Realizing New Possibilities
The Utility Network at Duquesne Light

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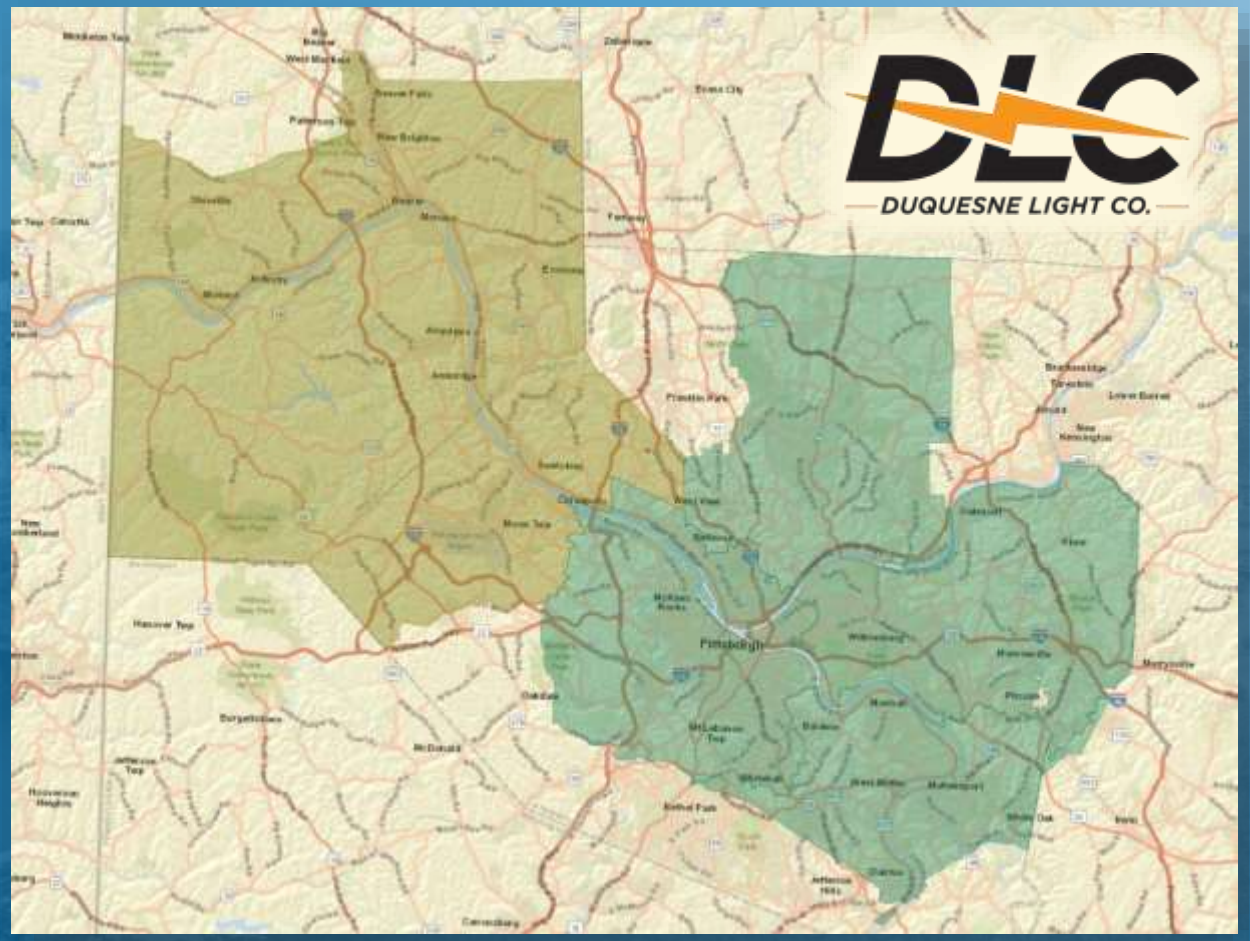
Duquesne Light Company

- Located in Pittsburgh, PA
- Investing $2.9B in infrastructure and technology
- 817 square miles in Allegheny and Beaver counties
- 175 Company Owned Substations
- 650 Distribution and Sub-Transmission Feeders
  - 4kV – Distribution
  - 23kV – Distribution & Sub-Transmission
- 600,000 Electric Customers
- Over 1,500 full time employees
- Current GIS group – 5 Technicians/5 GIS Analysts



Current State of DLC GIS

Ad-Hoc GIS System

Regulated Inspections
1 SDE Instance and Hosted Data
(ArcGIS Collector & Survey 123)

Annually
18000 Pole Inspections

15% of our at
or below grade Transformers

15% of our Manholes

Downtown Network Inspections

20% Overhead Primary Circuits

Point and Line Asset Data
3 SDE Instances
(Managed in ArcMap)

