

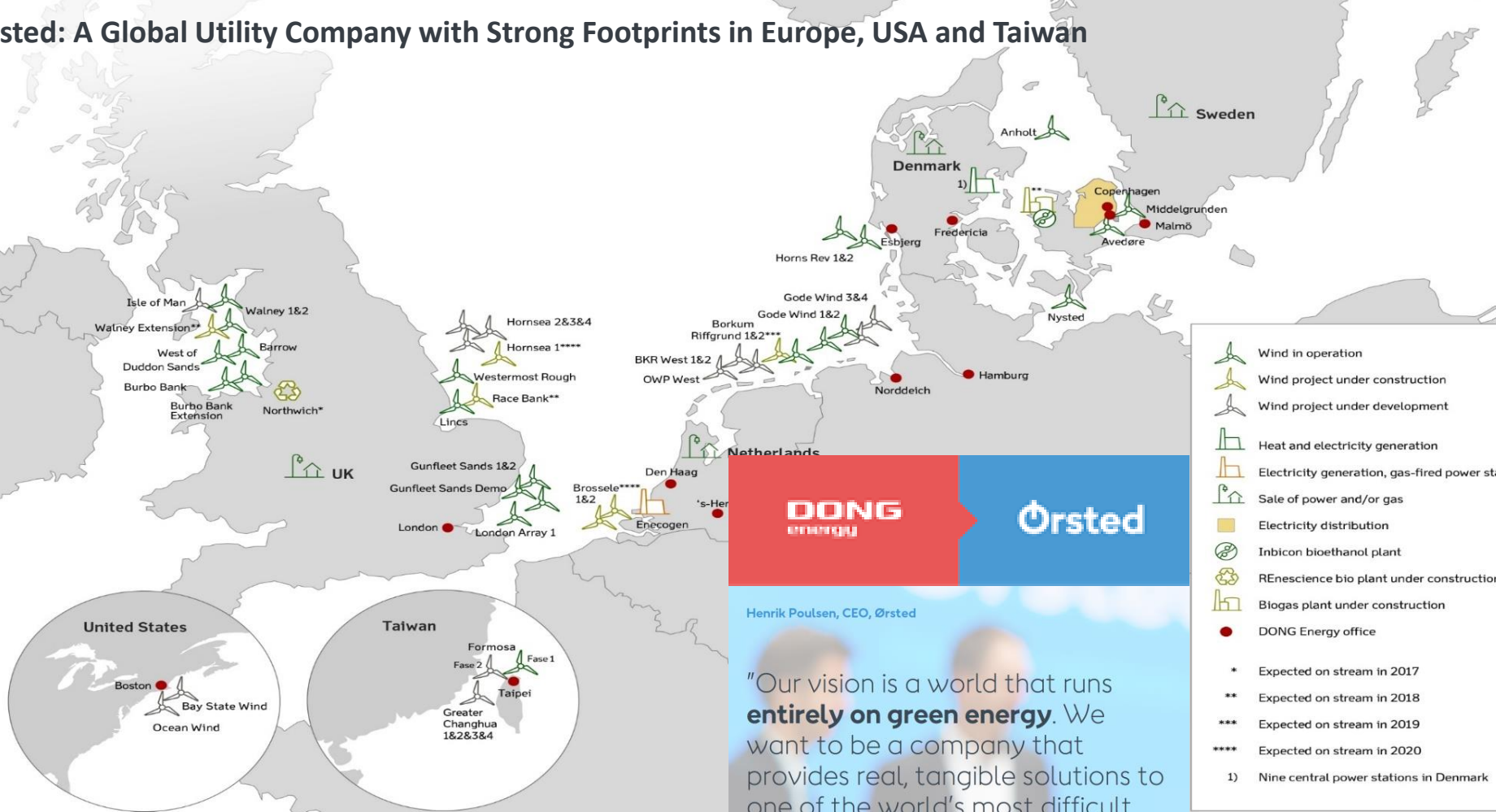
Enabling Smart Grid with GIS, Common Information Model and Utility Network

A Journey Towards Digital Transformation



Gaurav Grigo and Ninna Samsøe-Jensen

Ørsted: A Global Utility Company with Strong Footprints in Europe, USA and Taiwan



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."

* Expected on stream in 2017
 ** Expected on stream in 2018
 *** Expected on stream in 2019
 **** Expected on stream in 2020
 1) Nine central power stations in Denmark

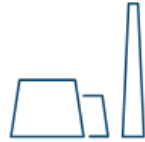
Business Units Objectives and Strategic Direction

700+ IT Employees



Wind Power

- Maintain the position as global market leader
- Support profitable growth by realising our current build-out plan for the period towards 2020
- Expand installed capacity to 11-12GW (ambition) by 2025 provided that the risk and return profile is sound
- Continue to reduce the cost of electricity for offshore wind through industrialisation, economies of scale and innovation



Bioenergy & Thermal Power

- Continuously strengthen operational excellence
- Continue the conversion of Danish CHP plants to sustainable biomass
- Phase out the use of coal and stop using coal from 2023
- Continue the commercial development of our enzymatic waste technology REnescience



Distribution & Customer Solutions

- Maintain a high level of security of supply and customer satisfaction in our distribution business
- Further strengthen competitiveness and customer satisfaction among residential and business customers in our sales business
- Optimise our energy portfolio and provide competitive market access



Oil & Gas

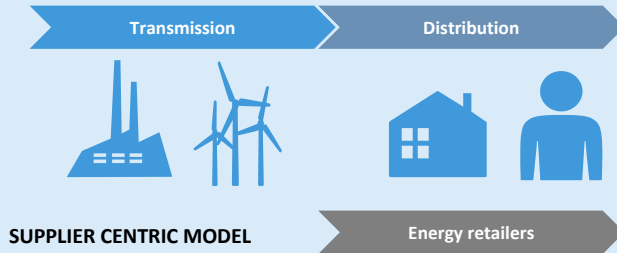
- Adapt to new market realities
- Transform Oil & Gas into a lean cash-generating business to fund investments in renewables
- Prepare for new ownership

