Keeping Pace with the Evolution of Energy

uta
Utility Technology Association

WELCOME

Skye Perry | *Founder & CEO*
SSP Innovations

ssp innovations

ssp wind lake

tc technology

Guiding Utilities into the Future of GIS, Work and Asset Management

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A VIEW INTO THE FUTURE

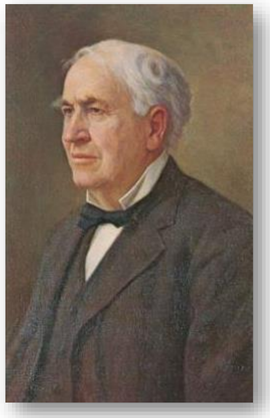
2035 Will be a Very Different Environment

The Electric and Gas Industries as We Know Them Will Experience **Fundamental and Transformational Change**

- New technologies with great potential
- Increased connectivity → cyber security & information privacy concerns
- Significant increased in plug-in hybrids & pure electric vehicles
- Natural gas grows to account for a quarter of global energy demand, becoming second-largest fuel in the global mix after oil
- Significant increase in Distributed Energy Resources (grid-scale wind and solar generation)

What would they say now?

The grid then…….and now

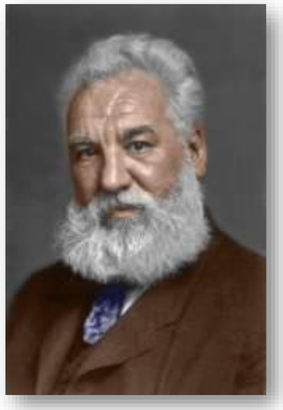


Thomas Edison (1847-1931)

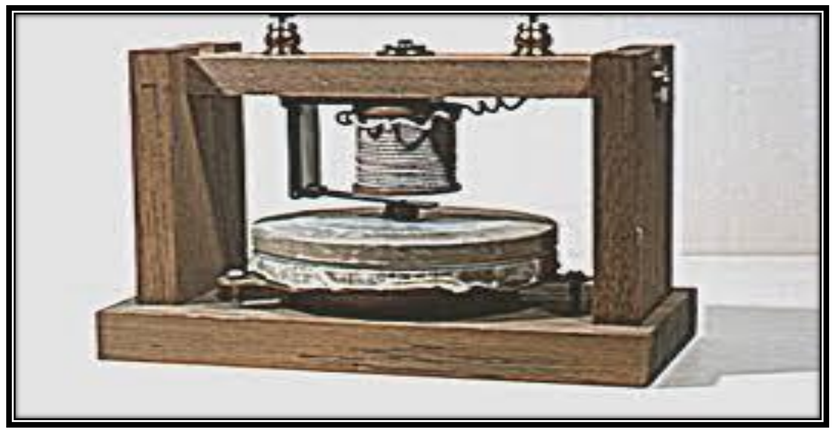
c. 1890

"Hey, this looks pretty familiar to me…what's new?"

The telephone then…….and now



Alexander G. Bell (1847-1922)



c. 1876

"Wow, you can do all that …. and without wires!!"

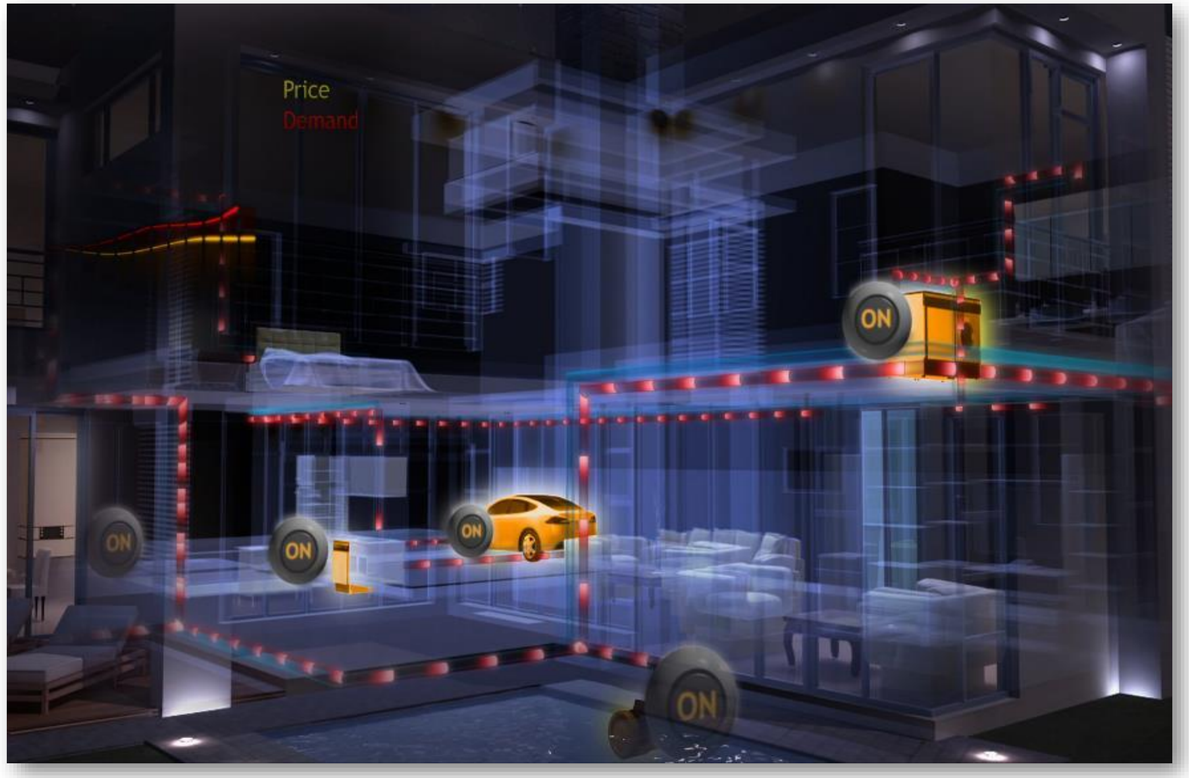

Today


2035

What does the future have in store?

