

Utility Network and Productivity Tools

Baselining & Accelerating Your GIS

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AVINEON®

Visualize IT. See IT Through.



Utility Network Management
Specialty

Challenges faced by GIS organizations

- Technology stack shifting dramatically
 - Desktop, web, mobile
- New licensing models require analysis
- IoT creating new data and integration opportunities
- Increased use within organizations requires new capabilities
- Health check of existing systems and data typically lagging
- Institutional knowledge growing and undocumented
- Near term return on investment demands

GIS Technology: Modernization

2019

Geometric Network

- ArcMap
- ArcGIS Server
- ArcFM

ArcGIS 10.2/10.6

2019 + Future

Utility Network

- ArcGIS Pro
- ArcGIS Enterprise (Web/Mobile Apps)
- ArcFM

ArcGIS 10.7+

Low Fidelity
Network Model



High Fidelity
Network Model

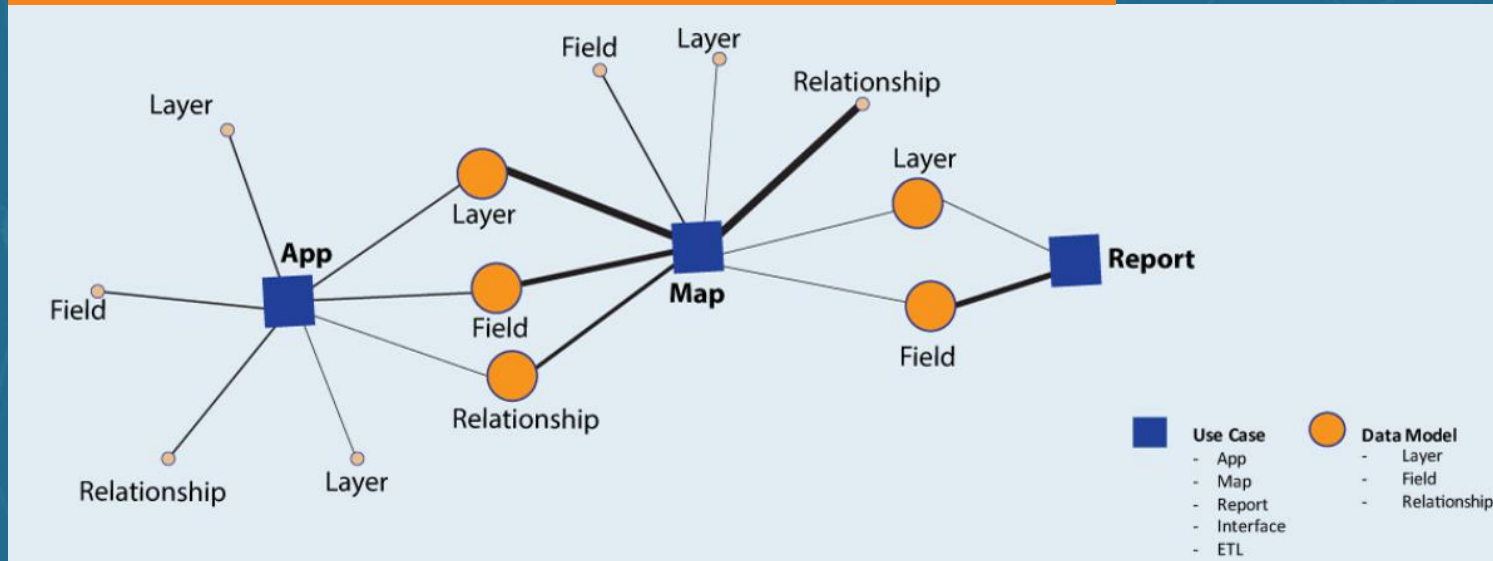
- ▶ Reduction in 3rd party software
- ▶ Full Representation including all asset details
- ▶ Web/Mobile Network tracing and editing
- ▶ Higher data integrity
- ▶ Network diagrams
- ▶ 3D Maps for mixed reality use cases
- ▶ Support consumer facing use cases
- ▶ Machine Learning

Suggested Activities

1. Ensure Existing Data Quality
2. Document Integrations with other Business Systems
3. Document Configurations and Customizations Specific to Network Data
4. Evaluate Attribute Assistant Methods
5. Start Using ArcGIS Pro
6. Implement Current Version of ArcGIS
7. Deploy the ArcGIS Utility Network Configurations
8. Determine the Level of Effort to Migrate your Data
9. Leverage Esri Resources

Baselining GIS

Current State: Information Model Dashboard



How is
ArcGIS
used
Now?



Future State: Information Model Dashboard



How should
ArcGIS be
used in the
Future?