Sold to INEOS

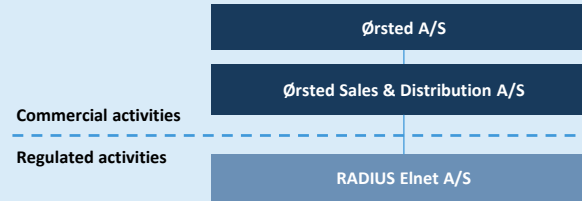
GIS

Radius Connects ~1m Customers: Largest Power Distribution Company in Denmark

Radius connects customers to the energy market



Grid Operations is a part of S&D (DCS) and operates as contractor to Radius Elnet A/S



Radius Elnet A/S Power Distribution

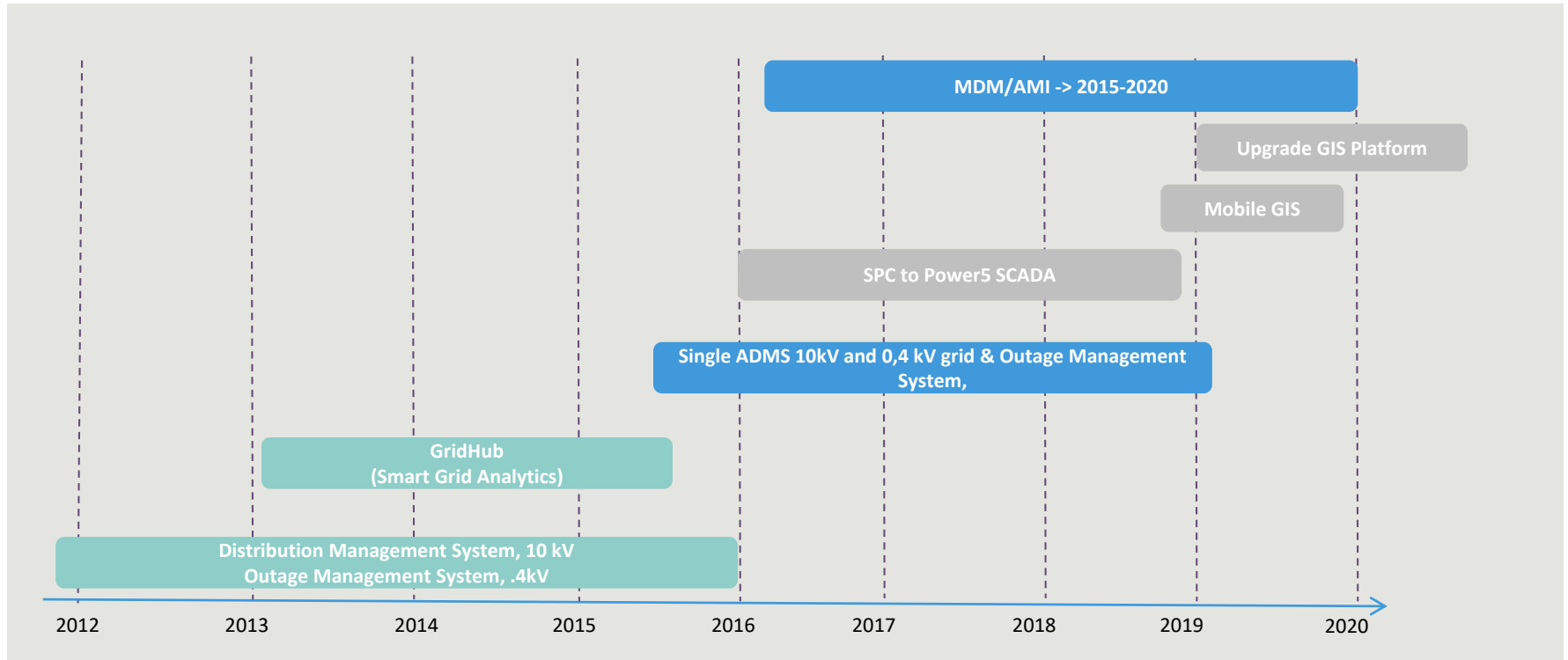
- 1.000.000 connections /meters
- 19.000 km of lines and cables
- 116 Primary substations
- 10.700 substations
- 1.200 MV Feeders
- 145.000 cabinets



