UPDM

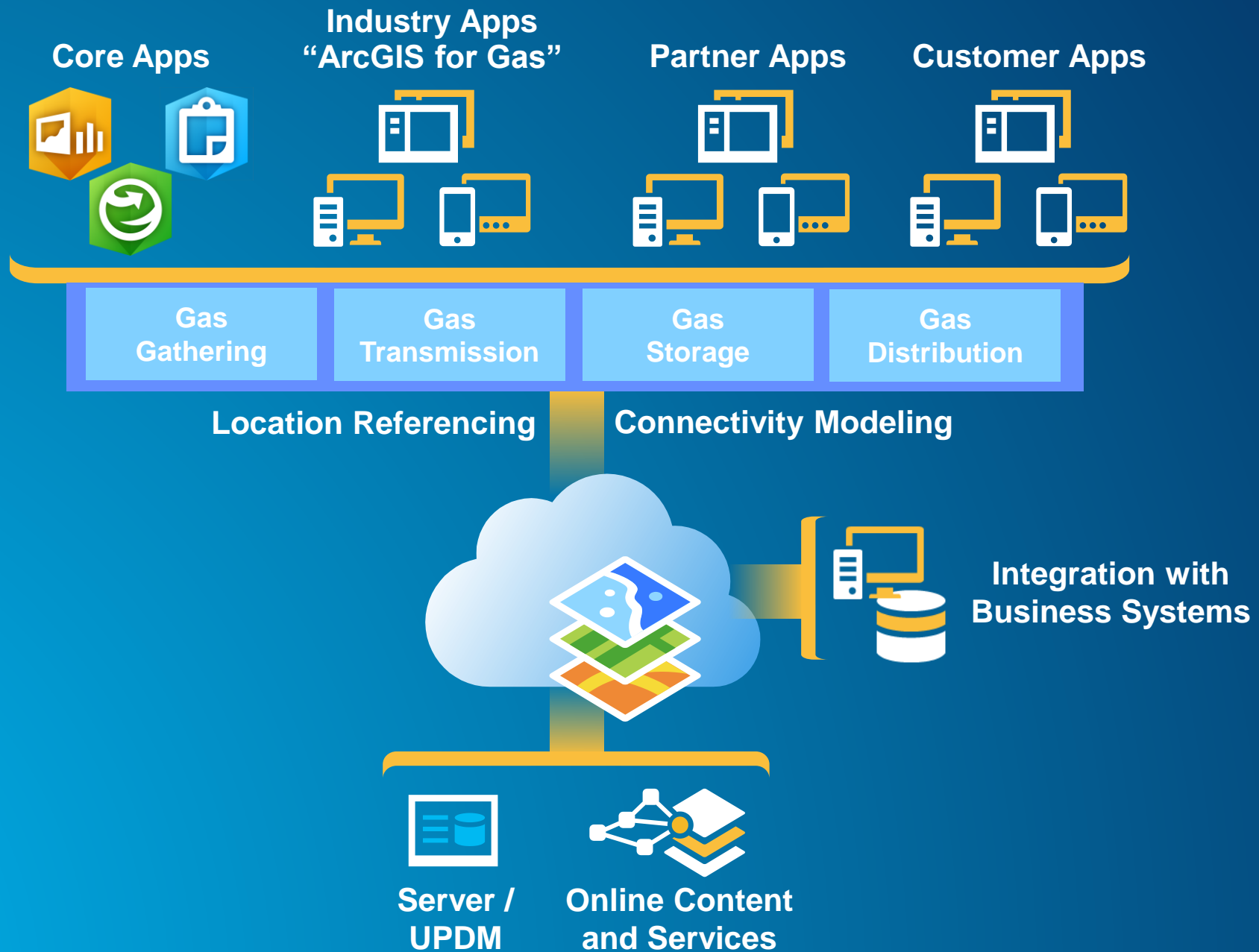## Utility & Pipeline Data Model

Esri Electric and GIS Conference
Update Technical Session
Wednesday, October 7, 2015
8:30 am – 9:15 am

About UPDM

Esri's UPDM is a geodatabase data model template for operators of pipe networks in the gas and hazardous liquids industries. UPDM is a

- moderately normalized data model

- that explicitly represents each physical component of a pipe network from the wellhead to the customer meter, terminal or delivery point, in a single database table object.