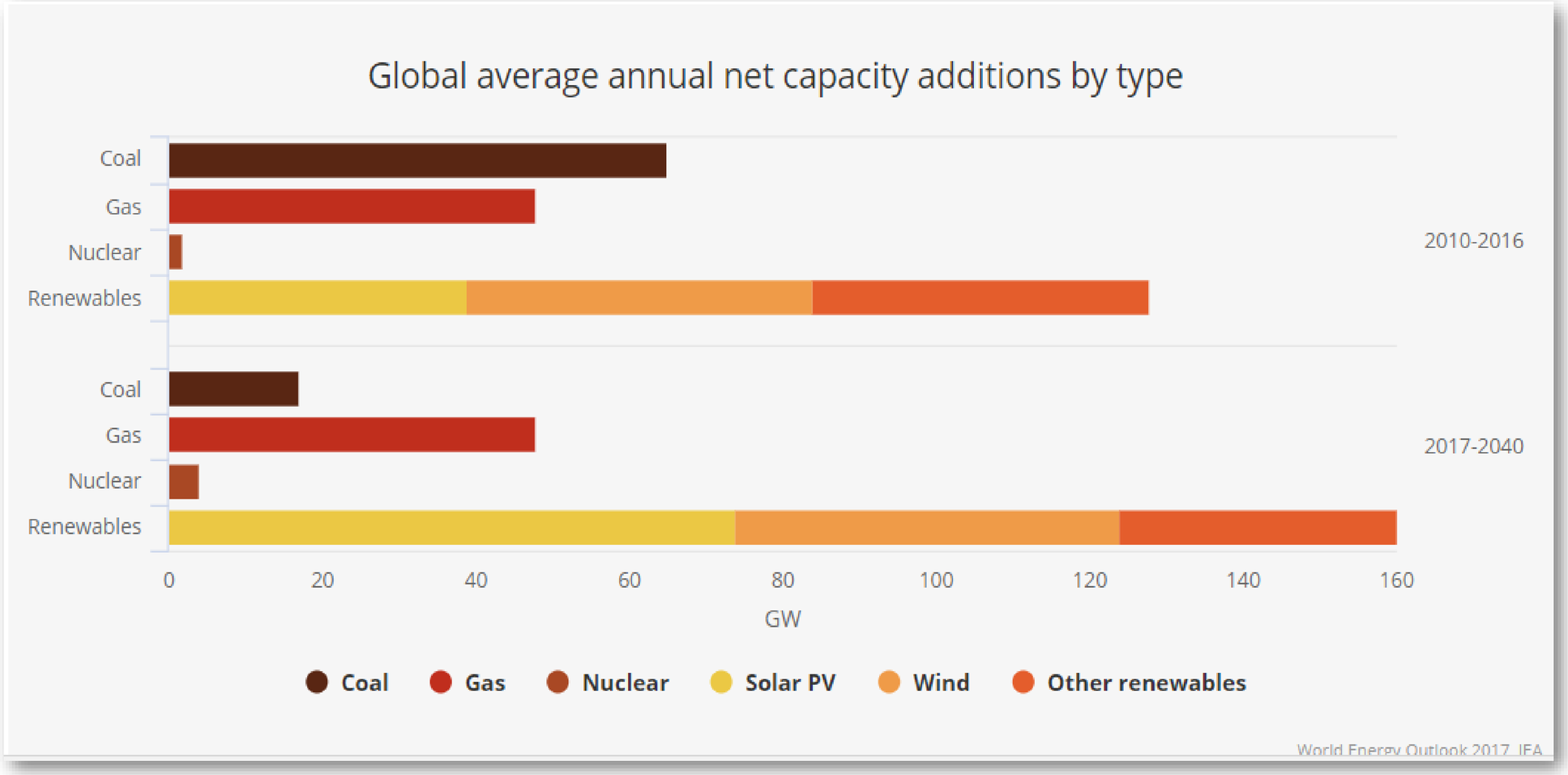
The House of the *Future* has rapidly become the house of the *past*

What will the future home energy requirements entail?

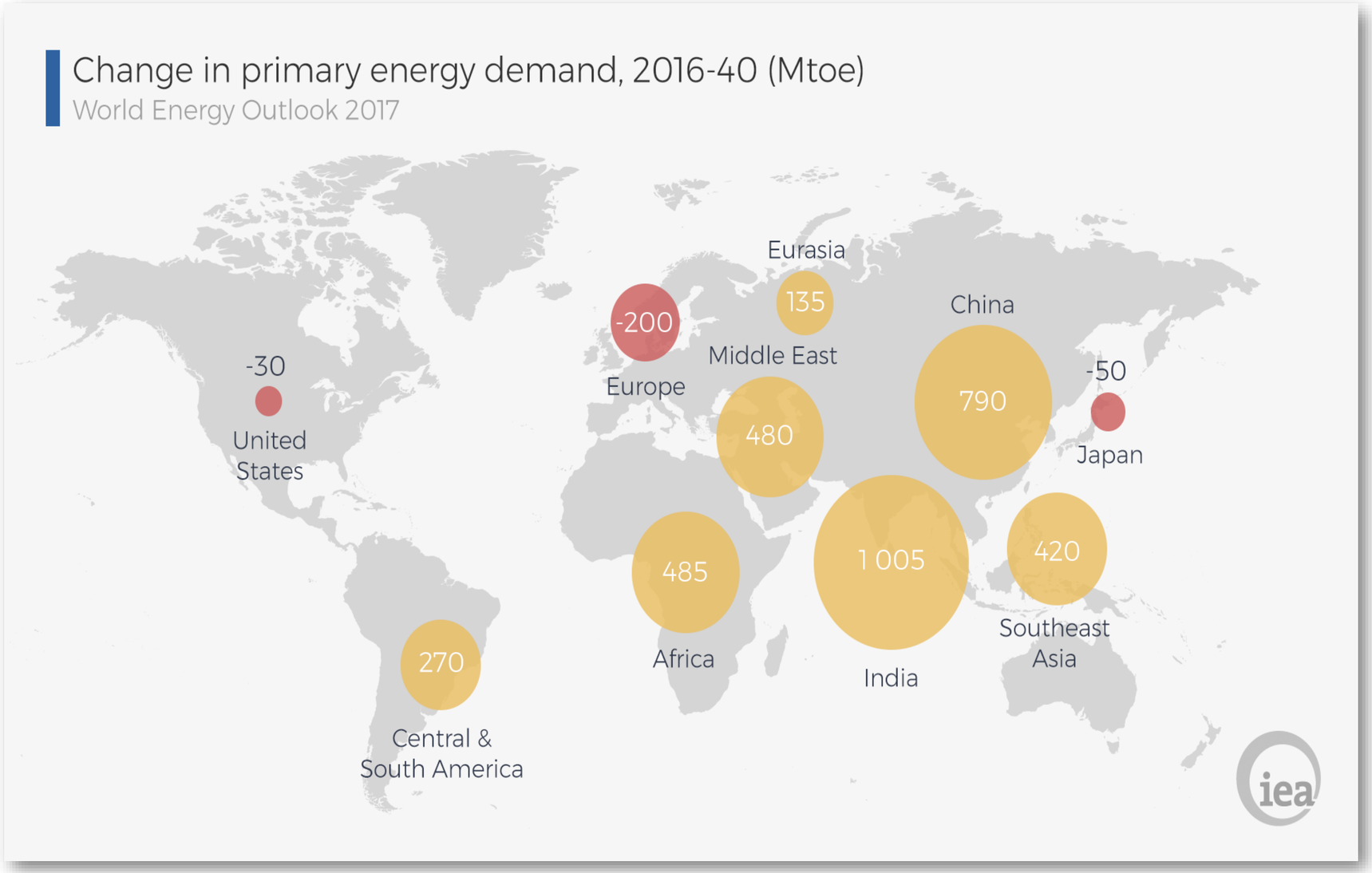


Future is Bright for Renewables

Renewables capture two-thirds of global investment in power plants to 2040 as they become, for many countries, the least-cost source of new generation



Energy Demand



- Global energy needs rise slowly but still expand by 30% between today and 2040.
- Equivalent of adding another China and India to global demand.