Distribution licence,
Northern Zealand &
Copenhagen

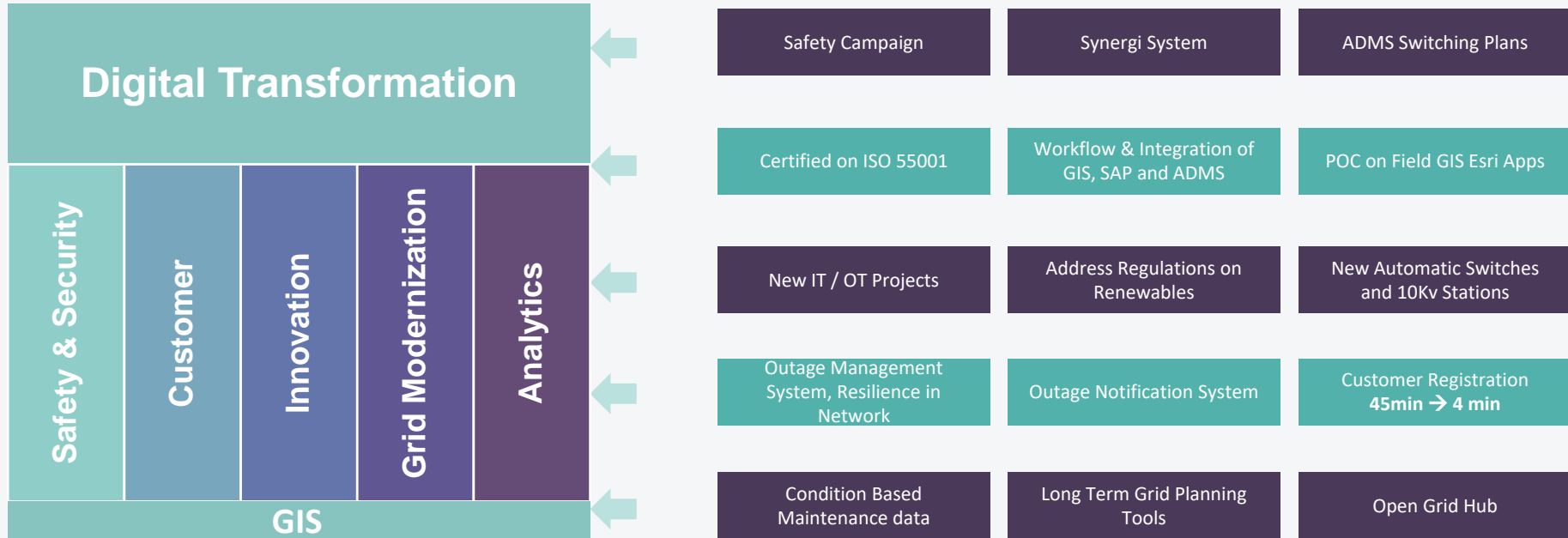


Smart Grid Master Plan : The Journey So Far



Projects: Smart Grid & GIS

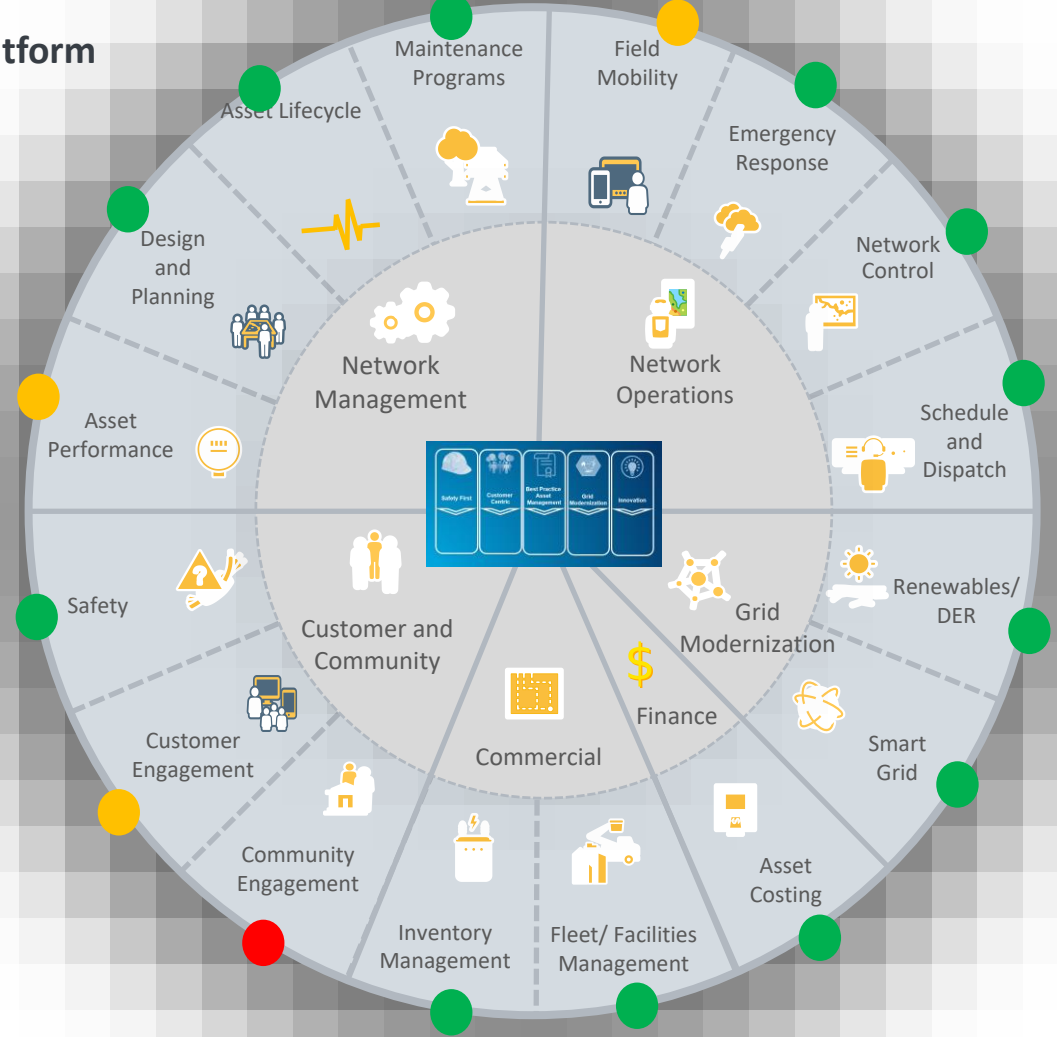
Strategic Orientation at Ørsted



Ørsted vs. Esri's Interconnected ArcGIS Platform

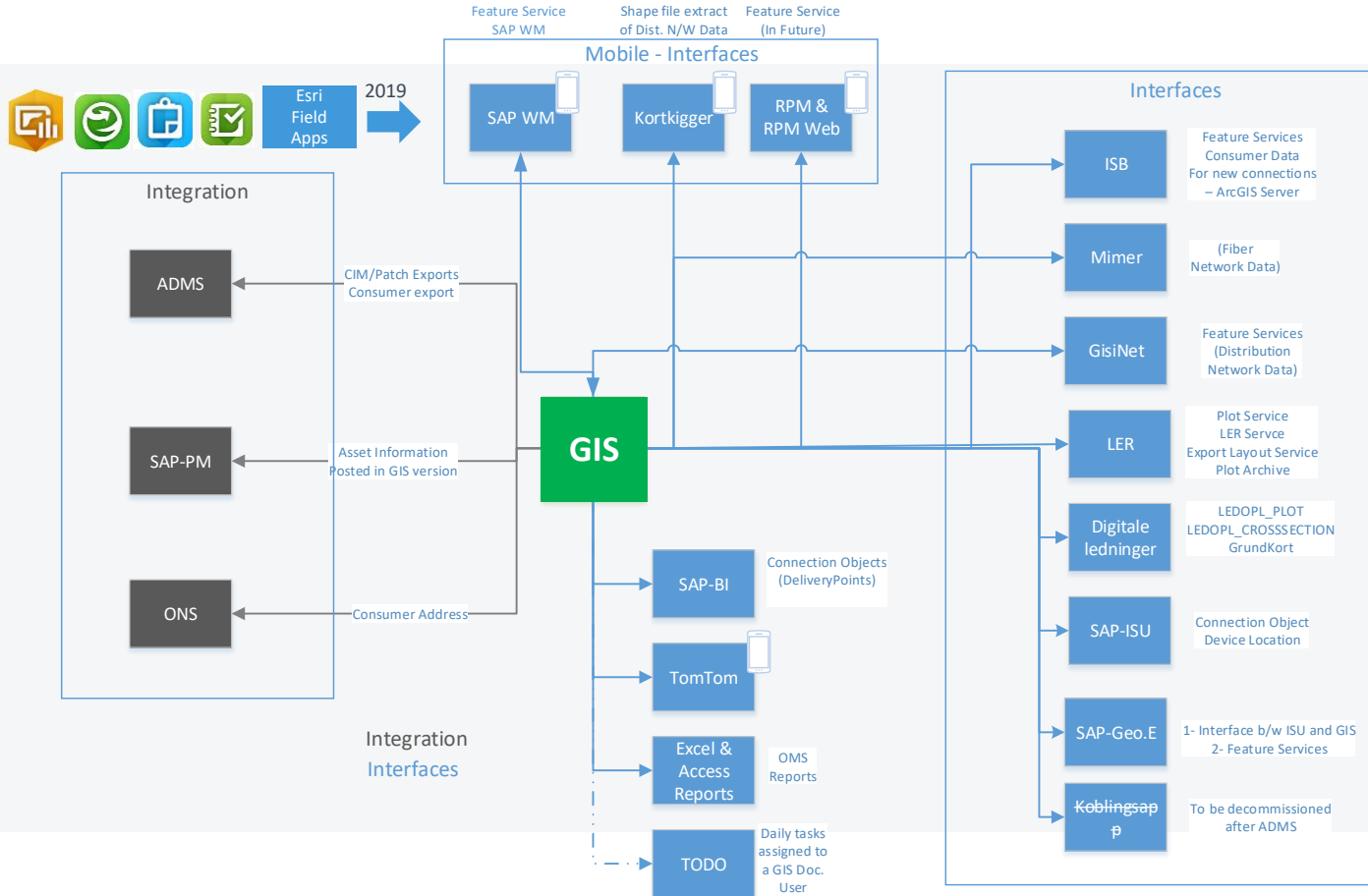
2014	2 Projects	30 People
2015	3 Projects	35 People
2016	3 Projects	40 People
2017	4 Projects	80 People
2018	3 Projects	60 People
2019	3-4 Projects	60 People

