IDE4L demonstrations

IDE4L
ideal grid for all

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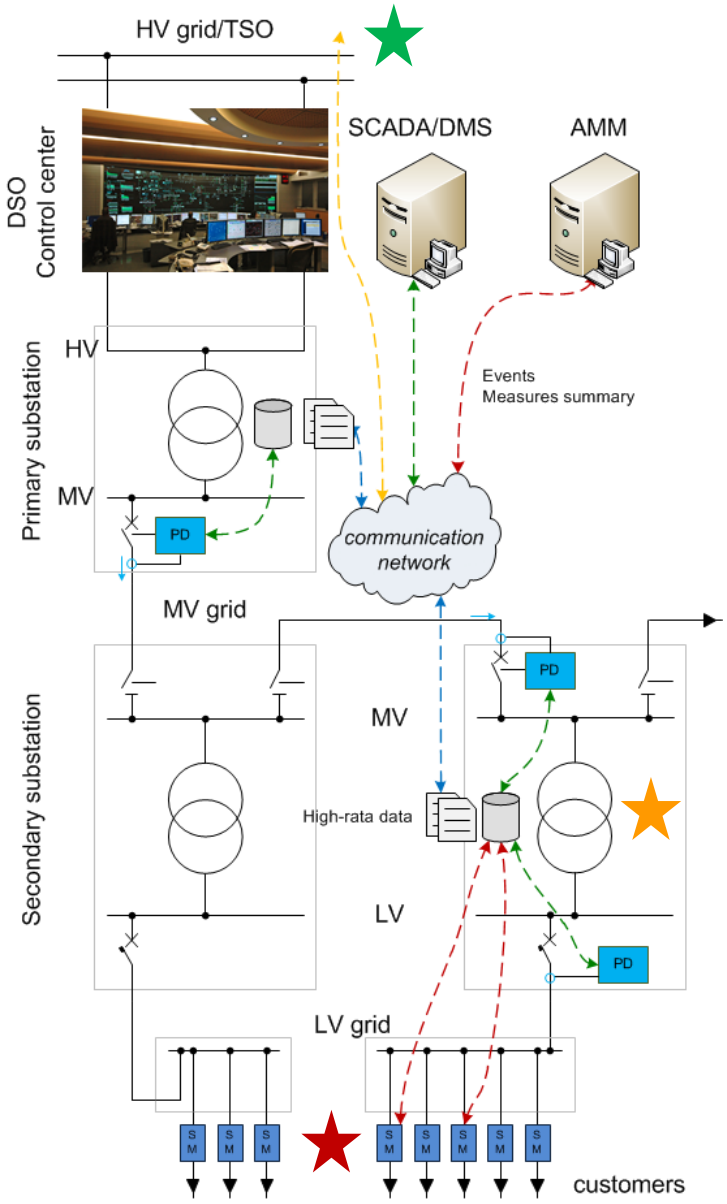
EEGI
EUROPEAN ELECTRICITY GRID INITIATIVE
- SUPPORT -

IDE4L is a project co-funded by the European Commission (Project no: 608860)

