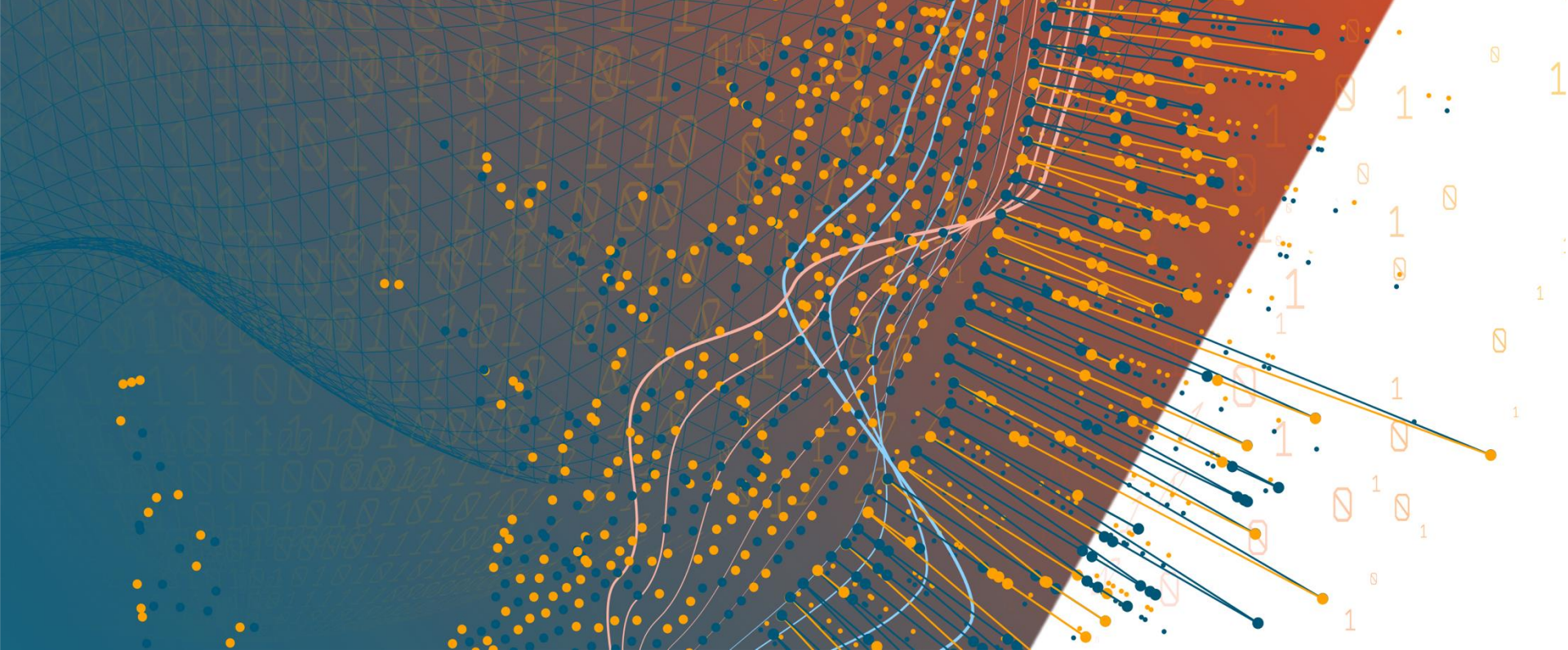


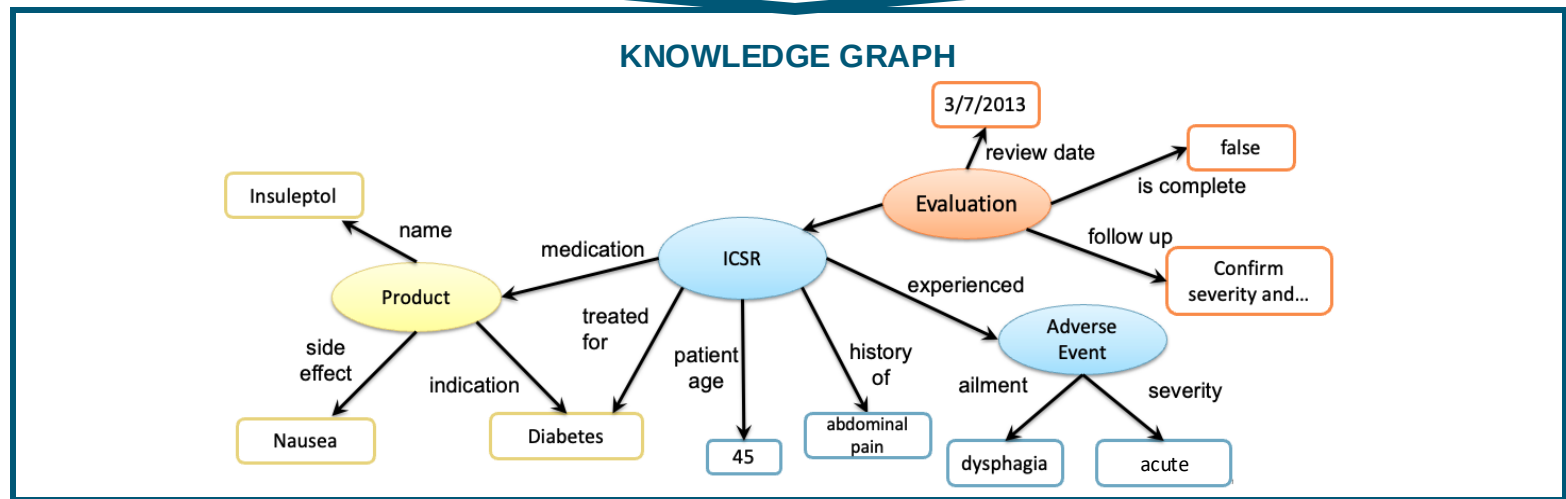