Above figures are only for Core IT and Business Teams



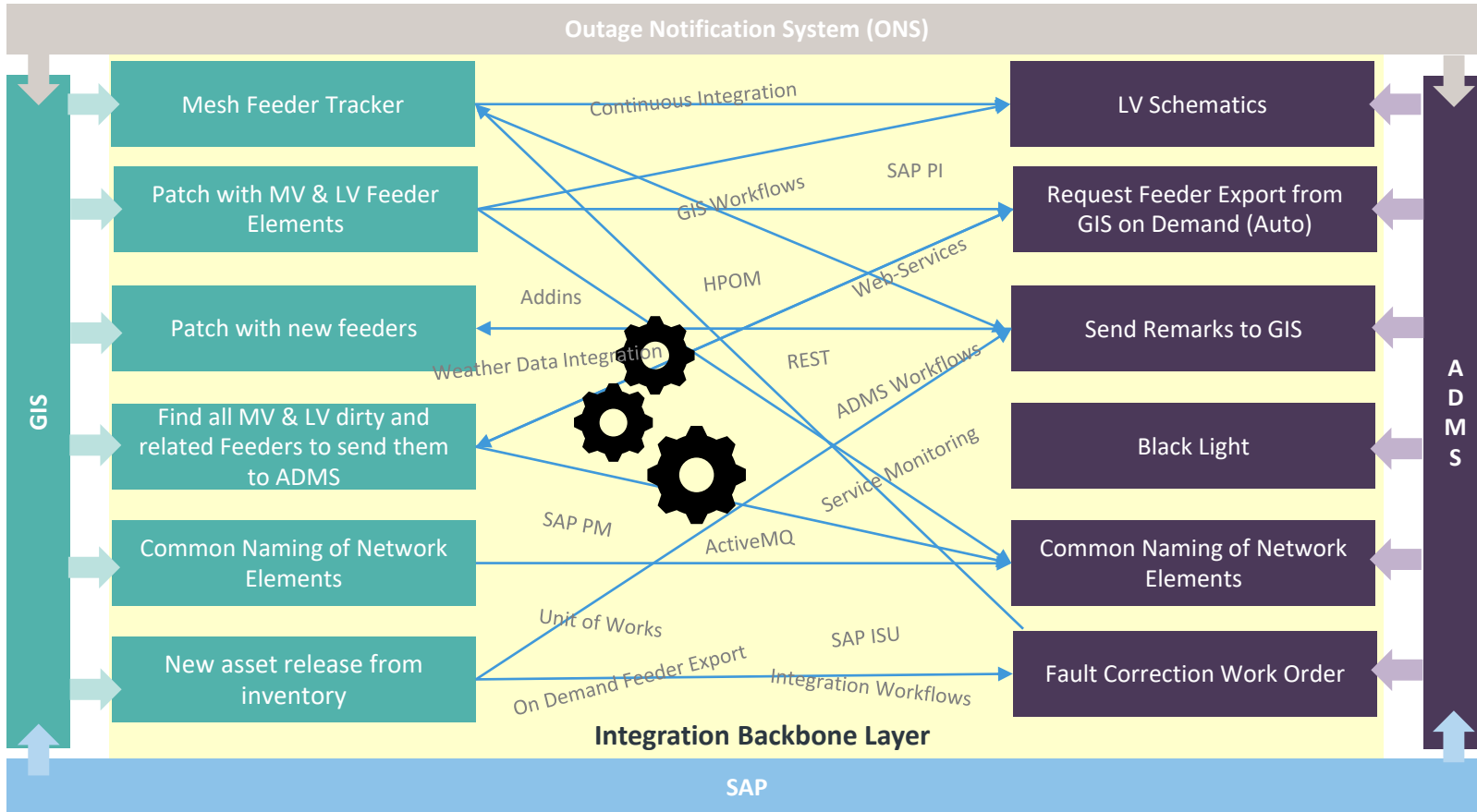
- Already in place
- Work in progress / in Pipeline
- Long term planned / not yet started

Systems Dependent over GIS at Ørsted (Distribution)

