DIRECTIONS

LIVE Online

Extend your GIS Capabilities with Graph Data Analytics

ArcGIS Knowledge

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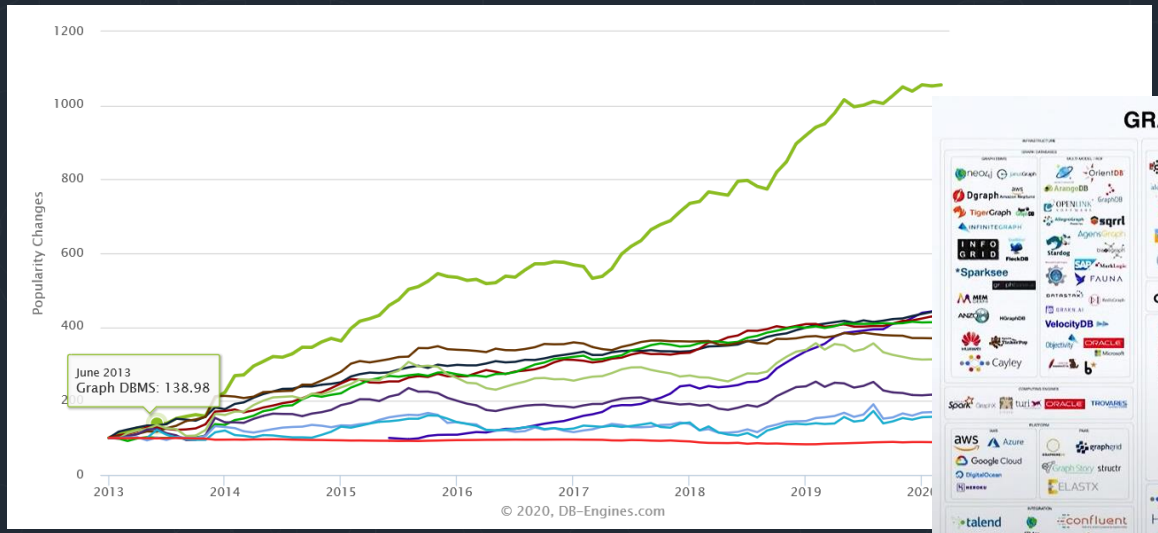
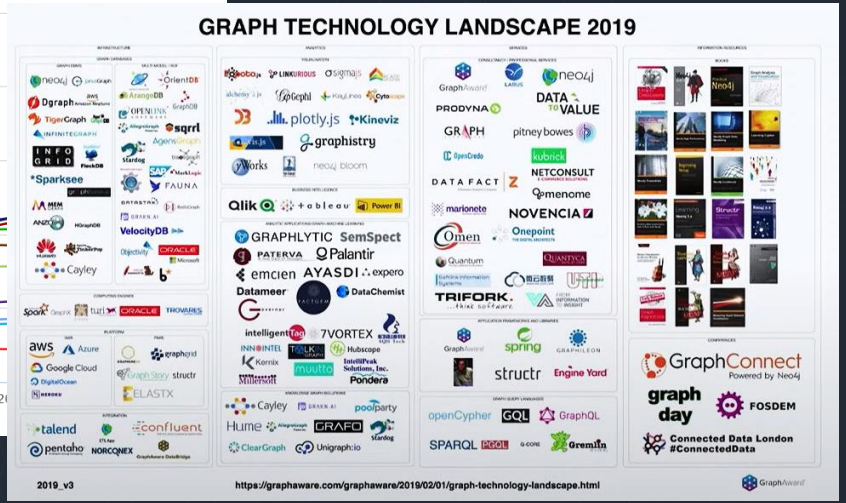
Database Management System Trends