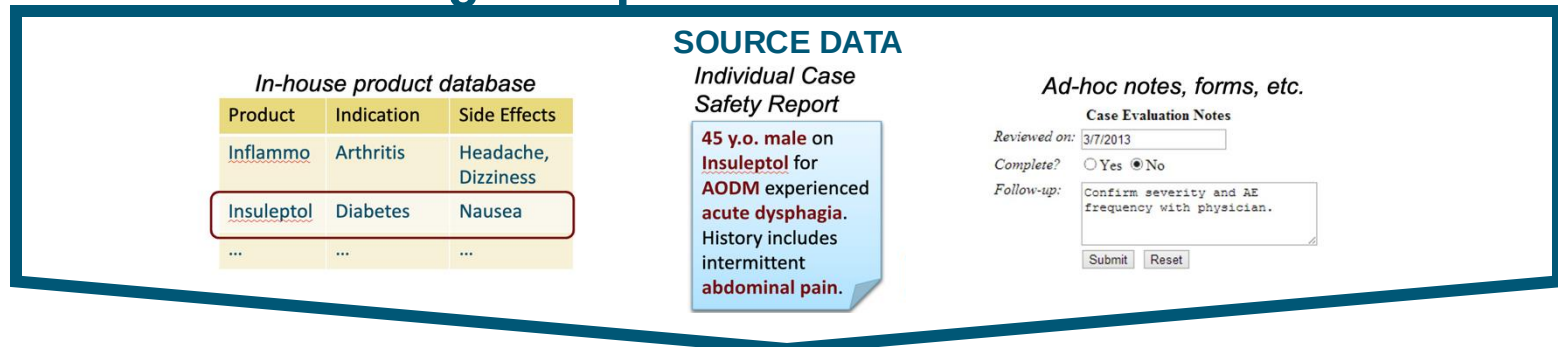