Findings

Analysis

GIS
Strategy &
Road Map

GIS
Modernization
Plan

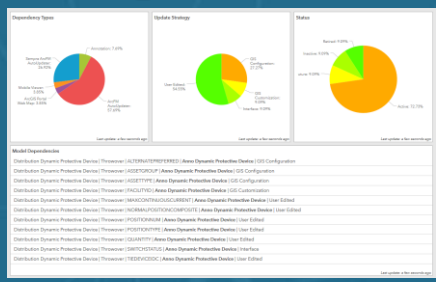
- Readiness
- Software Licensing
- Infrastructure
- Data Model Tailoring
- Migration
 - Data
 - Apps
 - Integrations
- Training and Change Management

Model Manager: ArcGIS Pro Add-In

Designing Utility Network

ArcGIS Pro Add-In

Manage Data Model Dependencies



Industry Standards

Business Processes

Labels and Annotations

Attribute Rules and Feature Templates

ArcFM Auto Updaters and Favorites

Analysis Tasks

Mobile Apps

Import/Export Jobs

Model Manager

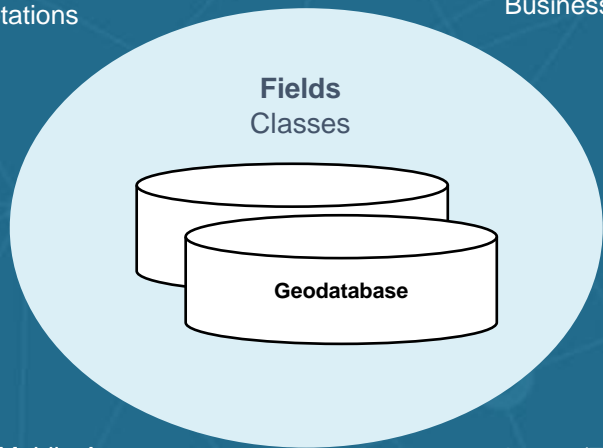
Visualize Utility Network data models



Use-Ability



Scale-Ability



View Utility Network Properties By Network Category and Asset

Model Manager: Network Properties

SDE Service Utility Network

Current Project Map Utility Network

Network Categories (3)	Diagram Templates (3)	Terminal Configurations (1)	Terminals (1)
Terminal Valid Paths	SubNetwork Function Barriers	SubNetwork Summaries (0)	
SubNetwork Propagators	SubNetwork Summaries (0)	SubNetwork Summaries (0)	
Domain Networks (2)	Tier Groups		

Domain Network	Domain Network Alias Name	Tier Definition
Structure	Structure	None
Electric	Electric	Partitioned

Customizations

Project Map Insert Analysis View Edit Imagery Share Model

Properties Assets Fields Dependencies Services

Model Manager: Assets

SDE Service Utility Network

Current Project Map Utility Network Electric Utility Network

Feature Class: ElectricDevice

Asset Group: [Dropdown]

Asset Type: [Dropdown]

Tiers: [Dropdown]

Containment: [Dropdown]

Junction Edge Connectivity: [Dropdown]

Association Roles: [Dropdown]

Domain Network: [Dropdown]

Feature Class: [Dropdown]

Asset: [Dropdown]

Unknown

- Distribution Boundary Point
- Distribution Break Point
- Distribution Disconnect Switch
- Distribution Dynamic Protective Device
- Distribution Fuse
- Distribution PF Correcting Equipment
- Distribution Switch
- Distribution Transformer

Function Edge Connectivity

Relationships

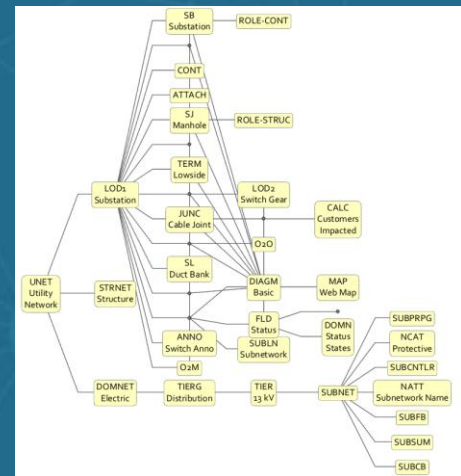
Associations

Terminals

Semantics

View Scale

Generate Network Properties Diagram



Data Model Governance



Analysis: How is GIS Setup and Used?