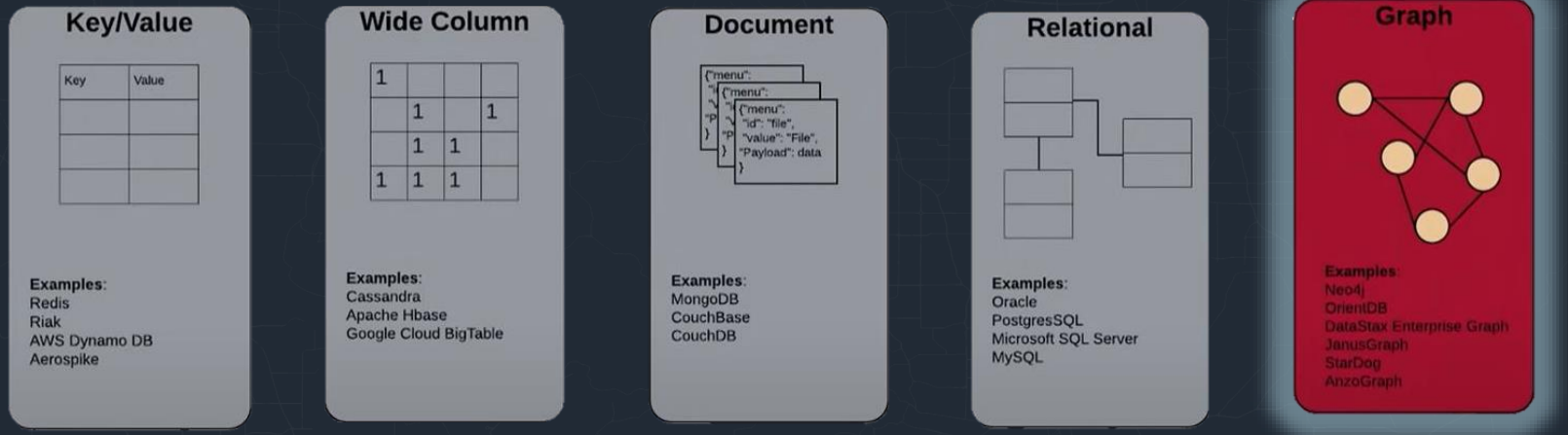
Complete trend, starting with January 2013



Massive graph database platform with specific target market



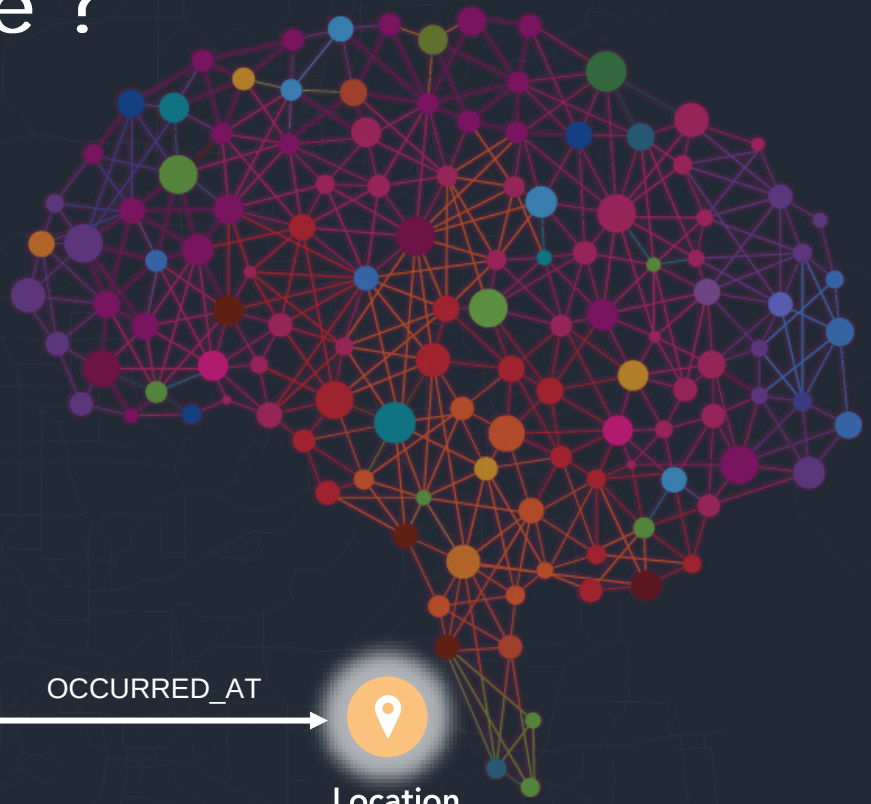
Where do Graph Database Fit ?



