



Migrating a UPDM-PODS7 Implementation (w/APR) to a Utility Network (UN)

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Review of existing UPDM / PODS-7 Implementations



Pipeline Data Models - Overview

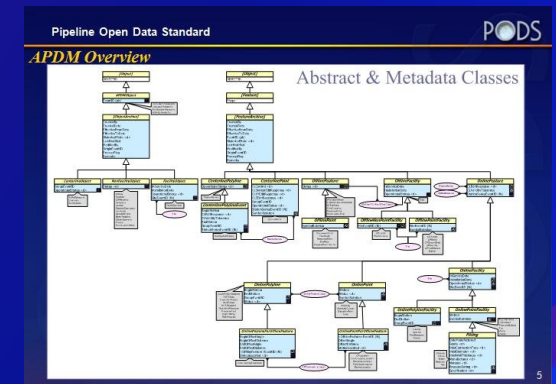
- **Foundation Models:**

- ISAT
- PODS
- PODS Spatial
- APDM



- **Pipeline data models have continued to evolve over the years**


- PODS-7
- UPDM



Reasons for not implementing UN during initial UPDM/PODS-7 migration?

- Various pipeline companies have already upgraded to UPDM and/or PODS-7, but did not implement a full Utility Network (UN). Why?
- The decision is often tied to a couple primary reasons:
 - An integrated UN supporting the LRS events wasn't yet available when the decision to move to ArcGIS Pipeline Referencing (APR) occurred
 - The implementation requirements (data gathering, data clean-up, QA/QC, etc.) necessary to take full advantage of a UN were deemed too excessive.
- Some additional items contributing to not implementing UN:
 - Traditional versioning vs. Branched versioning
 - Dependencies (3rd party apps, views, reports, ETL's, etc.) working against traditional versioning





How far must a midstream operator go to leverage UN technology?

What UN configuration options are available for midstream operators?

Option #1:

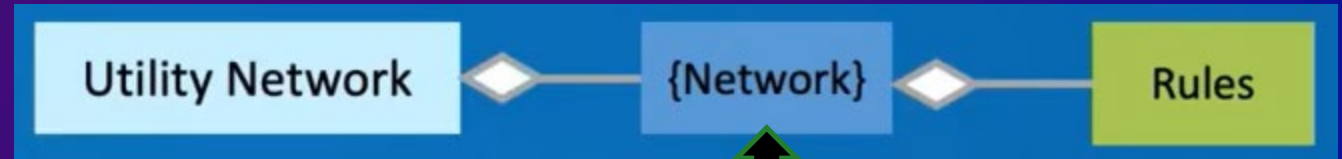
- **Staged Approach – (UN Prepared)**
- **Advantages:**
 - Validation of Network Topology
 - Define Network Rules
 - Develop Connected Network
 - Enable Branched Versioning
 - Enable OOTB Tracing Capabilities
 - APR & Feature Service Editing

Option #2:

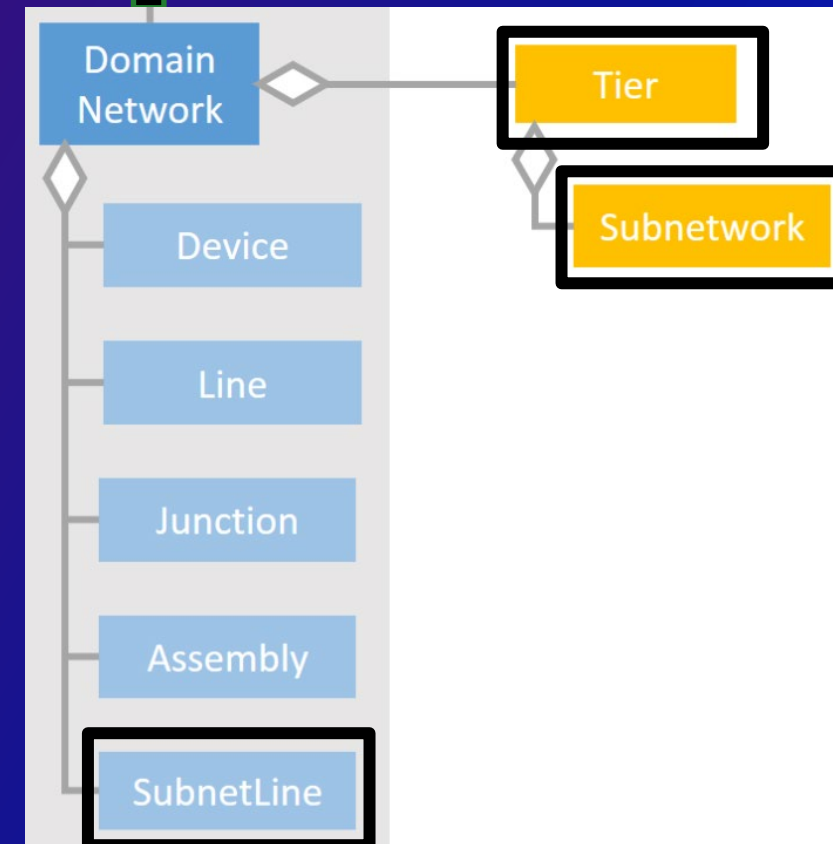
- **Full Utility Network (UN) Deployment**
- **Advantages:**
 - Tiers
 - Subnetwork Configuration Capability
 - Full Engineering Based and Combined APR/UN Editing
 - Tracing & Network Management



UN Configuration: Tiers & Subnetworks



- **Tiers:** provide the ability to further distinguish business-oriented levels with a Pipeline or Utility system
 - System zones
 - Pressure zones
 - Isolation zones
 - CP zones
- **Subnetworks:** are connected sub-portions of the network:
 - Driving analytic operations
 - Labeling and map production
 - Visualization (pressure zone, CP area)
 - Summarization of asset attributes
 - Exporting subset network to external systems



