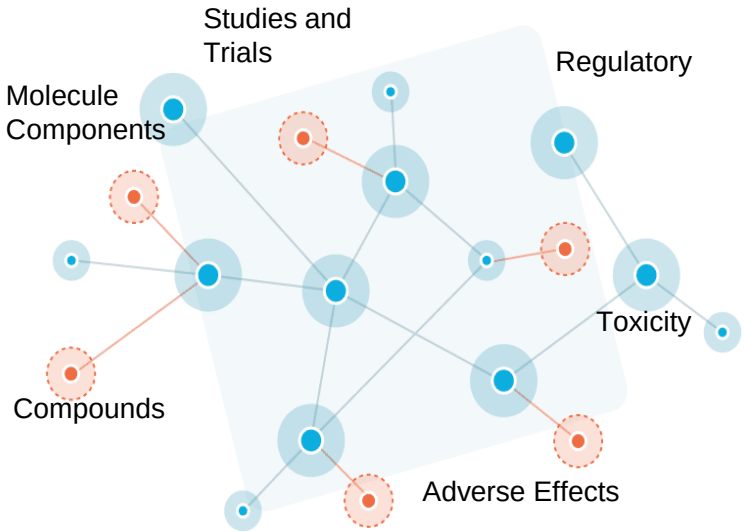
Faster Target identification: from X months down to X-y months