ACCELERATING PATIENT SAFETY WITH KNOWLEDGE GRAPHS: LESSONS FROM A SUCCESSFUL IMPLEMENTATION

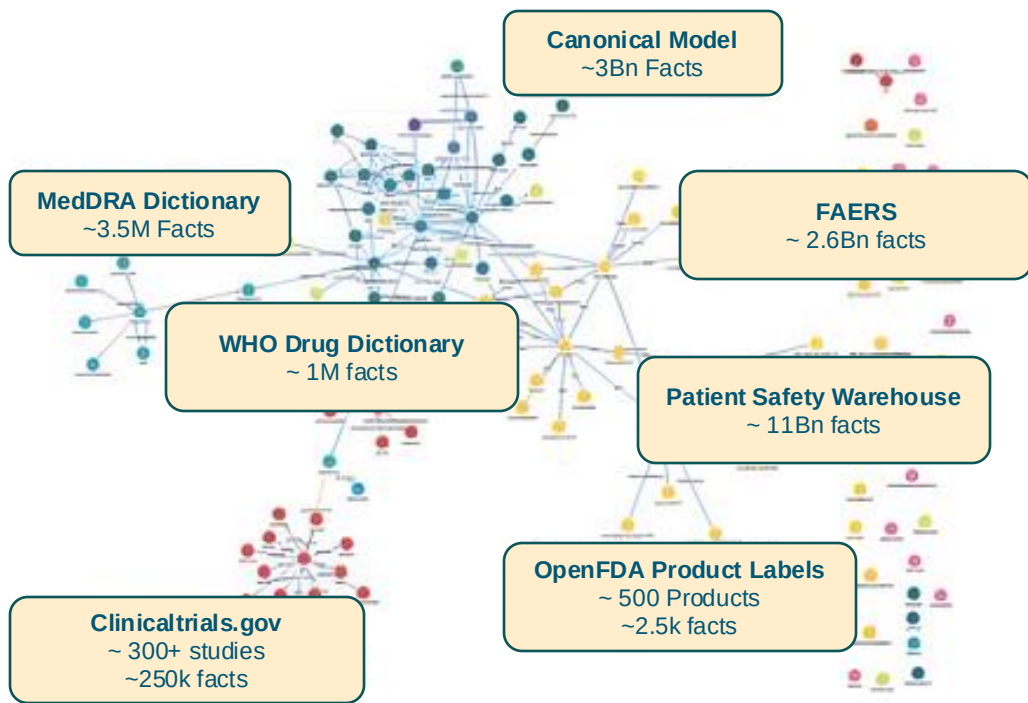
Kirti Aggarwal, Senior Technical Consultant
Patrick Jackson, Principal Technical Consultant
Partha Bhattacharjee, Solution Architect Director

SOLUTION OVERVIEW

A Primer on Knowledge Graph



Patient Safety Knowledge Graph



20 Bn+

Facts (Wikipedia scale)

7

Data Sources (and growing)

