Implementing the Utility Network at Ørsted

Jakob Møl Mortensen, Ørsted

Signe Bramming Andersen, Similix

Jesper Vinther Christensen, Similix

ESRI USER CONFERENCE

Presenters

- **Jakob Møl Mortensen, jakmm@orsted.dk**
  - Jakob holds a Master degree in Geology and has 20+ years of professional IT experience
  - Jakob is heading the team Energy Analytics & Geo Services at Ørsted, a global utility

- **Signe Bramming Andersen, signe.bramming@similix.dk**
  - Signe is MSc in Economics and has 20 years of experience within the Utility industry
  - Signe is working with business development at Similix, an Esri partner with global experience with Utility Networks

- **Jesper Vinther Christensen, jesper@similix.dk**
  - Founder and owner of Similix, an Esri partner providing technological expertise to the global utility sector
  - Similix offers a variety of products enabling customers to migrate to and benefit from UN

Agenda

- Short introduction to Ørsted
- The Utility Network project at Ørsted
- New functionality out of the box in the Utility Network: Tracing and Subnetwork Management enabling CIM integration
- New functionality build on top of the Utility Network: Outage Management System

Ørsted Who?

Jakob Møl Mortensen

Global Utility – 3 Continents
Headquartered in Denmark
2017 Revenue 8 Billion Euro

Henrik Poulsen, CEO, Ørsted

"Our vision is a world that runs **entirely on green energy**. We want to be a company that provides real, tangible solutions to one of the world's most difficult and urgent problems."

MV & LV element asset types	Count
Primary substations	84
10 KV Feeders	1.400
Feeder Measurements	2,500
Primary substation breakers	2,500
Primary substation disconnectors	3,000
10 KV lines	13,000
10 KV cables	61,000
0.4 KV lines	40,000
0.4 KV cables	220,000
Substations	10,676
Substation breakers	25,000
Substation transformers	12,000
Substation transformer breakers	12,000
Remotely operated/measured points	2,000
RTU's	630

The Ørsted Project

Jakob Møl Mortensen

Electric Distribution
European Grid Model
1 million customers

Why Ørsted considers moving to the Utility Network?

- we revised the business case after the 10.2.1 and 10.6.x support was prolonged!

1. Business Process Support

- We can create a data model, that is the best possible representation of reality
- Better dialogue across departments – shared objects created in GIS instead of interface
- Better integrations for ADMS & ERP – service enabled architecture

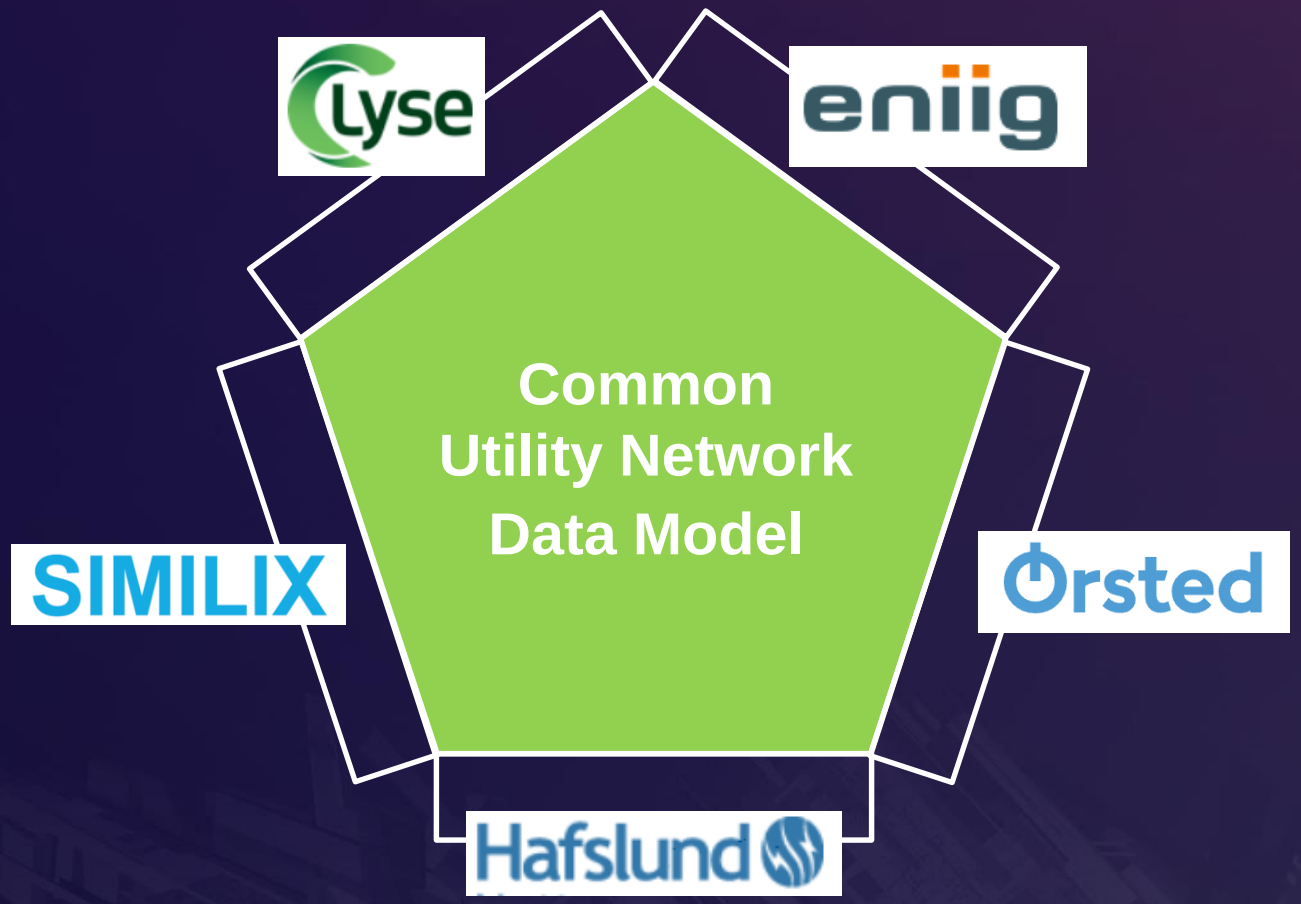
2. GIS magic for everybody

- Full stack implementation
- Attractive functionality like trace and diagrams are moving into the field
- Performance, performance and performance – thank you!

3. Out of the box functionality

- Reduced need for custom code - we can transfer custom build trace to standard
- Reduced need for manual data maintenance – we get schematics automatically
- 3rd party license cost – based on an extended base, we can get more value for money