300000+ Poles
20000+ Below Grade Transformers
4000+ Switchable Devices
75% of Overhead Primary
Distribution Line Locations
Overhead Transmission Facilities
Underground Transmission
Facilities
Third Party Attachment Data

Portal for ArcGIS

Visualization for
Point and Line Asset Data

Enable business workflows

Vehicle electrification

Landslide aggregation
& Analysis

Engineering Transmission
facilities risk mitigation study

Smart meter antenna
connectivity Analysis

ArcGIS Enterprise 10.5.1 System – Over 470 Users

System Silos – Current State of mapping at DLC

Human Glue

- Ad-Hoc GIS Data Model
  No Connectivity or Rules
- 10 Types of AutoCAD Maps
  all Non spatial in nature
- Construction Drawings
- Non Spatial in nature
- No Secondary or Service
- Mapped
- Customer to Transformer
- Relationship unknown
- Sub Optimal
- As-built\As Designed
- mapping process

Isolated Systems

- Oracle CC&B
  Customer Information System
- Oracle WAM
  Work Management System
  (Asset component not used)
- Oracle Primavera P6
  Construction Scheduling

Sept ‘19

- IBM Maximo
  Work, Asset and Scheduling

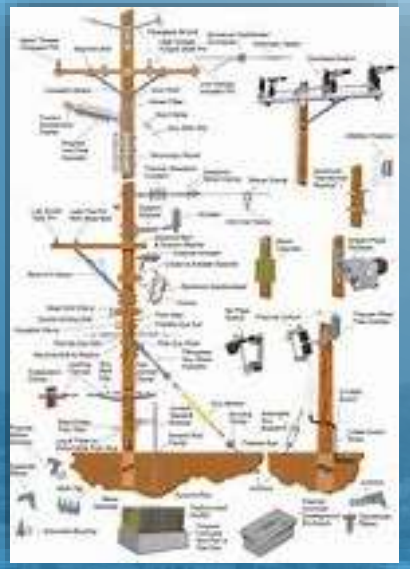
ADMS Program

Advanced Distribution Management System – 6 Projects

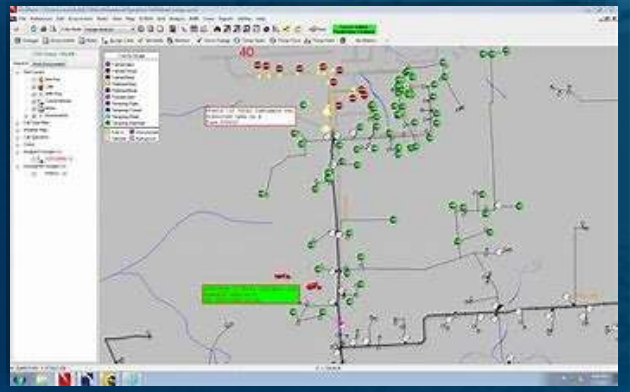
Distribution SCADA
(Holistic SCADA)

ArcFM SOLUTION

Electrical Model

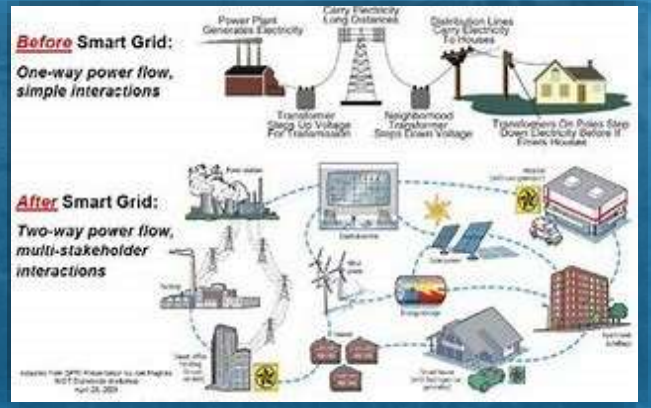


Engineering Design



Outage Management

Field Survey



Distribution Management

Decision to Adopt the Utility Network

Partnering with Schneider on the Journey

Utility Network Risks

- Product maturity
- No Electric Production Implementations
- ArcFM Suite maturity
- Placing DLC on the “Bleeding Edge” and not being a preferred “Fast Follower”
- Downstream projects would not have mature integrations developed against the UN

Utility Network Reward

- No initial GN Data Model or Data
- ESRI Product Influencer
- ArcFM Suite product influencer
- No data migration project
- ESRI projecting 20+ years of development for Utility Network
- Systems integrations which will not have to migrate