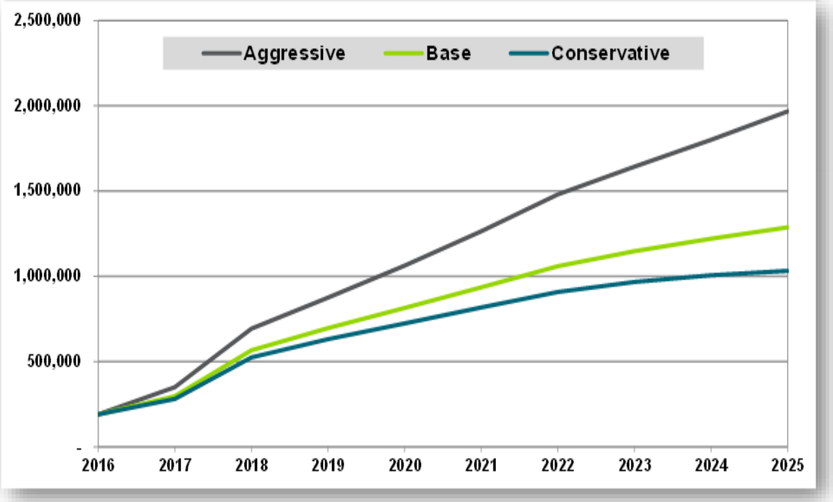
Significant Change is Coming

- **200 TWh+** Electric Vehicles will be single largest addition of energy demand to the grid globally
- **$50+ billion** Residential and commercial customers will invest in behind the meter integrated energy assets
- **$600 billion** The smart city technology market, with annual revenues expected to grow 2.5x
- **$700 billion** in investments expected through 2030 in Digital Grid infrastructure and emerging technologies

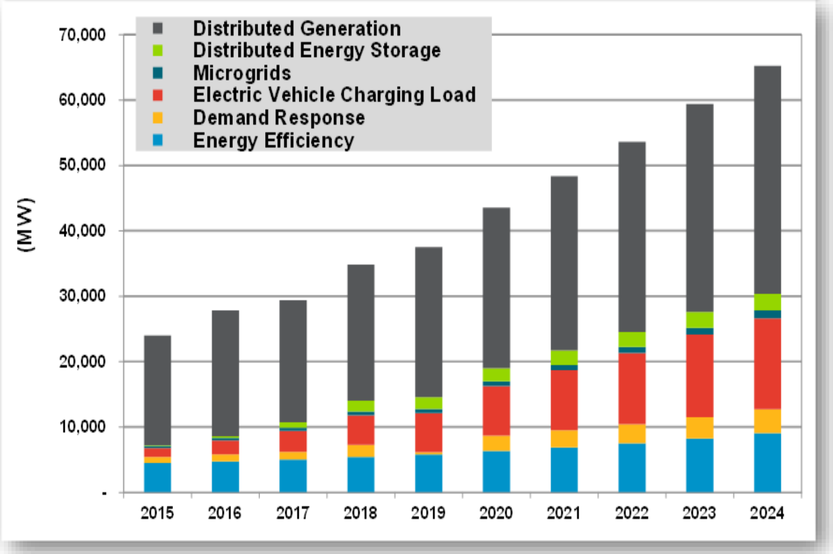
Distributed Energy Resources (DER)

- DER deployments will reach ~35 GW this year in the US, versus new central station generation (19.7GW)
- **On a 5-year basis** (2015-2019), DER in the US is growing almost 3 times faster than central generation (168 GW vs. 57 GW). `

Electric Vehicles by 2025



Annual Installed DER Power Capacity Additions by DER Technology, United States: 2015-2024



Yet... Utilities Lag Other Industries in Digital Experience

- Utilities among lowest-performing industries in digital
  - The utility industry scores 571 on a 1,000-point scale.
  - The retail sector, by contrast, scores 771.
- More information in a streamlined format
  - Platforms (desktop or mobile) display a great deal of information, including usage, location, account information and payment information
  - Ability to clearly and easily view usage information is top driver
- Alabama Power ranks highest in overall satisfaction with a score of 879. SRP (872) ranks second and MidAmerican Energy (870) ranks third.

Expected lifespan: 40 years

Average age: 42 years

Key Questions to Consider

How do I envision technology deployment?

Where do I believe value is best obtained?

What is my timing for capital investment?

How will the new technology be integrated into the existing infrastructure?

What role(s) do I want / need my regulators to take?