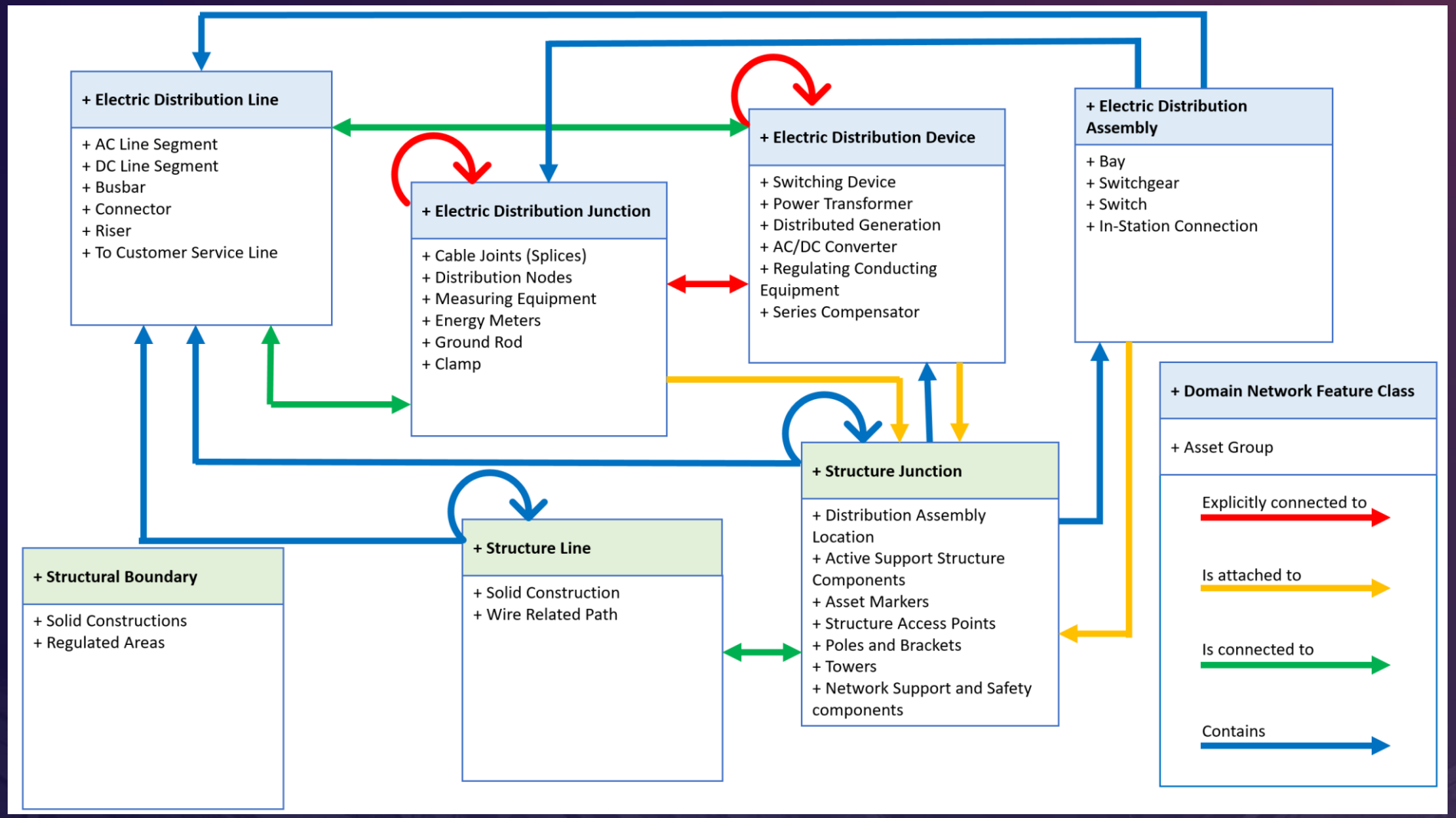
We are travelling in good company…



The Utility Network Community

- Lower project and operational cost
- Impact the core Esri model
- Co-develop European model on top
- If possible share development on top of Esri standard

The Data Model co-developed in the Utility Network Community



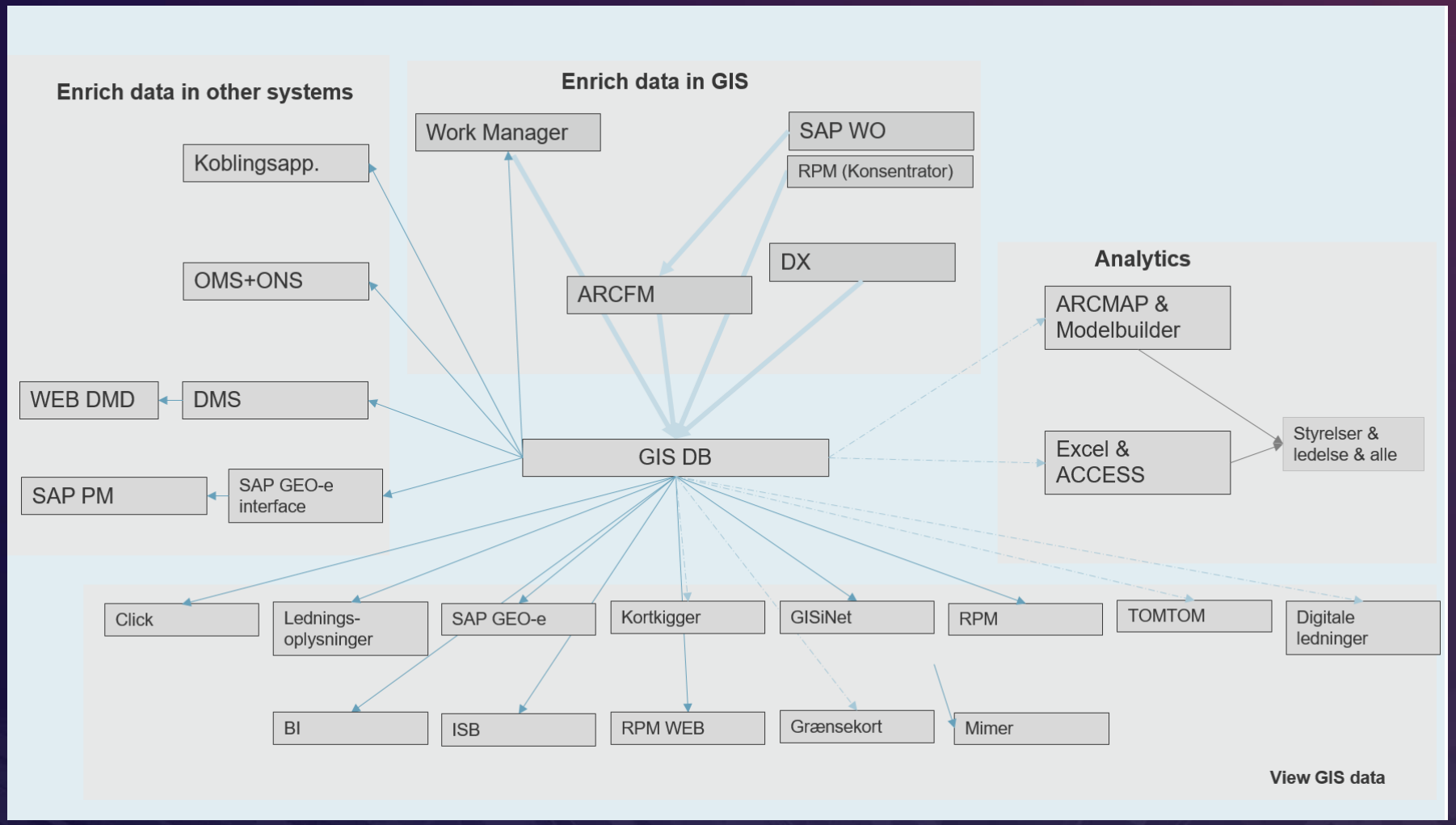
Contains:

- Asset Groups
- Asset Types
- Rules

within Esri Feature Classes

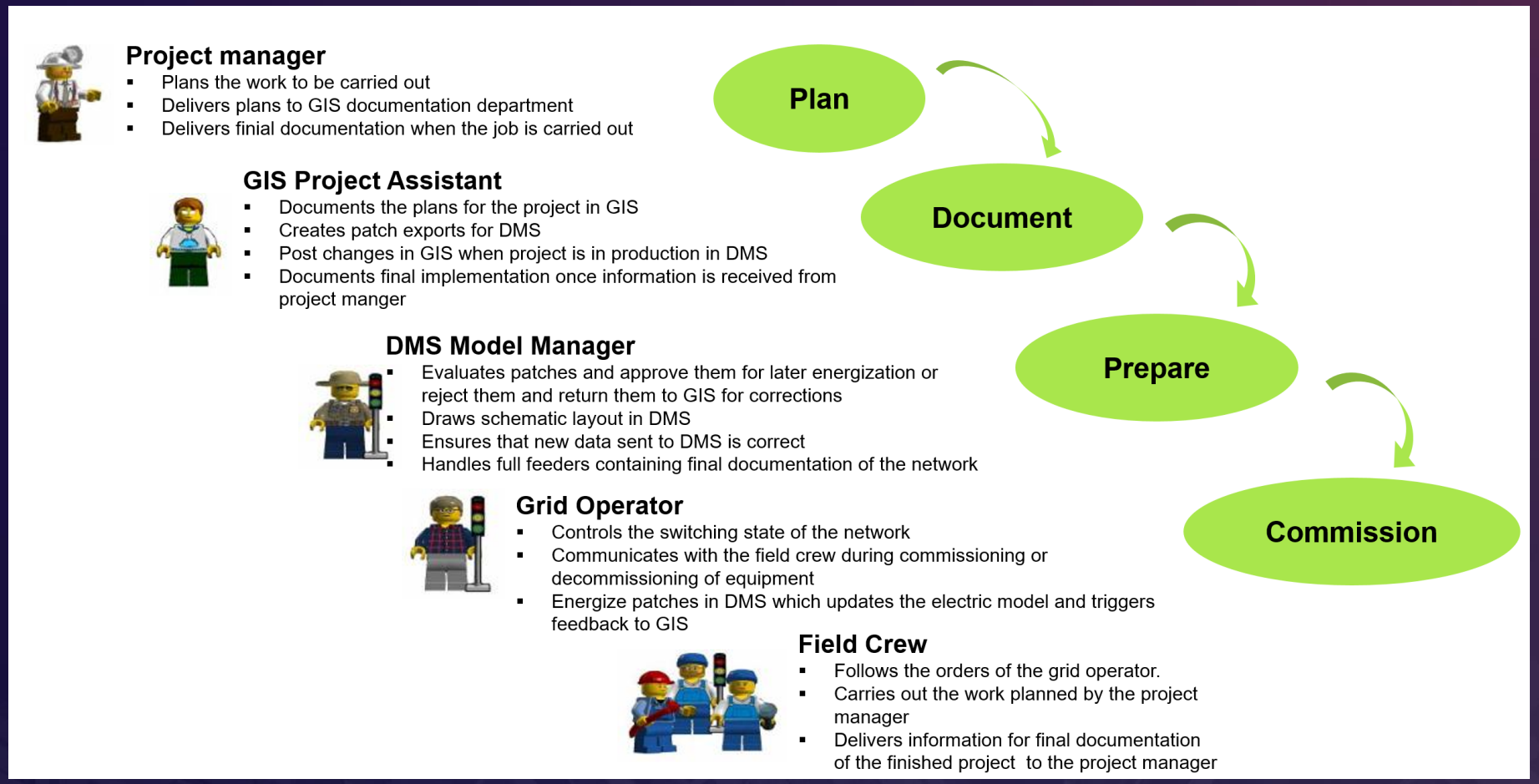
You can get the UNC model and our presentation after the session