Implementation

The UN at Duquesne Light Company

The Journey So Far…

System Architecture

- ArcGIS Enterprise, Utility Network, ArcFM XI Ecosystem
- DLC IT Standards , Enterprise Systems and In-flight projects

Data Model

- Core Team Training
- Data Model Workshops & model iterations

Implementation

- Business & Technical Workshops
- Establish Non-Prod & Prod Environments

Support Distribution Field Inventory

- Prepare Surveys, Redlines for QA of Field Inventory
- Data Load and Validation of Asset Packages

Integrations

- Deployed Document Management System Integration
- CC&B, Maximo Integrations past Design stage-gate

Pittsburgh at Night, Wikimedia Commons

Solution Overview

- GIS Editing Solution
  - ArcGIS Pro w/ ArcFM Editor XI
  - ArcGIS Enterprise based Authentication

- Field Mobility Solution
  - ArcFM Mobile XI
    - ArcGIS Runtime App
    - ArcFM XI SSO
    - ArcGIS Enterprise based Auth
    - Survey123 Integration

Solution Overview

- Web Viewer
  - ArcFM Web XI
    - ArcGIS JavaScript based
    - ArcGIS Enterprise based Auth

- Integrations
  - Duquesne Light Azure Service Bus
  - ArcFM XI Job Services Framework

- GIS Administration Interface
  - ArcGIS Enterprise
  - ArcFM XI Solution Center