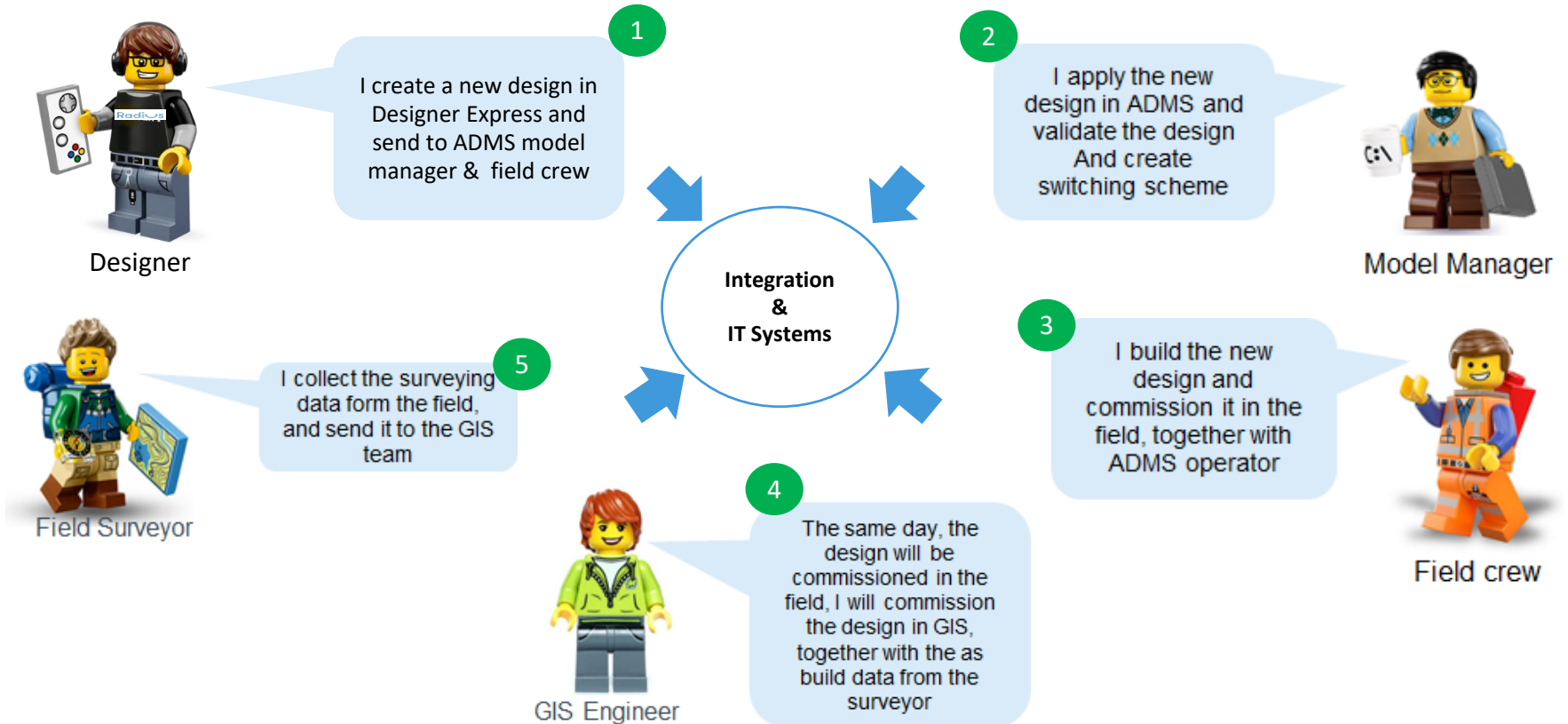


ADMS Upgrade Project

ADMS Upgrade : Added Key Capabilities



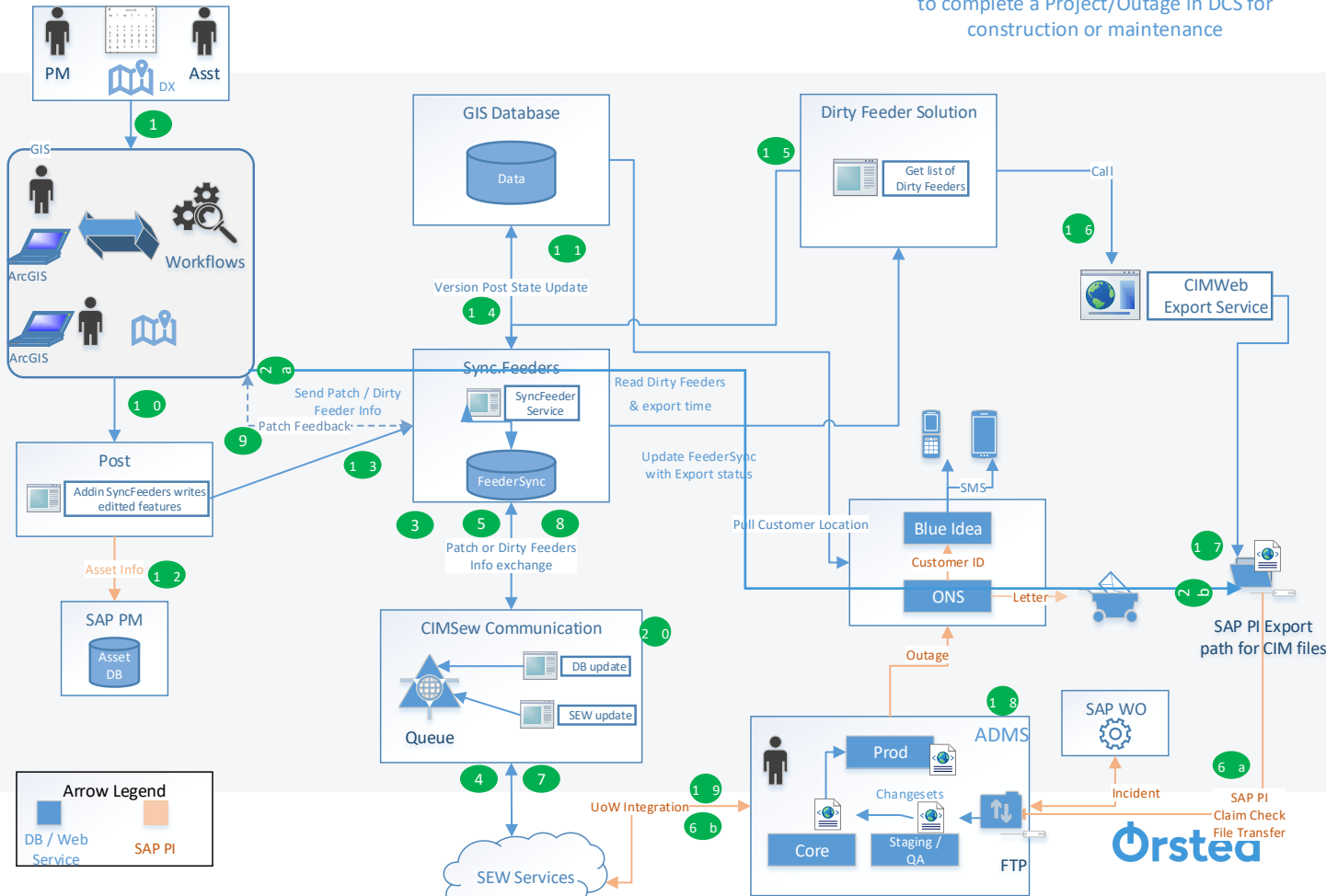
An example: ADMS Patch Integration vs. Radius Business Teams