Our GIS landscape will benefit from a service enabled GIS



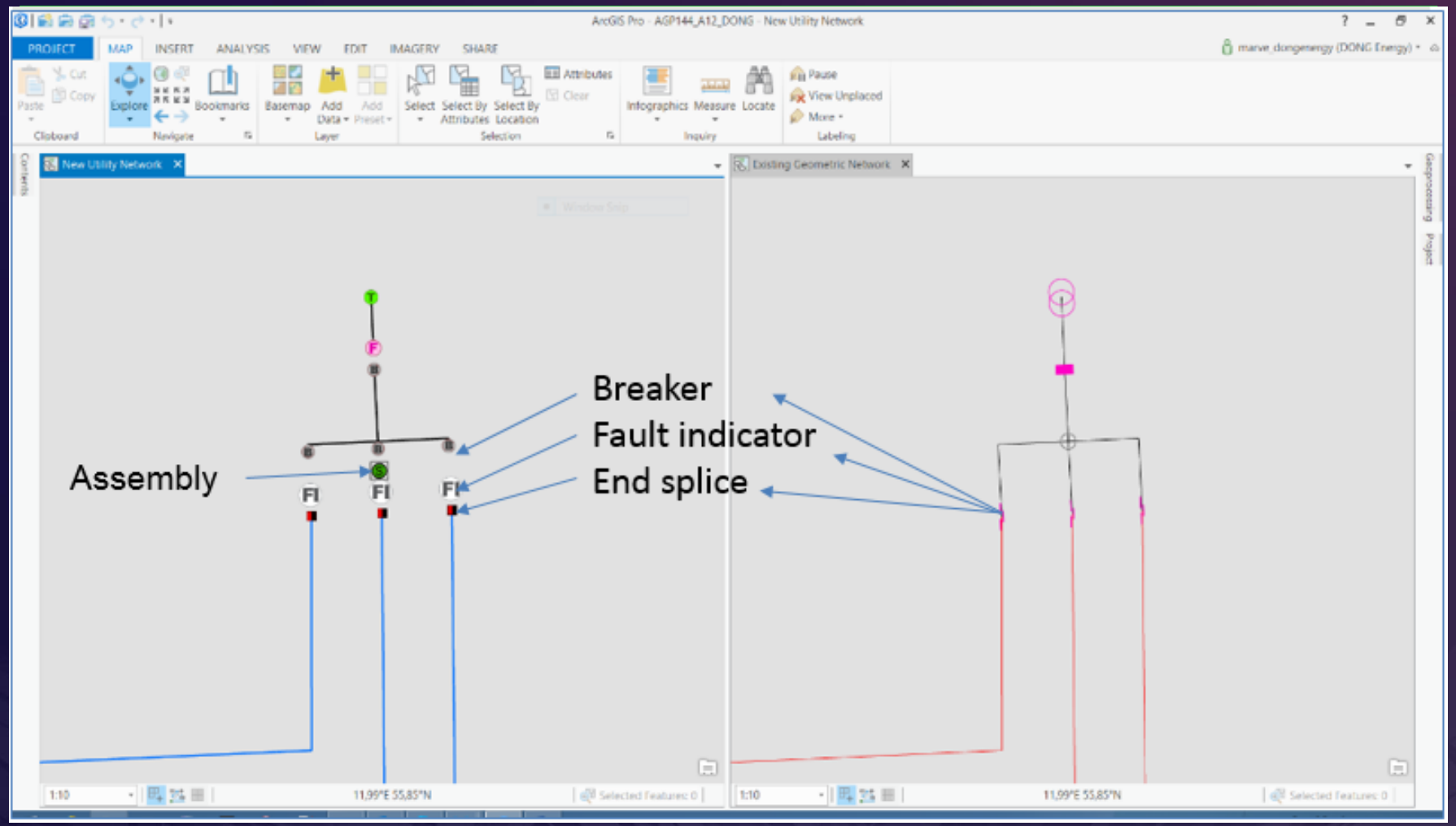
GIS is serving as master data system for 25+ applications at Ørsted

Our processes will benefit from an improved data model and trace



We run a delta integration between GIS and ADMS based on IEC CIM 61968 & 61970

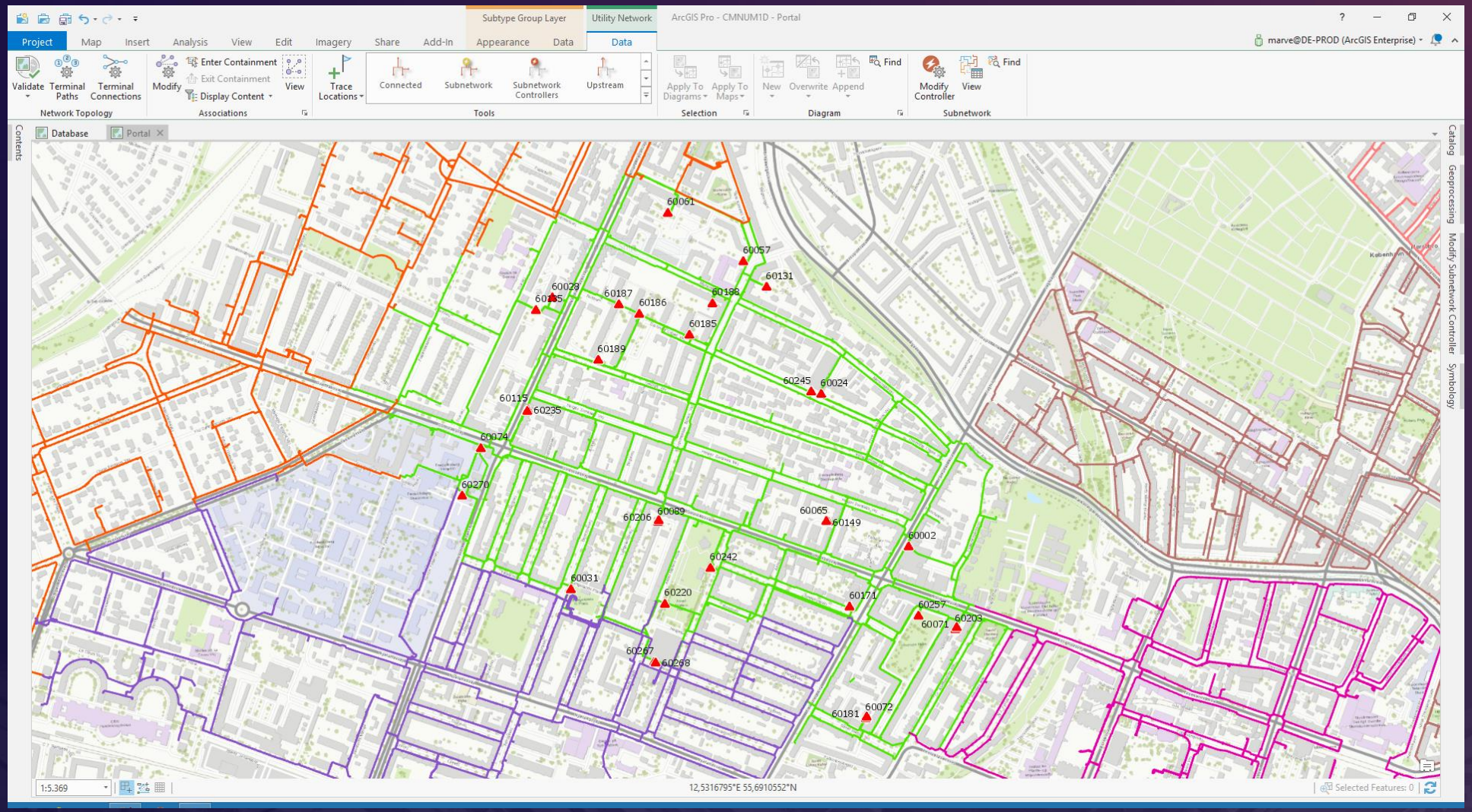
We enrich the data model in automatic data migration



Objects needed in ADMS can now be created in GIS instead of in the CIM interface.