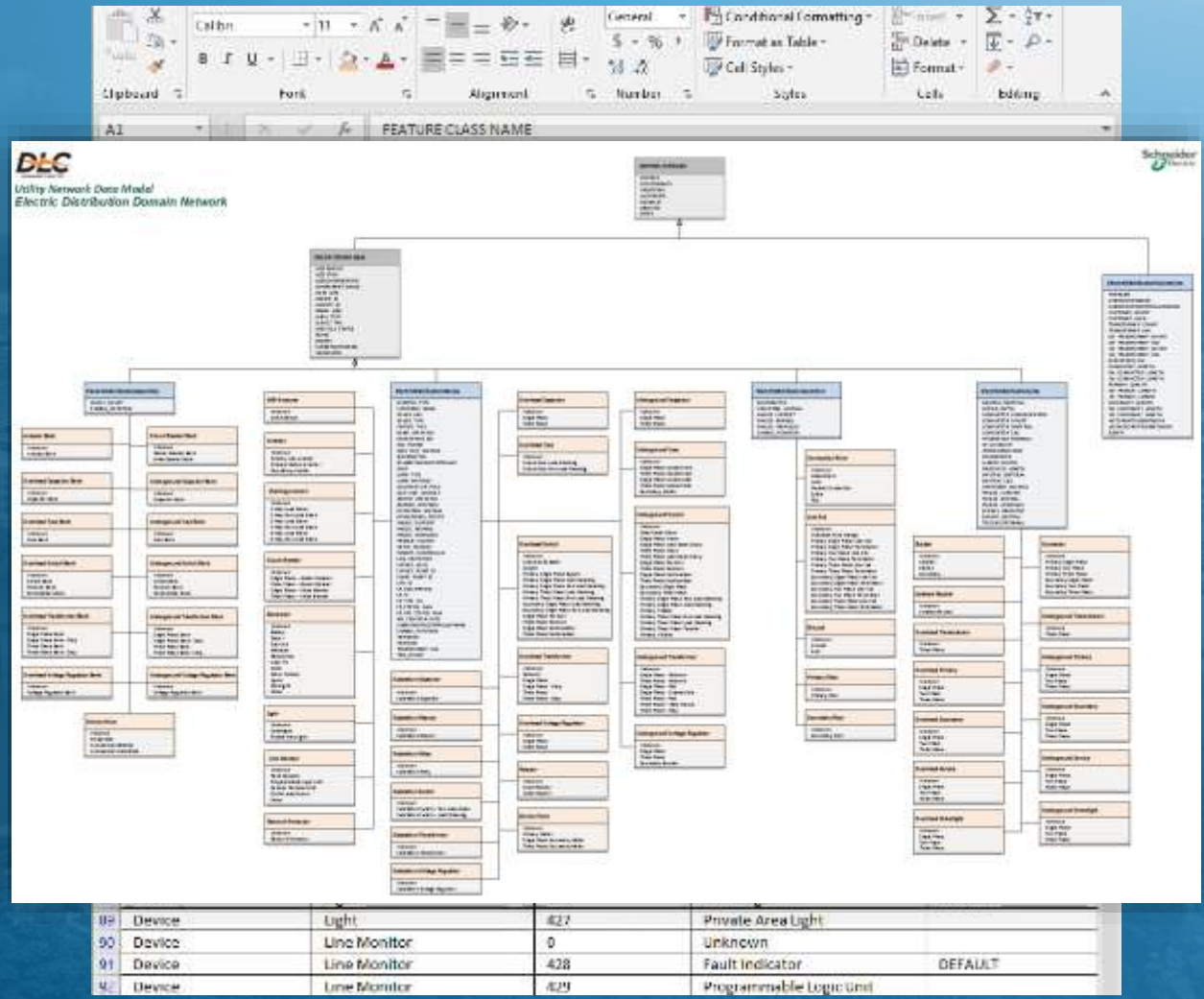
Utility Network Data Model

- Core team Training
  - Familiarize Team with UN & ArcFM XI
  - Hand-On using Azure based ArcFM EXI Training

- Data Model
  - Spreadsheet based Business Review
  - Asset Package Generator

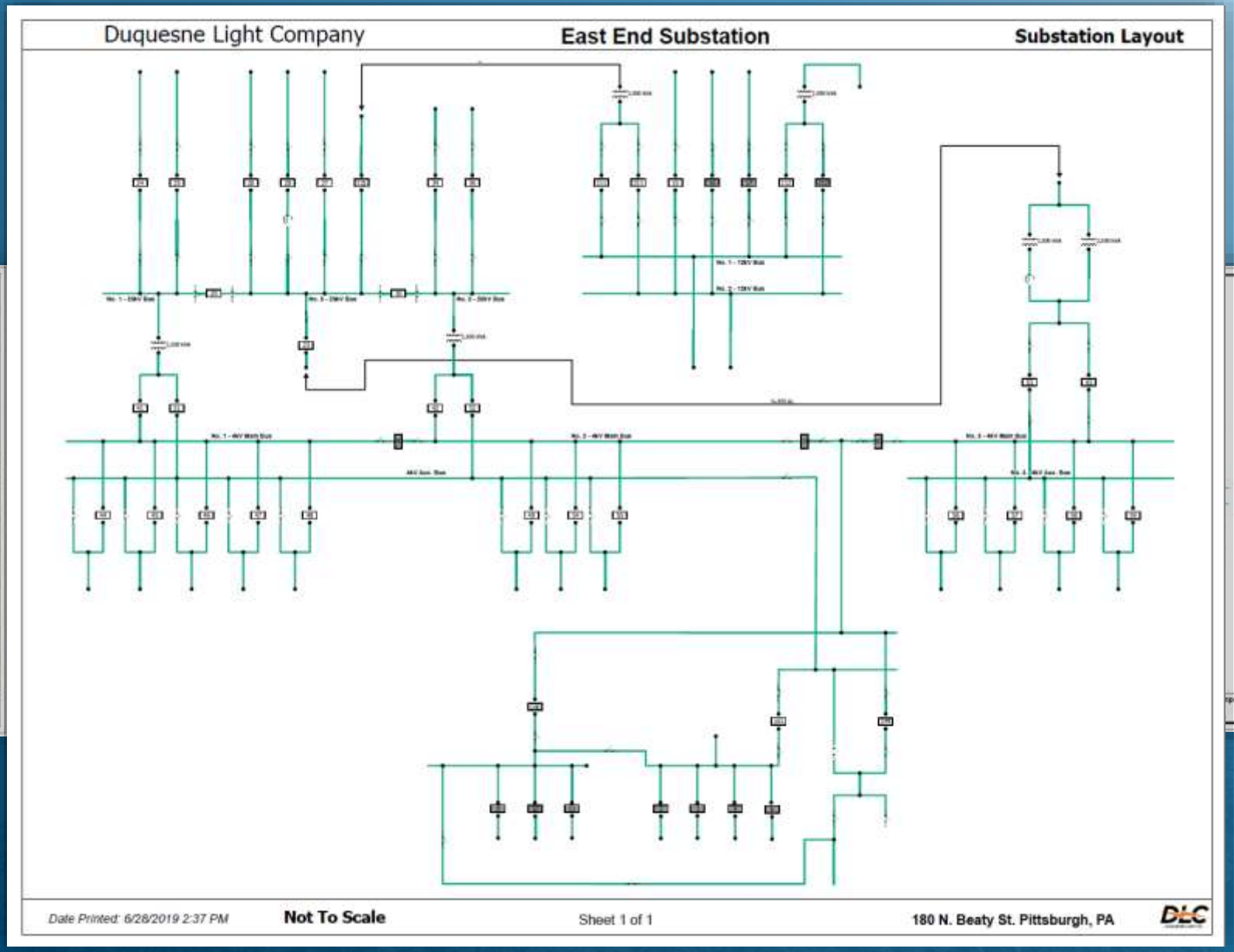
  - Defined additional Asset Groups/Type for
    - OH/UG facilities
    - Substation Internals