An Example of ADMS Patch Integration

Overview of DCS Documentation and Control Room Processes / Systems

This Integration reflects upon interactions, data exchange and processes of IT systems to complete a Project/Outage in DCS for construction or maintenance



CIM and Esri Utility Network

A Typical Day at Work



ADMS - dept

Hello!!
„ the recent export file from GIS is missing some elements!!

Fuse in Cabinets?
Grounding?
FaultIndicators?
Containment is wrong



GAP



IT - dept

Listen!

Because, CIM Integration Tool synthesise those elements for ADMS



GIS - dept

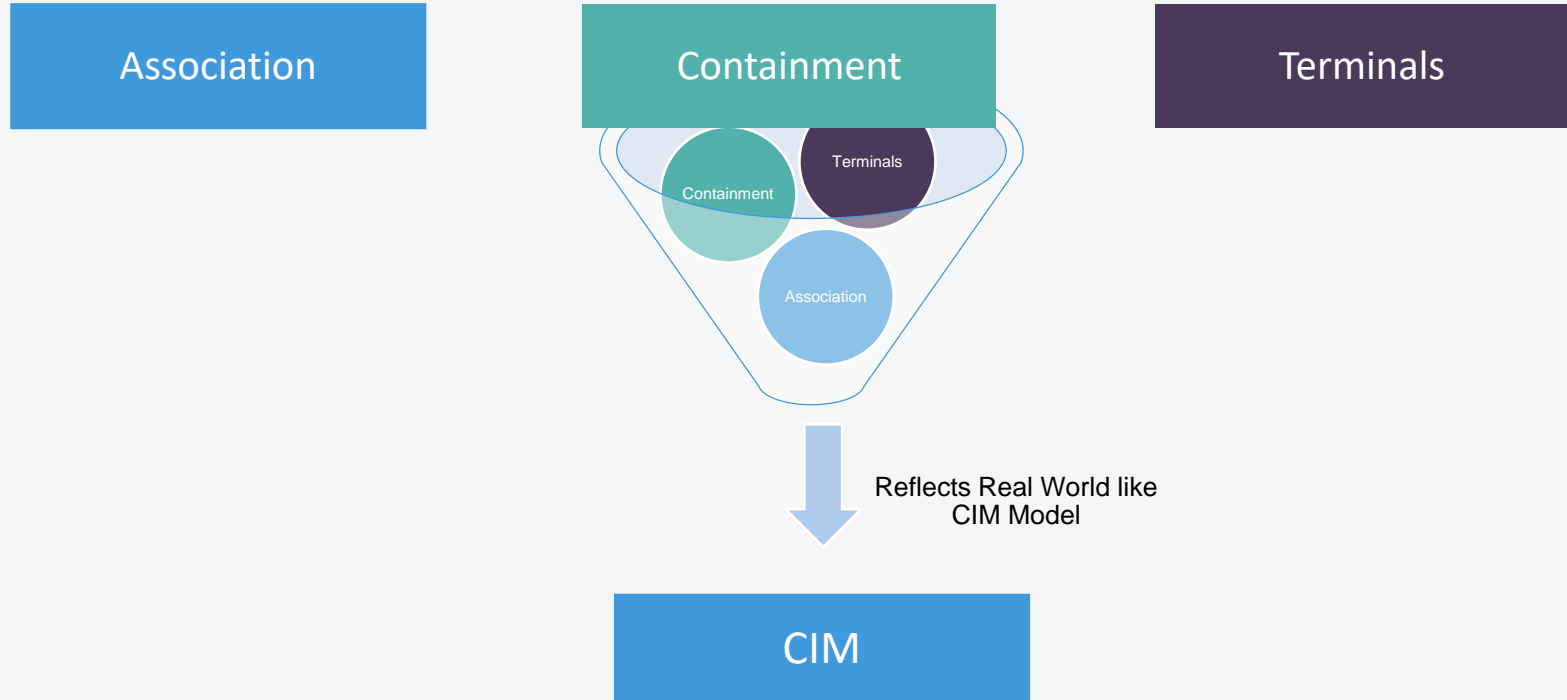
Hi !!
WHAT?
I don't draw those elements in GIS!!

HighVoltageSwitch?
ConnectionPoint?

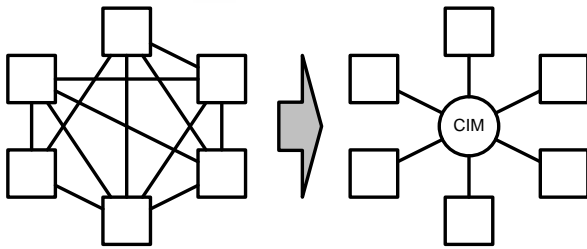
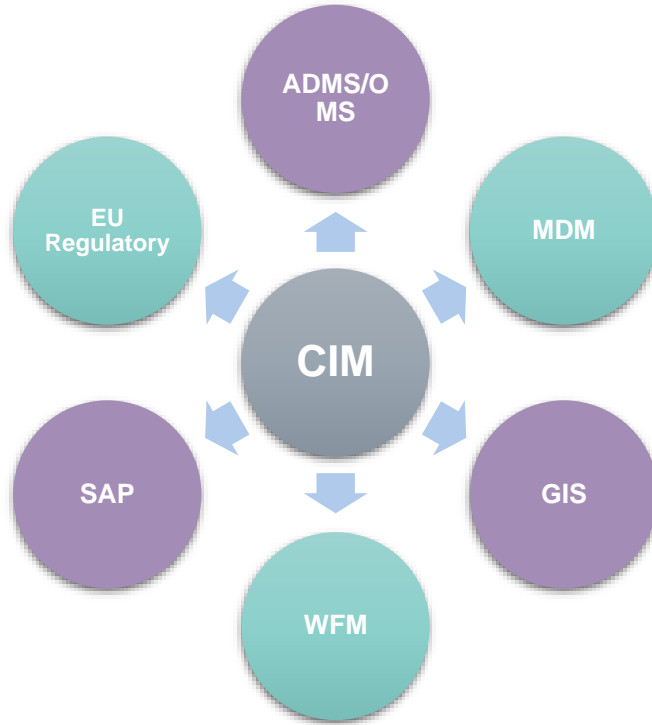


UN datamodel bridges this gap!!