The dialogue between the Documentation Department and the Control Center is improved.

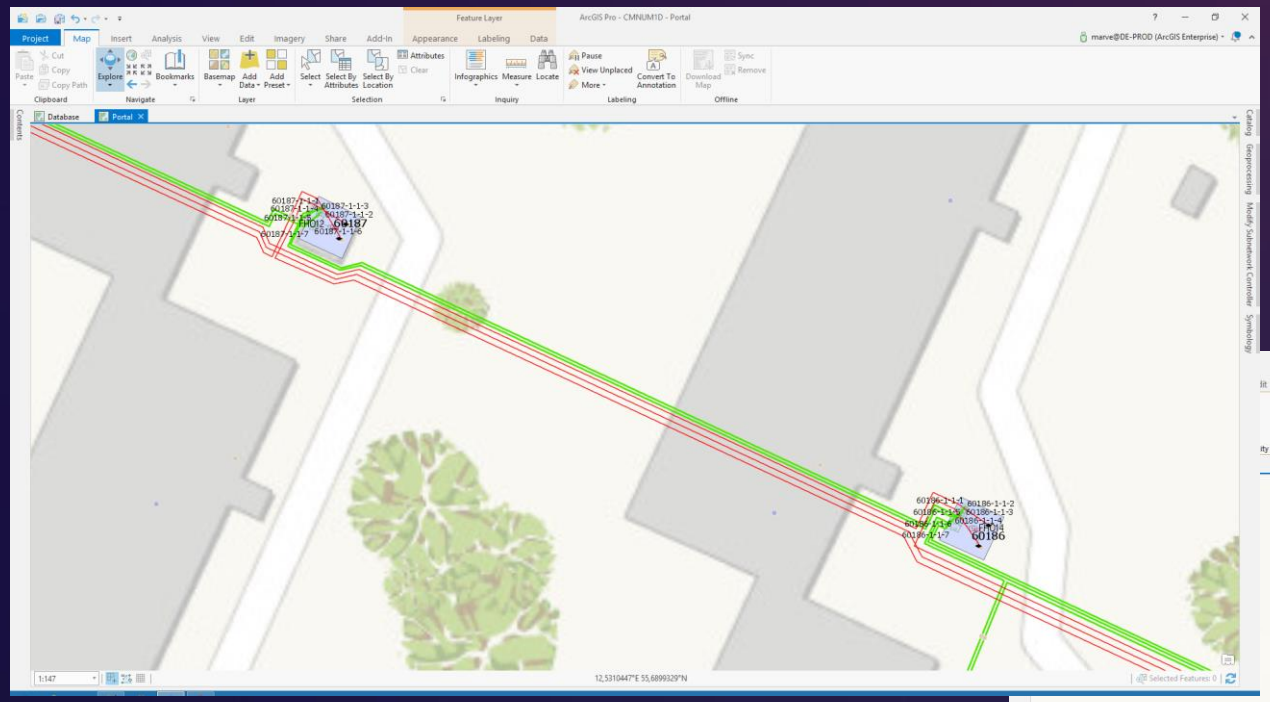
Complex Meshed Network

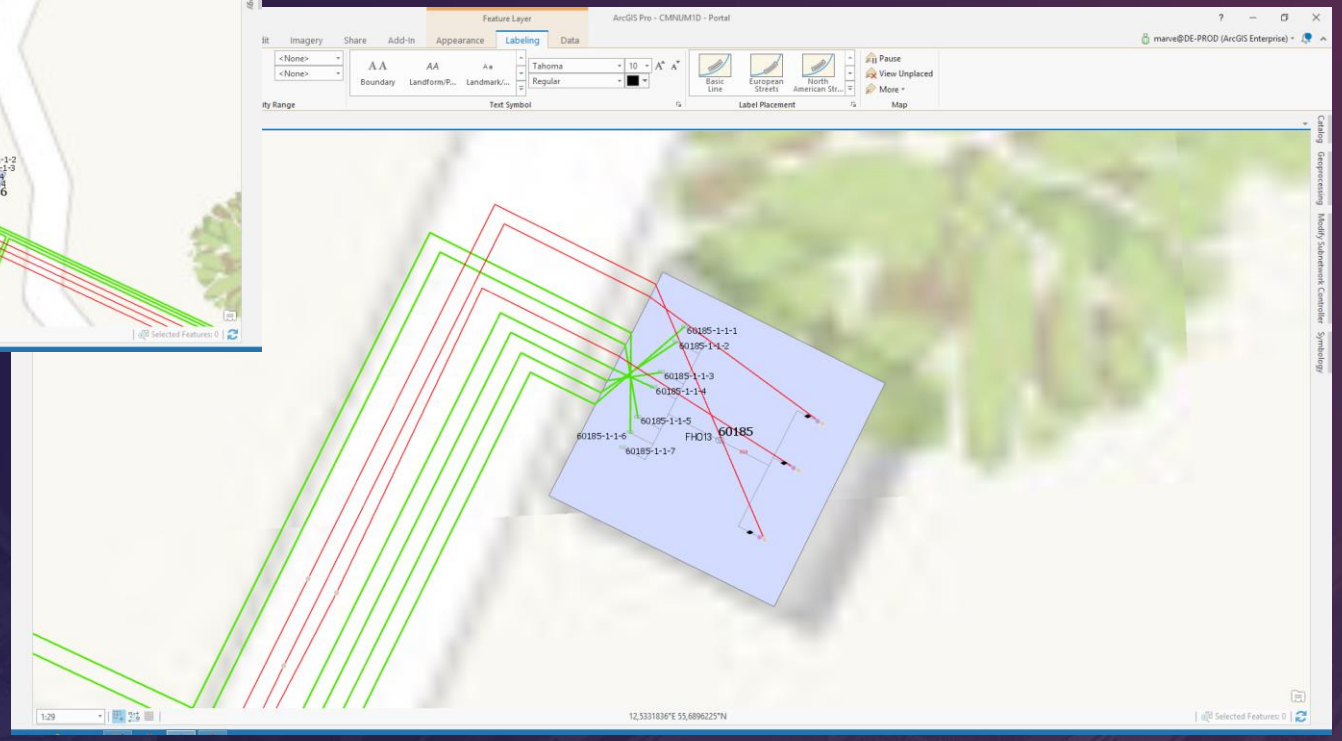


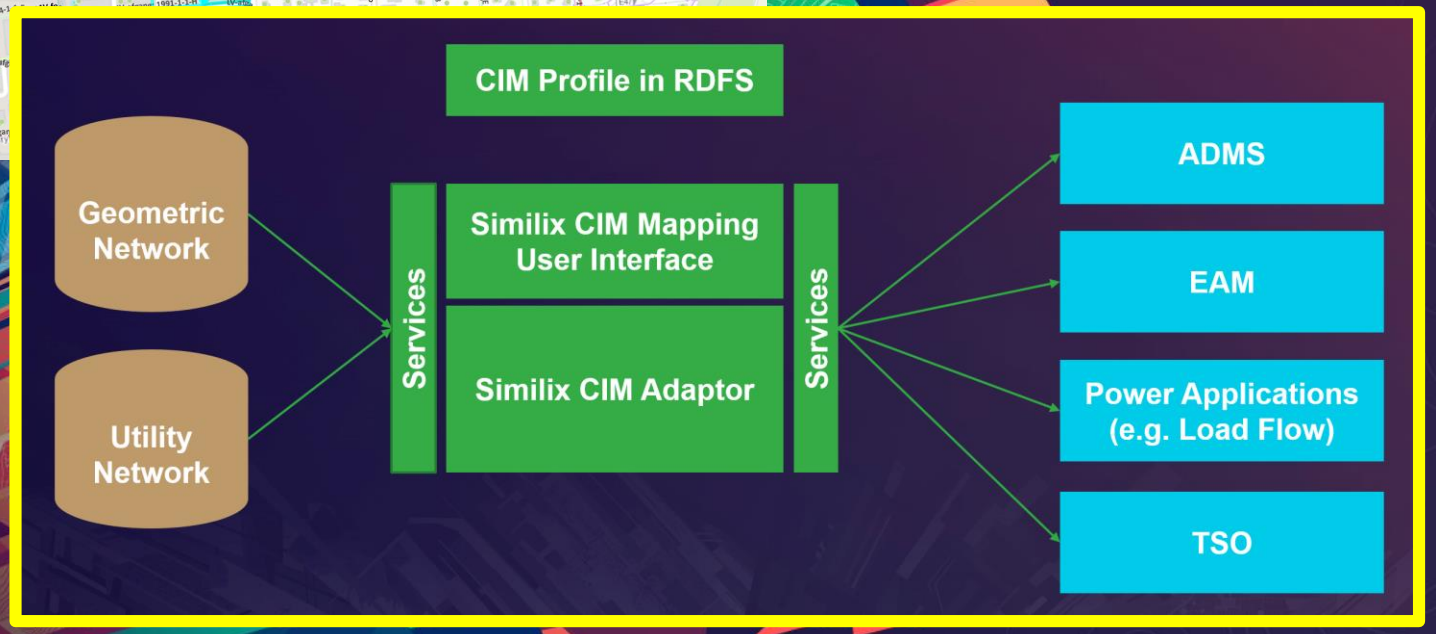
Two Substations

Each with several Feeders

Feeding into one Meshed Network







From Tracing to CIM Integrations

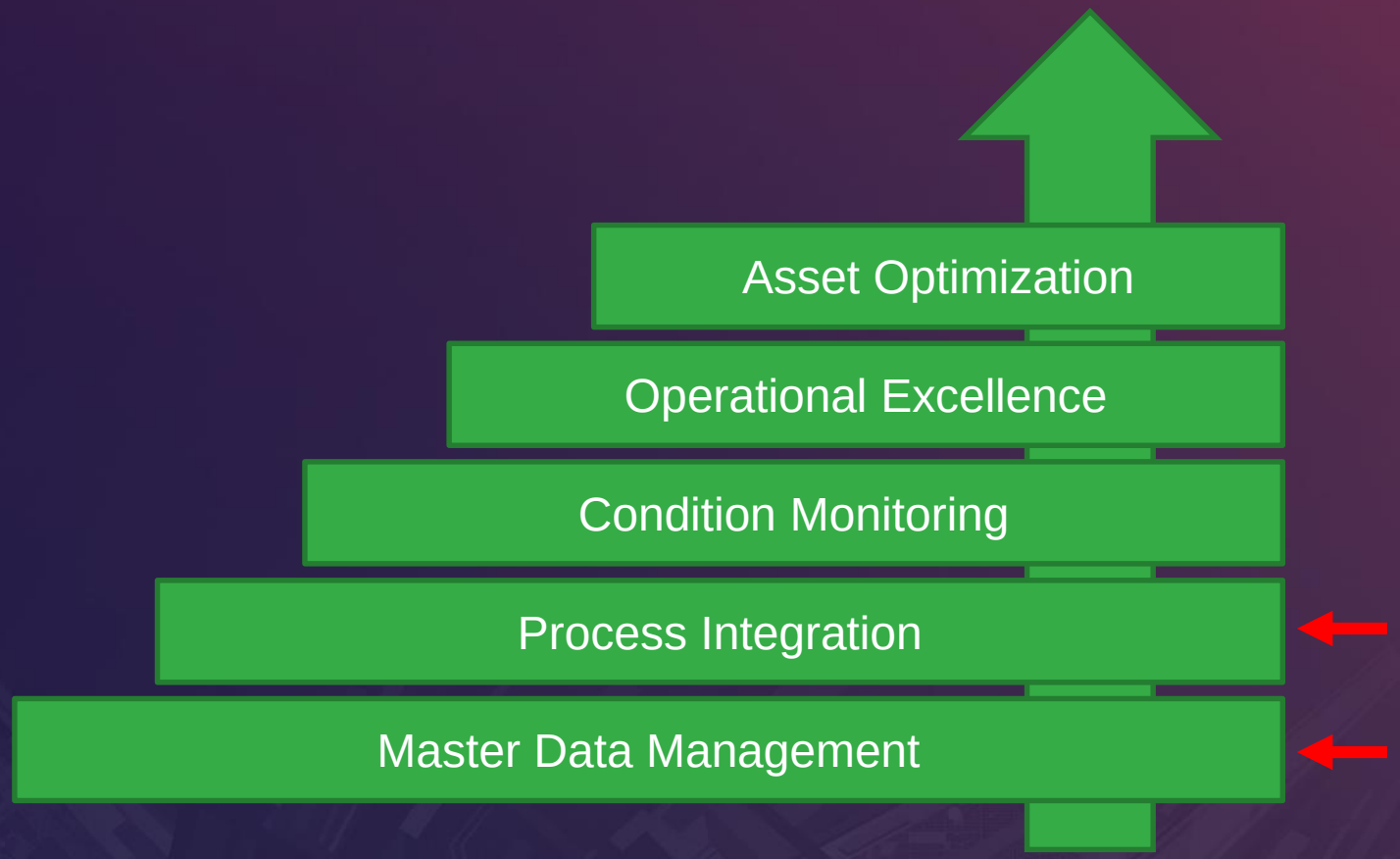
Signe Bramming Andersen

- Domain expertise generalized into a product