Options Range

Sensing ⟷ Self Optimizing

Operations ⟷ Demand Management

Immediate ⟷ Long-Term

Ubiquitous ⟷ Targeted

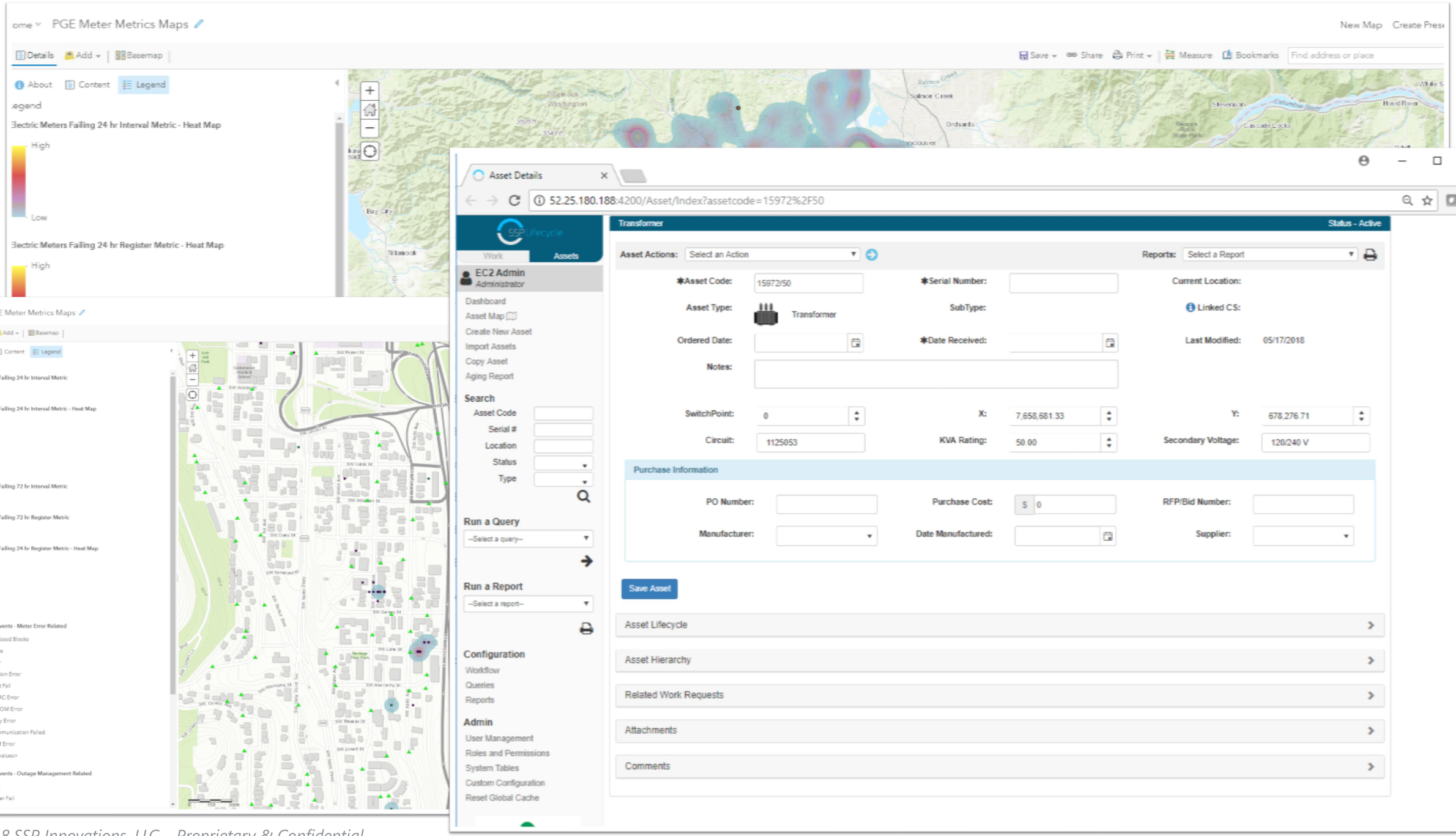
Passive ⟷ Active

FUTURE OF UTILITY GIS

Evolving Needs = More GIS Questions

How do we model assets today vs. what is required in the future?

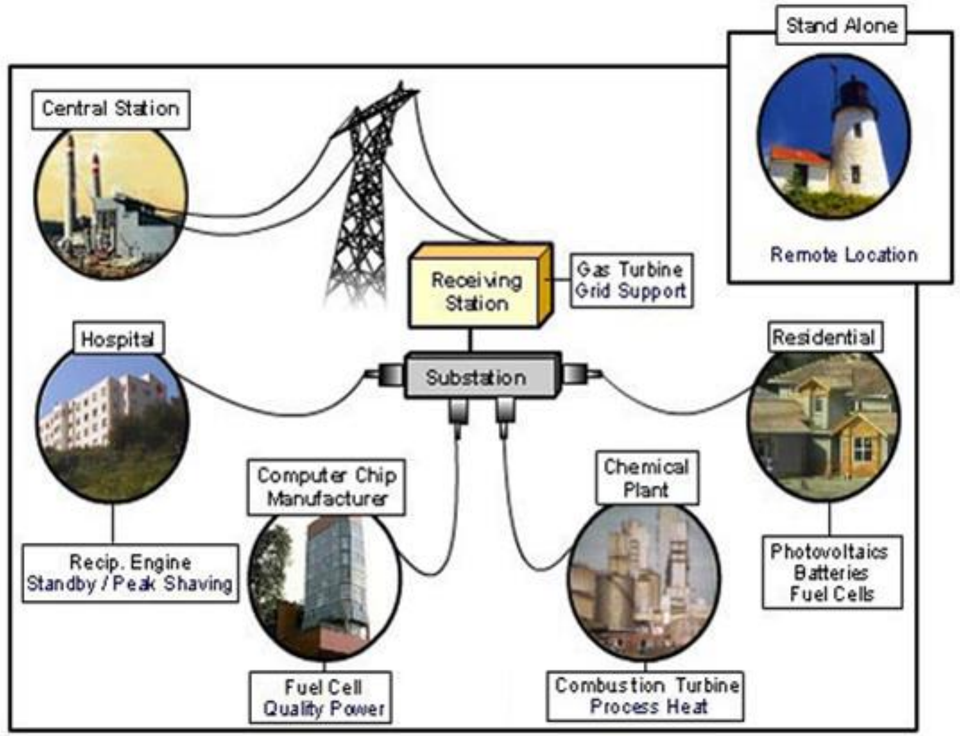
- How are Meters & Distributed Generation Assets managed today?
  - **What** does a Utility choose to manage ‘as an asset’ and with **how** much detail?
  - **Where** does this data reside?
  - **When** are they entered into the systems that need to know about them?
- What types of solutions can leverage this information?
  - What is the ultimate benefit of managing this data?
  - What type of **analysis** is available?