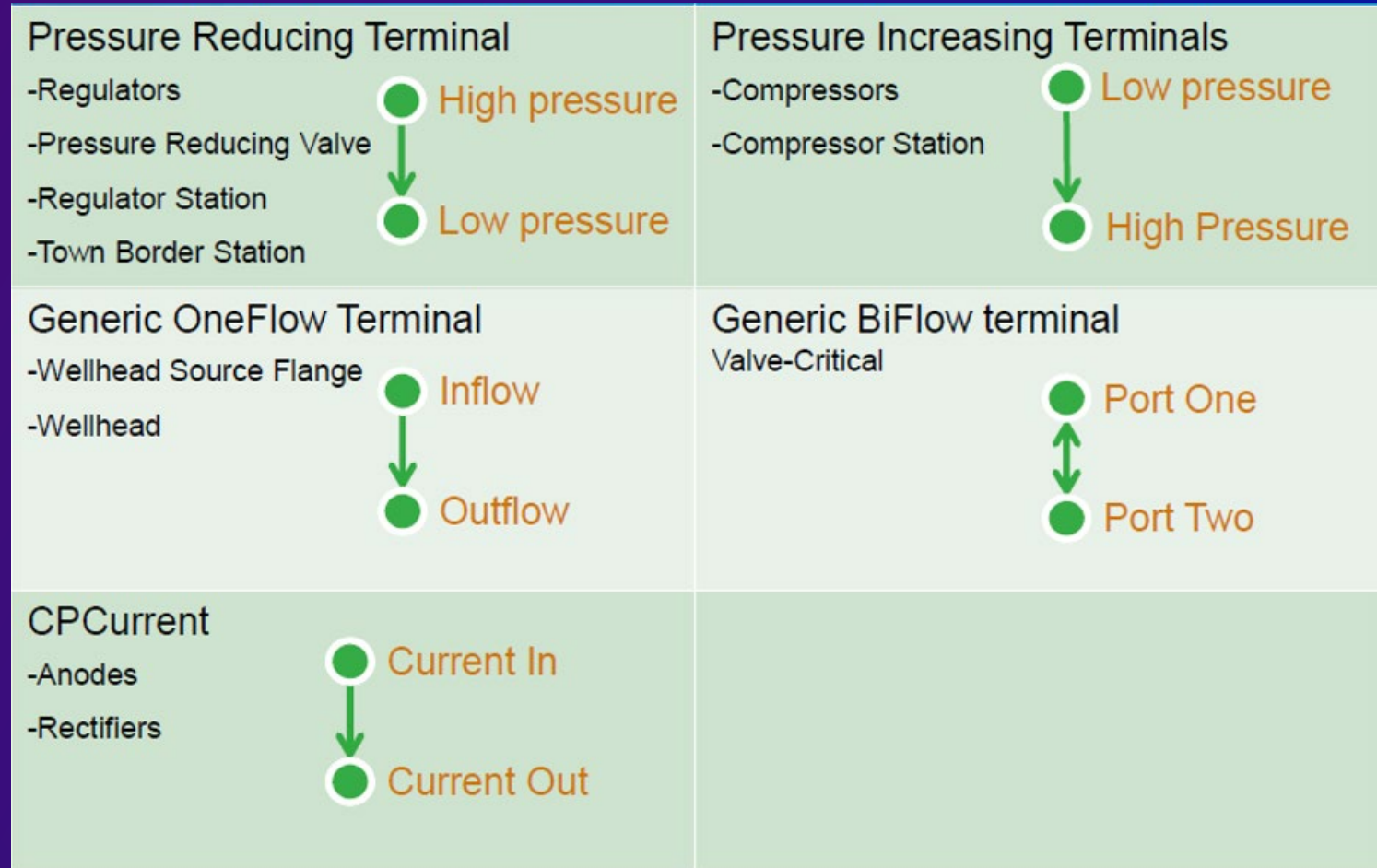
UN Configuration: Network Rules

- Junction – Junction Connectivity
- Junction – Edge Connectivity
- Edge – Junction – Edge Connectivity
- Containment
- Structural Attachment



UN Configuration: Terminals

- The Utility Network will support, at most, eight terminals on a device!



Implementing a full UN solution



General UN Implementation Steps

- Application of the UPDM/PODS-7 Asset Package against UN enabled database
- Database extensions – Features, Asset Groups/Types, Attributes & Domains
- Utility Network Rules
- Perform database migration passes from the source database to destination
- Test and validation of UPDM/PODS-7 output
- Error & Data evaluation
 - Updates to UN rules
 - Source Data Updates
 - Creation of New Data in Destination
- Attribute Rules, APR configuration, Core GIS application customization and configuration (UN)



Utility Network: Data Preparedness

UN Data Validation Tests:

- Key Checks
- Attribute Checks
- Spatial Checks
- Utility Network Analysis
- Visual QA for Utility Network

The screenshot displays a GIS application interface. A map window shows a network of lines with a red square highlighting a specific area. A pop-up window titled 'Pop-up' is open, showing details for a 'Controllable Valve' with the following attributes:

Pipeline Device - Controllable Valve	
Object ID	67660
Asset group	Controllable Valve
Asset type	487
Association status	None
Is subnetwork controller	False
Is connected	Unknown
Subnetwork controller name	Unknown
Tier name	Unknown
Tier rank	0
Terminal Path	
Creation date	1/12/2021 2:53:27 PM
Creator	CWILEY

Below the pop-up window, a table titled 'DirtyAreas_Statistics' is visible, showing a list of objects with their status and error details.