Business Drivers for UPDM

- Enable vertically integrated gas companies that have distribution, transmission and gathering pipe networks to use one data model

  - The trend is to a smaller number of bigger gas companies

  - More gas companies will have integrated systems including a combination of distribution, transmission and gathering assets

  - How those high pressure distribution pipes are operated and how they are regulated will differ

- Enable location referencing and connectivity modeling to operate on the same geodatabase

Business Drivers for UPDM

- Simplify staff training

  - Single workflow for maintaining distribution, transmission and gathering asset data

- Better manage HP Distribution pipe (> 20% SMYS)

- Improve staff efficiency and productivity

UPDM evolution

- Traces its heritage to the first release of the Gas Data Model in 2001, being renamed now to reflect broadened scope

- Partners and customers always have played a role in the development of the Gas Data Model, and they are playing an active role in the evolution of UPDM

- The latest release of UPDM occurred July 1, 2015.

UPDM adoption

- As of September 30, 2015, UPDM has been downloaded by non-Esri employees 545 times since.


Heat map as of end of July 2015
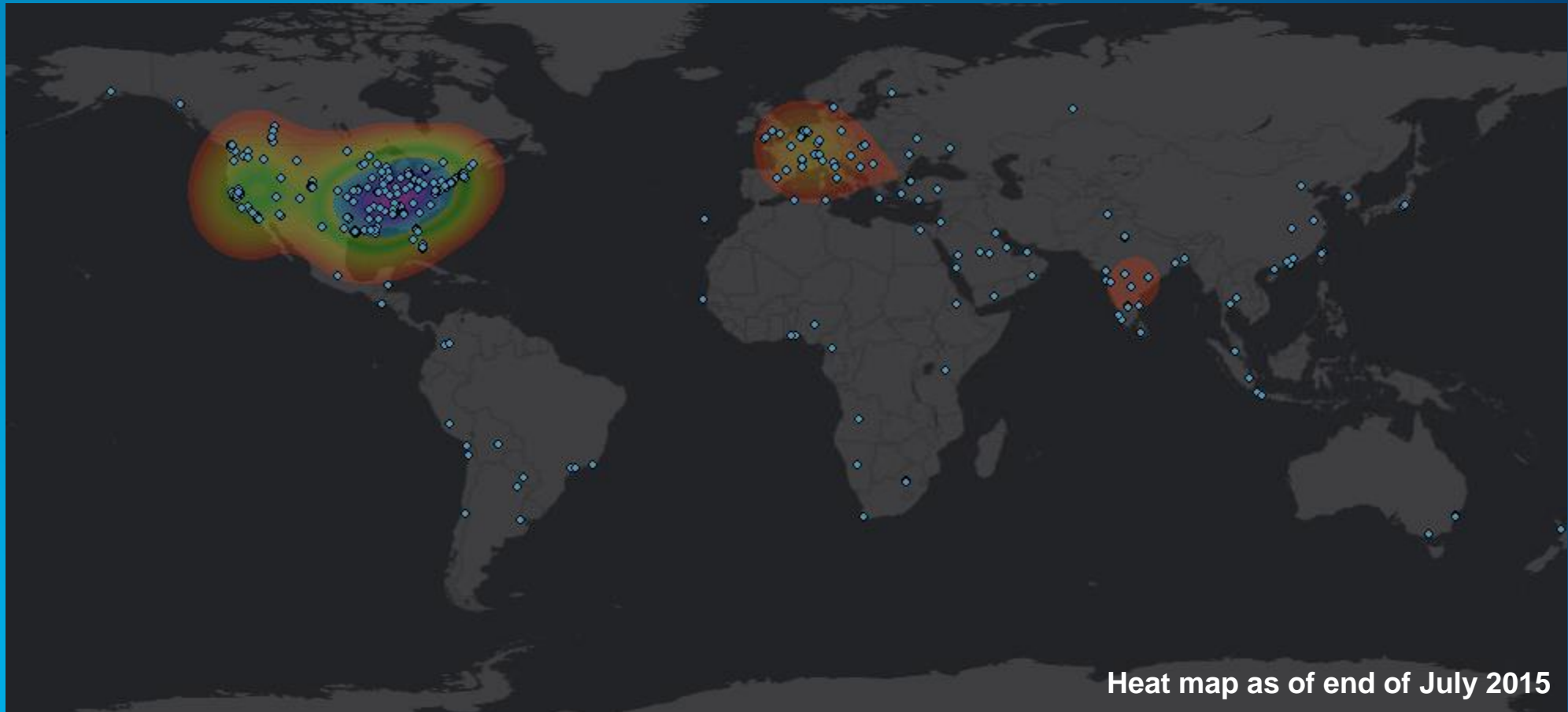
UPDM adoption