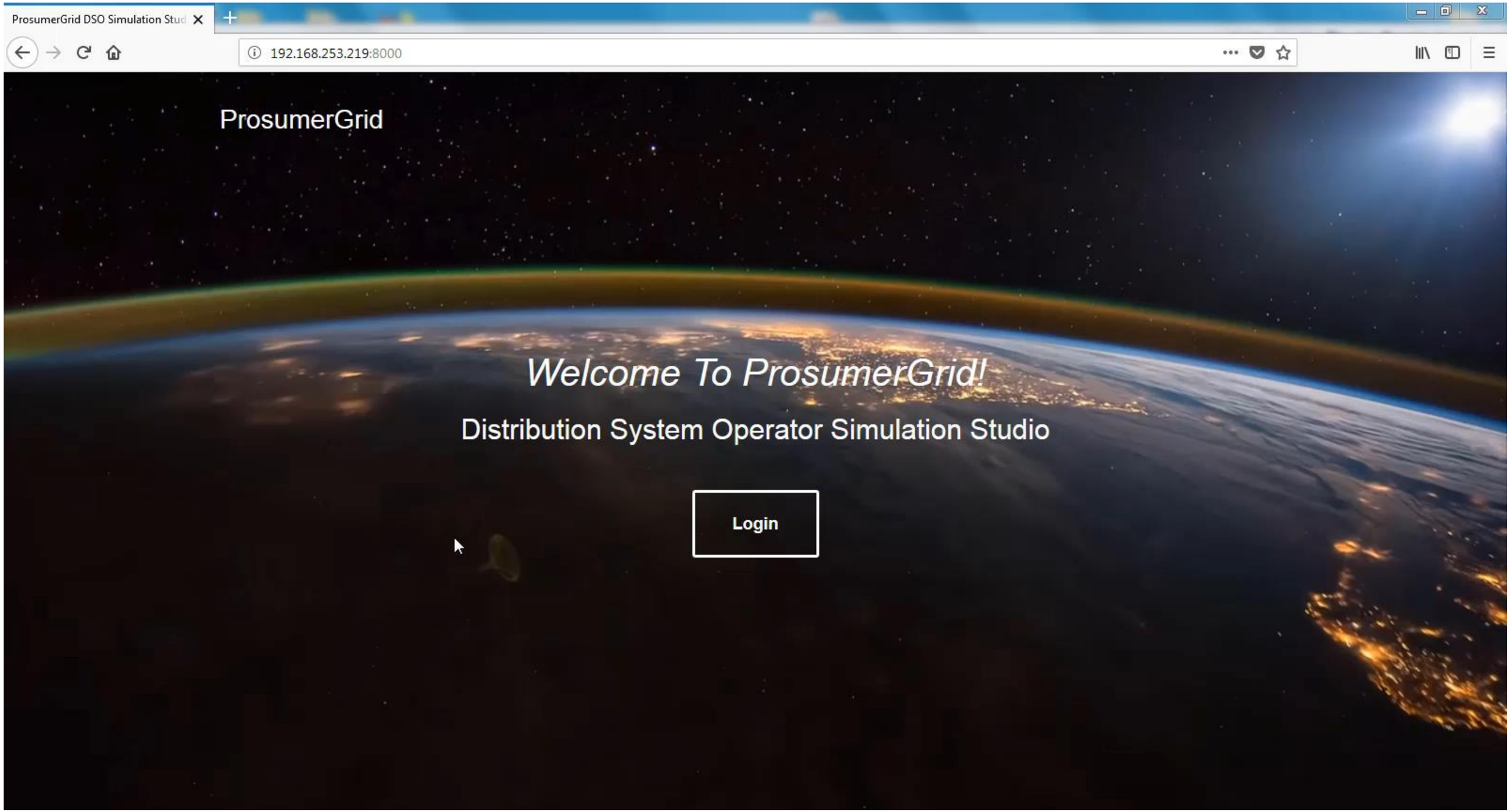


Distributed Energy Resources (DER)

DER Provides an Alternative to the Traditional Power Grid

- Types
  - Green Power: Wind, PV, Geothermal, Biomass, Hydroelectric
  - Generators, On-site Power Systems, Fuel Cells, Batteries
- Benefits
  - Reduced frequency variations, voltage transients, surges, dips, or other disruptions
  - Back-up power used in the event of an outage
  - Peak shaving, Low cost energy
- But what types, where to install, what is the benefit?
  - This is geospatial analysis based on an advanced network!





Considerations for GIS and DER

As an industry, we need to incorporate these assets into our GIS

- Enable Analysis
  - **Non-wire Alternatives Assessment:** How to defer or avoid large capital investments using solar, energy storage, demand response
  - **Hosting Capacity:** How many of these resources can be installed in the distribution system without undergoing any upgrades?

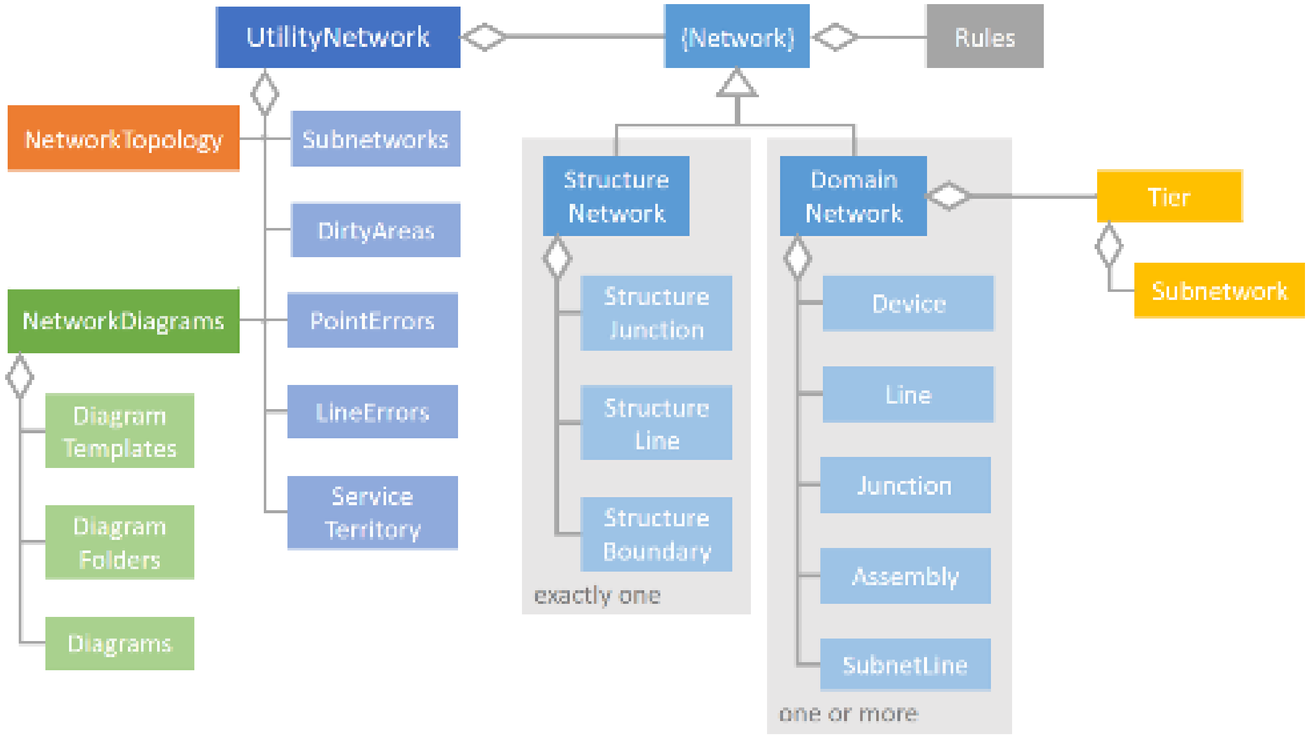
How will GIS & WAM Meet Future Demands?