- Benefit from the rich data model, the tracing capabilities and the service based architecture

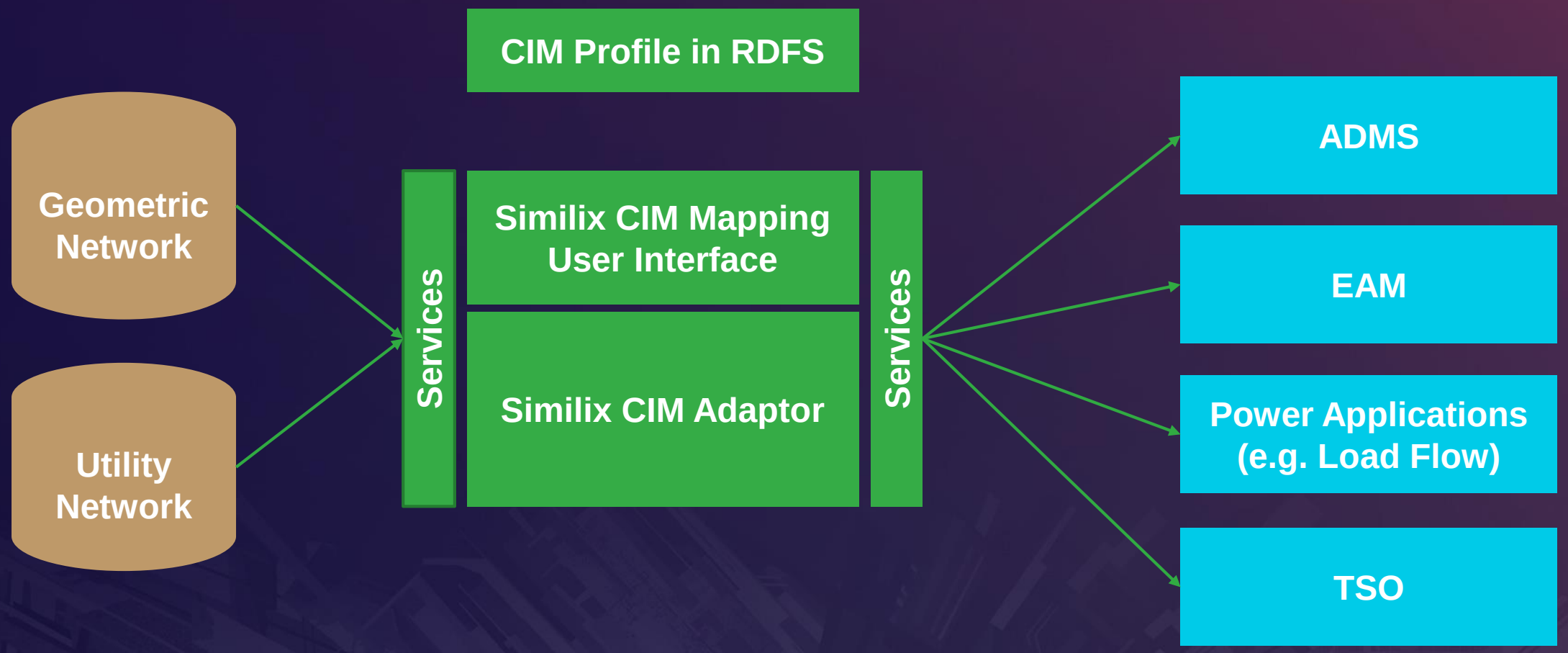
Looking forward – vision for the future

- *Construction Projects*
- *Project Manager Support*
- *Customer Information*
- *Field Crew Support*
- *Work Planning*
- *Customer Connection*
- *Task Management*
- *Outage Management*
- *Health Monitoring*
- *Event & Incident Management*
- *Asset Diagnostics*

"We are building a state of the art platform for asset optimization within the utility and energy industry".