Model Manager

Avineon Type All Category All Sources All Class All Field All Dependency All

Customizations 2	Customizations ArcFM Inherit Phase Auto Updater Network Tracing	Dependencies 36	<ul style="list-style-type: none"> Medium 4 High 4 Low 27 Critical 1 	<ul style="list-style-type: none"> Field 17 Layer 14 Data Source 5 	
Configurations 4	Configurations Anno Switch ArcFM Populate Facility ID Auto Updater	Data Source (Database Instance, File Database and Feature Service) Dependencies Data Source Vs. Interface: HQL 46513M2\SQLXEXPRESS2017\ELECTRICGN\SQLServer - Oracle OMS Exported from GIS once every week Data Source Vs. Interface: file:///C:/Avineon/Esri_Solutions/Electric/GeometricNetwork/ElectricNetwork.gdb - ABB Network Manager ADMS Used for exporting once every month Data Source Vs. Map: https://hql-46513m2.internal.avineon.com/server/rest/services/Gas_Utility_Network_2/FeatureServer - Web Viewer Used by the web map related to web viewer application Data Source Vs. Interface: HQL 46513M2\SQLXEXPRESS2017\ELECTRICGN\SQLServer - Oracle Customer Information System			
Maps 4	Maps Desktop Editing Mobile Viewer Web Viewer Web Editing	Class/Layer Dependencies Layer Vs. Interface : RemoteDatabase ELECTRICGN.DBO.Switch Medium ABB Network Manager SCADA Layer Vs. Business : RemoteDatabase ELECTRICGN.DBO.ConduitSystem Critical Occupancy Reporting Quarterly tax reporting to submitted to service commission Layer Vs. Customization : RemoteDatabase ELECTRICGN.DBO.Transformer Low Network Tracing Layer Vs. Customization : RemoteDatabase ELECTRICGN.DBO.ServicePoint Low Network Tracing Layer Vs. Customization : RemoteDatabase ELECTRICGN.DBO.Switch Low Network Tracing Layer Vs. Customization : RemoteDatabase ELECTRICGN.DBO.SecUGElectricLineSegment Low Network Tracing			
Apps 11	Apps ArcFM Desktop 3-GIS Web Viewer City Works Web	Field Dependencies Field Vs. App : RemoteDatabase ELECTRICGN.DBO.PriUGElectricLineSegment PhaseDesignation High ArcFM Desktop Field Vs. App : RemoteDatabase ELECTRICGN.DBO.SecUGElectricLineSegment PhaseDesignation High ArcFM Desktop Field Vs. App : RemoteDatabase ELECTRICGN.DBO.PriOHElectricLineSegment PhaseDesignation High ArcFM Desktop Field Vs. App : RemoteDatabase ELECTRICGN.DBO.SecOHElectricLineSegment PhaseDesignation High ArcFM Desktop Field Vs. Configuration : RemoteDatabase ELECTRICGN.DBO.Switch SubtypeCD Low Anno Switch Field Vs. Configuration : RemoteDatabase ELECTRICGN.DBO.Switch TieSwitchIndicator Low Anno Switch Field Vs. Configuration : RemoteDatabase ELECTRICGN.DBO.Switch PhaseDesignation Low Anno Switch Field Vs. Configuration : RemoteDatabase ELECTRICGN.DBO.Switch FacilityID Low Anno Switch Field Vs. Configuration : RemoteDatabase ELECTRICGN.DBO.Switch ConstructionStatus Low Anno Switch Field Vs. Configuration : RemoteDatabase ELECTRICGN.DBO.Transformer FacilityID Low ArcFM Populate Facility ID Auto Updater			
Business 2	Business Occupancy Reporting Data Quality Report				
Interfaces 5	Interfaces Milsoft Windmil ABB Network Manager SCADA ABB Network Manager ADMS				

Analysis: How is GIS Setup and Used?



Model Manager



Utility Network

Project Map Insert Analysis View Edit Imagery Share Model Data

Portals Information Models Use Import Setup Properties Assets Data

Information Model Utility Network

Information Model Dashboard

Use Case Type: All Model: All

Use Case Types

Autoupdater	16	Dashboard	1
Inbound ETL	1	Map	4
Process	4	Report	3
System	16	Web Map	18

Classes

AerialMarker	1
DeliveryPoint	2
DynamicProtectiveDevice	1
Fuse	1
OpenPoint	1
PrimaryMeter	1
PriOHElectricLineSegment	1
Riser	1
S_Structure	1
Streetlight	3
SupportStructure	1
Switch	1
T_Tower	2
Transformer	1
VegetationZone	1
VoltageRegulator	1

Fields

ConductorType	1
ConstructionStatus	1
FeederID	7
GangOperated	1
ManuallyOperated	1
NormalPosition_A	1
NormalPosition_B	1
NormalPosition_C	1
OperatingVoltage	5
PhaseDesignation	1
SwitchingFacility_GlobalID	1
TieSwitchIndicator	1

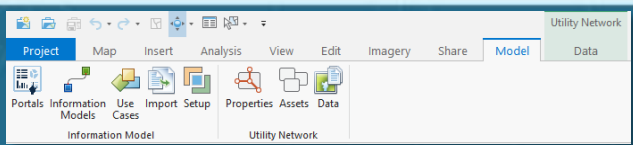
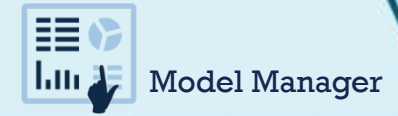
Data Model: Current State Usage