- Early adopting customers of various types already are implementing UPDM:

    - Vertically integrated gas company

    - Hazardous liquids pipeline

    - Gas transmission pipeline

UPDM adoption

- Esri solutions are based on UPDM.

- ALRP is home-based on UPDM. An alternative data model is in development by the PODS Association,

- Partners are developing on UPDM.

  - DNV GL

  - Eagle Information Mapping

  - Geonamic Systems

  - New Century Software

  - Novara GeoSolutions
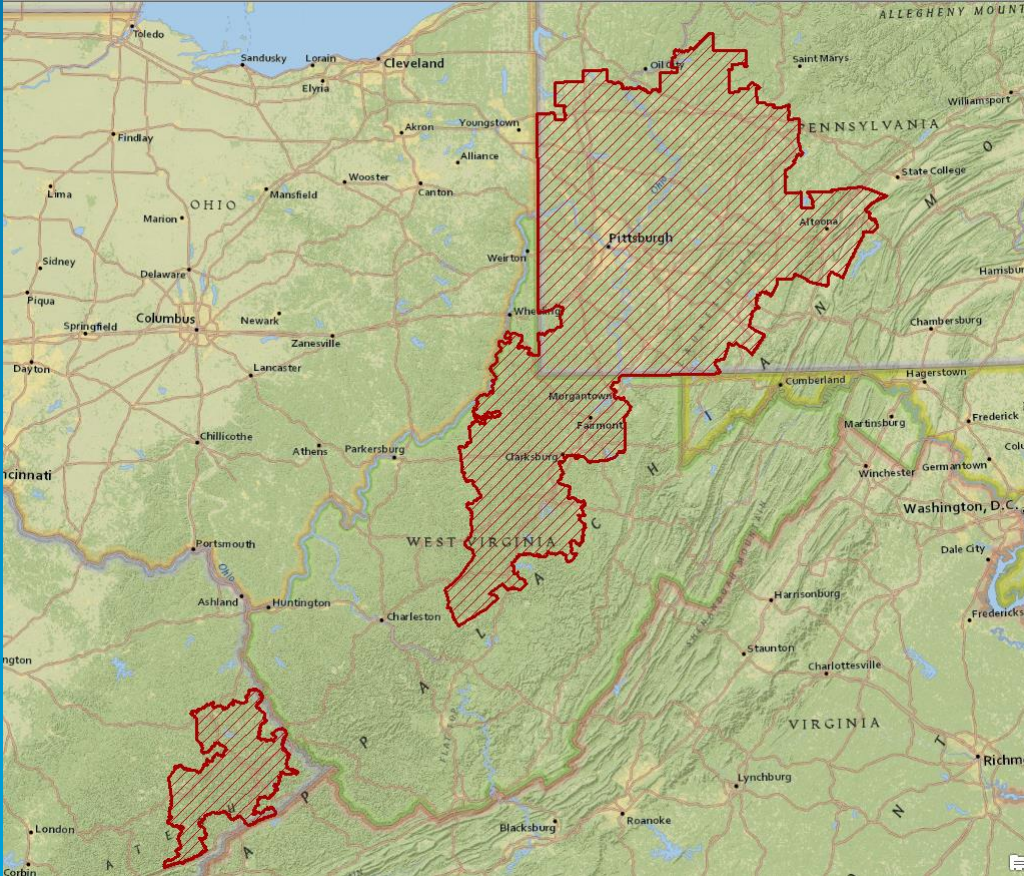
Peoples Natural Gas
Pittsburgh, PA