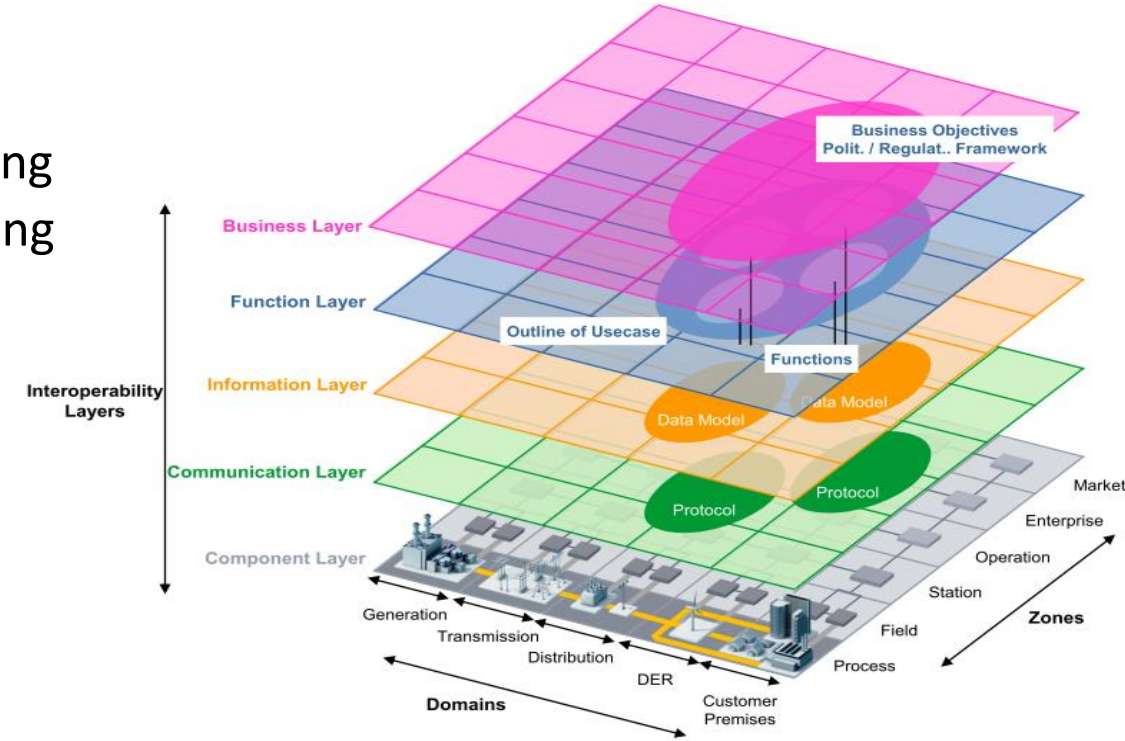
Motivation and pillars

- **Monitoring and control systems of MV and LV grids (if such exists) are designed for passive distribution network**
- **Amount of data increases**
  - Data is collected/processed locally
  - Only summary/alarms are reported upwards
- **Number of monitoring devices increases**
  - Smart meters
  - Fault detectors / protections
  - Power quality meters / PMU
- **Standards are needed to enhance integration and reduce maintenance**
  - CIM for grid assets
  - 61850 for data about the grid
  - DLMS/COSEM for metering data