- ArcFM Inherit Operating Voltage Field Transformer OperatingVoltage
- ArcFM Inherit Operating Voltage Field Fuse OperatingVoltage
- ArcFM Inherit Operating Voltage Field VoltageRegulator OperatingVoltage
- ArcFM Inherit Operating Voltage Field OpenPoint OperatingVoltage
- ArcFM Structure Relate Field DynamicProtectiveDevice SwitchingFacility_GlobalID
- CIS Layer DeliveryPoint *
- Graphical Work Design Field Switch FeederID
- Graphical Work Design Layer Streetlight *
- Mileage Field Transformer OperatingVoltage
- Mileage Field PriOHElectricLineSegment ConductorType
- Mileage Field PriOHElectricLineSegment FeederID
- OMS Field Switch FeederID
- OMS Field Switch ConstructionStatus
- OMS Field Switch PhaseDesignation
- OMS Field Switch ManuallyOperated
- OMS Field Switch NormalPosition_A
- OMS Field Switch NormalPosition_B
- OMS Field Switch NormalPosition_C
- OMS Field Switch TieSwitchIndicator
- OMS Field Switch GangOperated
- OMS Layer PrimaryMeter *
- OMS Layer DynamicProtectiveDevice *
- OMS Layer Switch *
- OMS Layer OpenPoint *
- OMS Layer SupportStructure *
- OMS Layer Transformer *
- OMS Layer VoltageRegulator *
- OMS Layer Fuse *
- OMS Layer Riser *
- OMS Layer PriOHElectricLineSegment *

Use Cases

ArcFM Inherit Operating Voltage	1
ArcFM Structure Relate	1
CIS	1
Graphical Work Design	1
Mileage	1
OMS	25
SCADA	1
Streetlights	1
Switching	1
Transmission	1
Vegetation	1
WMS	1

Analysis: How is GIS Setup and Used?

