



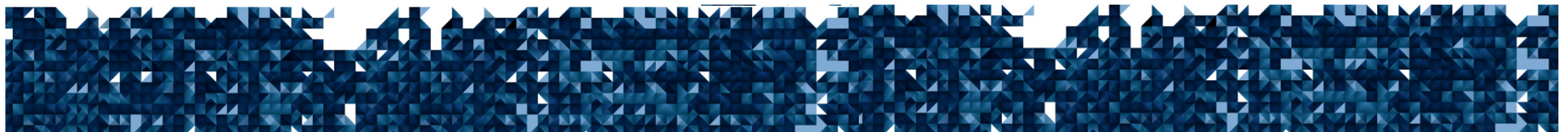
Workshop Smart Grid
Standardisation
May 16th 2013



Technology & Communication standards in the Grid4EU project

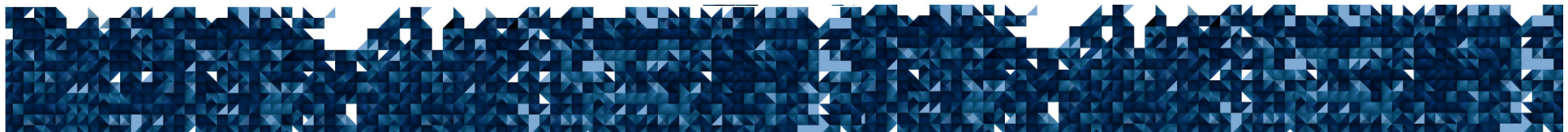
Session DER integration & grid control

Jérôme Frémont, EDF Research & Development Division



The Grid4EU project

- Started officially on November 1st 2011 and will last 4 years.
- 6 European Smart Grid demonstrators.
- To test system innovative concepts and technologies.
- Areas : renewable energy, grid automation, energy storage...
- For more information, see <http://www.grid4eu.eu>.



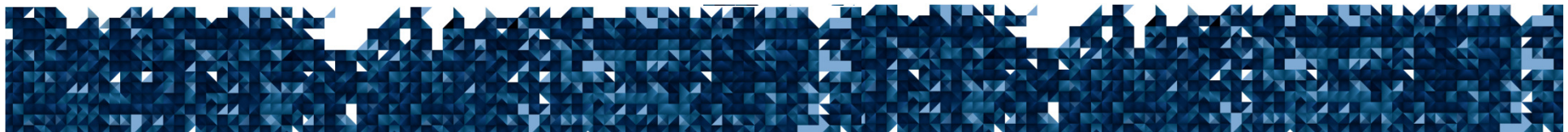
The Grid4EU project : the DSOs

- Lead by 6 European DSOs covering more than 50% of the Electricity supply in Europe.