Avoidance of duplicate work & higher operating efficiency

CLINICAL DEVELOPMENT

Faster Trial design & execution cycle time

Avoidance of some trials based on preclinical data & external research



STARDOG'S ENTERPRISE KNOWLEDGE GRAPH

REGULATORY

Better understanding of regulatory challenges and history on similar compounds

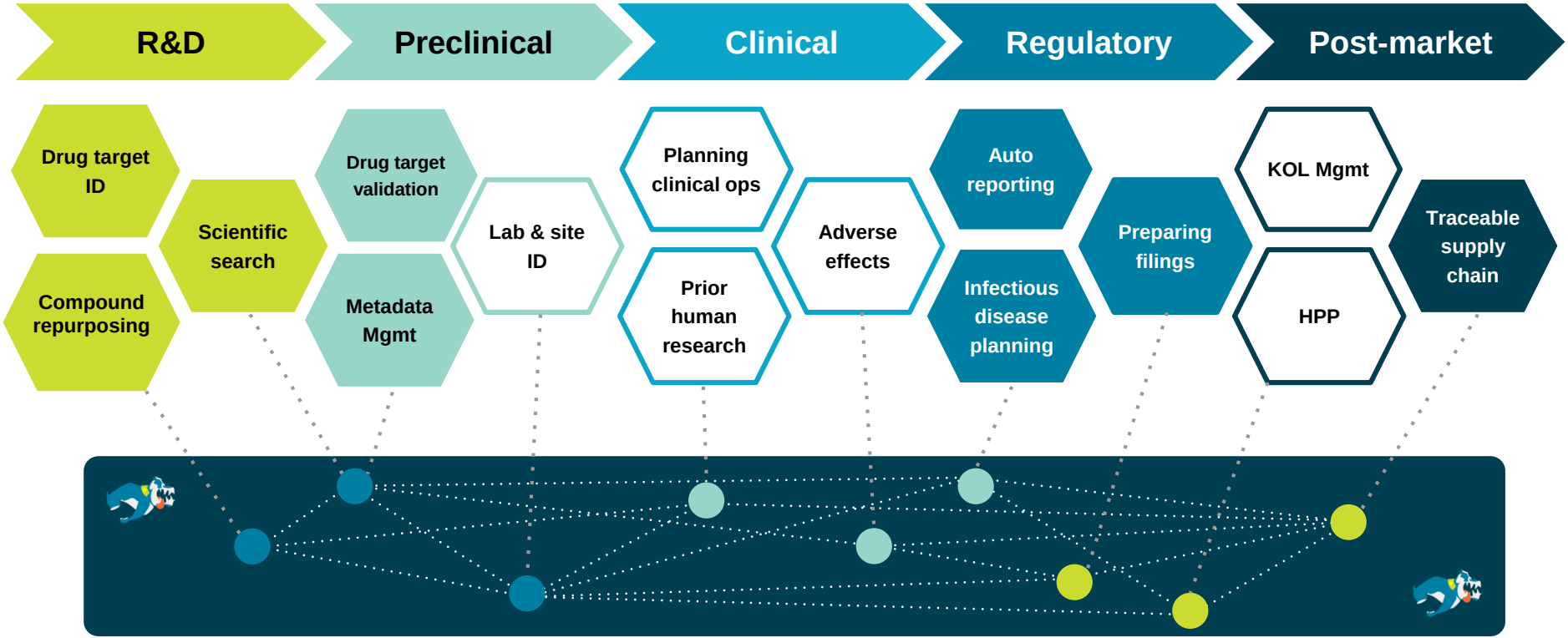
Supply chain insight

SAFETY

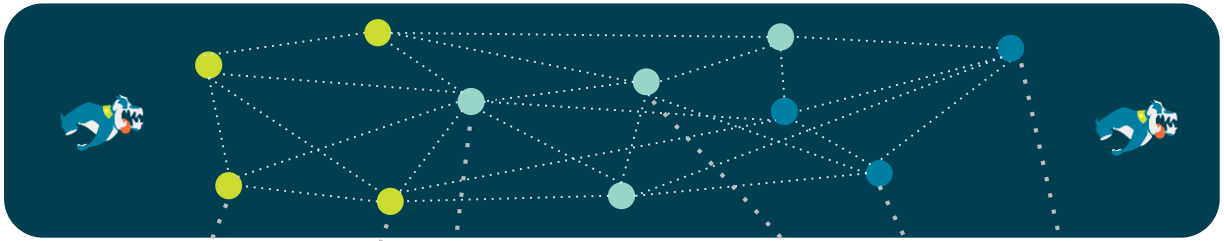
Ability to handle Signaling for organic growth, acquisitions with existing team

Faster and deeper adverse events investigations

A reusable platform for scalable digitization across drug development & commercial



Knowledge Graphs enable researchers to answer complex scientific queries



"Are certain genetic conditions suitable to be treated with *z* drug?"

"Could *x* gene expression be used as a biomarker to understand whether *y* drug is delivering an effect?"

"Which compounds have been tested in similar conditions and with similar treatments?"

"Show me all the lots of raw materials and associated suppliers involved in the production of finished good lot 123."

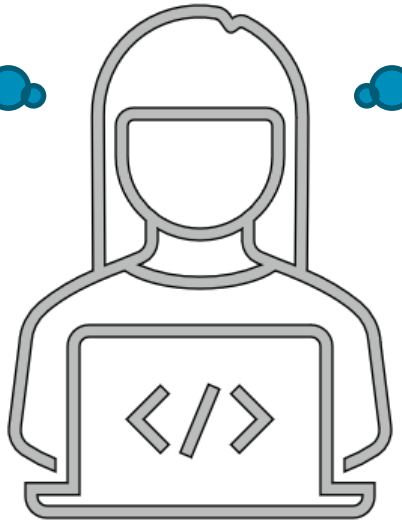
"How do COGS for product A compare between these two regions?"

"Which manufacturers supplied the raw ingredients involved in this customer complaint?"

DEMONSTRATION

Persona – Insurance Risk Analyst

What is the risk of flooding, fires, etc?



I need a complete profile of a customer's financial situation, including assets.

