SmallWorld GIS Electric Office: One Connected Network

Pedro Bermejo
SmallWorld GIS Electric Office

What is it?
A global electric data model and application suite that provides geospatial asset management for utilities.

Value Proposition
• Rich functionality supports customer workflow through configuration and minor extensions rather than customizations.
• Enterprise-wide view of the electric network eliminating asset data inconsistencies.
• One solution updates corporate asset data as work is performed, eliminating backlog and improving data quality.

- Transmission (HV)
- Distribution (MV)
- Secondary (LV)

- Reduce interface cost and complexity
- Reduce installation, operation and upgrade costs (20-40% GIS Opex)
- Reduce expensive and risky software customization (50-70% GIS Capex)
Full Life-cycle Support

- GeoSpatial Analysis
- Strategic planning
- Distribution planning
- Corporate systems
- GE Electric Office
- System Planning Tools
- Grid modernization
  Renewables, DER
- Design Manager/A&O
- Efficient, consistent
  design
- Operations Restoration
- Construction Execution
- Network design
- Integrated Mobile
- E-Terra /PowerOn
  Reliance
- Maintenance & Inspection
- Integrated Mobile
- As-Built
- Construction orders
- Service orders
- Full Life-cycle Support
- Outage orders
- Damage Assessment
- Field data collection
  Inspection programs
- Integrated Mobile
- As-built updates
  Field design

GE Restricted – Distribution authorized to named individuals only
Electric Office Advantages

• **Off the shelf** GIS Core with standard transmission data model applications – 80% Out of the Box

• **Supports future requirements** – OMS integration, design workflow, Telecom integration

• **Simple upgrade path**

• **Eterra/Power On Reliance CIM Integration** with Control Room for automated network updates

• EO functionality continually extended, driven by **user community**

• EO is part of a product suite/vision encompassing **electric utility business processes** – from generation to meter

• EO enables all network asset data on **one connected platform**
Utility IT/OT Core Platforms

Core Platforms: Integration/Data Flow Key
“Integration is difficult. Utility operating systems were traditionally custom-built over the course of several decades. Integrating new systems, or getting them to “talk” to each other, is complicated and requires an information technology foundation that can support each component of an ADMS.”

“The cost of an ADMS project has many variables including the level of integration (how seamless is seamless), the degree of accuracy of the data you require, the functionality you want, the size of your system, and the current accuracy of your GIS. (GIS is usually the system on which the model is based.)”

“Do not assume products are compatible or will integrate easily—even if they come from the same vendor. Ask specifically about integration, and have the vendor demonstrate compatibility.”

“The more seamless the integration, the greater the complexity. You must decide up front how seamless you want the system to be. This will determine the level of integration you will need.”
Benefits for Integration

• With integration comes cost savings, through optimization and efficiency,
  • Minimizing the amount of manual entry
  • Reducing or eliminating duplication of network model changes
    (Potential to reduce labor for manual data updates by up to 15%)

• Having one common view of the network model across the enterprise
  • prevents errors in judgments
  • Increase performance by not having to discern model differences
Understanding the Models

Geographic versus Operational

Geographical Model
- A graphical/geospatial representation of the network
- Includes connectivity aspects
- "As Constructed" representation
- Used for Asset Management
- Used for Inventory Accounting
- Land based underlays integration
- State of the network is fairly static
- Equipment attributes Repository
- Not expected to be up-to-date with "real-time" accuracy

Operational Model
- A graphical/geospatial representation of the network (for crew routing needs)
- Full functionality of GIS connectivity model plus operational components
- "Current State" representation
- A schematic representation of network (for switching functions)
- Power flow analysis data requirements
- Requires phase based network model
- Expected to be up-to-date as near "real-time" as possible
Challenges of Integration

- Which model receives network updates?
Which model receives network updates?

- Utilities must consider which system will receive network updates as related to field equipment additions, removals and/or changes.

  **Option 1: Operational Model updated first**
  **Option 2: Graphical Model updated first**
  **Option 3: Hybrid Approach**
  **Option 4: Manual synchronization**

- Decision Drivers
  - The number of applications using a specific network model.
  - Identifying the network model existed first in the company.
  - The location of existing data entry staff members.
  - The business processes for entering network updates.
Challenges of Integration

• Which model receives network updates?
  • What symbology is used in the two models?
What symbology is used in the two models?