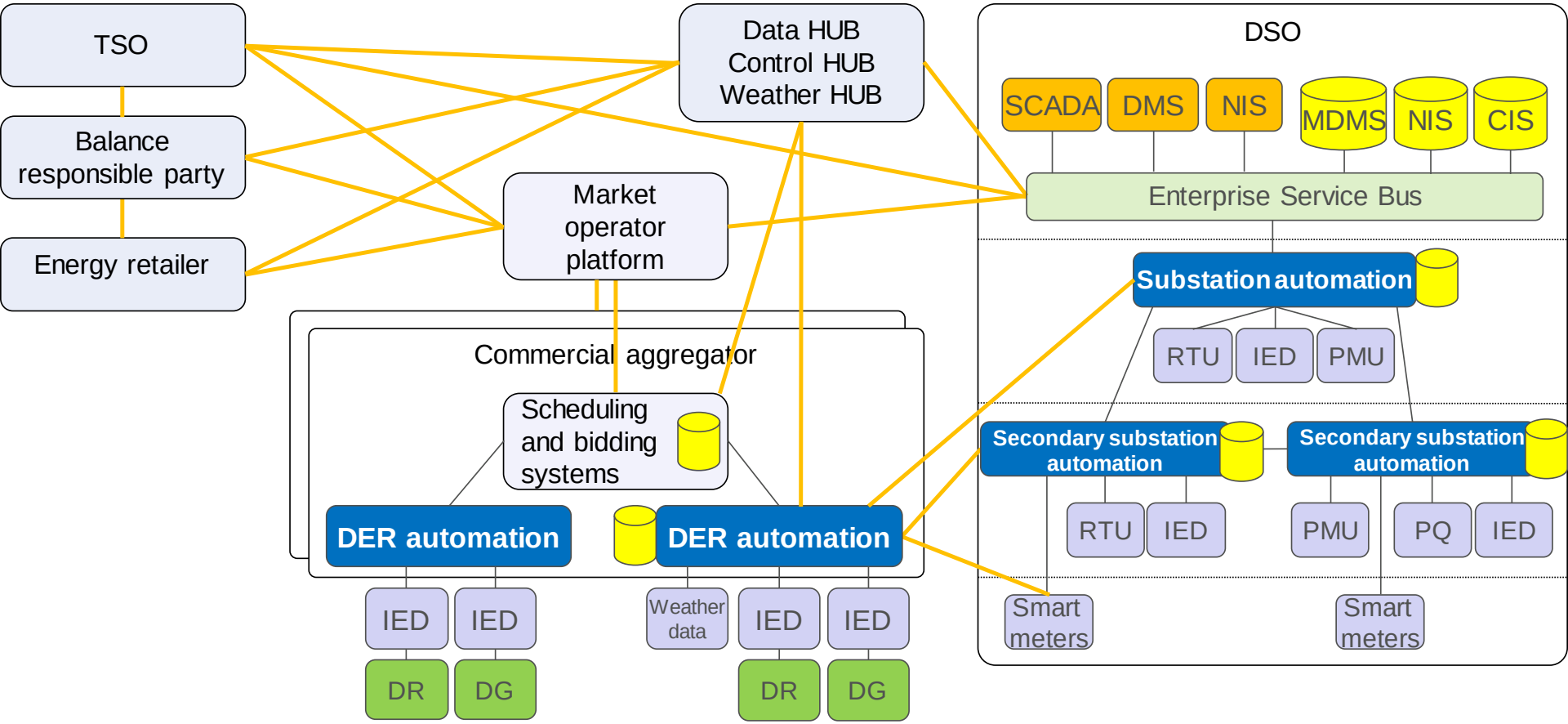
Use cases

1. Monitoring
   - Real-time monitoring
   - Load and production forecasting
   - State estimation and forecasting
   - Dynamics of distribution grid
2. Protection
   - Logic selectivity
   - FLISR with DERs and µGrid
3. Control
   - Congestion management
   - Optimal scheduling
   - µGrid voltage control
   - Dynamic grid tariff



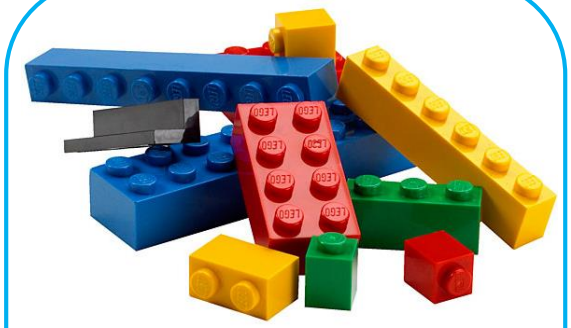
Smart Grid Coordination Group,
CEN-CENELEC-ETSI, Tech. Rep., 2012

Overview of IDE4L architecture



Demonstrations

Testing phase: a three-step procedure



Building-blocks, e.g.:

1. Algorithms
2. Protection devices
3. Third party devices
4. Third party software

1st Dev. lab

Groups of building-blocks, e.g.:

1. State estimation algorithm within a PC connected to an RTU via a 61850 interface

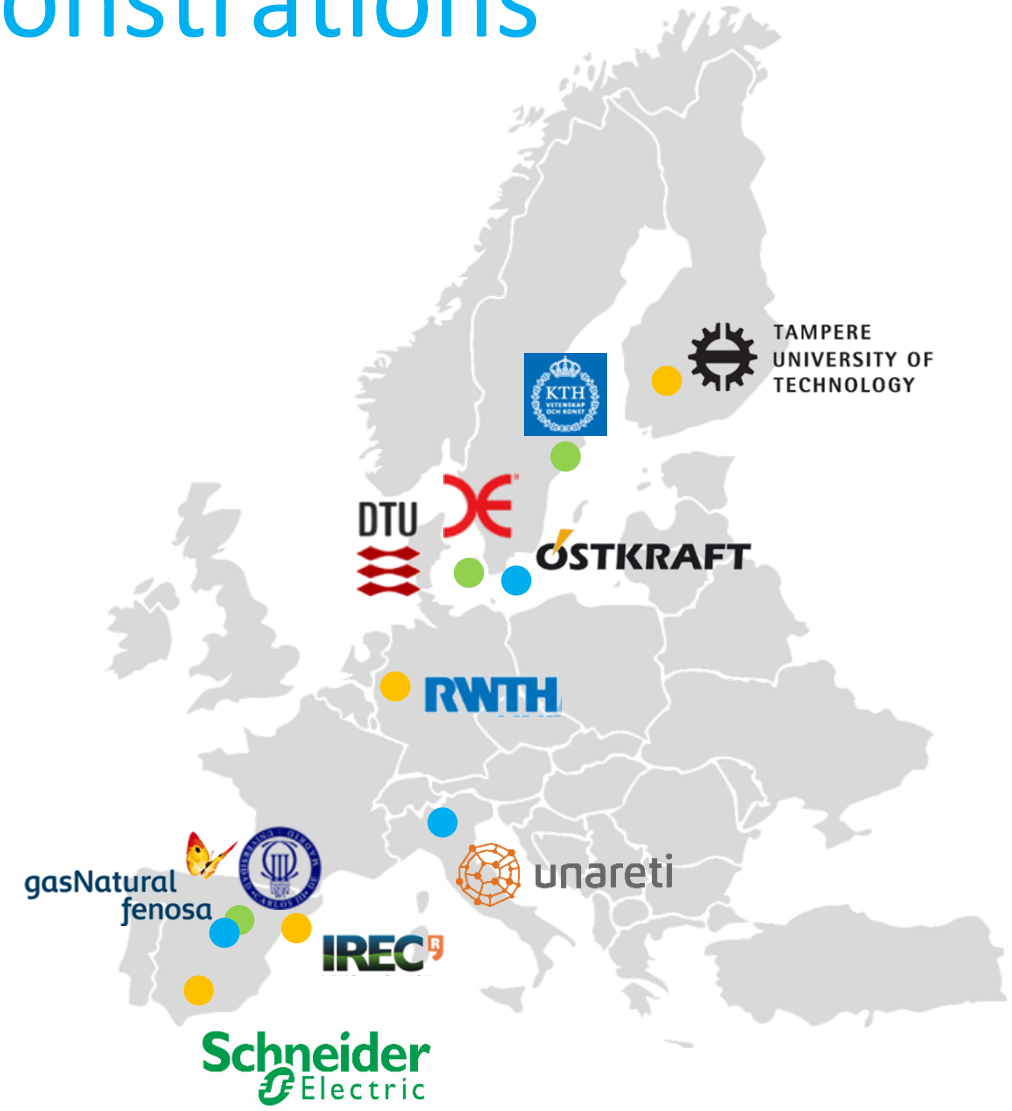
2nd Integration. lab

Use cases, e.g.:

1. Monitoring of LV grid (PC + state estimation + RTU + Smart meters + interfaces)

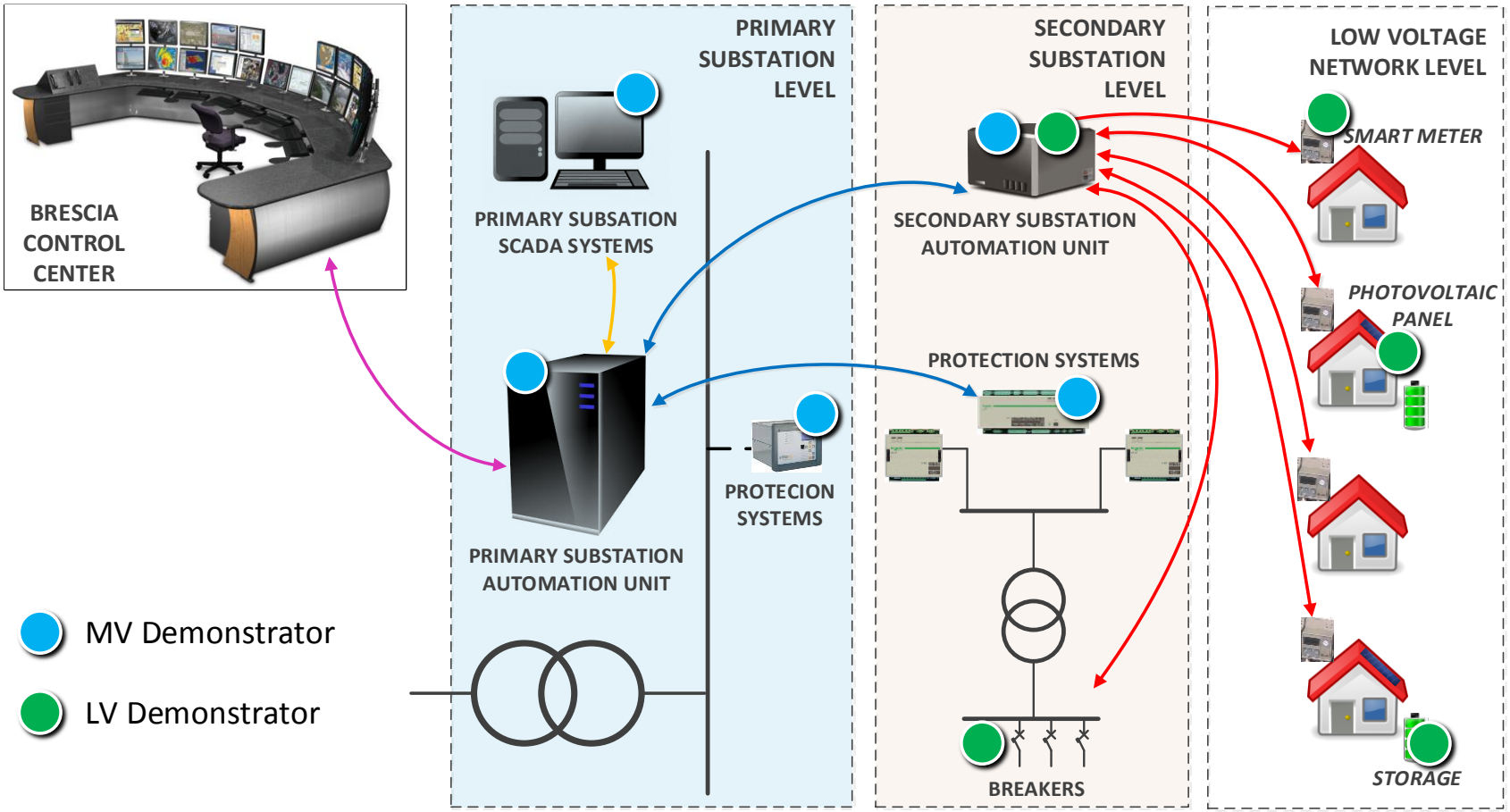