Gas System
- 700,000 Customers
- 15,000 Miles Distribution Pipe
- 153 Miles of Transmission Pipe

10 Desktop As-Built Editors

1300 Office Web Viewers

750 Mobile Users

PEOPLES

UPDM Deployment | Went Live with UPDM, July 2015

Technical Drivers to Evolve UPDM

- Represent "Best practice" for managing data in a Geodatabase

- Align with ArcGIS Pro and advances being developed in the ArcGIS Pro environment

- Align with ArcGIS Location Referencing for Pipelines extension

- Improve scalability and performance for larger transmission pipe networks using fully normalized data models (Performance and scalability issues not currently existing in the gas distribution user community)

UPDM support

- Esri has actively maintained and enhanced the Gas Data Model through the years, and that will continue with UPDM.

Geodatabase Concepts & UPDM

- All events stored as features

- Connectivity model used to maintain physical assets

- Linear referencing model used to maintain transmission integrity data

- Metadata managed as part of feature (Editor Tracking & Archiving)

- Documents managed with Attachments

- Time Aware (be able to view system at different states in time)

Improving Performance thru Better Data Management
Transmission – Viewing Pipe Segments
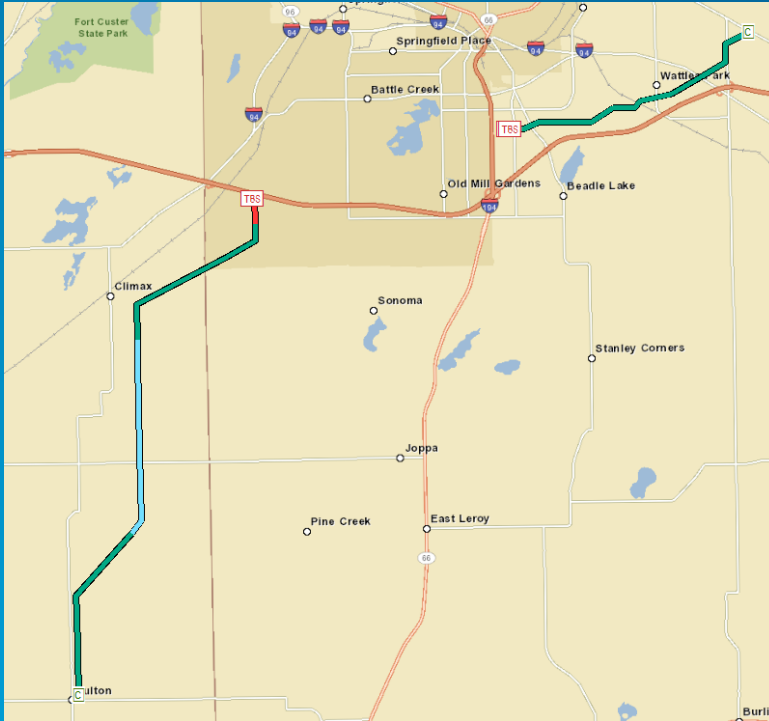
Database Activity with Legacy Data Model
- **1 – Geodatabase**
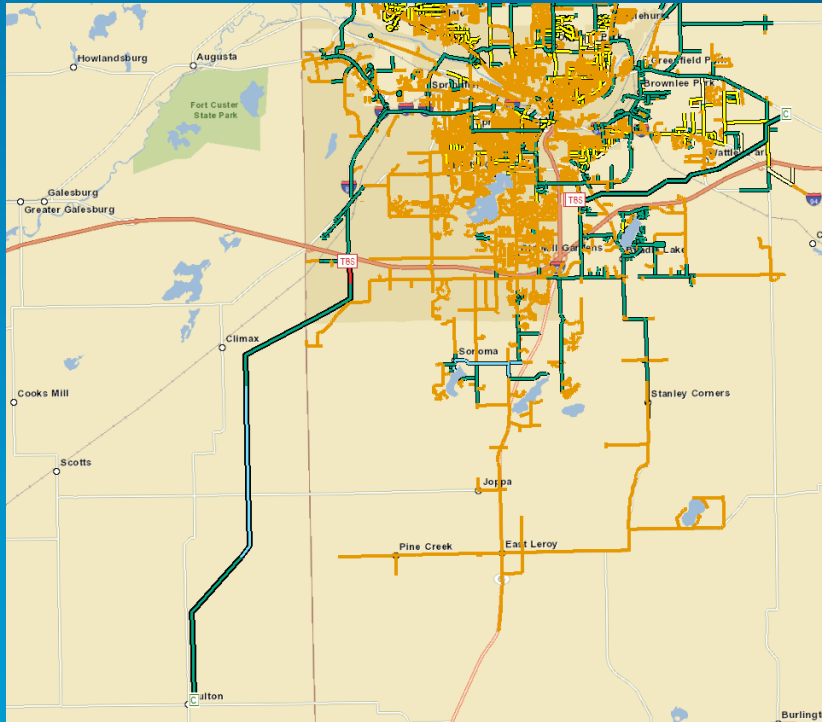- **3 – Tables/Featureclasses queried**