Patient Safety Warehouse

FAERS

MedDRA

WHO Drug Dictionary

OpenFDA Drug Labels

MeSH

Clinical Trials

30s

Typical query response time

30+

Dynamic Filters on Dashboard

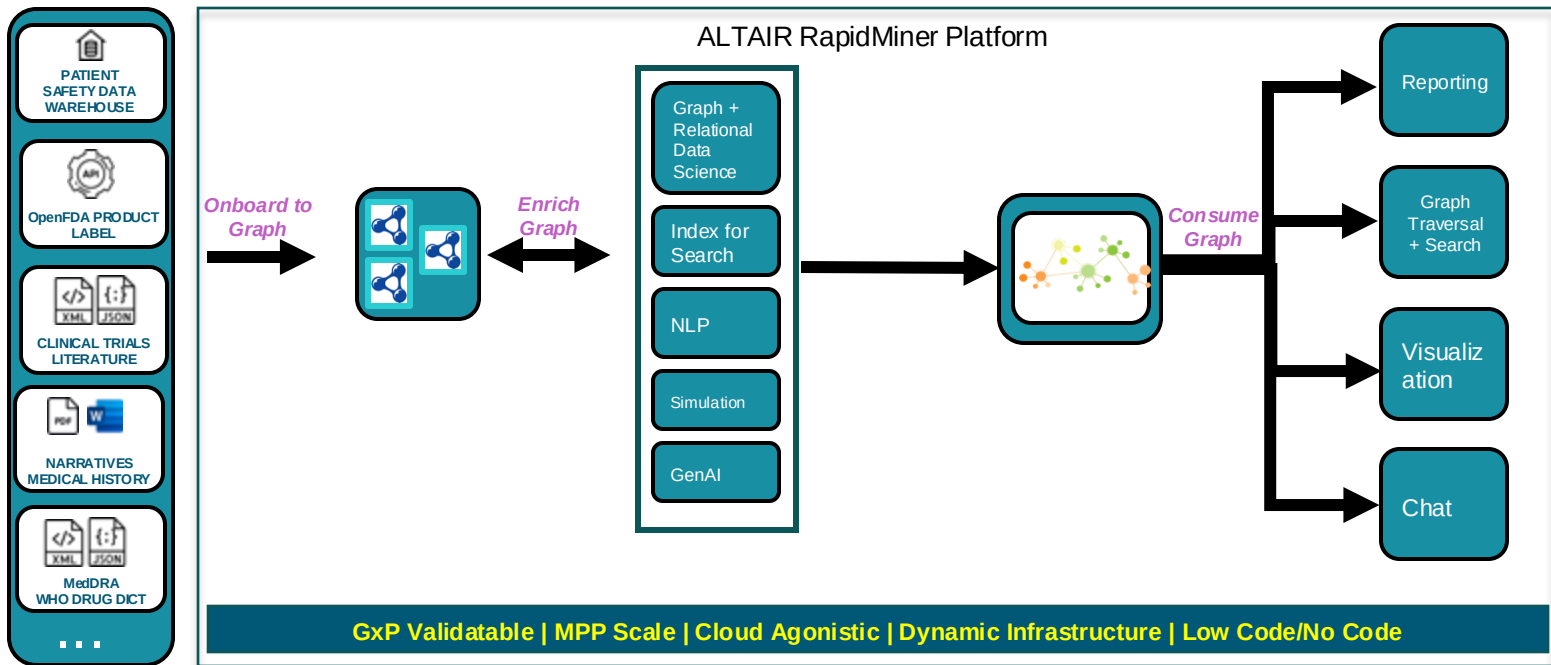
GxP Validated

Solution Data Flow



Disparate structured and unstructured data sources

Researchers, analysts, and business users interact with dashboards to make on-demand queries across all data sources



User Workflow

1

SELF-SERVICE

2

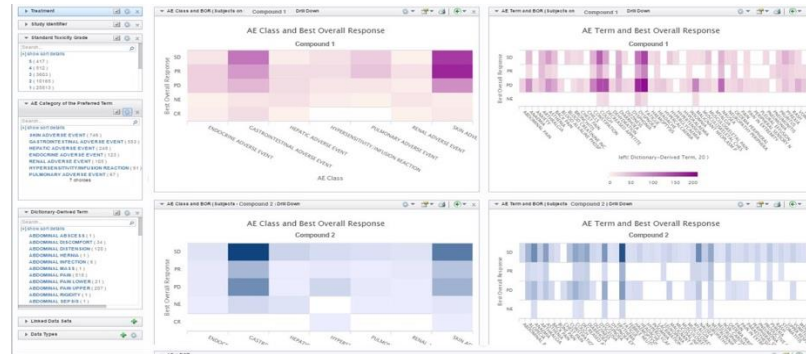
USER WORKFLOW

3

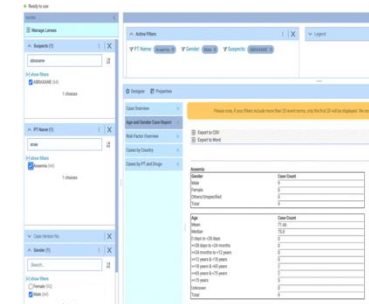
SEARCH + FILTER

- **Demographics**
- **Adverse Events**
 - Filter using MedDRA hierarchy + SMQ + CMQ
- **Suspect Products and Conmeds**
 - Filter using WHO Drug Dictionary Hierarchy
- Search phrases in **narratives and medical histories**
- MedDRA Terms in **Drug Labels**