3rd Demo

Demonstrations



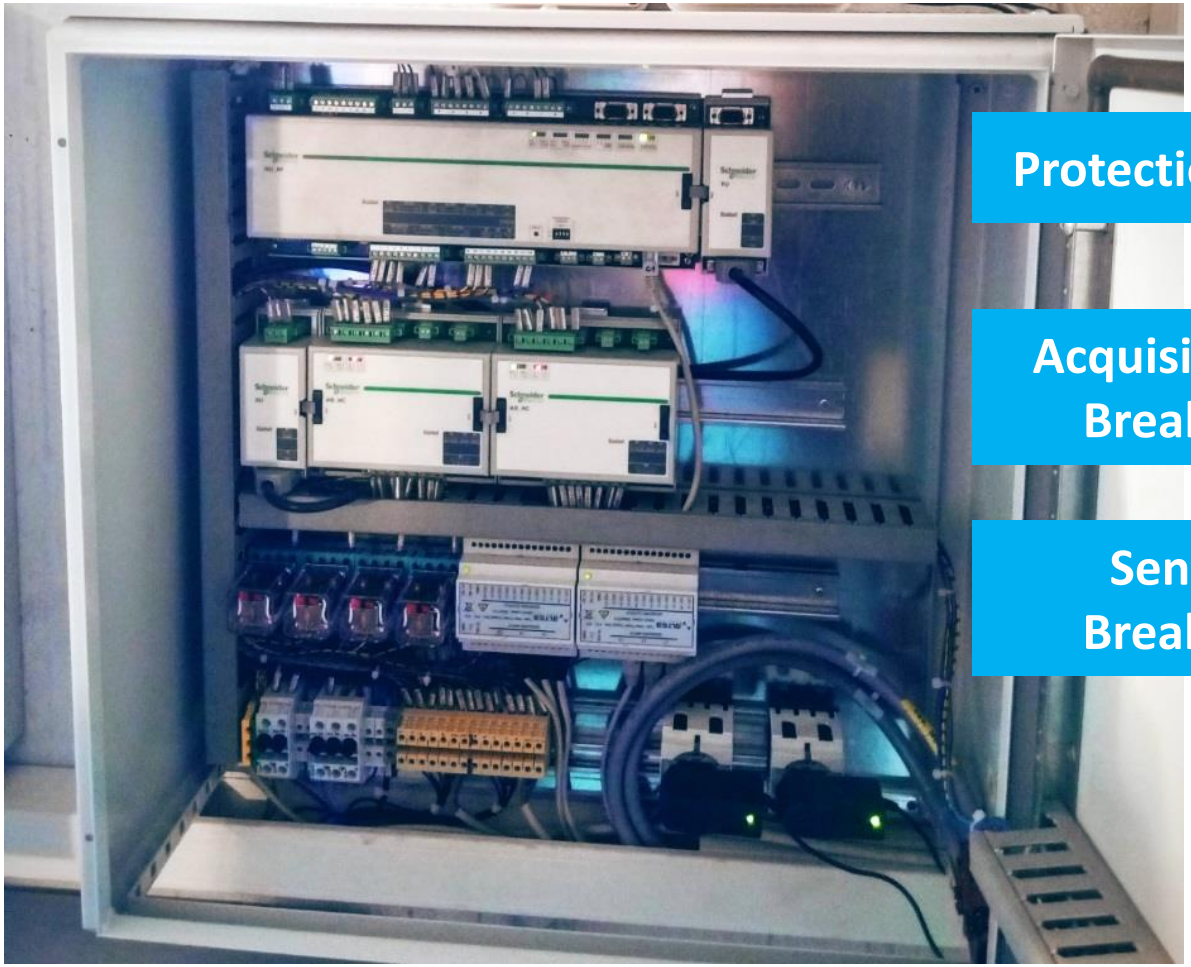
- Development site
- Lab. demo site
- Field demo Site