  - Defined per Circuit Subnetwork Summaries for
    - Conductors (OH/UG)
    - Customer Count & Load
    - Transformer kVA



Map Products

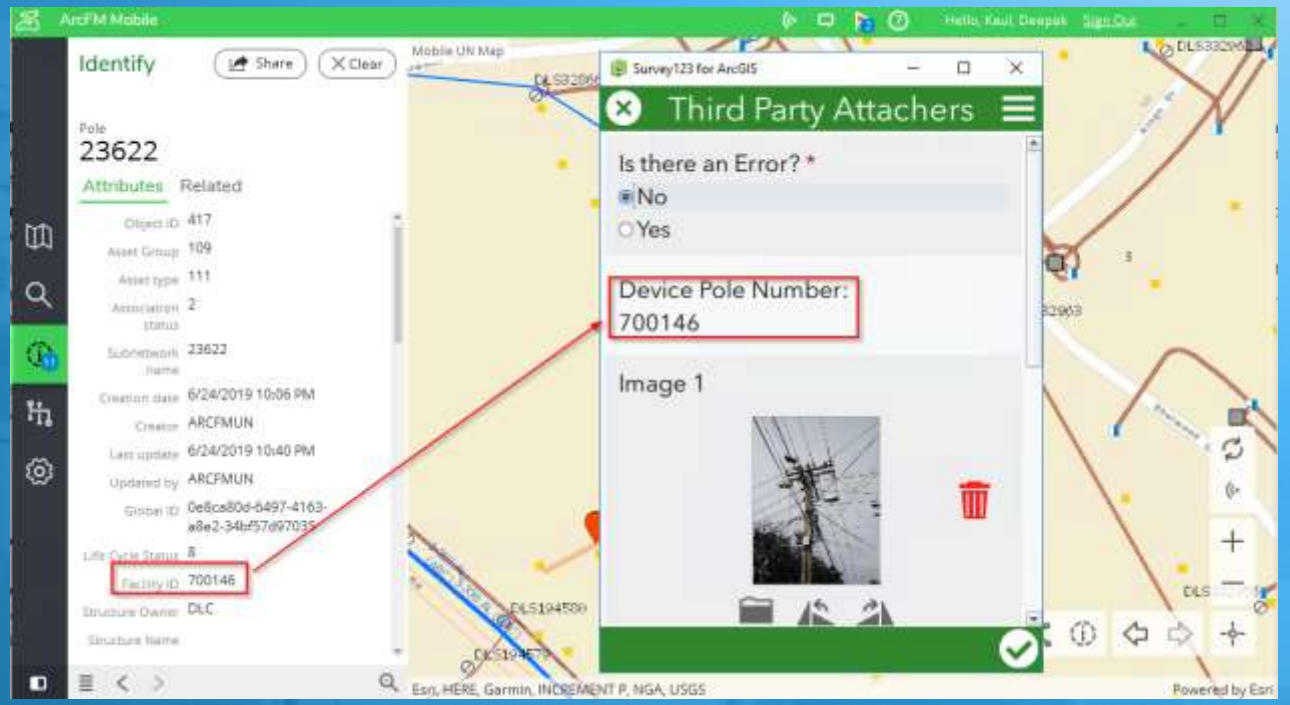
Circuit Map



Support Distribution Field Inventory

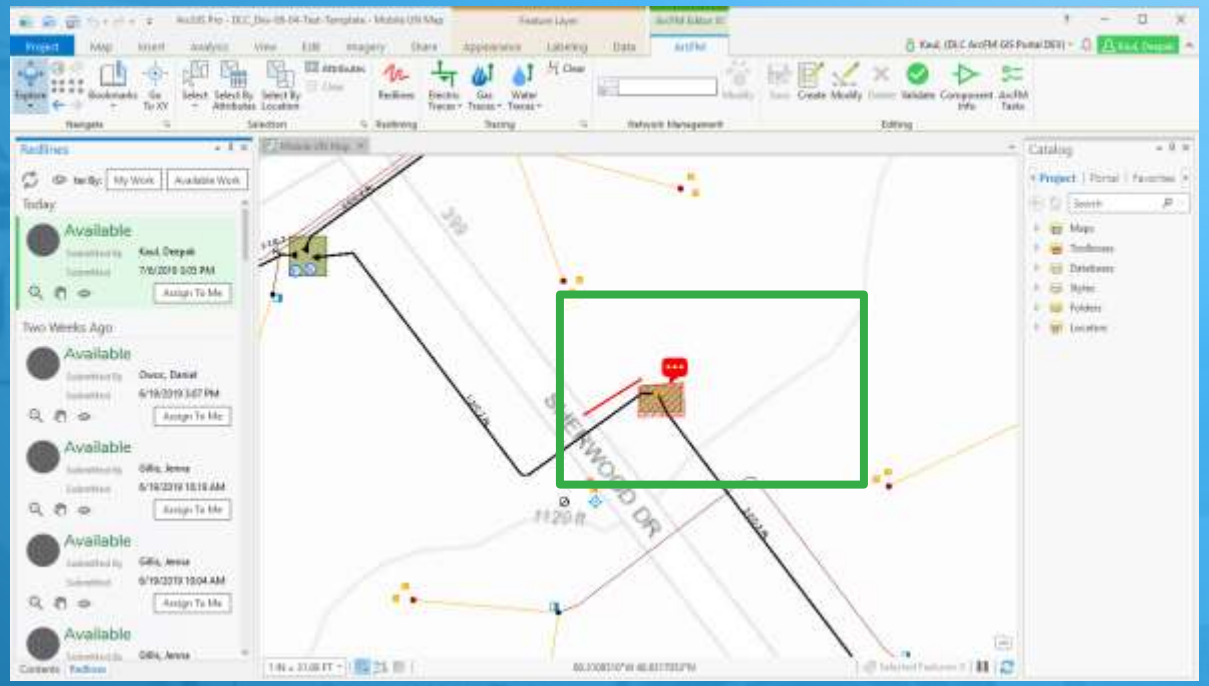
Field Surveys and Redlines

- Identify at Asset Group Level
- Select Survey
- Launch Integrated Survey123
- Automated Field population



