A pathway towards smart grids through an open IEC based software architecture

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Energy utilities adopting to new needs

Yesterday: A top-down hierarchy

Today: Transparency to build Smart Grids

Tomorrow: New business model & new needs
**Future proof AMI solution architecture**

### New business processes

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<th>Renewable Integration</th>
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<td>Demand Response</td>
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<td>Network Operations &amp; Delivery Control</td>
<td>Asset Management</td>
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### New technology

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Linking technology innovations with new business processes
How to create a solution architecture to meet the future needs?
Standardized solutions - secured investments

Rapid innovation on business applications requires data model to be separated from AMI

Hide details of the underlying communication and data acquisition machinery to provide a logical model which can be leveraged by business applications

Standards for enterprise system communications can be more challenging than device-level standards
Future proof reference architecture

Advanced business applications

Grid & Meter Data Management Systems

Head End Systems

Smart Devices

Utility Operational Systems

- Outage Management System
- Asset Management System
- NIS/GIS
- EDM
- NMS (DA)/SCADA System
- ERP/CIS
- DMS
- WOMS
What to consider for an effective implementation of the solution architecture?
Requirements for efficiency

- Clearly defined system functional boundaries
- Limited number of standards applicable at the interface points
- Common semantic model for all interfaces and systems
- Commonalities recognized—no need to re-invent the wheel
- Data communicated and stored in unified ways
Software of the future solves the challenges of today

Software plays a critical role integrating legacy and state-of-the-art utility systems

Structured, straightforward interoperability ensures maximized ROI for the utility

Standards-based development minimizes risk and provides consistent end-to-end results

There is a wide set of standards and requirements documents applying to the AMI infrastructure

How to mature the standards to support production deployments?
How to ensure end-to-end interoperability by choosing the right standards?
Choosing the right standards and efficient strategy

Pre-integration and choice of "right mix of standards" as the solution

The industry focus for software and IT systems is on the International Electrotechnical Commission (IEC) 61968 series of standards

- IEC 61968 series of standards for interface architecture, general requirements, meter reading and control and implementation

The Common Information Model (CIM), maintained by the IEC, underlying the IEC 61968 series of standards has been widely adopted in the utility industry

Today, utilities have come to rely upon the interoperability and consistent results yielded by products based on the CIM and its derivative standards
### IEC 61968

**Distribution Management; Business Functions**

- Network Operations
  - Interface standard: Part 3
- Record & Asset Management
  - Interface standard: Part 4
- Operational Planning & Optimization
  - Interface standard: Part 5
- Maintenance & Construction
  - Interface standard: Part 6

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**IEC 61968 Compliant Middleware Services**

- Network Extension Planning
  - Interface standard: Part 7
- Customer Support
  - Interface standard: Part 8
- Meter Reading & Control
  - Interface standard: Part 9
- Part 11:
  - Common Interface Model
  - CIM

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**Electric Distribution Network**

Planning, Constructing, Maintaining and Operating
ESMIG supports both SM-CG & SG-CG with:

- Definition of a functional reference architecture of the Advanced Metering Infrastructure (AMI) and Smart Grid.
- Definition of functional requirements by Use Cases.
- Design of sustainable standardisation processes
- Smart Grid Security

The ESMIG BSII work group provides a reference business system integration architecture and use cases mainly based on the IEC 61968 series that ensures a full interoperability between the technical metering data management systems and the business management systems.
How to create a solution architecture to meet the future needs?
Landis+Gyr reference architecture

Advanced business applications
- Service Operational Applications
- Prepayment / Pay As You Go
- Customer Service Dashboard
- Installation/Deployment Applications
- User and Consumer Applications
- Load Control / Demand Response
- BI/Analytics

IEC 61968

Grid & Meter Data Management Systems
- Grid and Meter Data unification, synchronization and storage
- Data Collection
- On-demand commands /controls
- Storage

IEC 61968

Grid and Meter Data Management applications
- Event Mgmt.
- Tariff/Profile Calculation
- VEE
- Supervision
- Work Order Mgmt.
- Data Profiling
- Reporting
- Data Aggregation
- App Enablement

IEC 61850 and IEC 62056 [DLMS/COSEM]

Head End System platform
- Smart Meter Management
- Network Mgmt Software
- Data collection and reporting

IEC 61968

Smart Devices
- Electric
- Gas
- Heat/Cold
- Water

Utility Operational Systems
- Outage Management System
- Asset Management System
- NIS/GIS
- EDM
- NMS (DA)/SCADA System
- ERP/CIS
- DMS
- WOMS
A pathway towards smart grids and smart communities

- **Smart Community**
  - New applications for intelligent management of infrastructure, appliances, resources & cost
  - HES software & Meter Data Management System solutions

- **Meaningful Information**

- **Intelligent Applications**

- **Measurement of Energy**

- **Smart Metering Infrastructure & Services**

- **“Information on Demand”**

Measurement technology
Thank you for your attention