- ADMS, DER, Renewables, Electric Vehicles, Regulation
  - We need to model NEW asset types
- Smarter Grids Require Smarter Data
  - Additional granularity is required
  - Real world connectivity needs to be modeled
  - Enables asset management, automated decision making
- There are future planning & analysis needs we don’t yet know
  - 5, 10, 15 years into the future

Esri Utility Network Management Extension

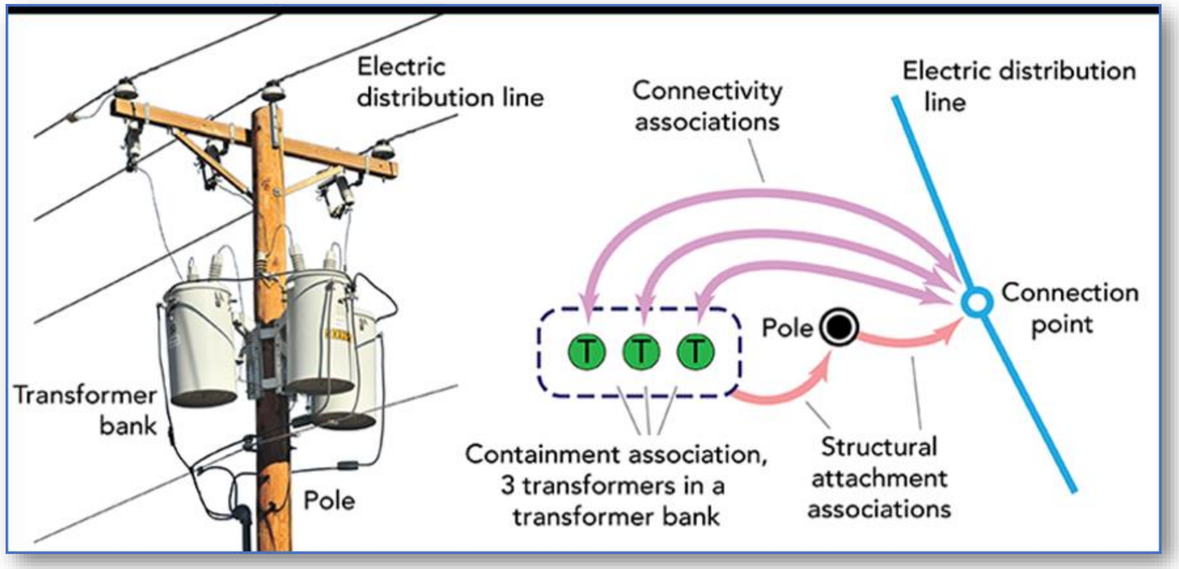
Utility Network represents the largest change in Esri technology in 20 years

- Model incorporating capability specifically designed for Utilities
- Geometric Network -> Utility Network
- Traditional Versioning -> Branch Versioning
- Services Based Architecture
- Support for Multiple Tiers
- Logical vs Coincident connectivity
- Support for Associations
- Support for “Terminals”



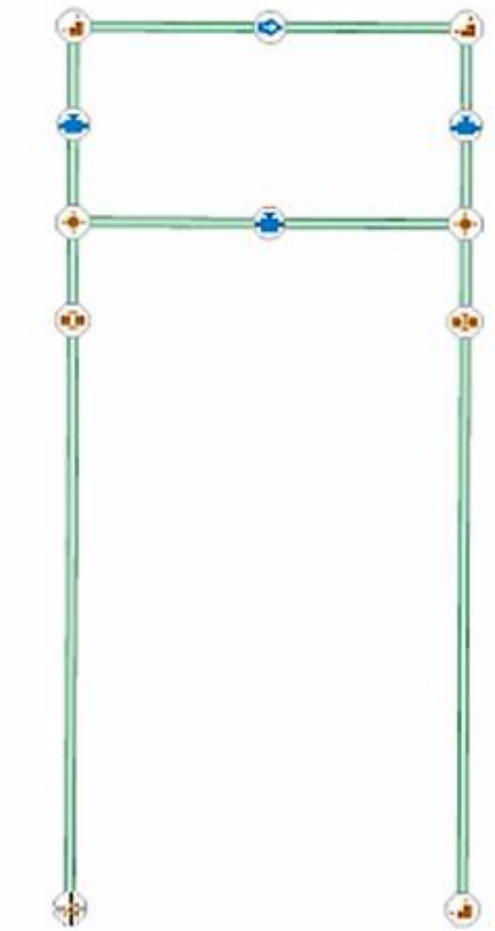
Esri Utility Network – Enhanced Capability

- Tracing, Circuit/System Management, Phase-based Propagation, feature placement / editing is now core
- Integrated Schematic (Diagrams)
- More realistic representation of ‘real-world networks’
- More powerful data to support work management, asset management, and engineering analysis
  - DMS, OMS, SCADA, DERMS
  - Distribution Planning, Design
  - Preparing utilities for new asset classes



Esri Utility Pipeline Data Model (UPDM)

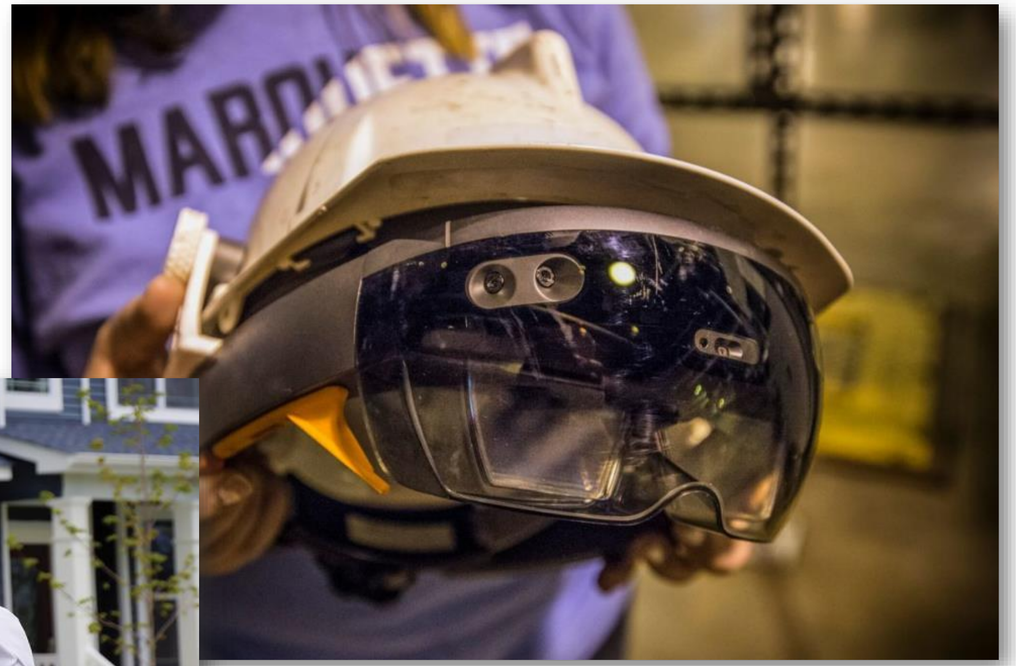
- UPDM evolved due to combined utilities needing one data model to manage both distribution and transmission data
- Gas utilities store all assets within a network and overlay linear referencing properties for the transmission pipelines
- Eliminate duel editing and asset representation in two database schemas
- One system of record
  - Regulatory reporting/analytics (PHMSA, NPMS, DIMP/TIMP)
- One location to store historical data