Object ID *	Is retired	Status	Network Source ID	Feature Guid *	Error code	Error message	Creation date	Creator
465547	1	8	Pipeline Device	{5220295F-ABF9-4708-8966-80507EE6B807}	8388608	<Null>	1/15/2021 7:32:34 PM	GAS
465551	1	8	Pipeline Device	{9271D44B-8962-400C-A840-83A116E7EA63}	8388608	<Null>	1/15/2021 7:32:34 PM	GAS
465555	1	8	Pipeline Device	{20D0167B-AD1A-414A-AA3E-7ABF96F124CA}	8388608	<Null>	1/15/2021 7:32:34 PM	GAS
465559	1	8	Pipeline Device	{D6C4327B-A3BD-4BC3-A14D-D22BC9D15353}	8388608	<Null>	1/15/2021 7:32:34 PM	GAS
465564	1	8	Pipeline Device	{19EFAA09-884C-440A-A2E9-E32525DA6C25}	8388608	<Null>	1/15/2021 7:32:34 PM	GAS

Utility Network: Data Preparedness

UN Data Validation Tests (cont'd):

- **Data Reviewer Checks**
 - Database Validation Checks
 - Table Checks
 - Default Checks
 - Duplicate Geometry Checks
 - Topology Related Checks
 - Feature on Feature Checks
 - Advanced Checks

The screenshot displays a GIS application interface. On the left, a 'Pop-up' window for 'Pipeline Junction (2)' is open, showing a tree view with 'Union' and 'Connection Point'. Below this, a table lists attributes for the 'Pipeline Junction - Union' feature. The main map area on the right shows a red circle highlighting a feature on a black line, with a yellow rectangle indicating the pop-up's footprint. The bottom of the screen shows a table of features with columns for Object ID, Is retired, Status, Network Source ID, Feature Guid, Error code, Error message, Creation date, and Creator.

Object ID *	Is retired	Status	Network Source ID *	Feature Guid *	Error code	Error message	Creation date	Creator
541080	1	8	Pipeline Junction	{8D59421D-EF31-4E12-8A69-8E28073DE236}	33554432	<Null>	1/15/2021 7:35:33 PM	GAS
541163	1	8	Pipeline Junction	{1389885C-9307-4241-87E6-4B058AE581D5}	33554432	<Null>	1/15/2021 7:35:35 PM	GAS
541167	1	8	Pipeline Junction	{FE31C33E-BA69-46EE-96E5-504B4BB19356}	33554432	<Null>	1/15/2021 7:35:35 PM	GAS
541171	1	8	Pipeline Junction	{353C3081-1CF9-44C4-B4DE-E02A06B08393}	33554432	<Null>	1/15/2021 7:35:35 PM	GAS
542561	1	8	Pipeline Junction	{EBBA0C74-F1CC-4C0A-9BD1-161EDE88824E}	33554432	<Null>	1/15/2021 7:35:37 PM	GAS
543014	1	8	Pipeline Junction	{D0A408C2-EAC2-49B6-82B0-0FA07C037AD4}	33554432	<Null>	1/15/2021 7:35:37 PM	GAS
562607	1	8	Pipeline Junction	{8900F9DE-D72D-4220-B45C-E16F89A67112}	33554432	<Null>	1/15/2021 7:36:25 PM	GAS
570880	1	8	Pipeline Junction	{344FDBF8-B794-49FB-B568-A96F0F672AEF}	33554432	<Null>	1/15/2021 7:36:44 PM	GAS
570962	1	8	Pipeline Junction	{022FBC8A-7A81-45D0-988D-FBF314EEA6AB}	33554432	<Null>	1/15/2021 7:36:44 PM	GAS

Other UN implementation items to consider...

- Centerline needs to be switched to PipelineLine (as the Centerline)
- Update Measure tool for UN features versus the Event Responses or Event Editor
- Event Editor is used for all other LRS Event Management
- What are the affects on external tools, systems? (branched versioning, feature services, etc.)?