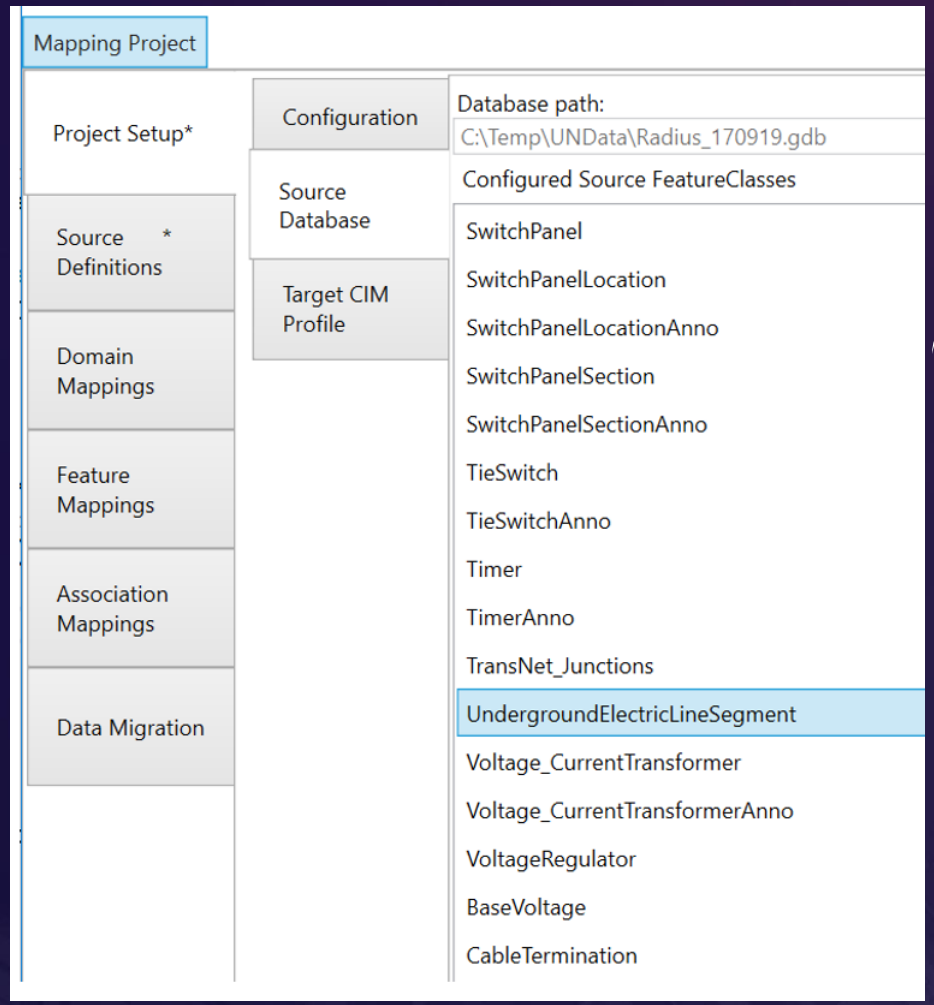


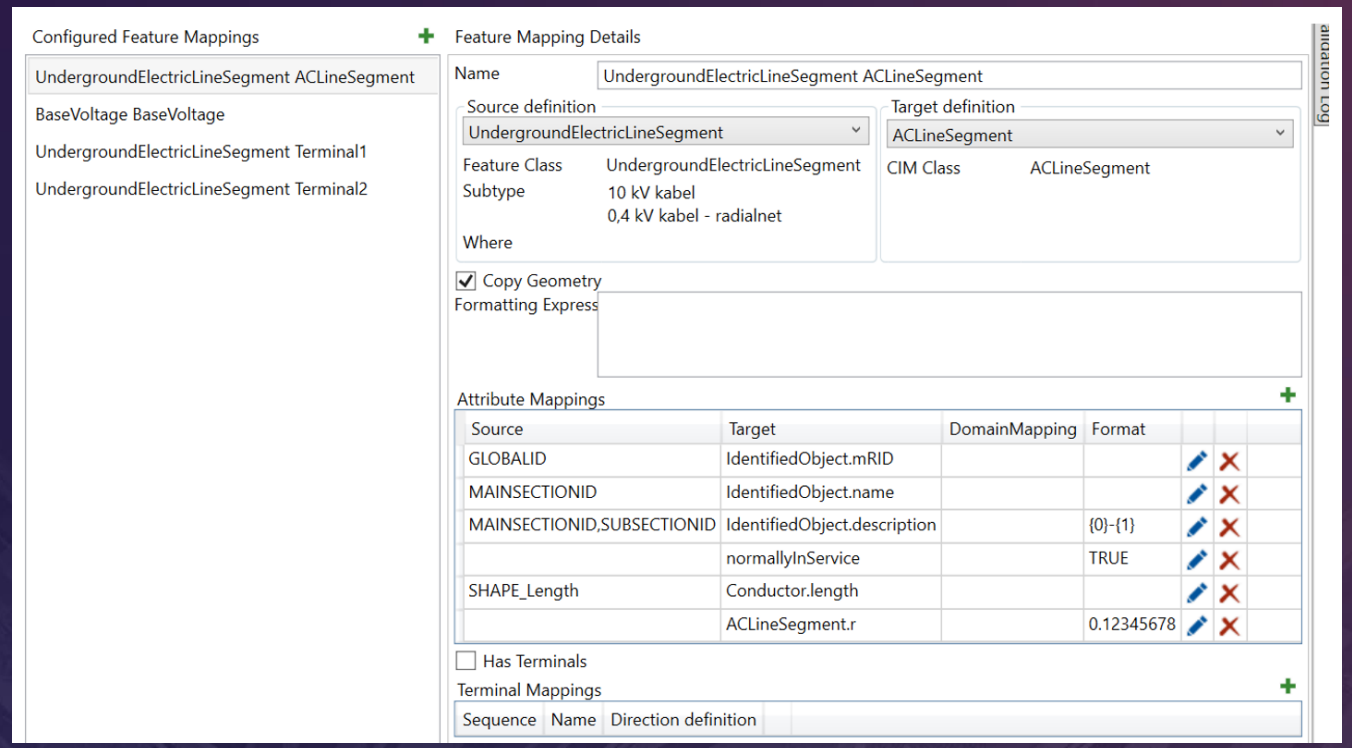
CIM based integrations



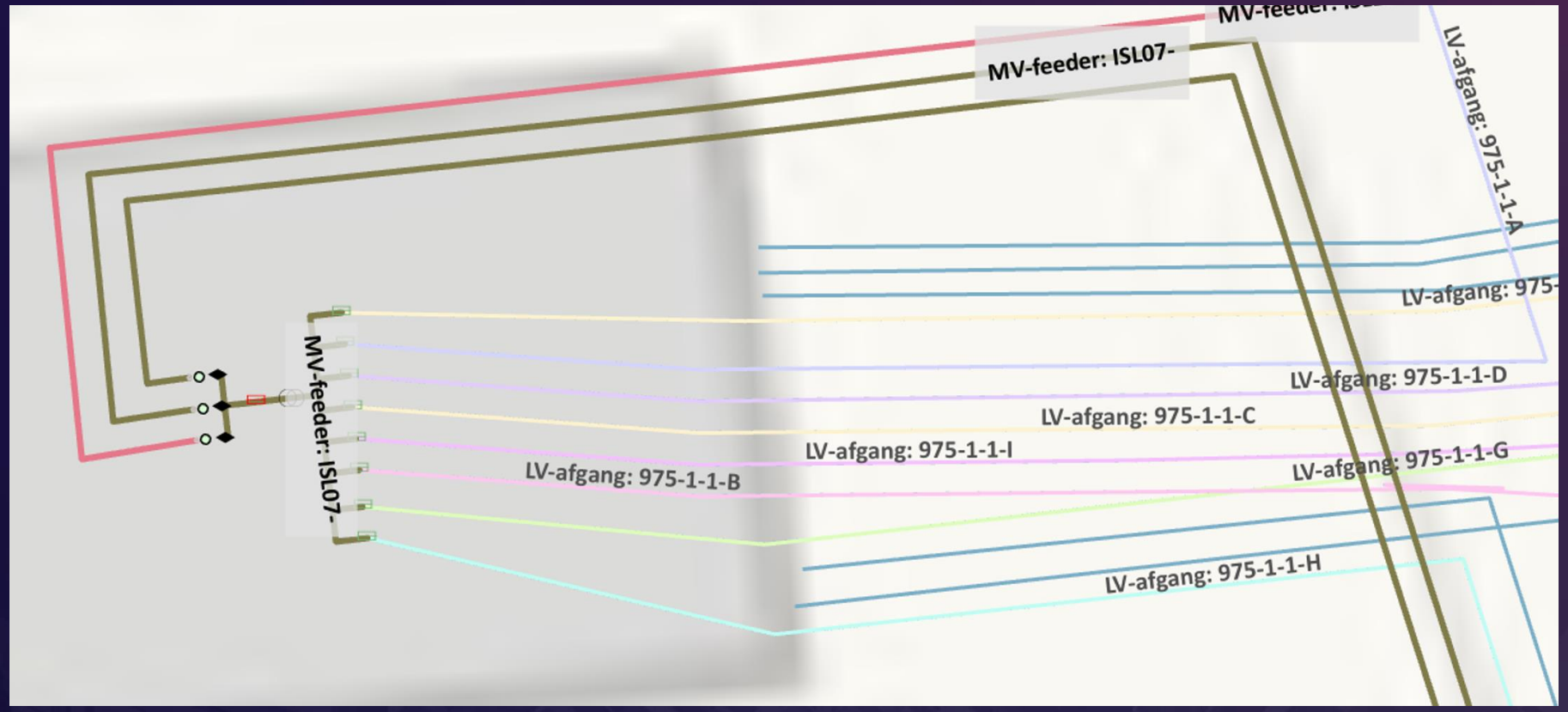
CIM based integration – current version

- Can read from a Geometric Network
- Produces CIM Files with:
  - Equipment
  - Terminals
  - Connectivity Nodes
  - Containers