Utility Network Datamodel Benefits: Close to CIM Model



Why CIM for Utilities : Enterprise Level Integration



Recognition on International Level

Semantic model describes components and structure of electric power systems

IEC 61970 (Transmission) and IEC61968 (Distribution) standards

Defined in UML

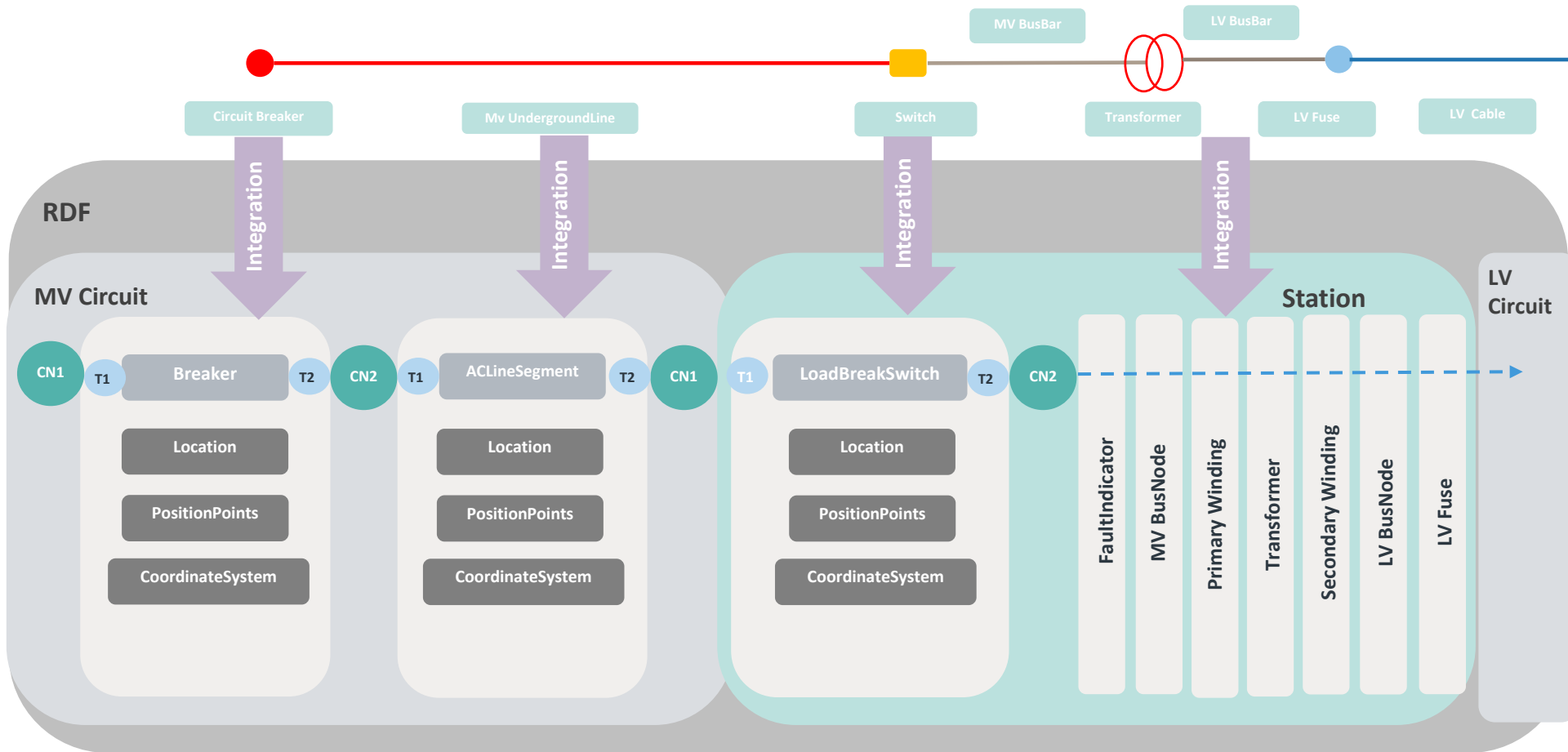
Objects and properties for overall Utility domain