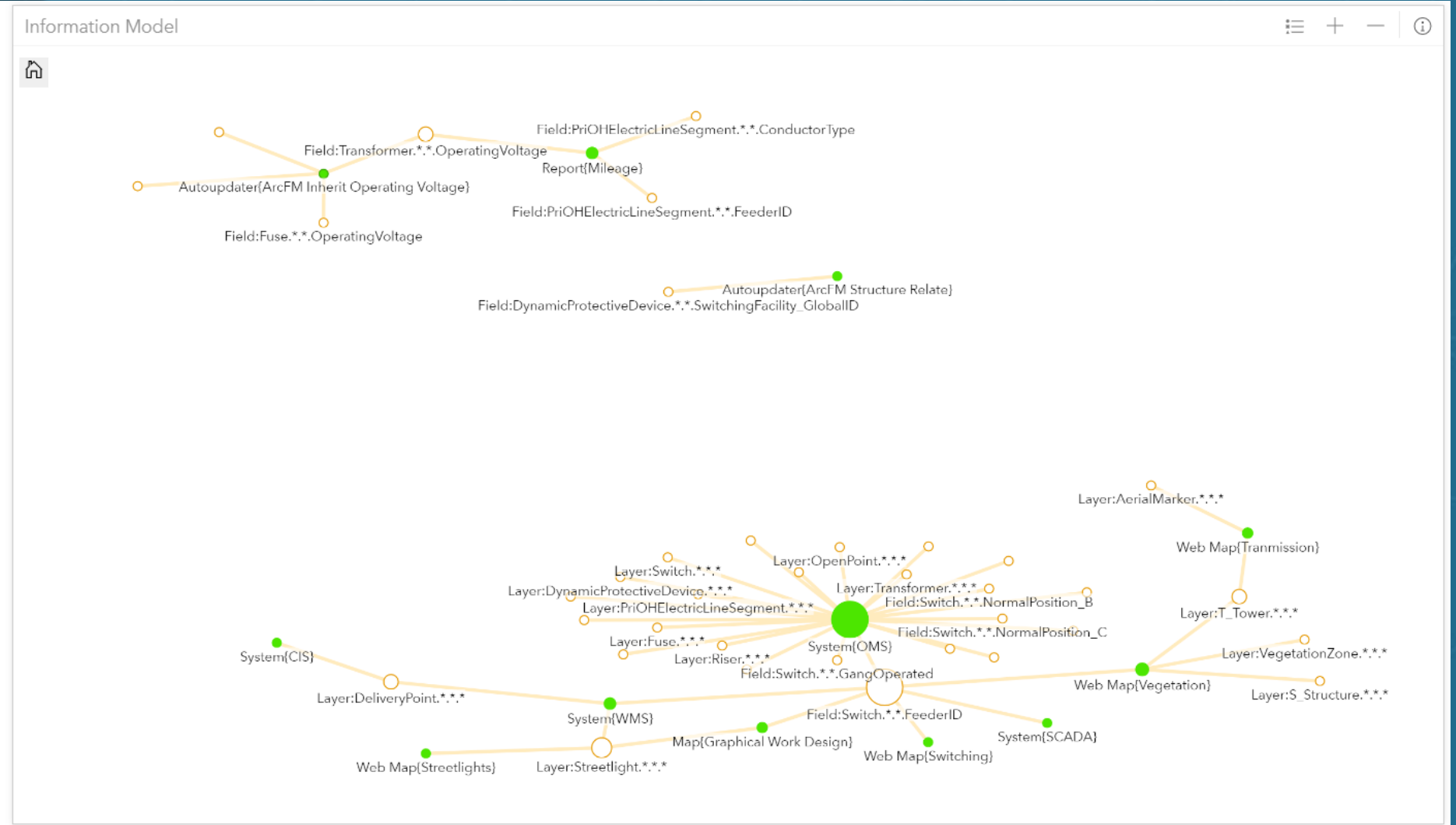


- Use Cases**

 - Select All
 - Autoupdater{ArcFM Inherit Operating Voltage}
 - Autoupdater{ArcFM Structure Relate}
 - Map{Graphical Work Design}
 - Report{Mileage}
 - System{CIS}
 - System{OMS}
 - System{SCADA}
 - System{WMS}

- Classes**

 - Select All
 - OpenPoint
 - PriOHElectricLineSegment
 - S_Structure
 - Streetlight
 - Switch
 - T_Tower
 - Transformer
 - VegetationZone
 - VoltageRegulator



Productivity Tools: Accelerators

For GIS/IT Specialists:

ArcGIS Pro Add-In

**Model
Manager**

ArcGIS Server Object Extension

**Metrics
Extension**

ArcMap Extension

**Conflation
Manager**

FME Workspaces

**GN2UN Data
Loader**

For GIS End Users:



ArcGIS Web AppBuilder Widgets

NetExplorer

**Display
Manager**

**URL
Navigator**

Similar

Mark 811

Metrics: ArcGIS Server Object Extension

Trust in Data

ArcGIS Server Object Extension

Metrics

Baseline reporting for data governance



Use-Ability Interoper-Ability Scale-Ability



Historical

Data Statistics and Trends (Counts, Distances, Area)

By Day,

Fields and Geography of Interest

Data Governance



Administrator: Metrics Extension to ArcGIS for Server

Overview: Metrics DB: 47 Metrics | 88756 Facts | Last Computed At: 01/16/2018

Geodatabase: NA Classes

Metric ID: 1

Name: Measures by Feature Class and Subtype

Description: Disconnected Count By Feature Class and Subtype

Configuration: Fact Compute * Class * Field (Where Populated) *

Schedule Status: Active

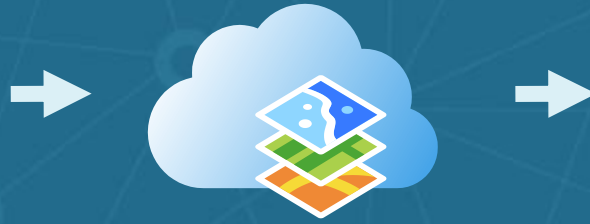
Frequency(Days): 7

Start Computation On: Tuesday, January 16, 2018

Email Address: Erik.Houser@avineon.com

ID	Name	Count	MIN	MAX	MEAN	RECENT	LASTTIME
1	Disconnected Count By Feature Class and Subtype	1	0	1	0.5000		

Build S4.12152016



Web GIS

ArcGIS Online
ArcGIS Portal
ArcGIS Server

SF_Accidents1

Map: SF_Accidents1

Age: Bar chart showing COUNT of SF_Accidents by age group.

Hit and Run: Pie chart showing counts for NO and YES.

Time: Line chart showing COUNT of SF_Accidents over time (2003-2015).

Gender: Donut chart showing counts for M and F.

Speed: Bar chart showing frequency of speed values.

Metrics Administrator

Define > Schedule > Compute

ArcGIS Insights

Visualize > Analyze > Share

Conflation Manager: ArcMap Extension

Improving Positional Accuracy

ArcMap Extension

Conflation Manager

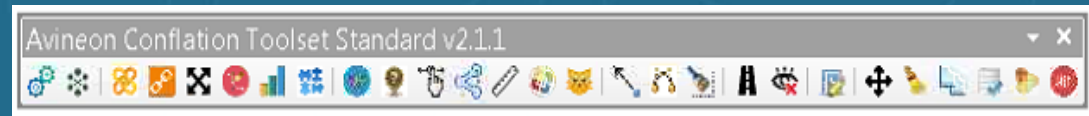
Improve spatial data accuracy and integration