Utility Network Advantages



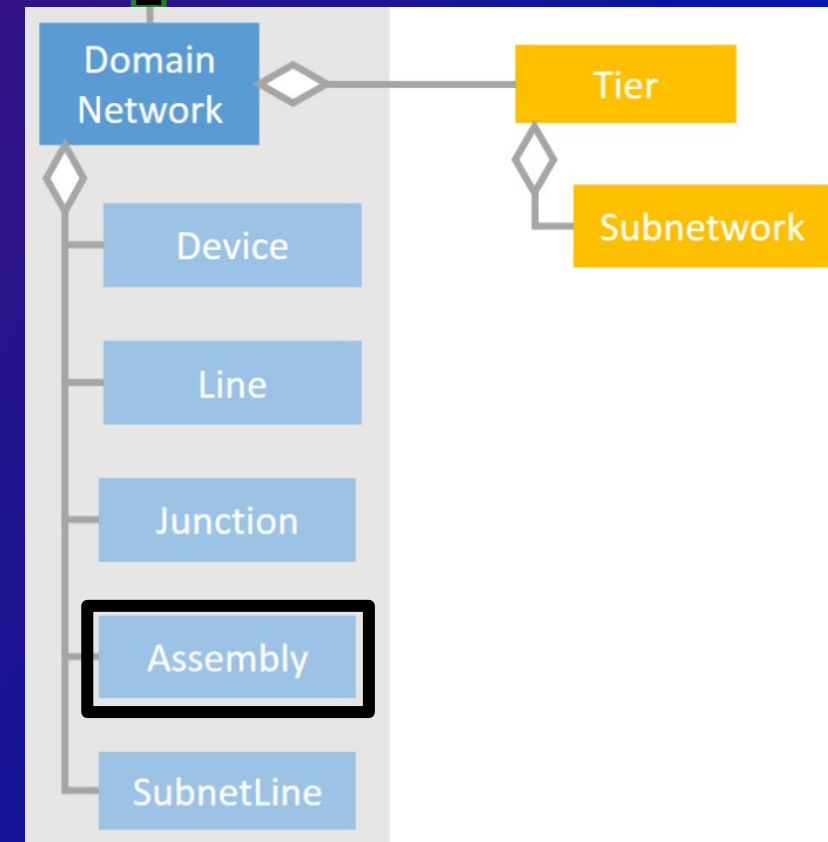
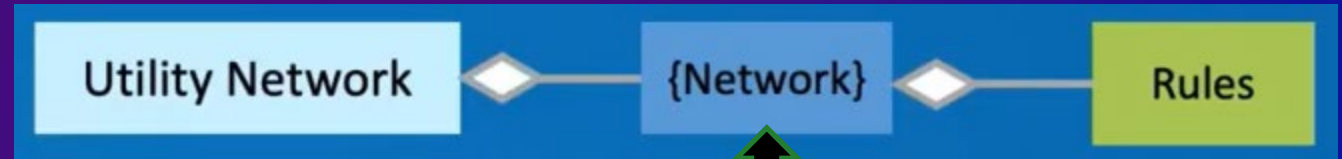
Advantages of moving to UN-enabled or Full-UN Implementations

- A natively spatial environment leveraging branched versioning, feature services and eliminating direct connections
- Ability to use geospatial coordinates and measures in the same environment
- The UN is part of the core Esri platform (easier version upgrades)
- Web Centric Technology: access data on any device, anywhere, at any time
- Engineering based editing with intelligent network rule base
 - Midstream Specific Rule Base
 - Lateral connectivity to a mid point on the mainline w/ out a Junction or Device
 - Change in Nominal Diameter without a reducer, reducing valve or other junction/device
- Network Tracing, Incident Planning
- Native 3D capabilities built directly into ArcGIS Pro/UN
- Integrated Network Schematic Diagrams
- Station Modeling
 - Containment
 - Assemblies