Unareti Demo Site Overall Architecture



Fault Location Isolation Supply Restoration

Improves both SAIDI and SAIFI

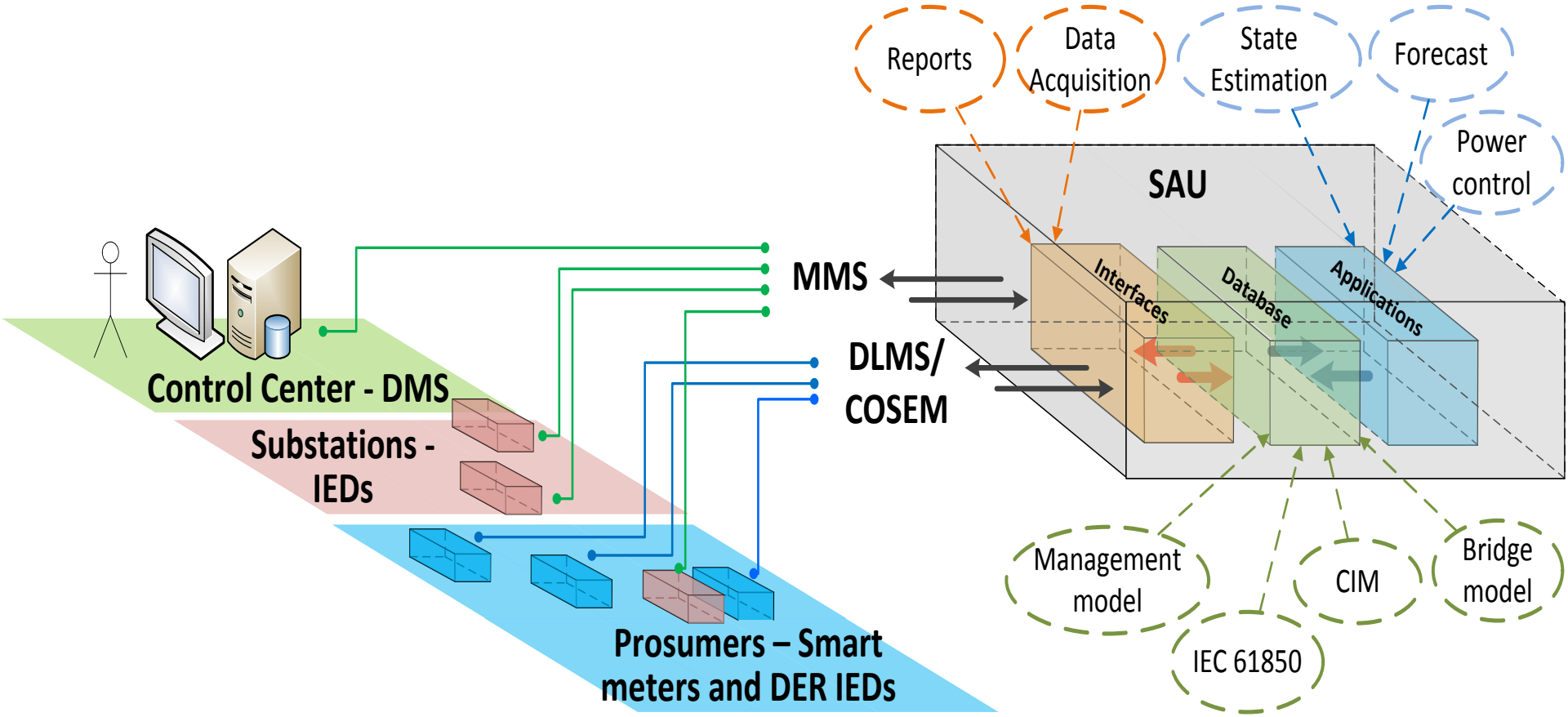


Protection Device RTU

Acquisition Modules Breaker A and B

Sensors Plugs Breaker A and B

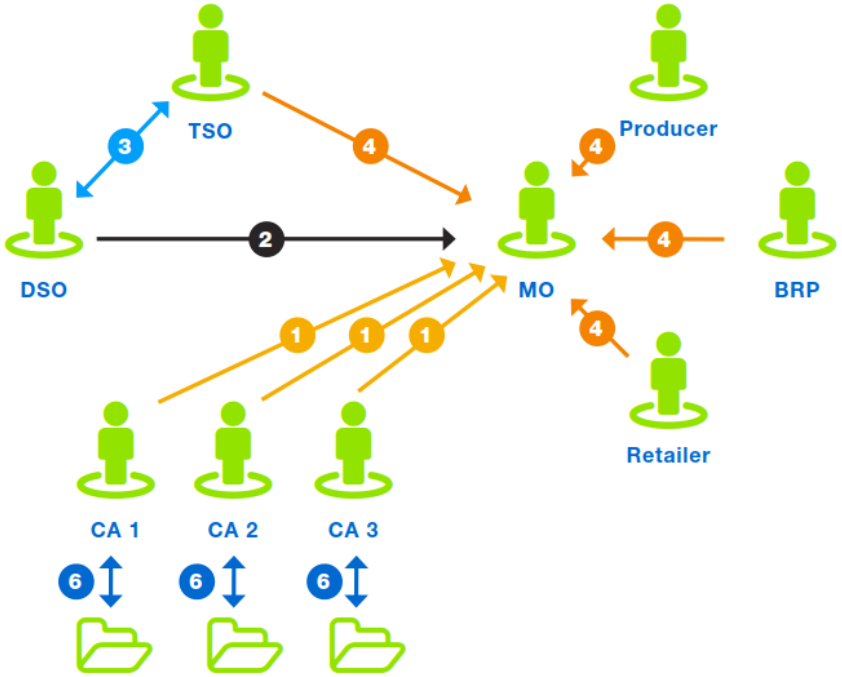
Substation Automation Unit



Congestion management

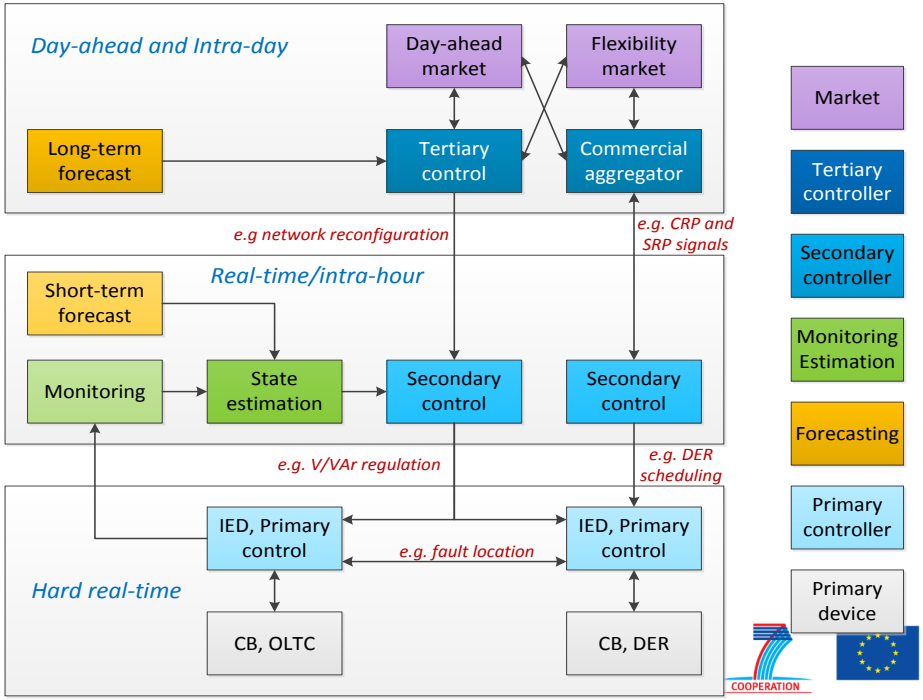
Tertiary controller:

- Reconfiguration of MV grid
- Capability of secondary controller
- Flexibility validation
- Flexibility purchase and activation



Secondary controller:

- Estimates grid congestion of control area in real-time
- Optimize the settings of primary controllers



Conclusions

- **Basis for distributed grid management and interaction of business players**
  - Design, implementation and demonstration of concepts
    - Active Network Management (ANM)
    - Hierarchical and distributed automation architecture
    - Commercial aggregator
- **Efficient utilization of grid assets**
  - Monitoring and control of complete MV and LV grid