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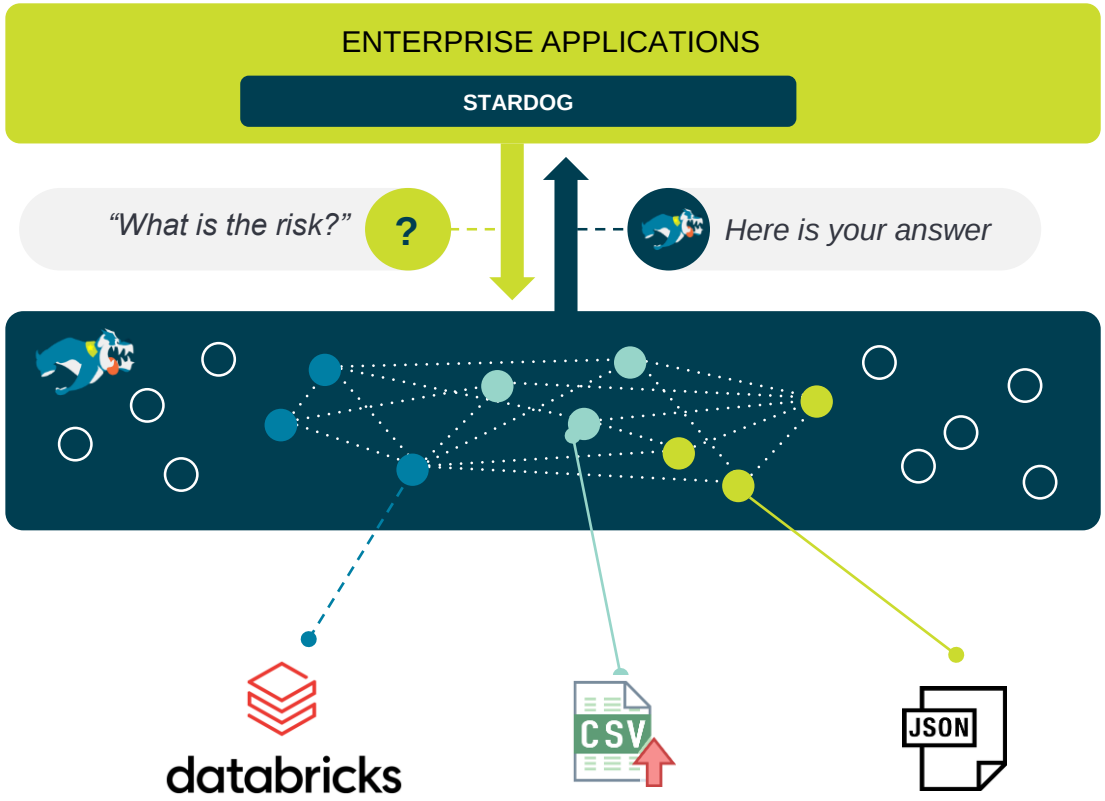
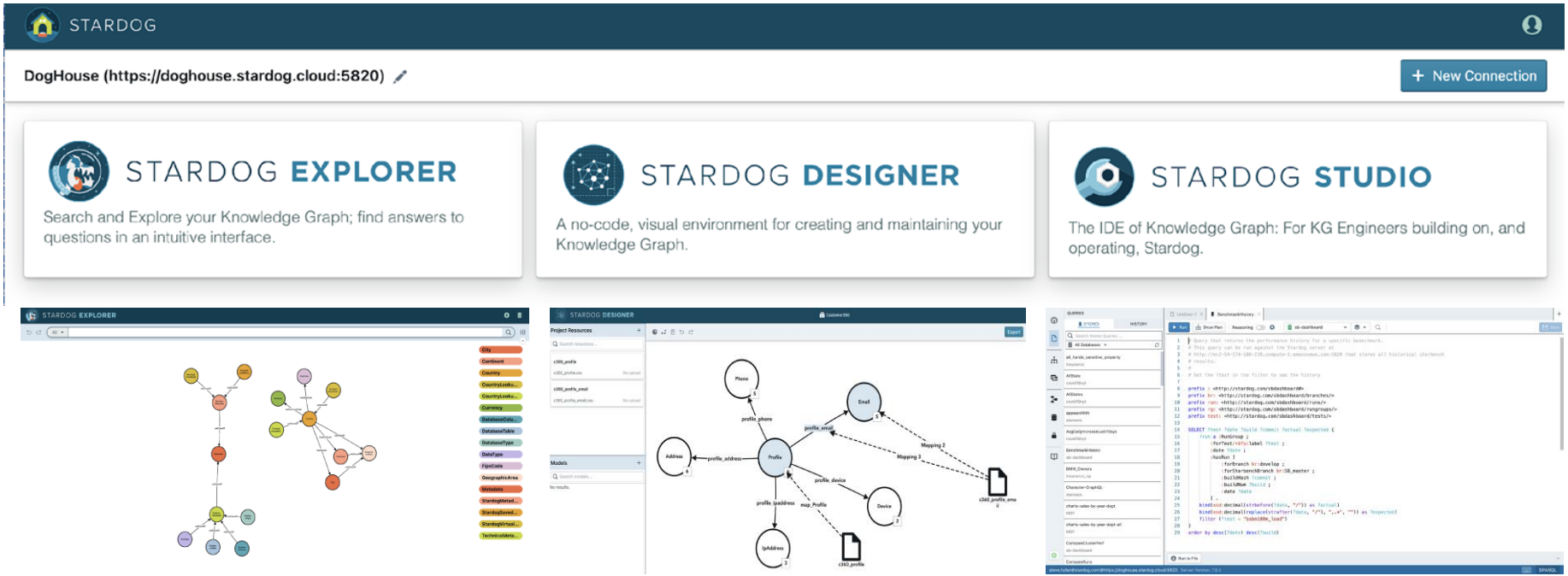
Streamline access to your data