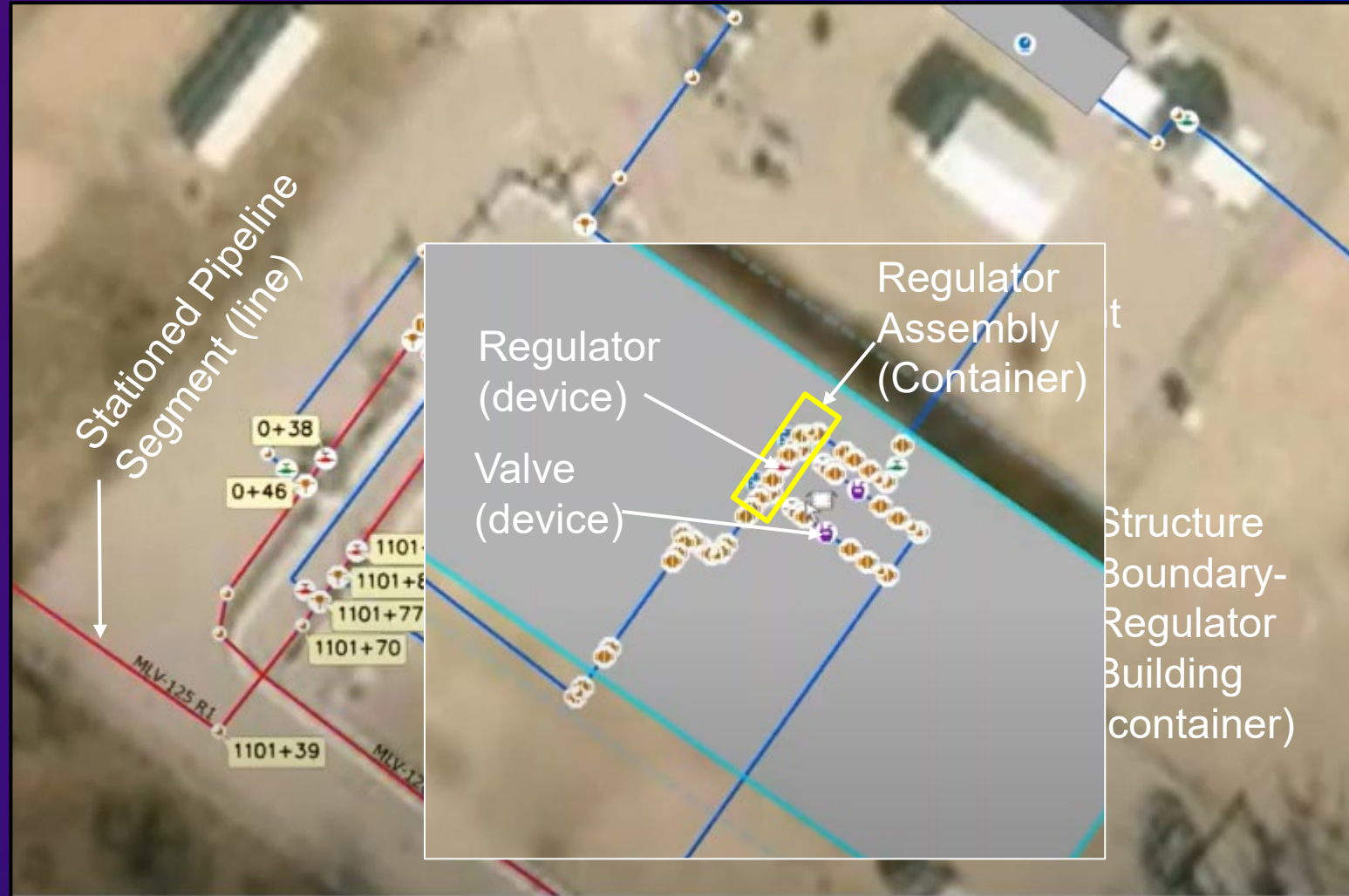
Advantages of moving to UN-enabled or Full-UN Implementations