Simple — DATA COMPLEXITY — Complex

What is Graph Database ?

- Graph database using a natural way to model complex relationships in data
- A type of database that focuses on storing data as entities and their relationship
- Commonly consists of three main components: Entities, Relationships, and Properties



Person Properties

nhs_no : 117-66-8129
surname : Hamilton
name : Todd

Officially Released : November 2021

Why was ArcGIS Knowledge Built ?

Massive increases in Data Generated - structured and unstructured

Need for adding geospatial references to data and analytics

Need for adding geospatial references to data and analytics Data Fusion

Asking the Human questions of the data

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The ArcGIS Knowledge Vision

ArcGIS Knowledge integrates our market-leading spatial analytics with new graph analytic capabilities

- Connecting spatial and non-spatial data from disparate data sources
- Working with logical and spatial relationships in their GIS
- Applying graph analytics

The Target Users

Advanced Analytics & Solutions Teams

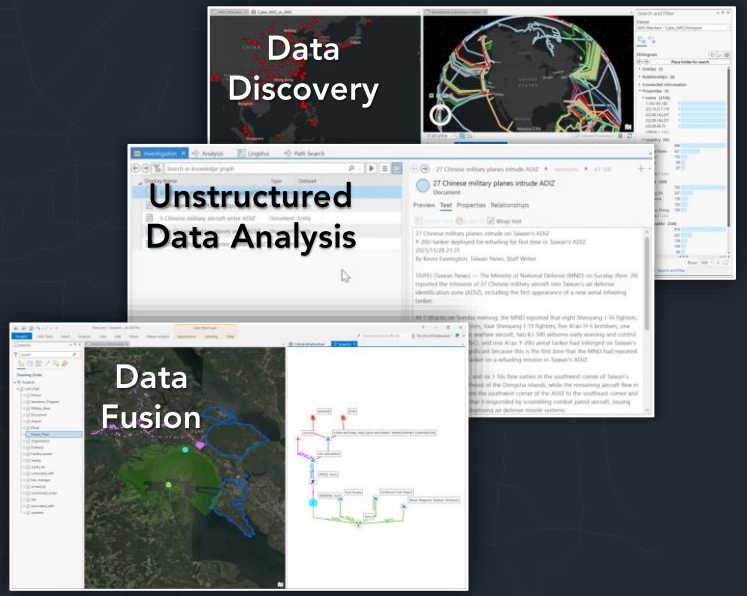
- Financial Services
- Manufacturing
- Global Retail