Automatically migrated data in UN with unfolded objects



Islev station 975: 10KV/0,4KV station with 10KV tie point

Station with tie points on MV side and MV feeder tracing via junction-junction to LV subnetwork controllers

Outage Management based on Esri UN

Jesper Vinther Christensen

- Domain expertise generalized into a product
- Benefit from the rich data model, the tracing capabilities and the service based architecture

Looking forward – vision for the future

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- *Event & Incident Management*
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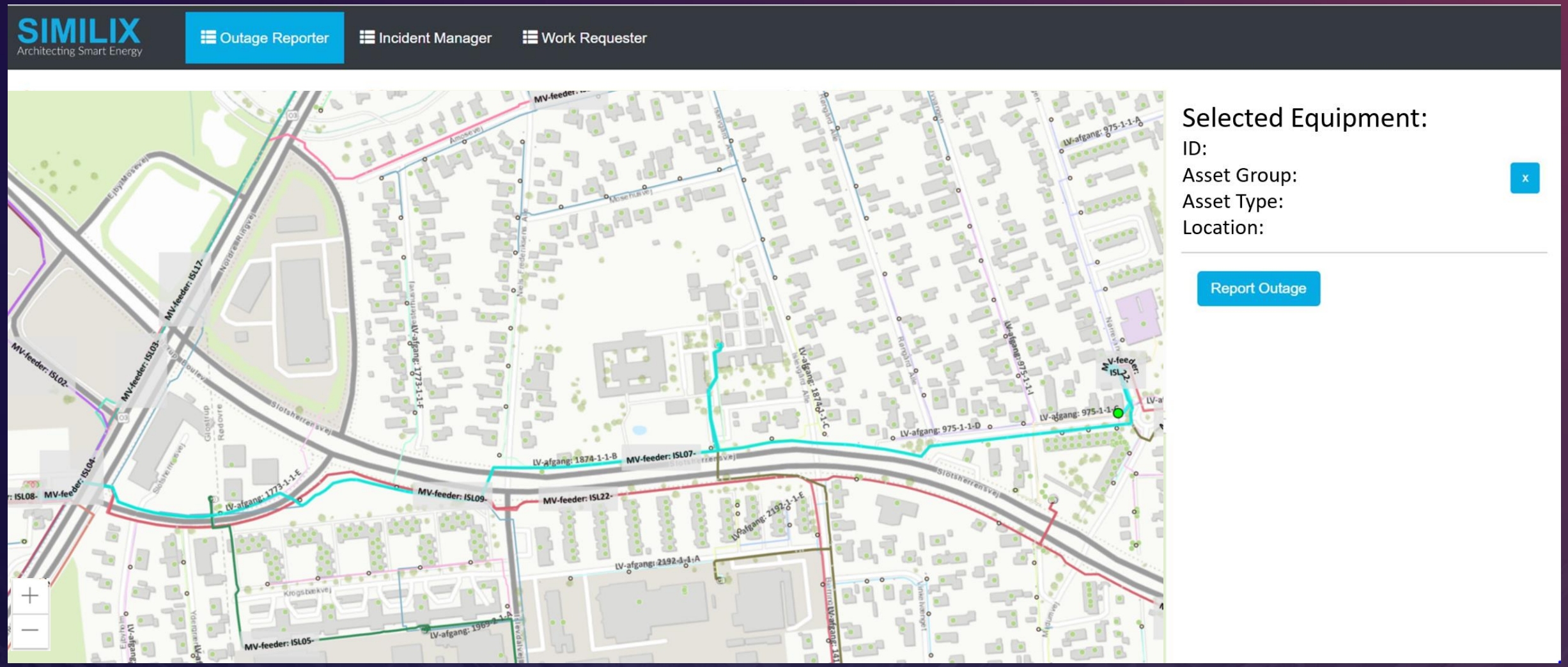
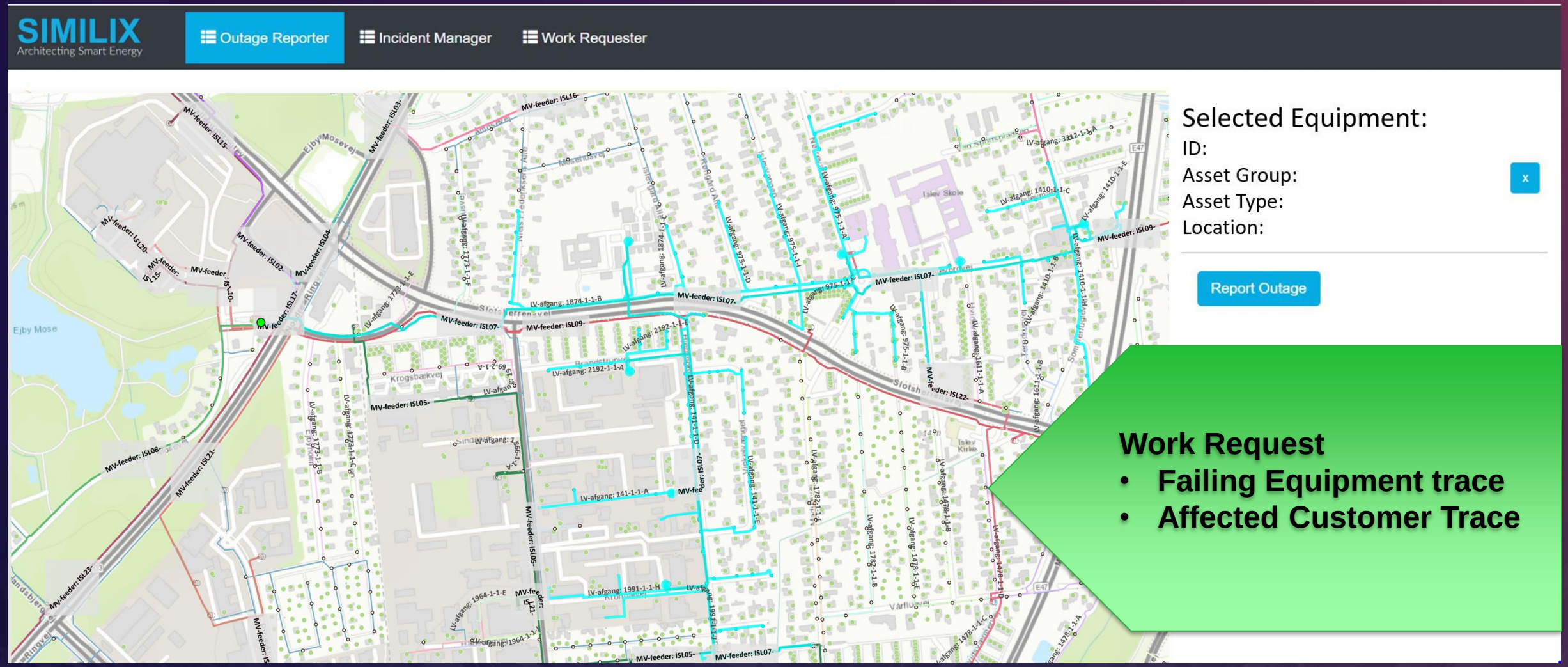
"We are building a state of the art platform for asset optimization within the utility and energy industry".