Spatial Evolution: 3D GIS

Esri Utility Network Natively Supports 3D Visualization

- How is this applied to my data?
- Why would I want to use it?
- How do a I capture this information?

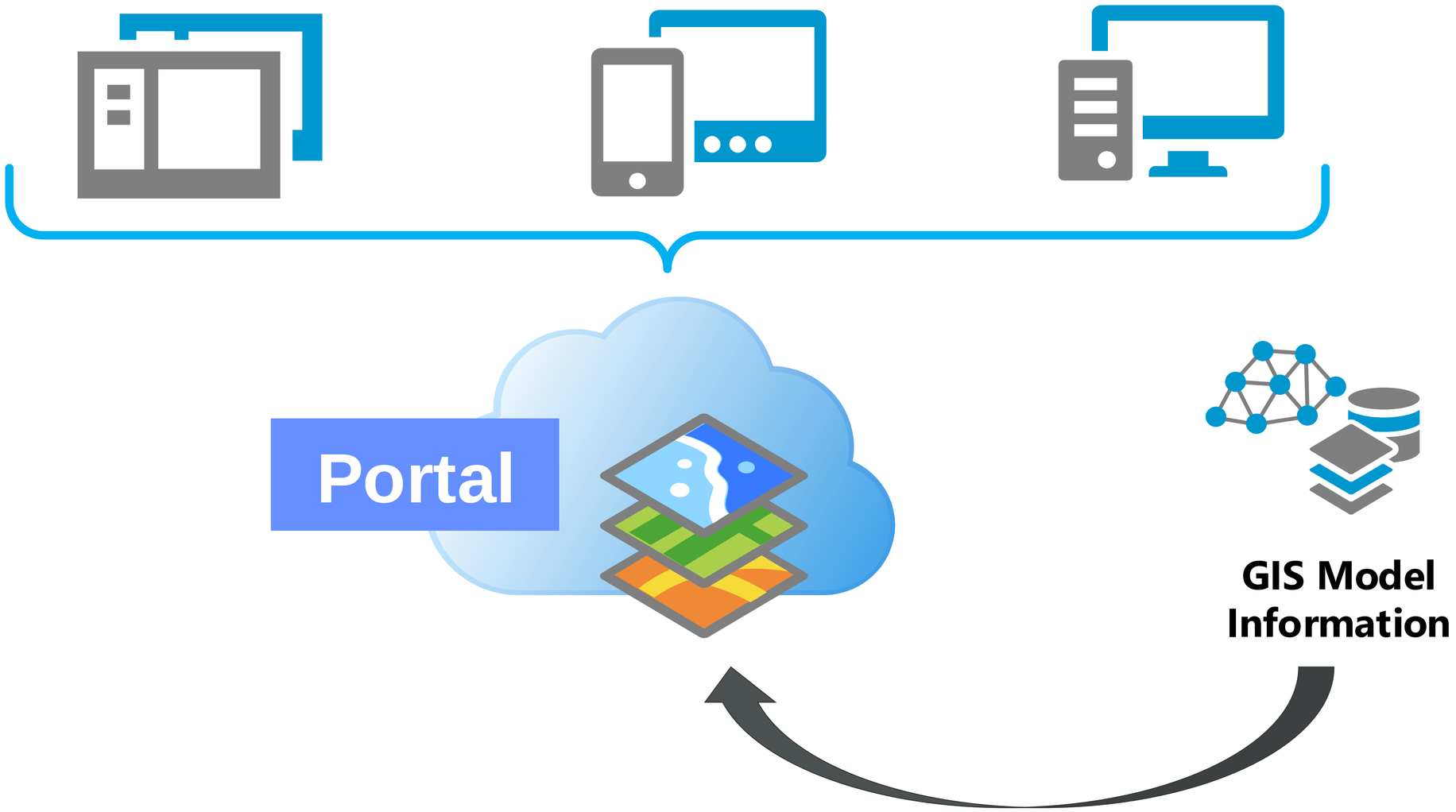


Why would I use 3D?