Database Activity with UPDM
- **1 Geodatabase**
- **1 – Featureclass queried**

66% Reduction in SQL queries in the database

Improving Performance thru Better Data Management
Transmission & Distribution – Viewing Pipe Segments
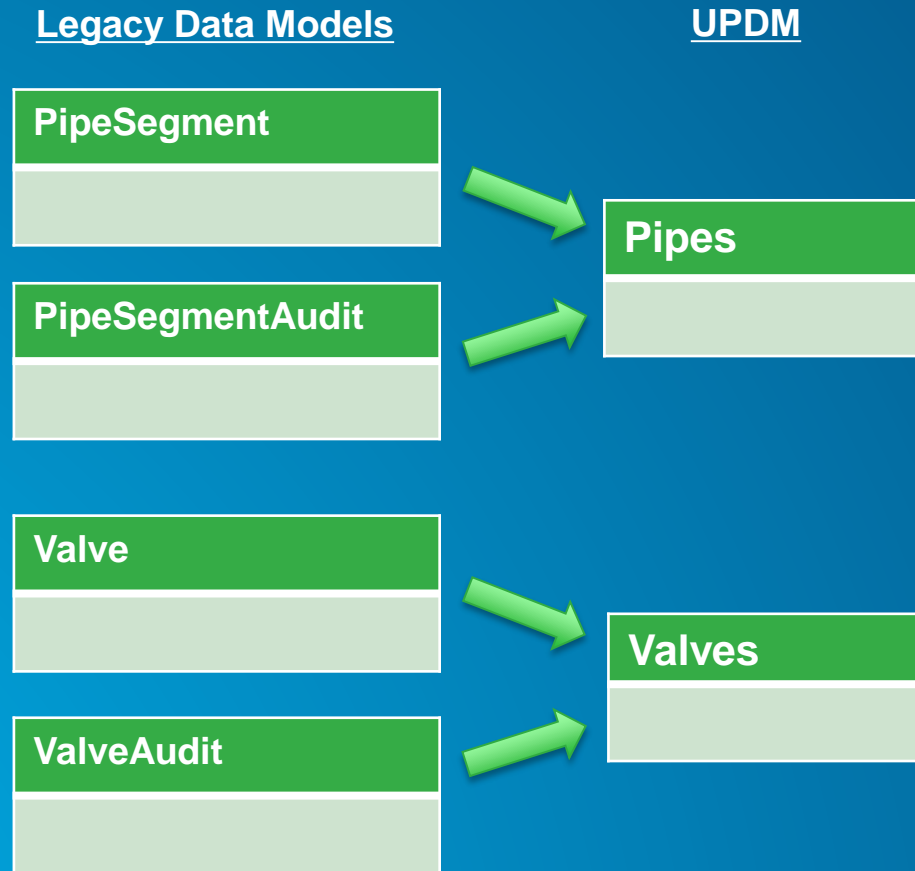