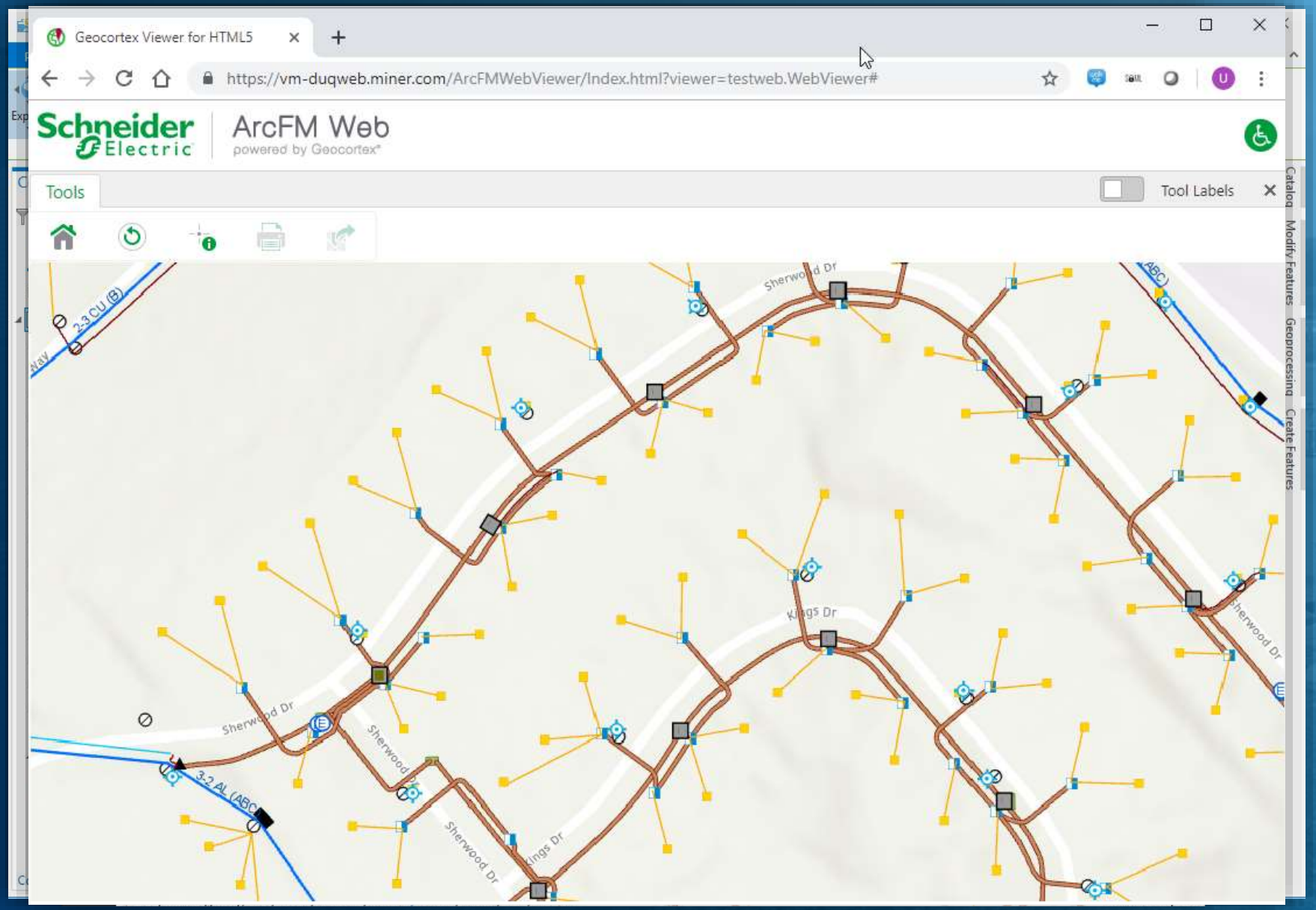
Support Distribution Field Inventory

Redlines – From Field to Enterprise



- **Field Redlines**
  - Captured offline/connected mode using ArcFM Mobile XI built in ArcGIS Runtime
  - Synced when connected
- **Enterprise Redline Workflow**