Intelligence & Investigative Analyst Teams

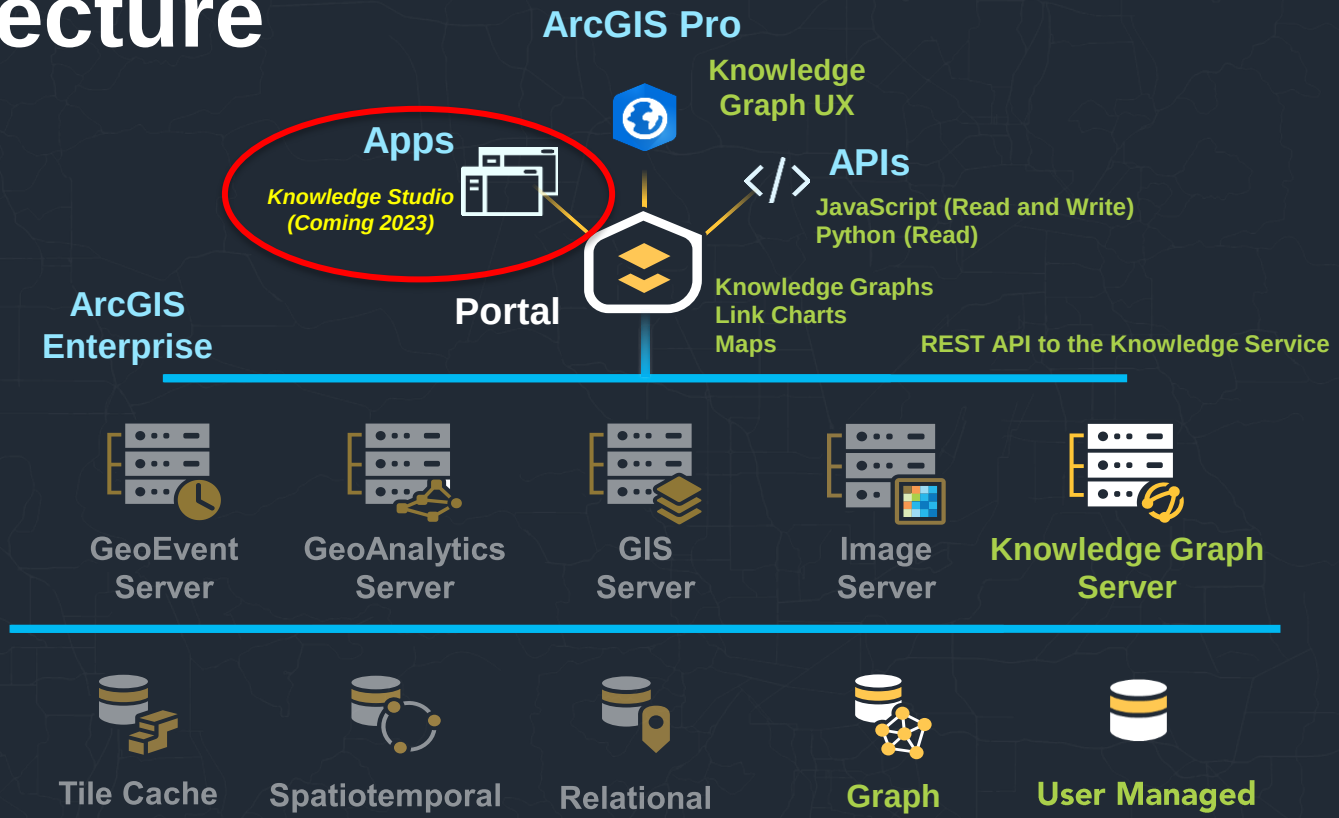
- Defence Intelligence
- Intelligence
- S&L Public Safety
- National Health
- State Health

Supply Chain Logistics and Inventory Risk Mgt Teams

- Oil & Gas - Distribution
- Manufacturing
- Global Retail
- Logistics



Architecture



Use Case Demonstration:

Uncovering drug trafficking network from unstructured crime datasets

About Demonstration Datasets

- We used UK street-level crime data, freely available from data.police.uk
- The crime data provides unique crime IDs, longitude and latitude (at street or ‘block’ level), month, crime type, and last outcome