ANALYZE



REPORT



LESSONS LEARNED

Lessons Learned

1. Enhanced Risk Factor Analysis is a True Differentiator

1 Apply Global filters

2 + Search Labels and Narratives

3 + Apply Fine-Grain Filters

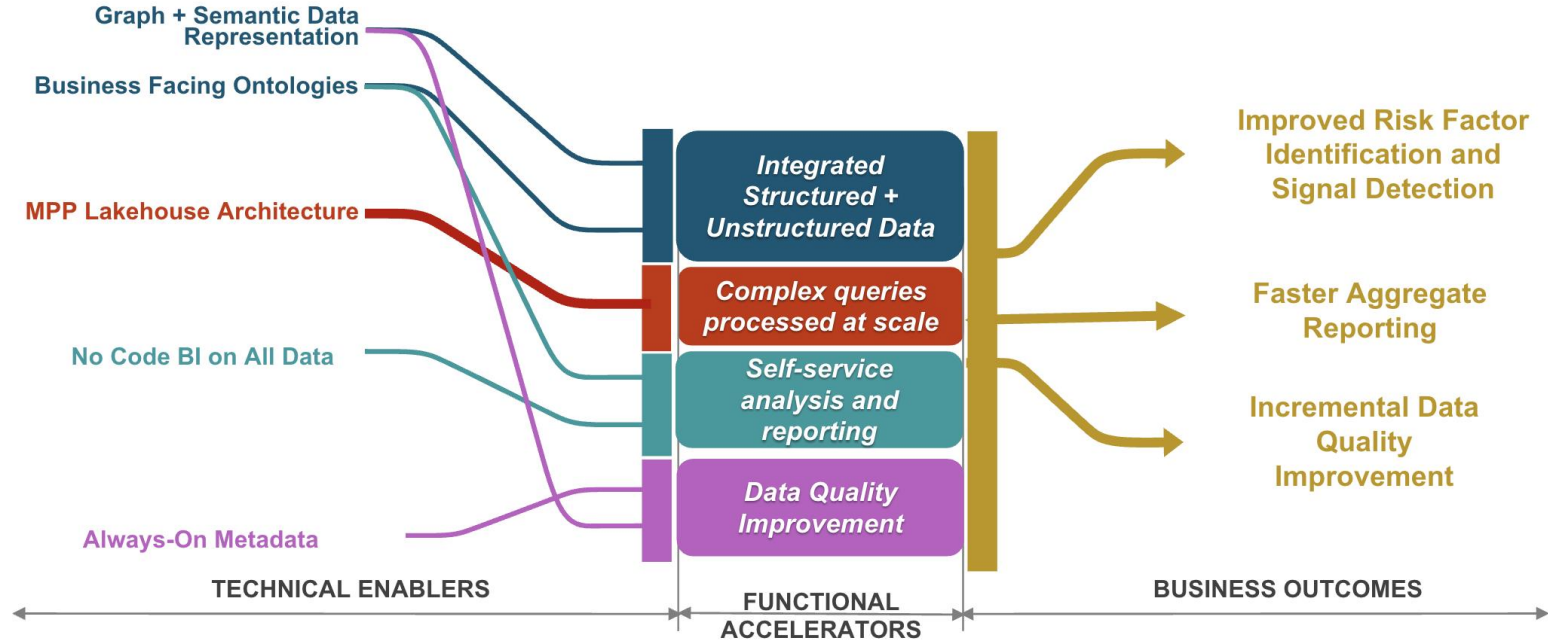
4 View Aggregate Results and Case Listings