Single source of truth

Simplified Integration across organization




Adopted by EU TSO and DSO regulatory

GIS elements to CIM elements



Mapping the Medium Voltage Switch in Utility Network

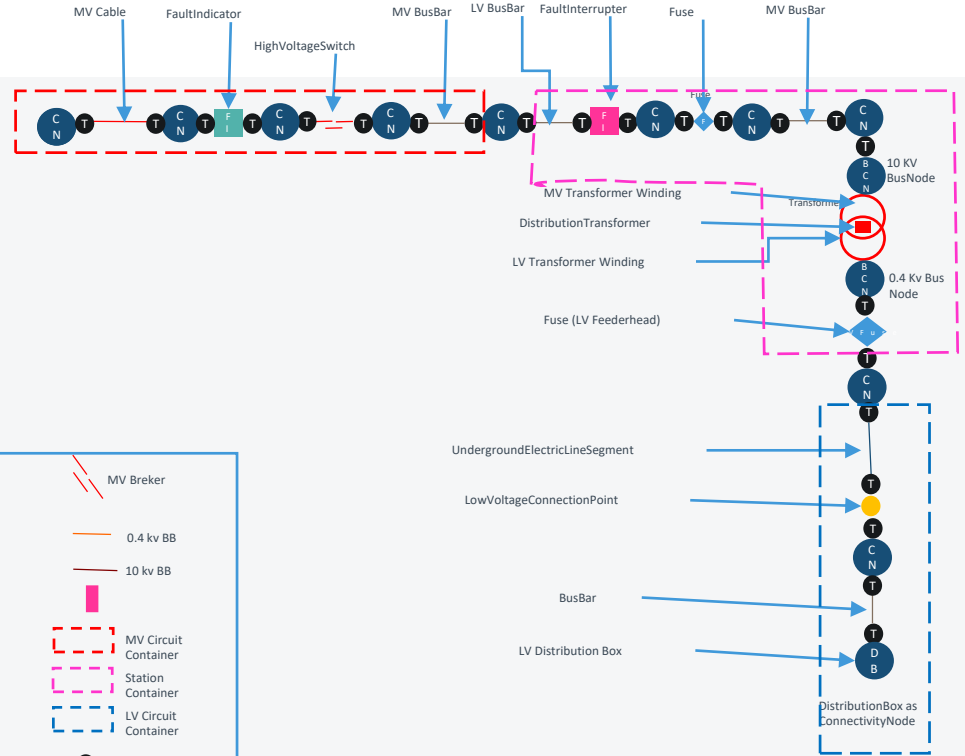
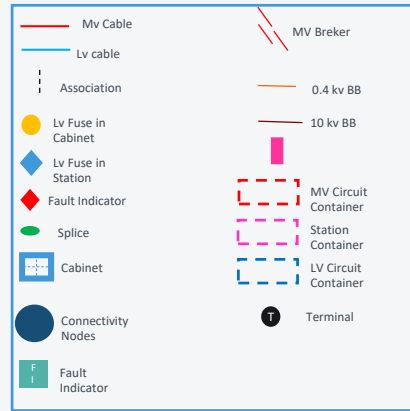


- Mapping the Highvoltage switch in a secondary substation
- Minimum 3 feature mappings
Disconnector to 3 features. 
2 Connectivity Associations 
3 Containment Associations 

Example of an Electric Station (10KV) – UN vs. CIM




CIM Objects Legend




POC on Esri Mobile Apps

Field GIS Capabilities : POCs


Mine undersøgelser




Afspærringer




Forsyningsskabe




Kabelsynsrapport



RADIUS Skabsrevision



Skabseftersyn Pilot - K&L




Skabseftersyn Pilot - NKEL

Kort Sortering

Søg


Nuværende



VIR Mødelokaler og print ...

7. okt. 2018


Nylige elementer



Forsyningsskabe i maskenet ...


4. sep. 2018

Mine kort




RADIUS Netstationer ...

21. sep. 2018



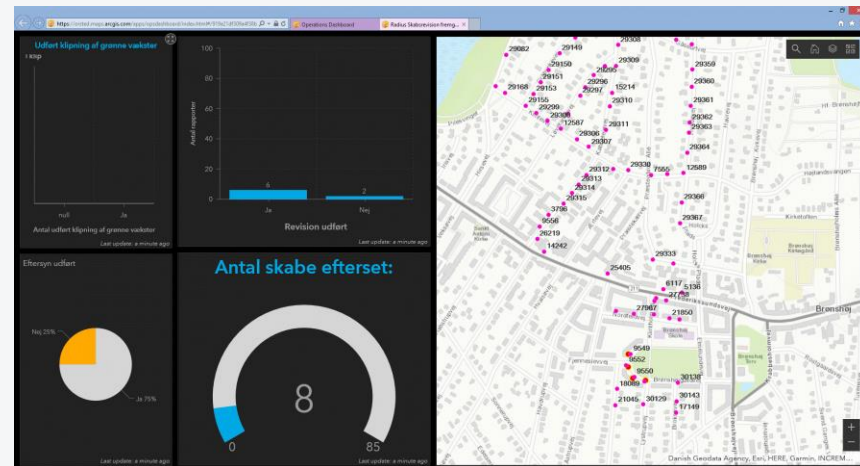
RADIUS_Skabe ...

21. sep. 2018



MÅL ...

21. feb. 2018



Common European Data Model

Our mission:

Develop and publish a open standard data model for electrical network that:

- ✓ Supports a European grid configuration
- ✓ Is in line with the international IEC & CIM standards whenever possible
- ✓ Represents the real-world appropriately
- ✓ Supports business processes (forecasting, design, operation and maintenance)

Our goal:

Ensure that Esri supports the European electrical grid model and business processes in the best possible way by giving timely input and feedback

Our ambition:

Encourage other utilities and partners to adopt the model:

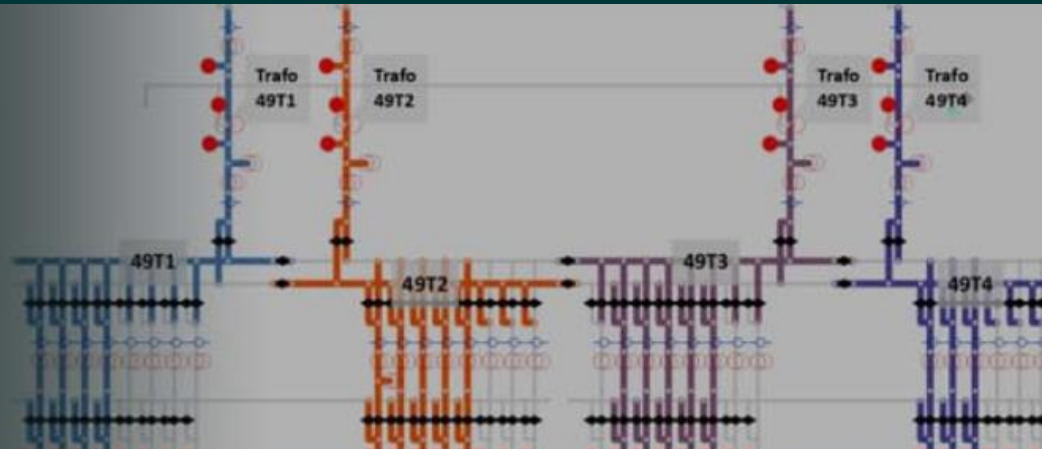
- ✓ To lower cost of migration and developing solutions
- ✓ To support innovation in the utility industry

European Electric Utilities forming a

UTILITY NETWORK COMMUNITY

to impact, collaborate and co-develop around
Esri's Utility Network

ARE YOU INTERESTED?



A COOPERATION AMONG

<https://www.utilitynetworkcommunity.com>

Orsted



Hafslund

eniig



Lyse