Database Activity with Legacy Data Model
- **2 – Geodatabases**
- **4 – Tables/Featureclasses queried**

Database Activity with UPDM
- **1 Geodatabase**
- **1 – Featureclass queried**

75% Reduction in SQL queries in the database

Improving Scalability thru Data Storage Efficiency
Transmission

Legacy Data Models

UPDM

PipeSegment

PipeSegmentAudit

Pipes

Valve

ValveAudit

Valves

50% Reduction in Records stored in the database

# Improving Scalability thru Data Storage Efficiency
Transmission & Distribution

Legacy Data Models   **UPDM**

PipeSegment

PipeSegmentAudit

Mains

Pipes
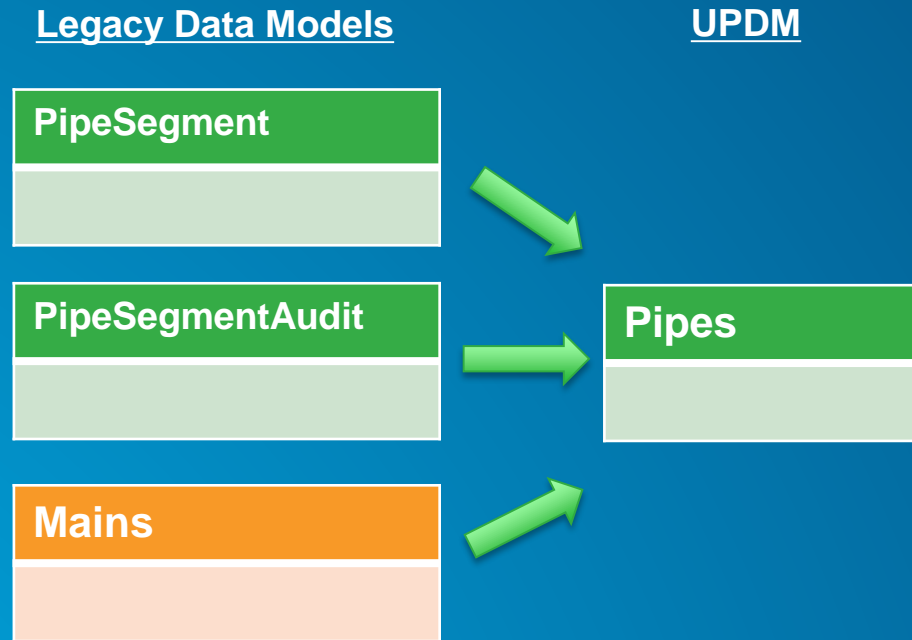
33% Reduction in Records stored in the database
66% Reduction in tables stored in the database

Release Schedule for UPDM

July 1, 2015 release of UPDM supports ALRP requirements.
Next release scheduled for Q4 2015.