The workflow is as follows:

- Apply Global filters:** The first screenshot shows the 'Summary Risk Factor Details' panel. A red oval highlights the 'Global Filters' section, which includes fields for 'Age Range and Age Group', 'Gender', and 'Medical History'. A red arrow points from this section to the next step.
- + Search Labels and Narratives:** The second screenshot shows the 'RISK FACTOR FILTER CRITERIA' panel. A red oval highlights the 'Search on Narrative Keyword' field, which contains the text 'fever'. A red arrow points from this field to the next step.
- + Apply Fine-Grain Filters:** The third screenshot shows the 'Summary Risk Factor Details' panel. A red oval highlights the 'Active Filters' section, which includes fields for 'Medical History PT - Category', 'Medical History Verbatim - Category', and 'Concomitant Medications - Category'. A red arrow points from this section to the next step.
- View Aggregate Results and Case Listings:** The fourth screenshot shows the 'CASE LISTING' panel. A red oval highlights the 'Filter by Dimension' dropdown, which is set to 'All'. A red arrow points from this dropdown to the next step.

Lessons Learned

2. Mapping Technical Enablers to Functional Accelerators Drives Buy-in



- For requirements verification and quick iteration
- For innovation (e.g., ruleset to match drugs and labels across sources)

1 Shortlist cases using filters

2 View AE + Suspect Med + Con-med Data

3 View AE in Product Label

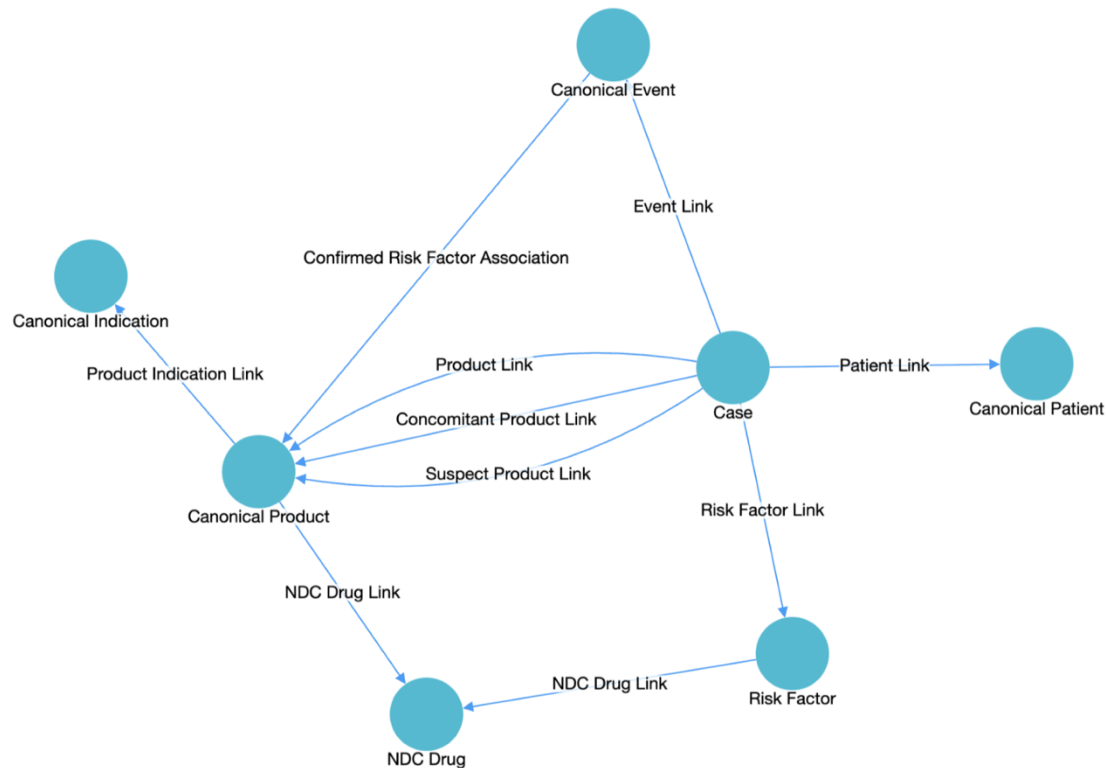
Lessons Learned

5. Building With GxP Validation Intent From Outset is Efficient

- Decide what will be excluded from its purview
- Important to develop shared understanding of the validation perimeter for the solution
 - Design operations to meet the Installation-, Performance- and Operational Qualification requirements.
- Ability to rely on Out of the Box capabilities of the product is a key accelerant during the validation effort.

Lessons Learned

6. Simple Business-Facing Ontologies Drive Value



Lessons Learned

7. Data Quality Improvements are an Emergent Property of Knowledge Graph Systems

- Knowledge graphs ensure data always exists with its context i.e., metadata. Such metadata are modeled using ontologies.
- The solution makes such data available for ontology-driven self-service analysis to not only business users but also data engineers.