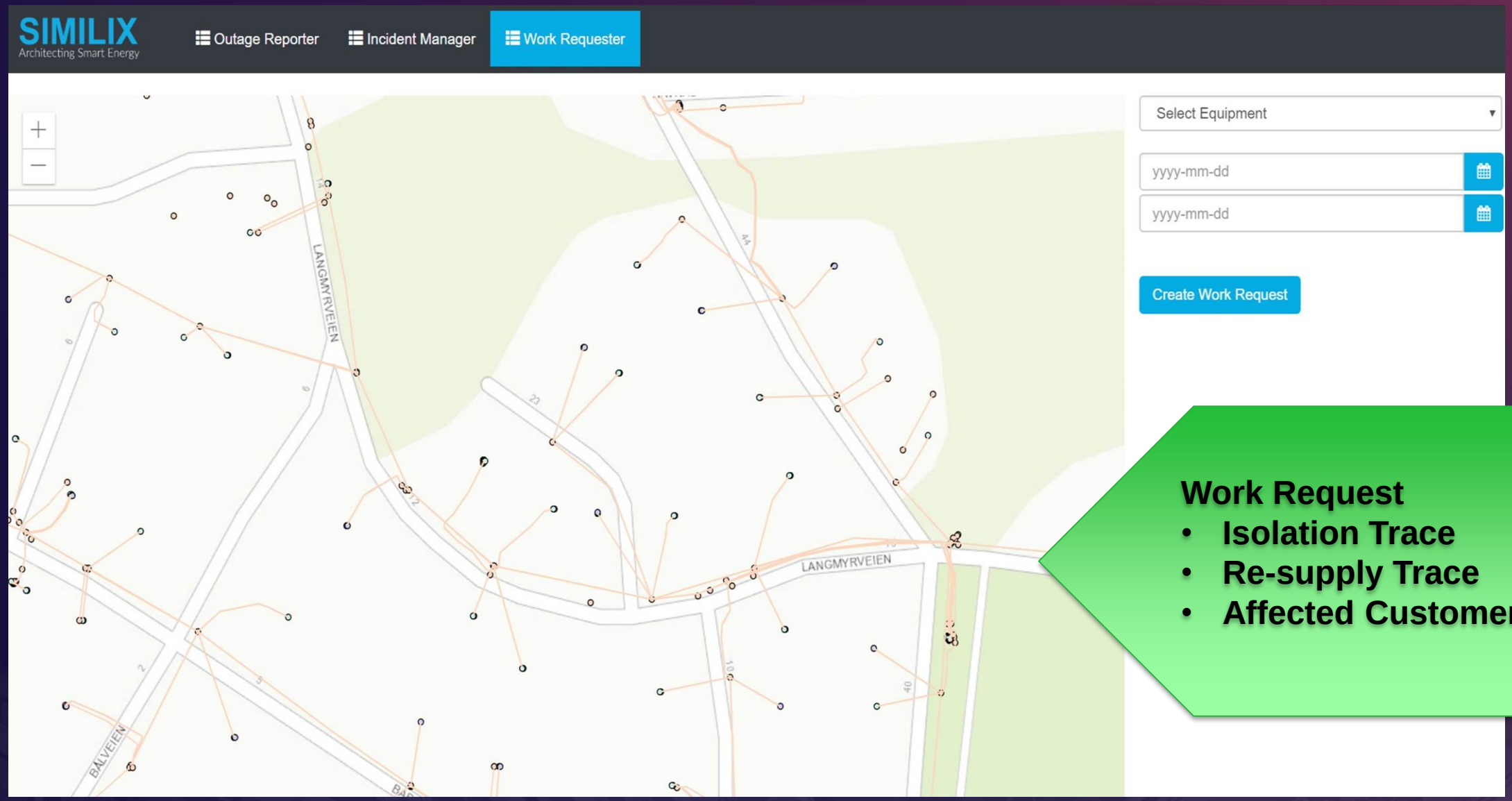
Outage Management – Outage Reporter



Outage Management – Outage Reporter



Outage Management – Work Requester



Work Request

- **Isolation Trace**
- **Re-supply Trace**
- **Affected Customer Trace**

Outage Management – Incident Manager

SIMILIX
Architecting Smart Energy

Outage Reporter | Incident Manager | Work Requester

User: User name

State: Incident state

Search

Id	Created Date
e4847b1e-6488-41de-a5b9-01bebd8d9775	Jun 13, 2018
33c6b701-aeb6-4278-8f8a-07f873691bd3	Jun 13, 2018
670dcd3a-53dd-42e4-88df-18d899f9db3d	Jun 13, 2018
41d5d6ec-878e-463b-a99f-1da2c03c0e3d	Jun 13, 2018
8613c16e-4b3d-44ed-87a5-1eb962de2f04	Jun 13, 2018
4d4c8b39-e1a6-4e78-96e6-210038d380b9	Jun 13, 2018
87305fc1-44f1-478e-a82b-26a6582a2e8c	Jun 13, 2018
4830ccaf-406d-48dd-ba20-2b308cee8d53	Jun 13, 2018
1b888f4b-0e4e-4933-8ff5-2d4541117e2d	Jun 13, 2018
089d05dc-0c68-46ea-8133-2dc8bd480b3b	Jun 13, 2018
17c900c9-db3c-4d4e-88a2-34acb4c331ea	Jun 14, 2018
16fa2b85-be0b-4219-b092-35d157f8e5b5	Jun 13, 2018
2e2a35bc-706a-4853-b274-415defe94246	May 10, 2018
0f8d5eb9-cf76-4ec6-9441-5ee588646e6f	Jun 13, 2018
3225b8e9-6db0-4f73-a29f-6858925d26ae	Jun 13, 2018
ed5af8d1-d42e-4040-a075-6e7d29b0863a	Jun 13, 2018
51785baf-d9f0-46b1-955b-7bca9b1940b8	Jun 13, 2018

Incident State History

From Date	To Date	User	State
May 10, 2018	May 18, 2018	Operator	Created
May 18, 2018	Dec 11, 9999	Operator	Confirmed

Created | Set State

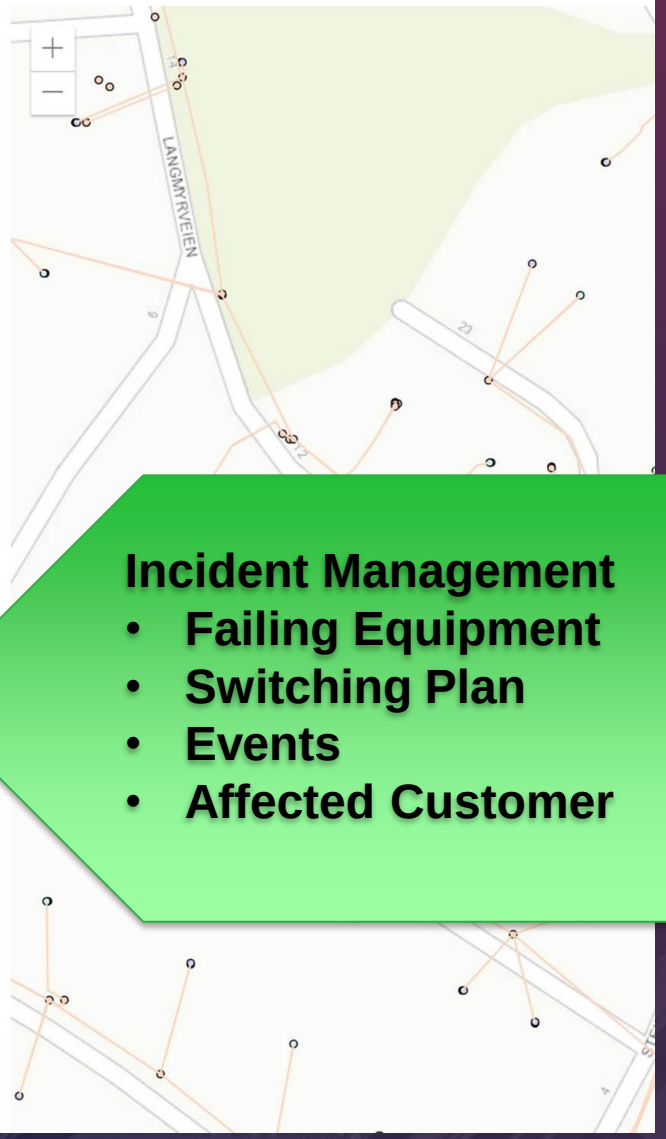
Switching Plan

Equipment	Time	ResultingState
Load Break Switch	18:35	Closed
Sectionalizer	19:00	Open
Contactor Relay	19:05	Closed

Failing Equipment

Event

Affected Customers<



Incident Management

- **Failing Equipment**
- **Switching Plan**
- **Events**
- **Affected Customer**

First learnings using the Utility Network for building applications

- *It is straight forward to use the rest end-points of the Utility Network services. We were up and running really fast, and were able to create and update features as expected*
- *A lot of parameters need to be set in order to run traces framework – this is nice as it gives end-less options – but also gives a little steep learning curve ;>) We are considering how we can offer standard configurations of the trace framework*
- *There are a few things we would like to see in the trace framework e.g. to be able to trace from a barrier*
- *The software is fast and responsive – most traces run in 1-2 seconds*
- *We are looking forward to all of the nice new features in the coming releases, e.g. a new version of Export Subnetwork, the java script API, partial posting, diagram editing and more*
- *Esri gives us tremendous support in our effort to use the Utility Network, both when it comes to developing data models and applications!!*

Q & A