  - Available in ArcFM Editor XI Redline pane for GIS Editor built in ArcGIS Pro
  - Task completion provides automated In-App notification to field user

Map Display across Applications



ArcFM Web

Geocortex Essentials

GIS Integrations

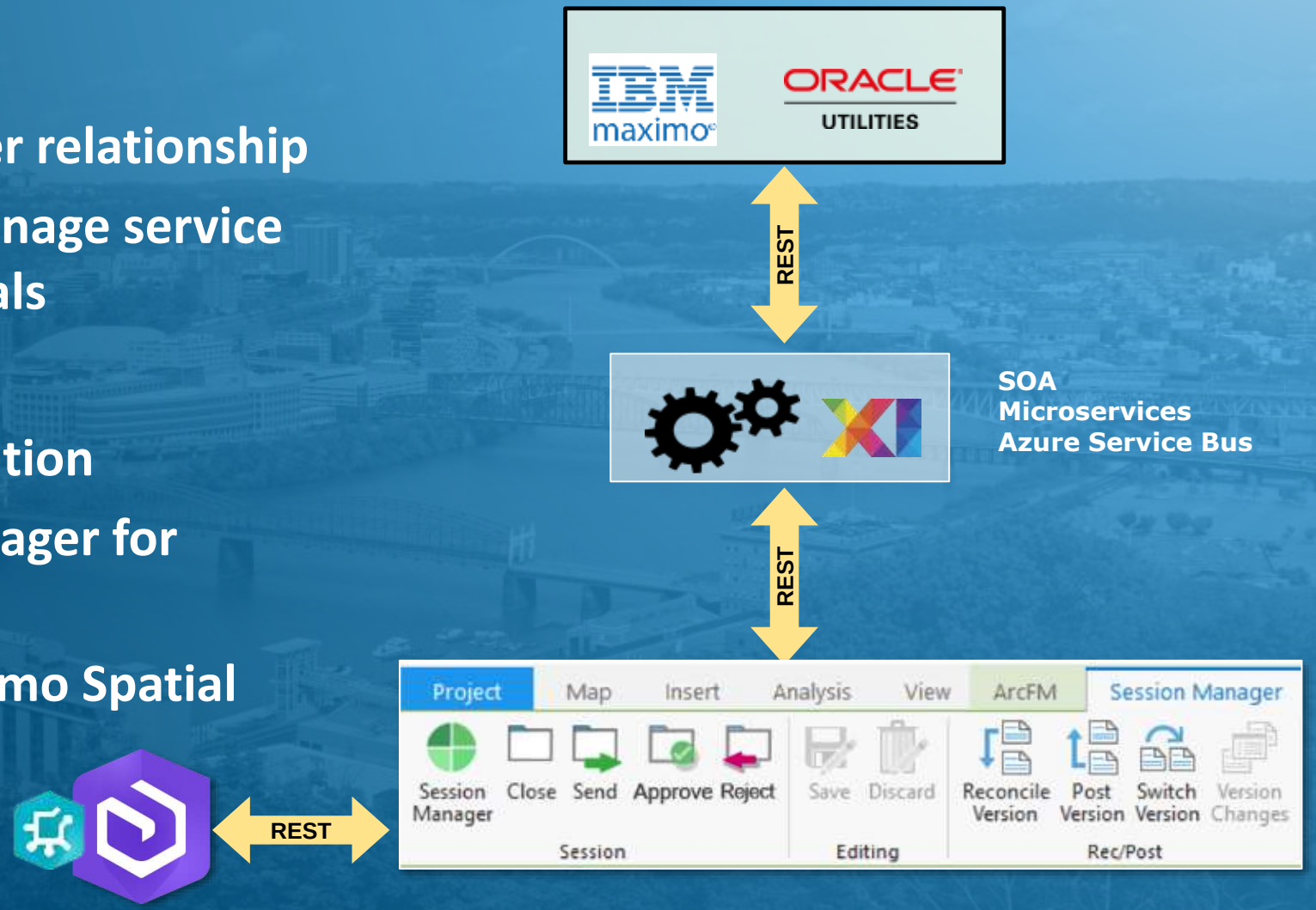
Map Products based on Circuit change detection