  - Increased hosting capacity for RESs and DERs
  - Enhanced reliability of power supply
  - Planning tools to estimate the hosting capacity

Conclusions

- **Scalability of automation solution**
  - Automation is based on existing devices
  - Functions can be deployed locally and coordinated
  - Complete view of the distribution network status
  - Validating, purchasing and activating flexibilities
- **Utilization and development of standards**
  - Chosen standards for architecture and implementation are IEC 61850, DLMS/COSEM and CIM
  - Interoperability of use cases and architecture
  - Implementations of automation system have been demonstrated in three demonstration sites

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Thank you for your attention!

http://ide4l.eu/

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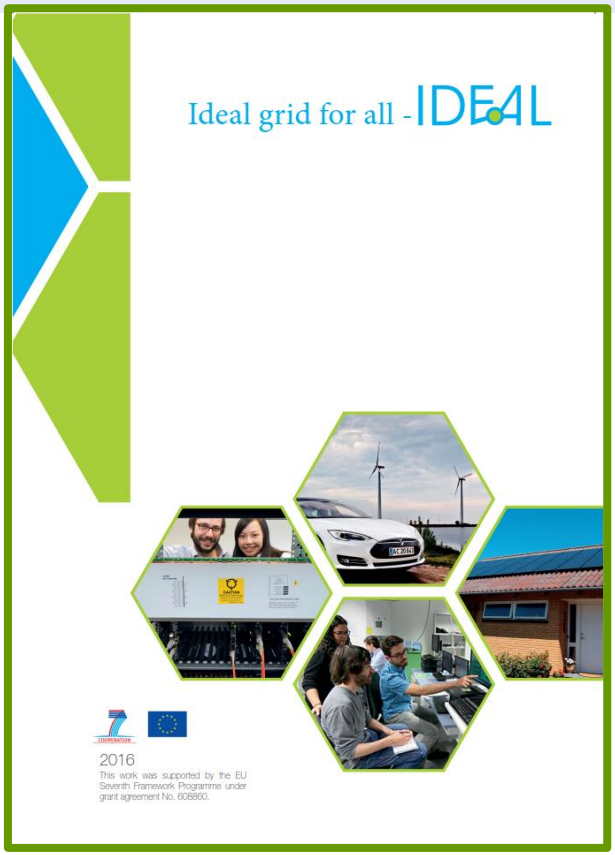

Final results

COOPERATION

TAMPERE UNIVERSITY OF TECHNOLOGY
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Universidad Carlos III de Madrid
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