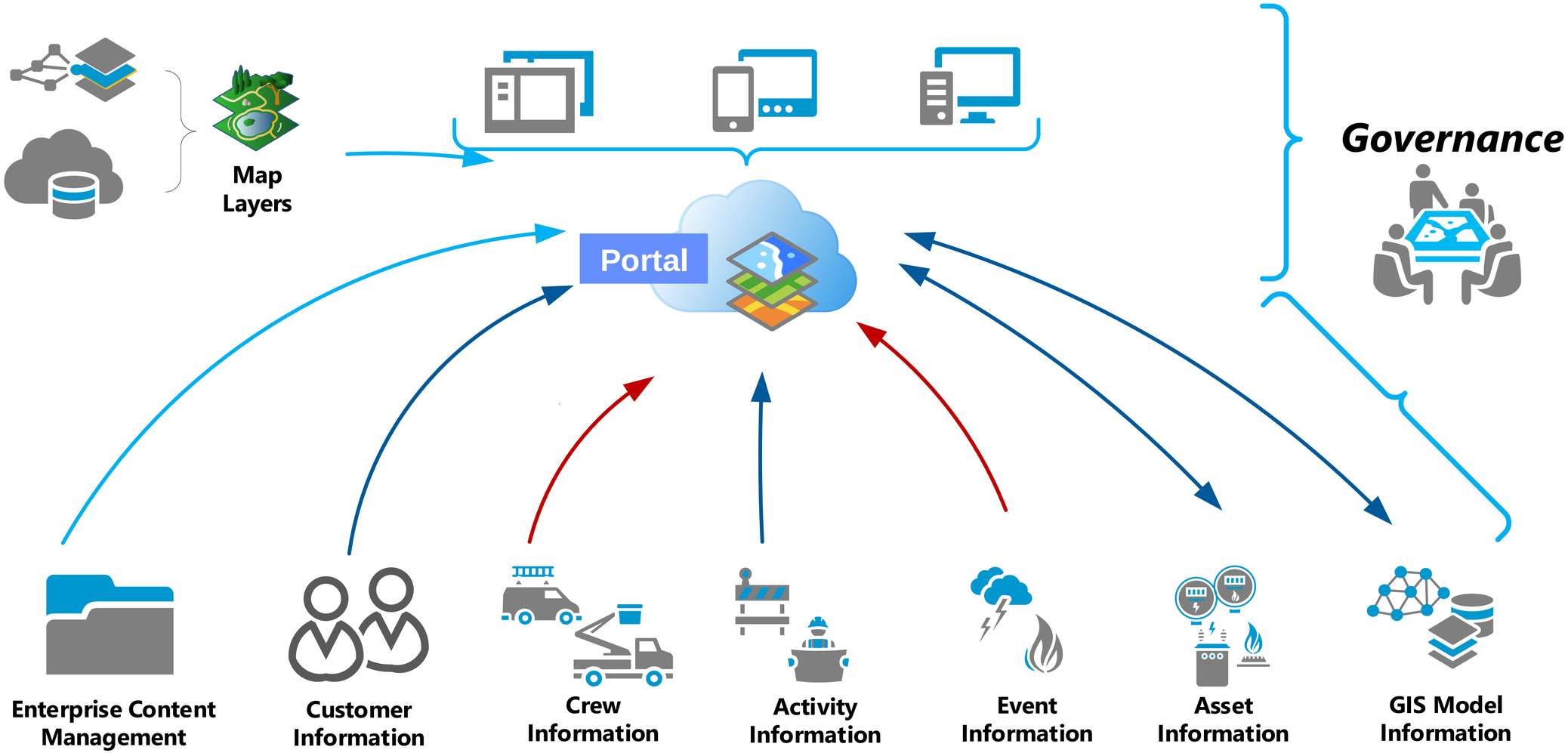
3D is an extension of the “real-world representation” goal

- We see a growing role for 3D in field verification
- Increased needs for co located facilities
- Communication and data validation

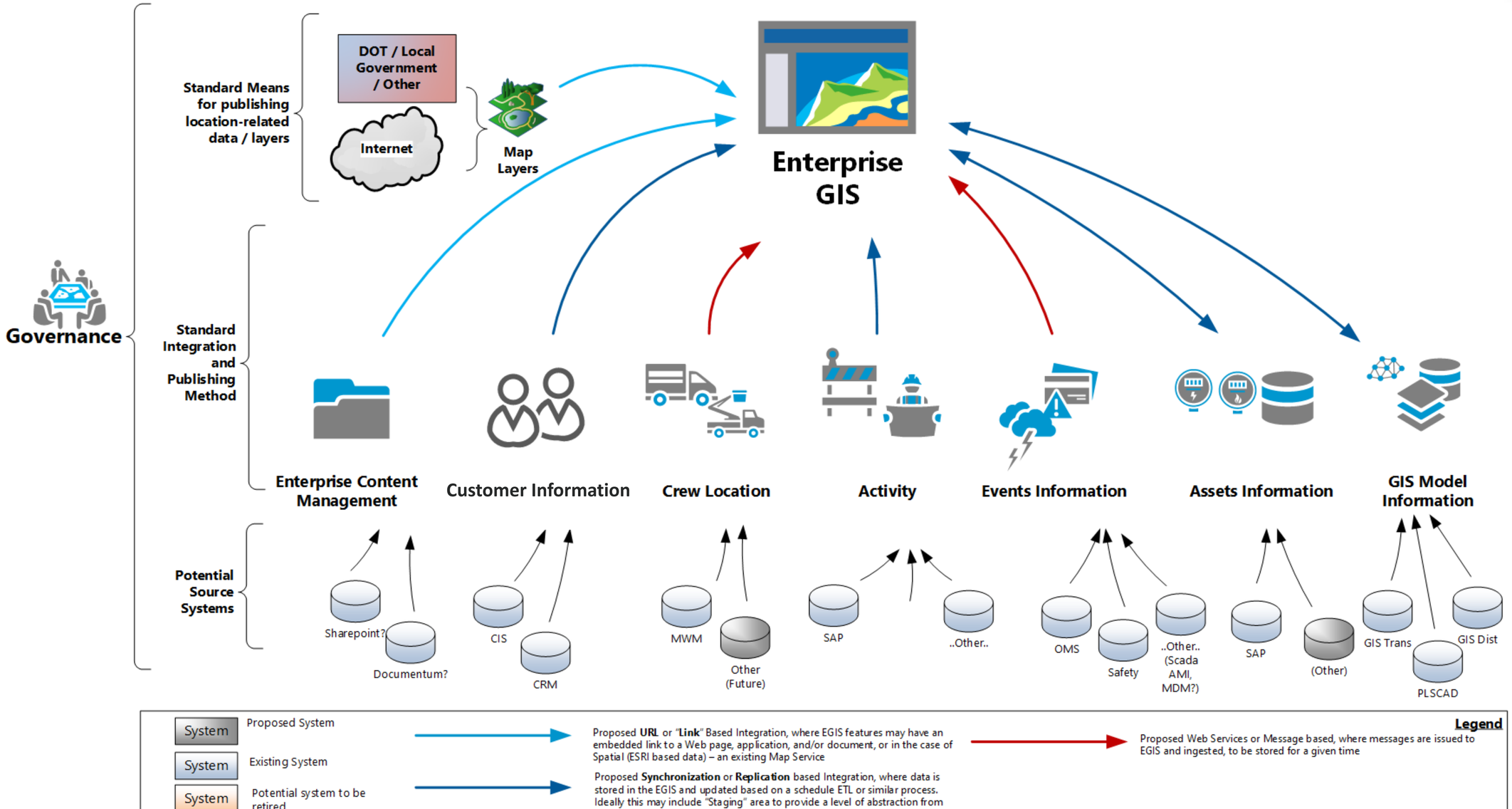
Utility Network, SOA, and the System of Engagement



Expanding GIS across your Enterprise



Enterprise GIS Considerations – Integration & Sharing



Final Thought

Change is Coming – Now is the Time to Plan

- Energy is evolving
- Evaluate where you are today
- Plan for tomorrow but be ready to iterate
- Align with industry leaders in innovation
- Community will drive advancement
  - Enable Customers to Become ***Good Grid Citizens***

Thank You