Use-Ability



Interoper-Ability



Data Accuracy

Configure Spatial Alignment Rules

ACS Configuration Window

Data Configuration | Global Settings | PreProcess | Inputs | Reports | Workflow

Data to be Conflated

Data Type: FileGDB Conflate Source Data

Data Source *

Data Configuration

Street Centerline * MatchField

ROW Featureclass Network Featureclass

Target Reference Data

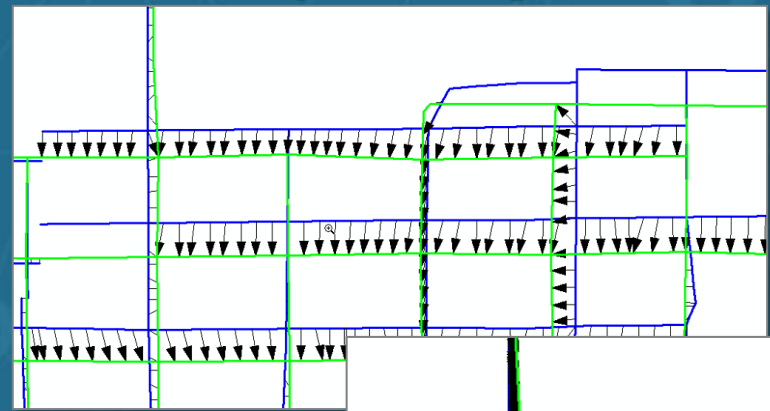
Data Type: FileGDB Database *

Street Centerline * MatchField

Wirecenter Name

Load Save Close

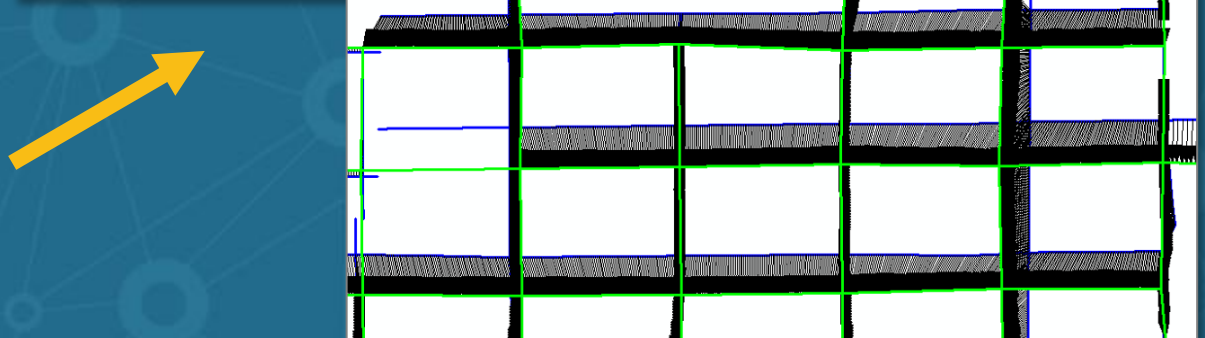
Preliminary Control Vectors Generation By Street Segment



Conflated Network with Higher Spatial Accuracy



High Precision Control Vectors Generation By Rules



Data Loader: FME Workspaces

Migrating Data to Utility Network

FME Workspaces

Data Loader
Load data into Utility Network Asset Package



Use-Ability



Interoper-Ability

Consolidation

Feature Class Consolidation

Object Class Consolidation

Fields Consolidation

Domains Consolidation

Annotation Consolidation

Topology

Stacked Geometries

Self Intersections

Duplicate Vertices

Connectivity

Relationships to Associations

Unit Geometries

Terminal Connectivity

Subnetwork Controllers

Visualization

Symbology Conversion

Annotation Upgrade

Diagrams Conversion

Loading

Non UN Data Loading

UN Data Loading

Assurance

Quality Reviews

Geometric Network

Utility Network

**Data Integration
High Fidelity Models**

NetExplorer: ArcGIS Web App Builder Widget



NetExplorer

Trace library to visualize and analyze networks



Configure User Experience

Configure NetExplorer

NetExplorer

change widget icon

- Configuration
- Options
- Zoom Factor
- Graph
- Map

One-Click Trace



NetExplorer

Trace

Inputs Outputs Details Analysis About

Trace: Assets Off Switch*

Network: ElectricDataset_1 DOWNSTREAM

Task: DOWNSTREAM

Parameters:

- Start At: DOWNSTREAM
- Switch|FacilityID: 219
- 217

Apply Clear Zoom

Start At(0)

Stop At(0)

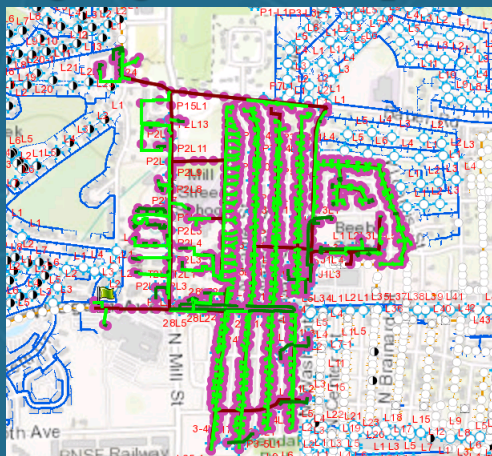
Disable(0)