**Geographical Model**
- Typically uses simplistic static symbols
- Full set of equipment attributes

**Operational Model**
- Requires symbols to be much more dynamic.
- Need to append additional indications; Alarms, Tags, Telemetry quality indications, State of device, Etc.
- Smaller set of equipment attributes

**Things to consider for integration**
- The GIS symbols are usually used as a framework for the operational symbol
- Need to account for symbol differences which usually results in a translation table ('x' in GIS = 'y' in DMS/ADMS)
Challenges of Integration

- Which model receives network updates?
  - What symbology is used in the two models?
    - How will you link the objects between the two databases?
Linking Objects between multiple databases?

- Each database has its own unique identifier for each of the objects
- The unique identifier is the key reference identifier between the two databases
  - Option 1: Have GIS master the unique identifier
  - Option 2: Have (A)DMS master the unique identifier
  - Option 3: Have middleware managing the translation
- Requires business rule considerations
  - For example, ‘Modification’ of an object in one system may result in a ‘delete and add’ in the other system.
Challenges of Integration

• Which model receives network updates?
  • What symbology is used in the two models?
  • How will you link the objects between the two databases?
  • How frequently are models updated and/or synchronized?
How frequently are models updated and/or synchronized?

• Are the updates in real-time or periodically?
  • Consider the impact of frequent updates on operators using the operational model
  • This may necessitate that the system has the ability to apply batch updates during ‘non-peak’ usage hours.
• Are the updates with ‘As-built’ network or ‘Pre-construction’ network?
  • ‘As-built’ updates are changes to the network that have already been constructed in the field
  • ‘Pre-Construction’ updates are changes to the network that have not been constructed in the field but are planned and in progress
• On demand synchronization?
Challenges of Integration

• Which model receives network updates?
  • What symbology is used in the two models?
    • How will you link the objects between the two databases?
      • How frequently are models updated and/or synchronized?
        • How to address Change Management issues?
Change Management issues?

• Integration changes focus across systems not individual systems

• Data Quality will likely need to be addressed
  • Higher demand for data quality because the data is now supporting multiple system needs

• New integration user stories need to be documented and evaluated
  • Ability to monitor and resolve integration issues
Challenges of Integration

• Which model receives network updates?
  • What symbology is used in the two models?
  • How will you link the objects between the two databases?
  • How frequently are models updated and/or synchronized?
  • Where will Change Management issues need addressed?
• What could go wrong?
What **could** go wrong?

Under estimating the complexity of integration

- What have we heard from utilities?

  - “We’ve had delays in our project?”
  - “My project costs have increased?”
  - “I have new data in the GIS that is suddenly not in DMS and conversely”
  - “My job is locked in the GIS because the DMS has not processed the changes yet.”
  - “Updates in the GIS are breaking my operational circuits in DMS”
  - “How can I roll back changes in the DMS or GIS?”
  - “How can I get the two systems back in sync?”
  - “How can I get the two systems back in sync?”
What is GE doing today?
Network Model Integration - today

Electric Office Interoperability with Operational systems

Utility Value – Available now

- Network introduction to ADMS using IEC CIM Standard – IEC validated
- One version of the Network – Incremental Updates of LV and MV Network
- Model Independent – configurable Pre-configured with Smallworld Electric Office
- Reduction in integration cost between the GIS and Operational Systems
- Data Quality Assurance across the enterprise.
- Proactive - Work Flow Driven – Accurate and Current Data
What is GE doing today?
Network Model Integration Solutions

Smallworld
Non-Smallworld
GIS

Network Model

One time Bulk and
Incremental Updates

Incremental Updates
Workflow driven
Updates Validated QA functions

Integration Solutions

ADMS
In Summary

With integration comes complexity

• Take the time needed to understand the roles and limitations of geospatial and operation models

With Integration comes benefits
• Reduction in data synchronization issues
• Increased outage management efficiency
• Standards based network data introduction to ADMS
• Corporate wide confidence in one version of network data across the enterprise
• Workflow driven network data updates – reduces cost in duplicate data entry
Thank you.