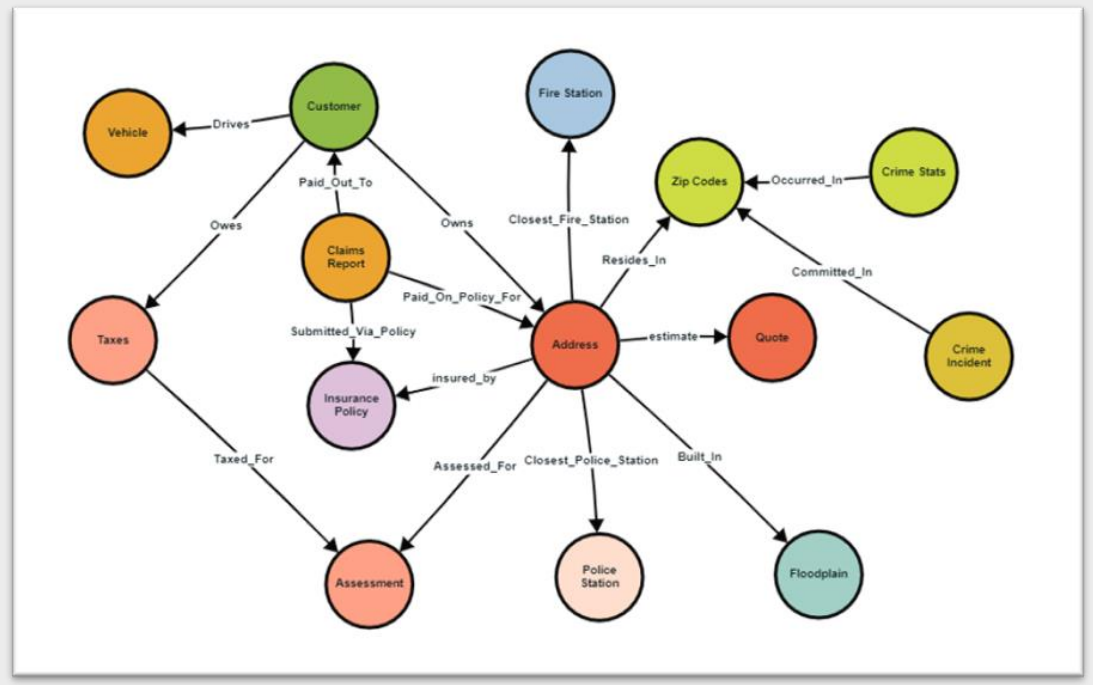


The Stardog Platform

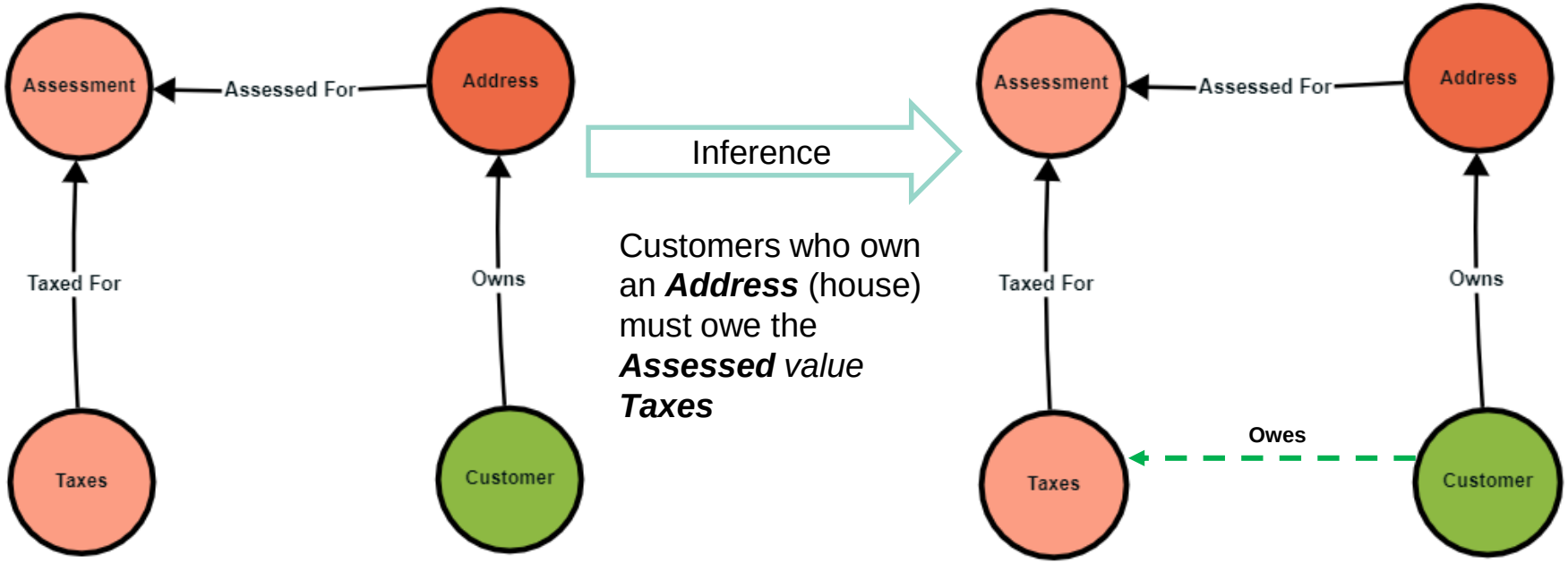


Unified View with a Knowledge Graph

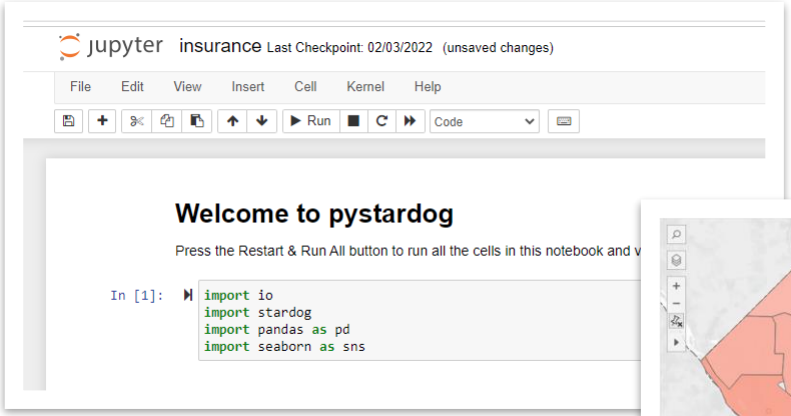
With data sourced from publicly available datasets