Release Sequence

	Configured for Geometric Network	Configured for Utility Network	ALRP Schema
UPDM (Oct 2014)	Yes		No
UPDM (July 2015)	Yes		Yes (alpha)
UPDM (Q4 2015)	Yes		Yes(final)
UPDM (Q3/Q4 2016)		Yes	Yes
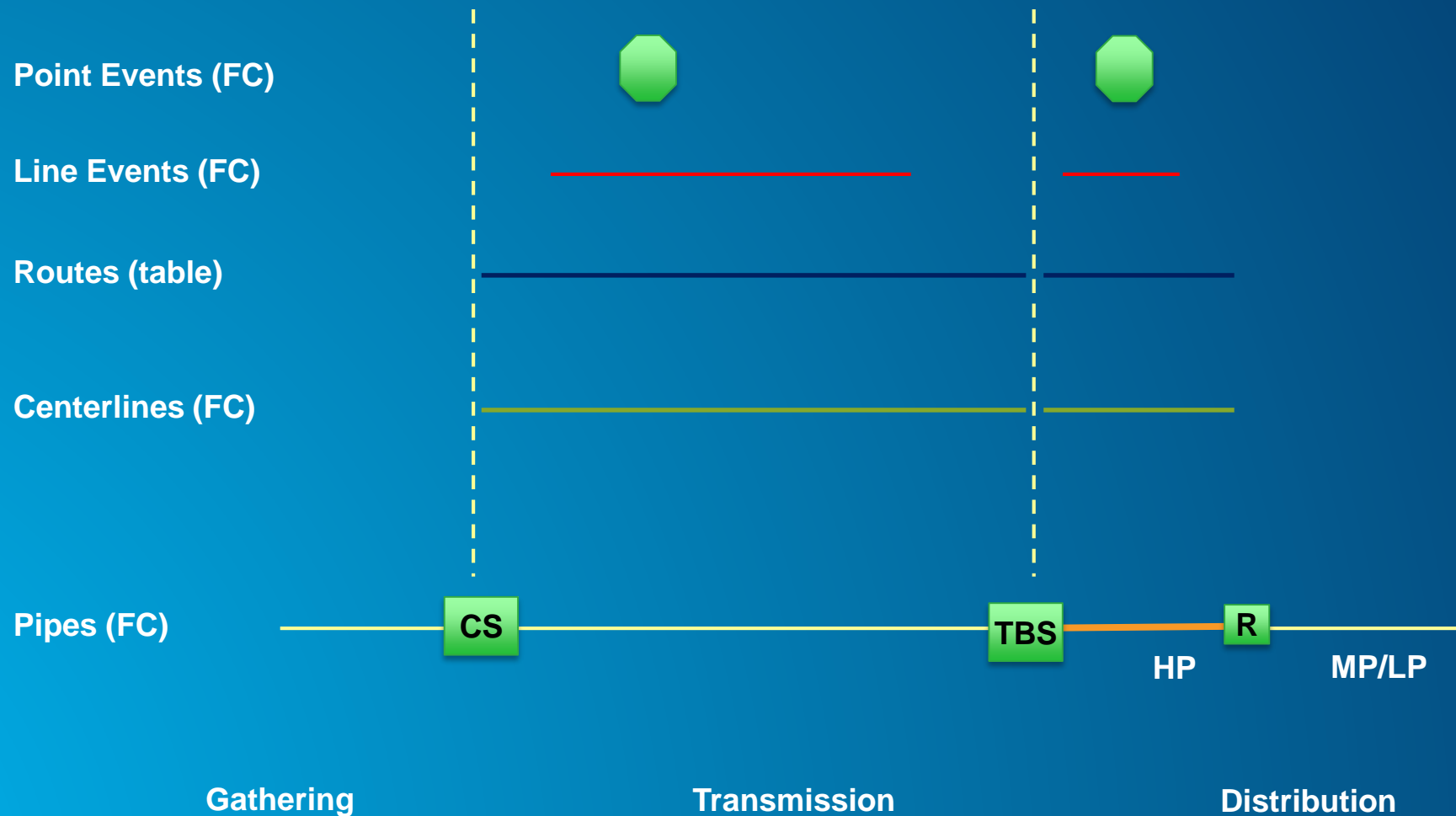
ALRP Schema in UPDM

P_Centerline
(Polyline FC**)**
-CENTERLINEIDGUID
-TODATE

P_CalibrationPoints
(FC)
-MEASURE
-FROMDATE
-TODATE
-ROUTEID
-NETWORKID

P_Redline
(FC)
-EFFECTIVEDATE
-MEASURE
-NETWORKID
-ROUTEID
-ROUTENAME
-ACTIVITYTYPE

P_Centerline_Sequence
(Table)
-FROMDATE
-TODATE
-ROUTEID
-CENTERLINEIDGUID
-NETWORKID