Exclude(0)

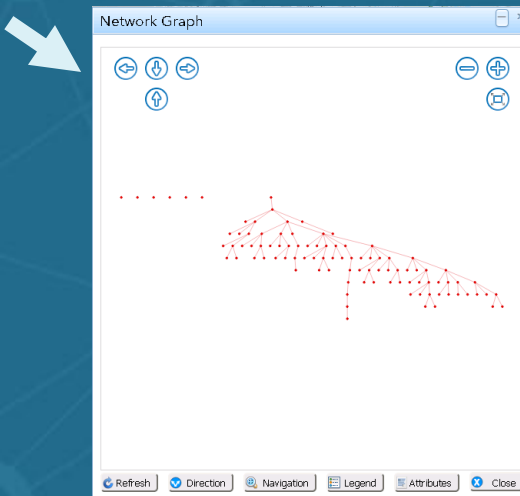
Zoom to trace results

Trace Save Delete Clear Cancel

View of Trace Results Highlighted in Map View



View Trace Results as Hierarchical Graph



Interact with Trace Results in Tree View

Trace

Inputs Outputs Details Analysis About

Display related records by features

- Trace Results
 - Primary Overhead Conductor(168)
 - Secondary Overhead Conductor(968)
 - Secondary Underground Conductor(171)
 - Primary Underground Conductor(67)
 - Bus Bar(1)
 - Support Structure(348)
 - OpenPoint(81)
 - Streetlight(90)
 - Service Point(690)
 - Fuse(30)
 - Transformer(45)
 - Switch(10)
 - 217(0.0 FEET E)
 - 218(371.7 FEET E)
 - 220(1116.0 FEET E)
 - 225(1295.3 FEET E)
 - 229(1462.0 FEET E)

Zoom to trace results

Trace Save Delete

Zoom Flash By Pass Start At Stop At Locate Clear

Summarize and Export to Microsoft Excel by Fields of Interest

Results Summary

Name	ConductorType	Measure
Primary Meter	...	1
Primary Overhead Conductor	Open Wire	168 37899.0 FEET
Primary Underground Conductor	Open Wire	67 11231.6 FEET
Secondary Overhead Conductor	Open Wire	3 549.9 FEET
Secondary Overhead Conductor	null	965 69985.0 FEET
Secondary Underground Conductor	Open Wire	171 15262.3 FEET
Service Point	...	690
Streetlight	...	90

Export Close

Display Manager: ArcGIS Web App Builder Widget

Display Manager
Easily filter map content



Configure filters library to apply on layers and related layers

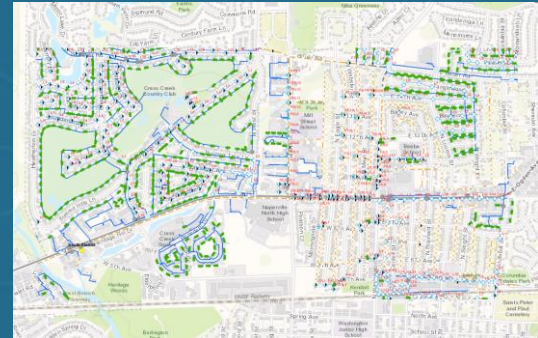
Key in and apply filter on map content




View results in Tree View



Filter content in Map View



URL Navigator: ArcGIS Web App Builder Widget

URL Navigator
Easily navigate from GIS to other web apps



Configure URL Library with field values to pass as parameters



Select features in the map to view dynamic links for navigating to related web based systems

Similar: ArcGIS Web App Builder Widget

Similar
Count Similar Features
Based on Attribute
Values of Selected
Features



Similar
⤴
✕

Similar

About

📁 Select

🗑️ Clear

Selection

Values

[-] Features

- + ELECTRICGN.DBO.SurfaceStructure(1)
- + ELECTRICGN.DBO.Transformer(1)
- + ELECTRICGN.DBO.PriUGElectricLineSegme
- + ELECTRICGN.DBO.SecUGElectricLineSegm
- + ELECTRICGN.DBO.District(1)

Similar
⤴
✕

Similar

About

📁 Select

🗑️ Clear

ELECTRICGN.DBO.Transformer
Count: 176/1486 (11.8%)

Selection

Values

FeederID RMT001	176 (11.8%)
<input type="checkbox"/> FeederID2 null	
<input type="checkbox"/> OperatingVoltage 7200 Volts Delta	
ConstructionStatus Existing	1486 (100.0%)
<input type="checkbox"/> WorkOrderID null	
<input type="checkbox"/> Comments null	

Mark 811: ArcGIS Web App Builder Widget

Mark 811
Document Utility
Locating Tickets & Print
Using Custom
Templates



Markup and Print

Manifest Print
⌵ ✕

Ticket No

▼ Manifest

Ticket

Markup

Date & Time

Locator Name

Marking Type

- Flags
- Paint
- Stakes
- Offsets

Special Note

- New Construction
- Inclement Weather
- Other

Ticket Code

must be present during dredging or other forms of excavation or demolition operations.