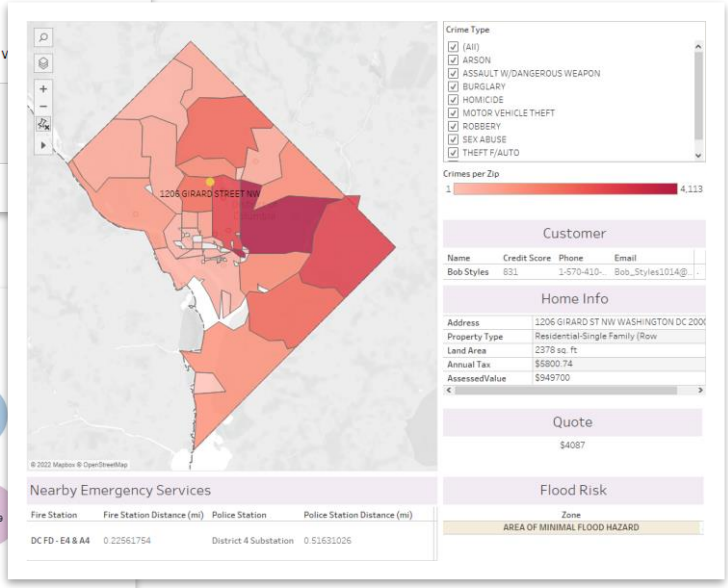


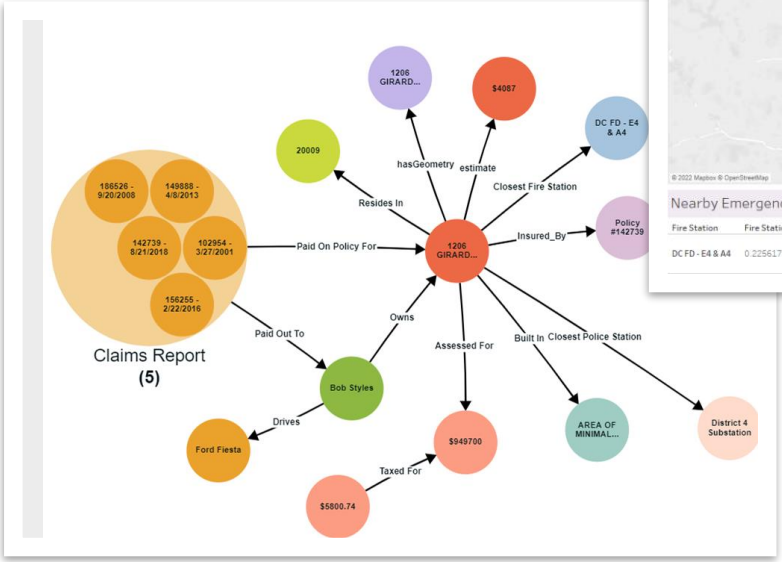
Discover new insights through inference



Supercharge your analytics







Closing the last mile with a Knowledge Graph powered Semantic Layer

✓ → ✓ → ✓ →

Incorporate all sources

Data Virtualization to let you access all relevant data without moving or copying every time you have a new business challenge.

Model as you think

Define the data model in relation to the meaning (semantics), not the structure of the data.

Uncover new insights

Use AI/ML to explore and infer new connections between your data, regardless of the domain and uncover new patterns