Data Records

14.904 Locations data

1.000 Officers data

28.762 Crime events

368 Person Information

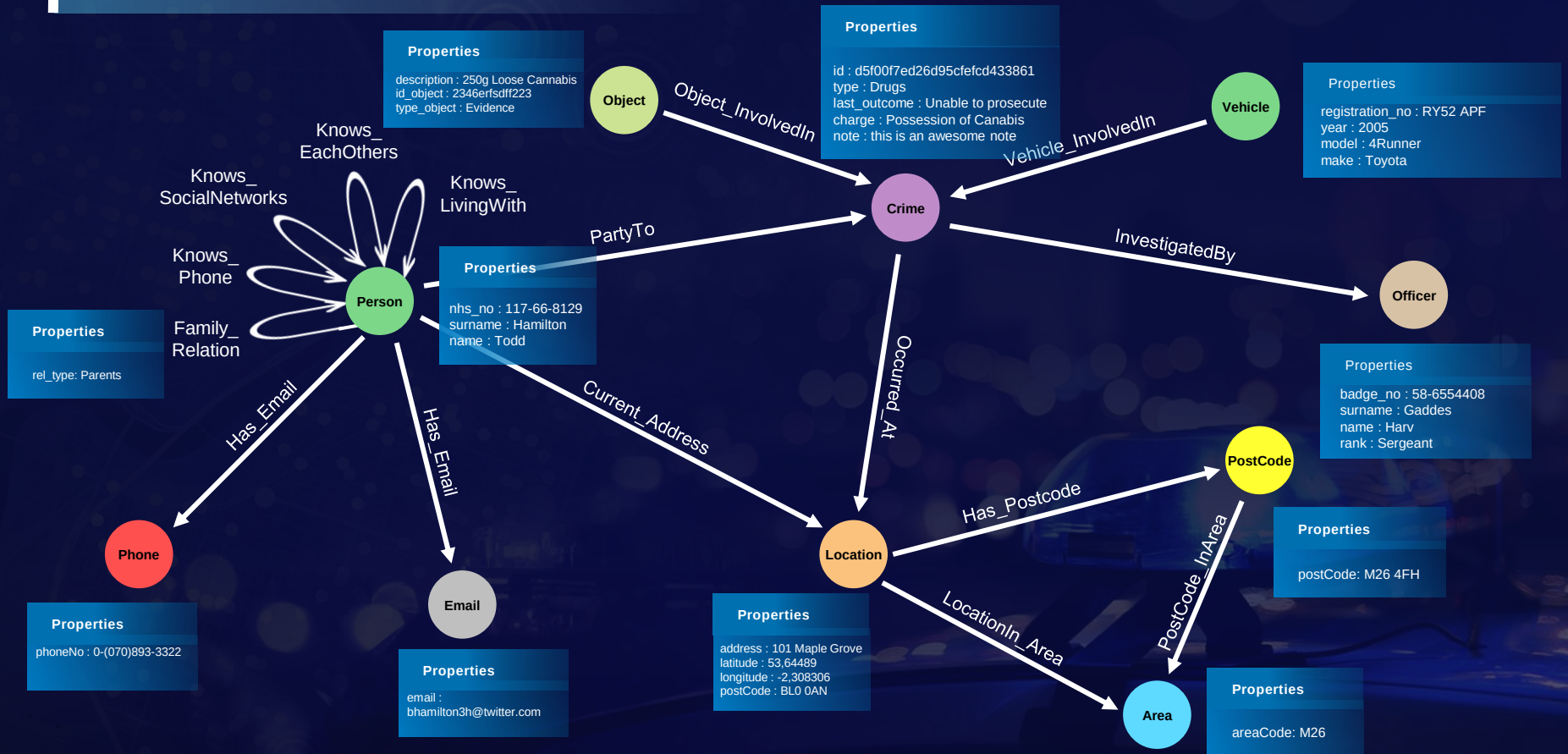
POLE Data Model Approach

POLE Use Cases

- Policing
- Counter Terrorism
- Border Control / Immigration
- Child Protection / Social Services
- Missing Persons
- Prisoner Rehabilitation
- Insurance Fraud Investigation

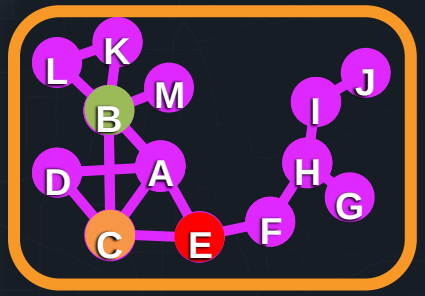
Our Crime Data Model

UK street-level crime data, freely available from data.police.uk



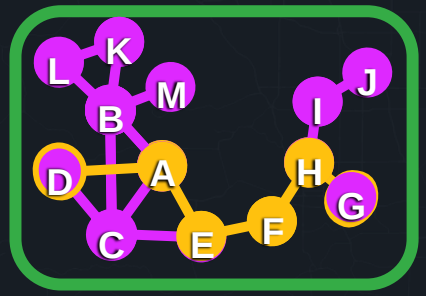
Demo 1 : Drugs Crime Investigations using Graph Analytics Tools

- Graph analytics uses math to investigate crime pattern
  - Based on Quantity, Strength, Direction, and Patterns



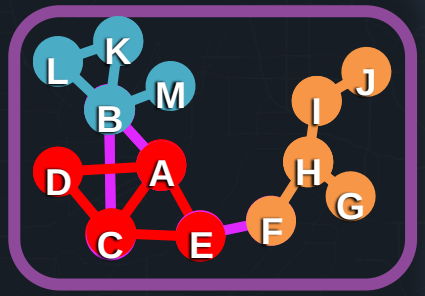
Centrality

What are the most important or influential entities?