- Containers allow a dense collection of features to be represented as a single polygon feature
- The Assembly feature class is generally used to represent multiple devices/junctions at a single location
 - Distribution:
 - RegulatorStation
 - Transmission:
 - PigLauncher
 - ValveAssembly



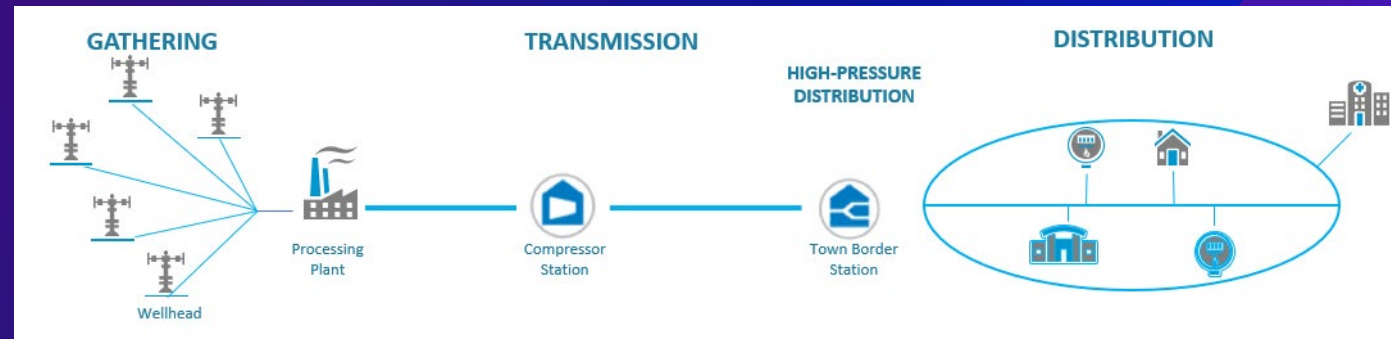
Advantages of moving to UN-enabled or Full-UN Implementations

- **Structure Boundary (Container)**
 - Regulator Building
 - Acts as containment/parent to child assemblies/assets (polygon)
- **Assembly (Container)**
 - Regulator Assembly
 - Acts as containment/parent to child assemblies/assets (point)
- **Line**
 - Pipeline segments
- **Device**
 - Valves
 - Regulators



Advantages of moving to UN-enabled or Full-UN Implementations

- Ability to finally move to a single enterprise geodatabase
- Digital-Twin - Allows you to create a real-world model for the entire pipeline network
 - Digital visualizations of real-world representations
 - Can come from many sources – but requires ability to interact
 - Encompass everything
- System of Record, Insight and Engagement
- Ability to leverage a ‘complete’ GIS



Final items to consider...

- Esri has recently **announced** that there are no future plans for ArcMap for 10.9
 - Unlike the UN, which is “Server” based, this effectively also represents the end of the Geometric network as well
- **Mature support ends 2/2026**
 - ArcGIS Pro replacing ArcMap
 - Software will continue to run while licensed

Product Life Cycle					Product Lifecycle Policy
Product: ArcGIS Desktop 10.8.1					
Release Date: July 28, 2020					
Support status: General Availability					
		General Availability Jul 2020 - Feb 2022	Extended Support Mar 2022 - Feb 2024	Mature Support Mar 2024 - Feb 2026	Retired March 01, 2026
Technical Support	Request Case	✓	✓	✓	
	Phone and Chat	✓	✓	✓	
	Online support resources	✓	✓	✓	✓

THANK YOU!!!!



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The logo for UKC 2021 features the letters 'UKC' in a large, bold, sans-serif font, with a diagonal slash through the 'K'. Below it, the year '2021' is written in a similar font. The text is colored with a gradient from blue to orange. The logo is set against a white background, which is itself centered on a vibrant, abstract background of swirling colors and geometric shapes.