P_ContinuousNetwork
(FC)
-ROUTEID
-ROUTENAME
-FROMDATE
-TODATE

P_StationSeriesNetwork
(FC)
-ROUTEID
-ROUTENAME
-LINEID
-LINENAME
-ORDERID
-FROMDATE
TODATE
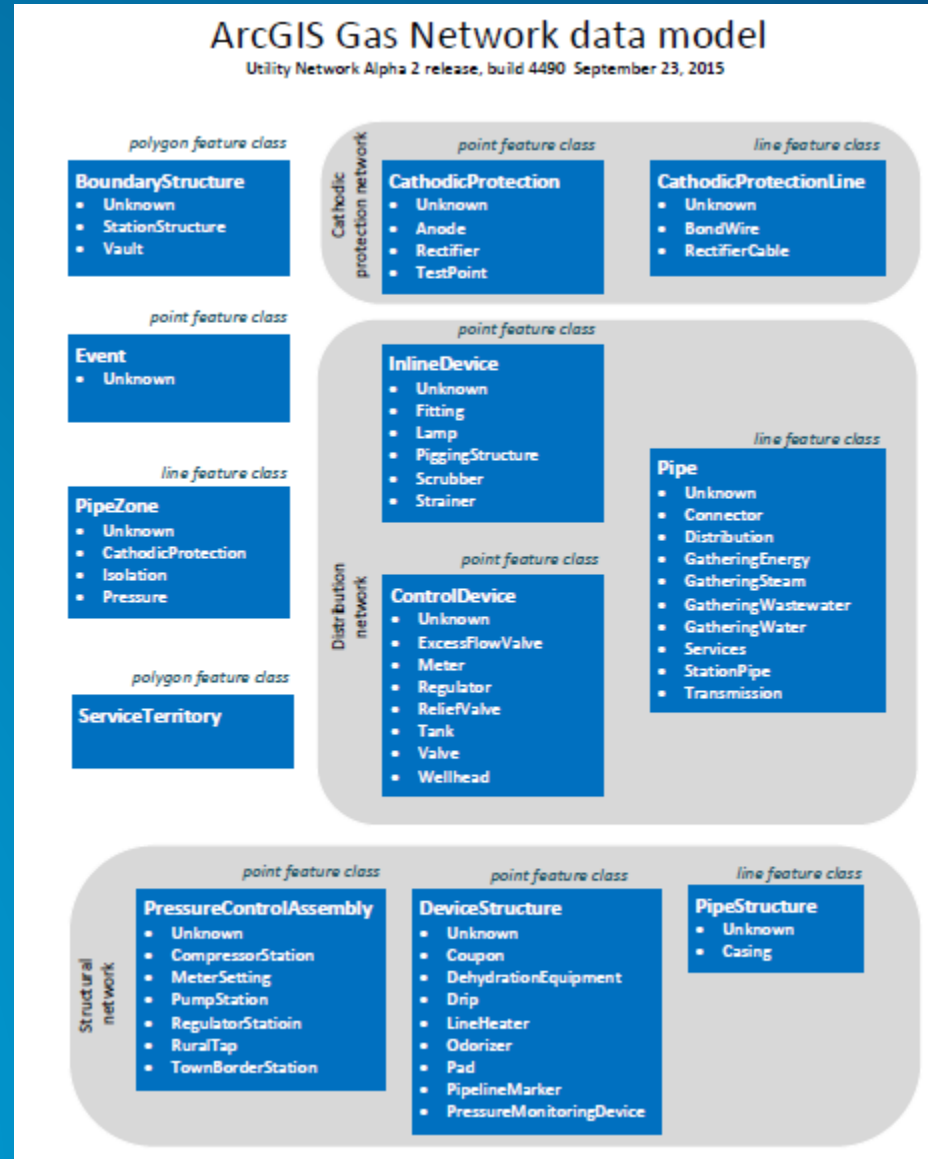
POINT EVENTS
(FC)
-EVENTID
-ROUTEID
-FROMDATE
-TODATE
-MEASURE
-LOCATIONERROR
-REFMETHOD
-REFLOCATION
-REFOFFSET

LINE EVENTS
(FC)
-EVENTID
-ROUTEID
-FROMDATE
-TODATE
-LOCATIONERROR
-FROMMEASURE
-FROMREFMETHOD
-FROMREFLOCATION
-FROMREFOFFSET
-TOMEASURE
-TOREFMETHOD
-TOREFLOCATION
-TOREFOFFSET

Utility Network

ArcGIS Gas Network data model
Utility Network Alpha 2 release, build 4490 September 23, 2015

esri

Understanding our world.