Paths

What else exists on the path between two entities?



Communities

Which entities behave similarly?

Demo 2 :

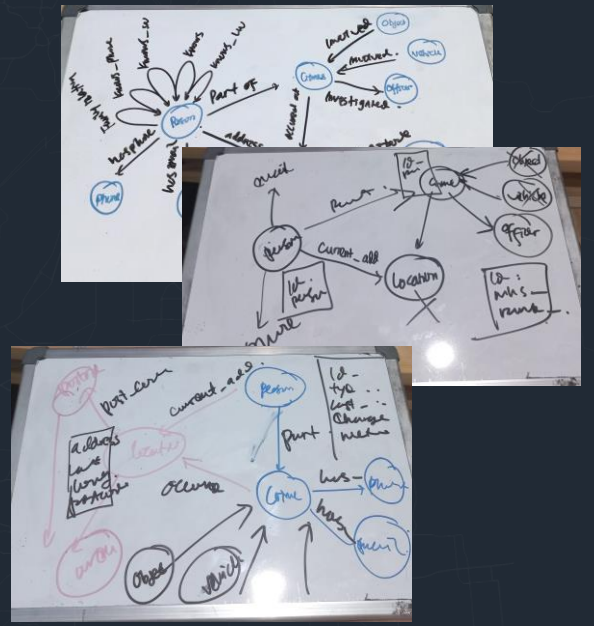
Vulnerable Person’s Investigation using Advance Cypher Query

- Explore a series of queries to simulate research on 'vulnerable person’s' or 'at risk' individuals in the graph.
- Vulnerable persons refers to someone who is not themselves associated to a crime.
- **Focus on top 5 most vulnerable person’s**

Lessons Learned in Data Modeling Development

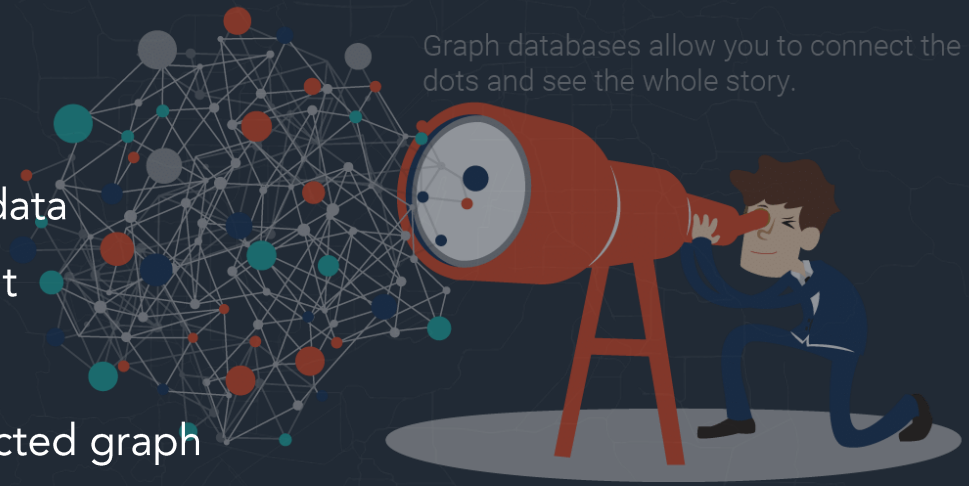
Regarding Data Modeling

- Data modelling is the most difficult and crucial stage of analysis
- There is no “one-size-fits-all” approach to data modeling, varies depending on the use case that needs to be solved
- Less is more in the graph data modeling stage, identify which entities play central and important roles
- Graph database (particularly in data model stages) is flexible, but still have common rules
- Complex data models can result in difficulties during data exploration



Benefits Working with ArcGIS Knowledge

- Cost-effective and highly flexible
- Answer your business questions by retrieving information from specific entities and relationships
- Adds new entity into existing graph data structure without endangering current functionality
- Geo-spatial analytics with interconnected graph dataset allows you to find unexpected meanings for complex decision-making



Q & A