Managing customer to transformer relationship

- CIS integration to place & manage service point installation and removals

Maximo & Maximo Spatial integration

- Utilize ArcFM XI Session Manager for Maximo initiated work
- Provide UN data within Maximo Spatial



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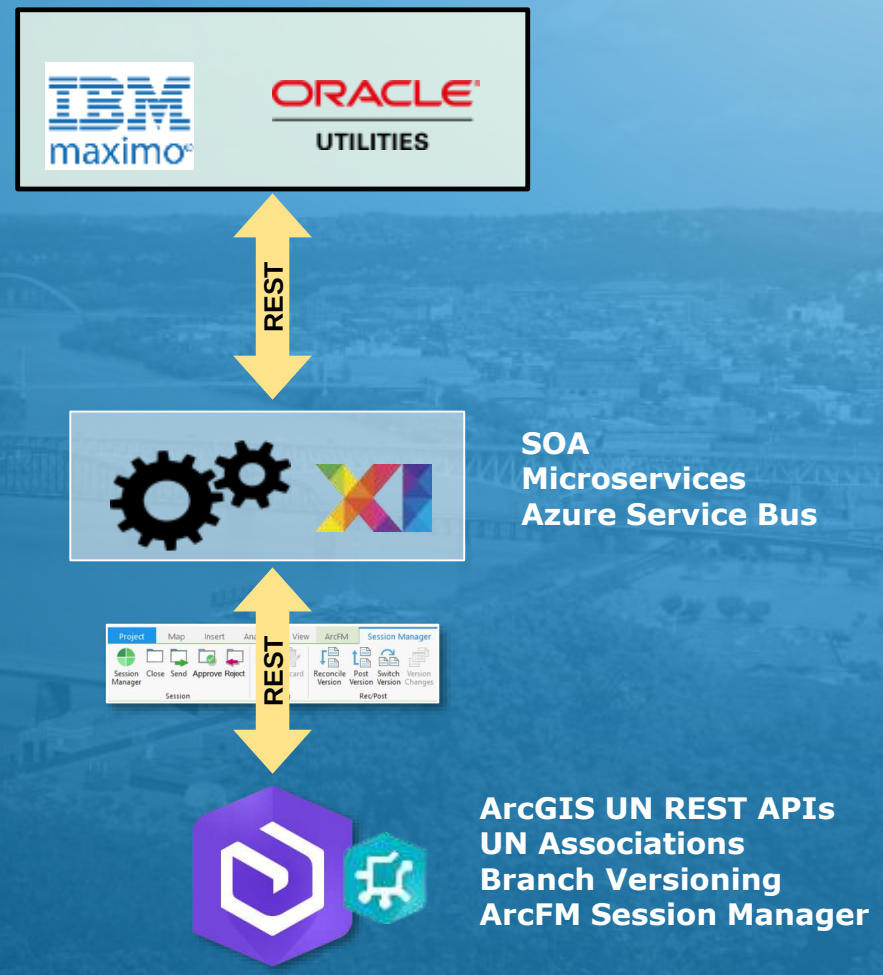

Identified Benefits

ArcGIS Pro w/ ArcFM Editor XI deployment

- Maintain data model
- Automated map products based on updates to the UN

- **ArcFM Mobile XI deployment**
  - Perform QA of field inventory
  - Support Operations field activities

- **ArcFM Web XI deployment**
  - Support Back Office & Operations activities

Automated App Updates

- **New features, Enhancements and Bug fixes (e.g. Vector TPK Support, App Integrations)**

- **Future Enhancements**
  - **Underground Duct management**
  - **Offline Tracing**
  - **Web Tracing**

Looking Ahead

- **Upgrades**
  - ArcGIS Enterprise 10.7.x
  - ArcGIS Pro 2.4
  - ArcFM Editor XI
- **Implement ArcFM XI Session Manager**
- **Deploy Integrations**
  - Maximo Integration
  - CC&B Integration
  - ADMS Integration**?**
- **Support Field Inventory work**
- **Load 600+ Circuits in the Utility Network model**

Questions?

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THE
SCIENCE
OF
WHERE