8. Legacy Systems are Fallible

- Every "Why don't the counts match?" is an opportunity to investigate and fix issues, either in the knowledge graph or upstream systems

DEMO

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Unstructured Data
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[CREATE GRAPHMART](#) [CREATE PIPELINE](#) [CREATE ONTOLOGY](#)

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Recent Activity [VIEW ALL ACTIVITY](#)

- Generate** [http://ndc.com/ontologies/NDC_Drug_Ont...]
Successfully generated ontology: NDC Drug Ontology
Run Time: 0 secs | End time: Sep 17, 2024 - 2:25:58 am
- Save** [http://cambridgesemantics.com/ontologies/P...]
Successfully saved ontology: Patient Safety Canonical Model
Run Time: 50 secs | End time: Sep 17, 2024 - 2:25:54 am
- Generate** [http://ndc.com/ontologies/NDC_Drug_Ont...]
Successfully generated ontology: NDC Drug Ontology
Run Time: 0 secs | End time: Sep 17, 2024 - 12:45:30 am
- Save** [http://cambridgesemantics.com/ontologies/P...]
Successfully saved ontology: Patient Safety Canonical Model
Run Time: 25 secs | End time: Sep 17, 2024 - 12:45:25 am
- Refresh Graphmart** [Patient Safety Ingestion Graphm...]
Successfully refreshed Graphmart.
Run Time: 5 mins, 58 secs | End time: Sep 17, 2024 - 12:01:27 am
- Reload Graphmart** [Patient Safety Ingestion Graphm...]
Successfully reloaded Graphmart.
Run Time: 24 mins, 7 secs | End time: Sep 16, 2024 - 11:27:23 pm
- Reload Graphmart** [Patient Safety Ingestion Graphm...]
Successfully reloaded Graphmart.
Run Time: 27 mins, 40 secs | End time: Sep 16, 2024 - 10:51:50 pm
- Generate** [http://ndc.com/ontologies/NDC_Drug_Ont...]
Successfully generated ontology: NDC Drug Ontology
Run Time: 0 secs | End time: Sep 16, 2024 - 10:19:06 pm
- Save** [http://cambridgesemantics.com/ontologies/P...]
Successfully saved ontology: Patient Safety Canonical Model

Rows per page 10 1-10 of 980

AnzoGraph Summary
AnzoGraph 2024-09-12-02:22:24

Memory Usage
89.24 GB (26%) of 355.1 GB Used
Azg Platform Memory 3.65 GB
Azg Data Memory 33.28 GB
Azg Query Memory 52.31 GB

Aggregate CPU: 48

- Graphmarts (0)
0 Online
- Datasets (Not Available)
- Data Layers (Not Available)
- Steps (Not Available)
- Cluster Nodes (1)
1 Online

More Information



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