⚙️ Advanced
🖨️ Preview / Print

Manifest Print
⌵ ✕

Ticket No

▼ Manifest

Ticket

Markup

Water Line	—
Sewer or Force Main Line	—
Reclaimed Line	—
Excavation Area	—
Power	—
Communications	—
Gas	—

—

—

■

✕ Delete

⚙️ Advanced
🖨️ Preview / Print

Map scale/extent:

Preserve: map scale map extent

Force scale: [current](#)

Layout metadata:

Author:

Map Only size:

Width (px):

Height (px):

Manifest print quality:

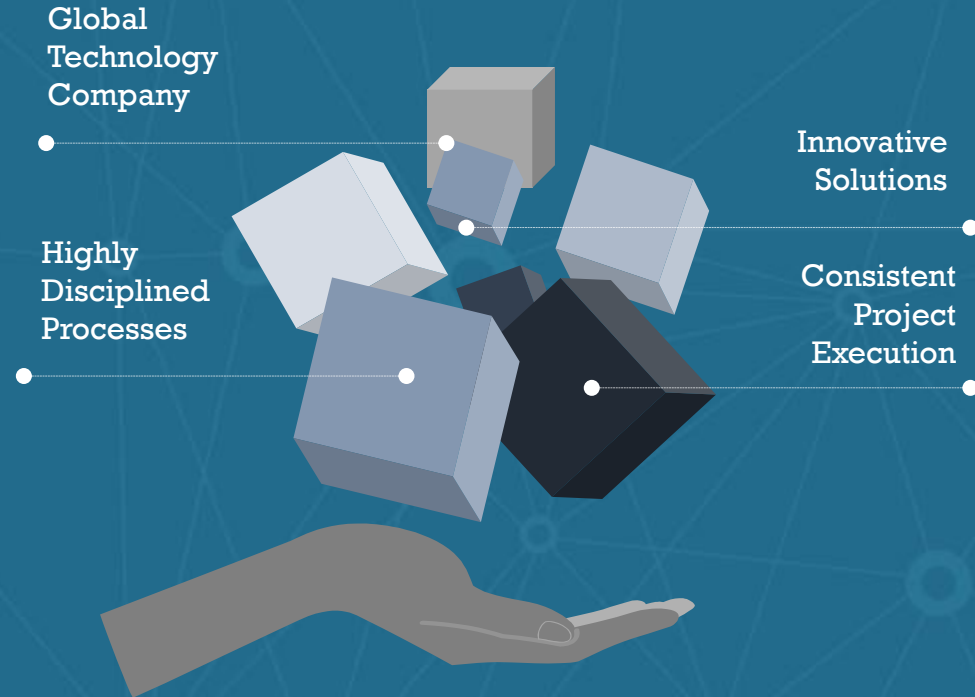
DPI:

Feature attributes:

Include attributes:

⚙️ Advanced
🖨️ Preview / Print

Corporate Mission and Global Presence



North America

- McLean, VA (HQ)
- Saint Petersburg, FL
- Traverse City, MI

Europe

- London (UK)
- Paris (France)
- Montpellier (France)
- Lier (Belgium)
- Roosendaal (Netherlands)

Asia

- Hyderabad (India)
- Kakinada (India)
- Abu Dhabi (UAE)

- Avineon is a global technology company specializing in **Information Technology, Geospatial, and Engineering Services** for government and private industry.
- We deliver total system solutions that provide outstanding value by applying our innovative approaches, skilled people, and disciplined processes.

Company Overview

- **Privately Held Information Technology Firm**
 - Founded in 1992
 - Financially Stable – Debt Free
- **Headquartered in McLean, Virginia**
- **Over 1,000 Employees Worldwide**
- **Quality and Process Driven**
 - CMMI® Maturity Level 3
 - ISO 9001:2015
 - ITIL v3
- **Extensive Experience in Federal Government and Industry**
- **Strong Geospatial Program**
 - Esri Business Partner for Over Ten Years
- **Offshore Capability**
- **100% Project Success Rate**



Appian

Bentley

esri

Microsoft

ORACLE

Geocortex

SAFE SOFTWARE



GE Smallworld

spatial eye

Schneider Electric



HEXAGON



Utility Network Management
Specialty



Release Ready
Specialty



ArcGIS Marketplace
Provider

Summary

- New technology need not be daunting
- Many tools available to assist in all phases
 - Design
 - Implement
 - Sustain
- Value can be determined and issues addressed in a methodical way
- Accelerators help realize an immediate return on your investment



Learn more at:

<https://avineonlab.com/>

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AVINEON®

Visualize IT. See IT Through.



Utility Network Management
Specialty