OUTCOMES

Improved data analyst productivity

Shorter time to market

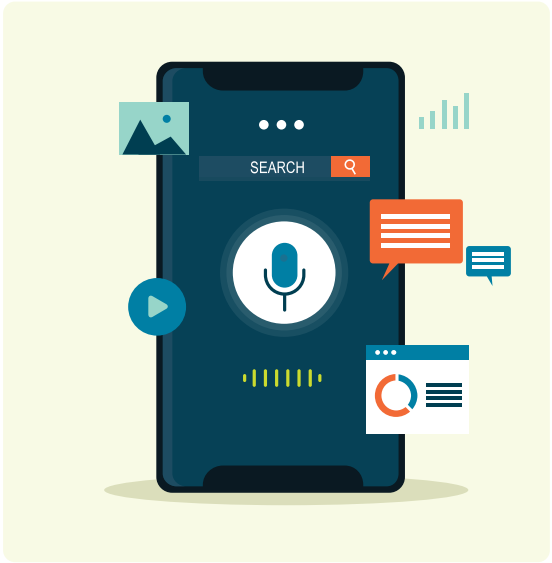
New revenue streams uncovered

Leading Applications of an Enterprise Knowledge Graph powered Data Fabric

Data Lakes Acceleration

Analytics Modernization

Semantic Search / Recommendations



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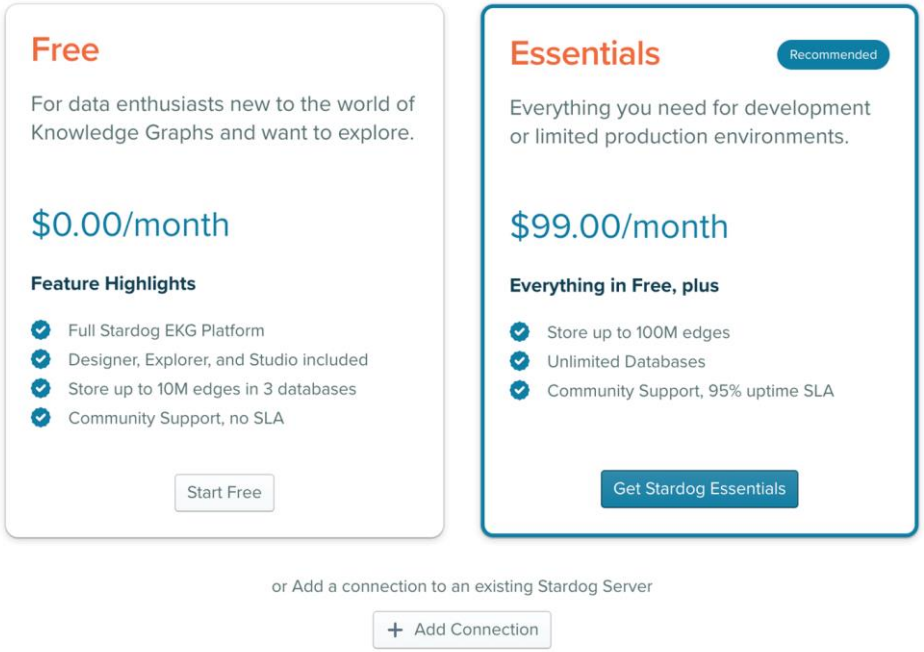
https://cloud.stardog.com/get-started



Audience Q&A with Speakers

Questions?

CONTACT INFORMATION

If you have further questions or comments:

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