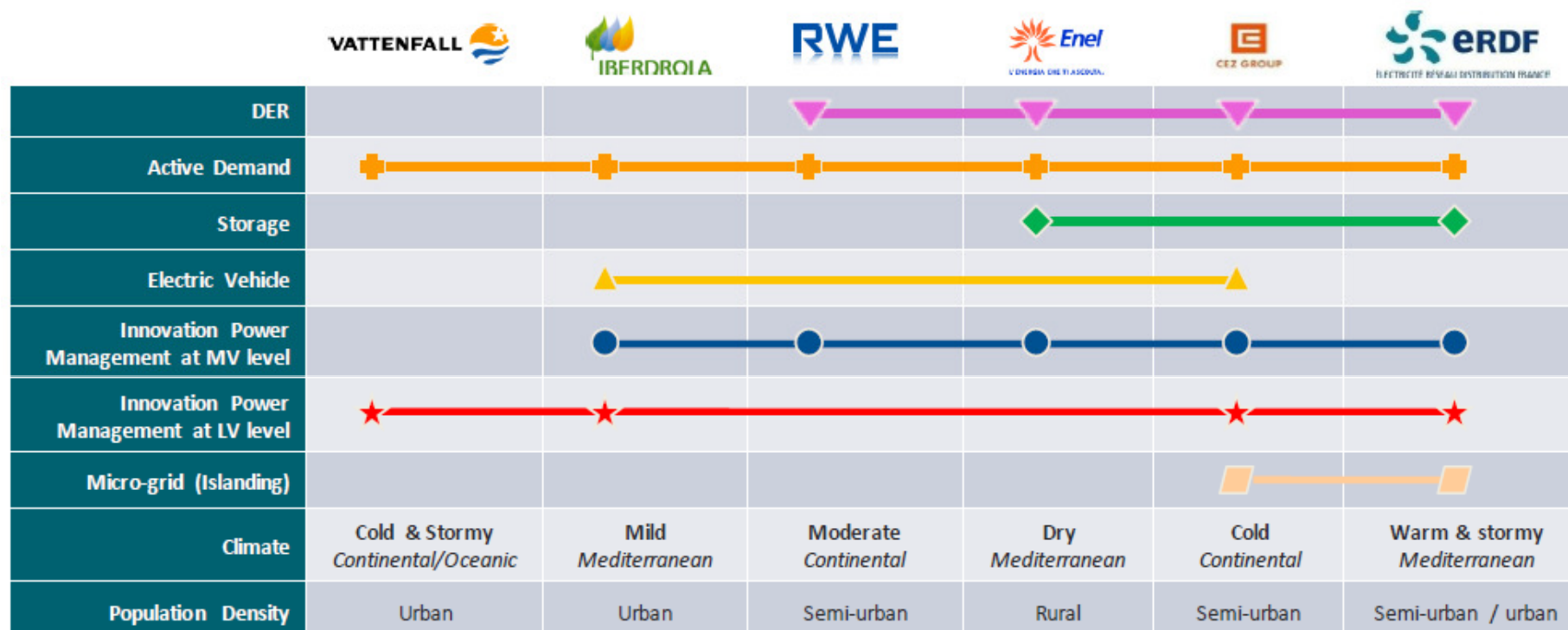


The Grid4EU project : the partners

- Includes 27 partners (manufacturers, system integrators, research centers and universities).



The Grid4EU project : interactions and synergies



● Innovation Power Management at MV level

★ Innovation Power Management at LV level

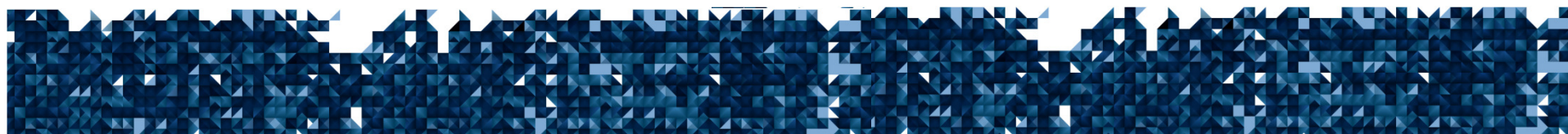
▽ DER

◆ Storage

✚ Active Demand

▮ Micro-grid (Islanding)

▲ Electric Vehicle



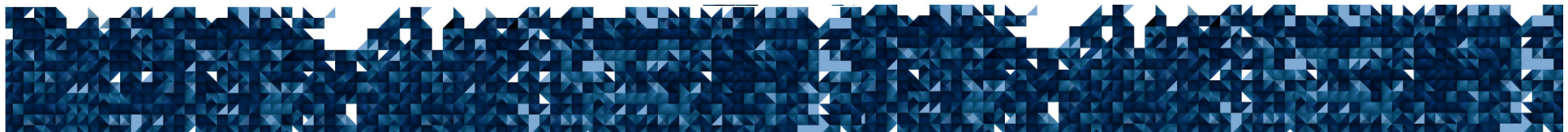
The Grid4EU project : organization

- 5 General Work Packages (GWP) supports the 6 Grid4EU demonstrators.
- The objectives of the GWP4 (Technology and Communication Standards) :
 - define the most recent standards potentially applicable to the 6 demonstrators,
 - monitor their implementation in each of the demonstrations.



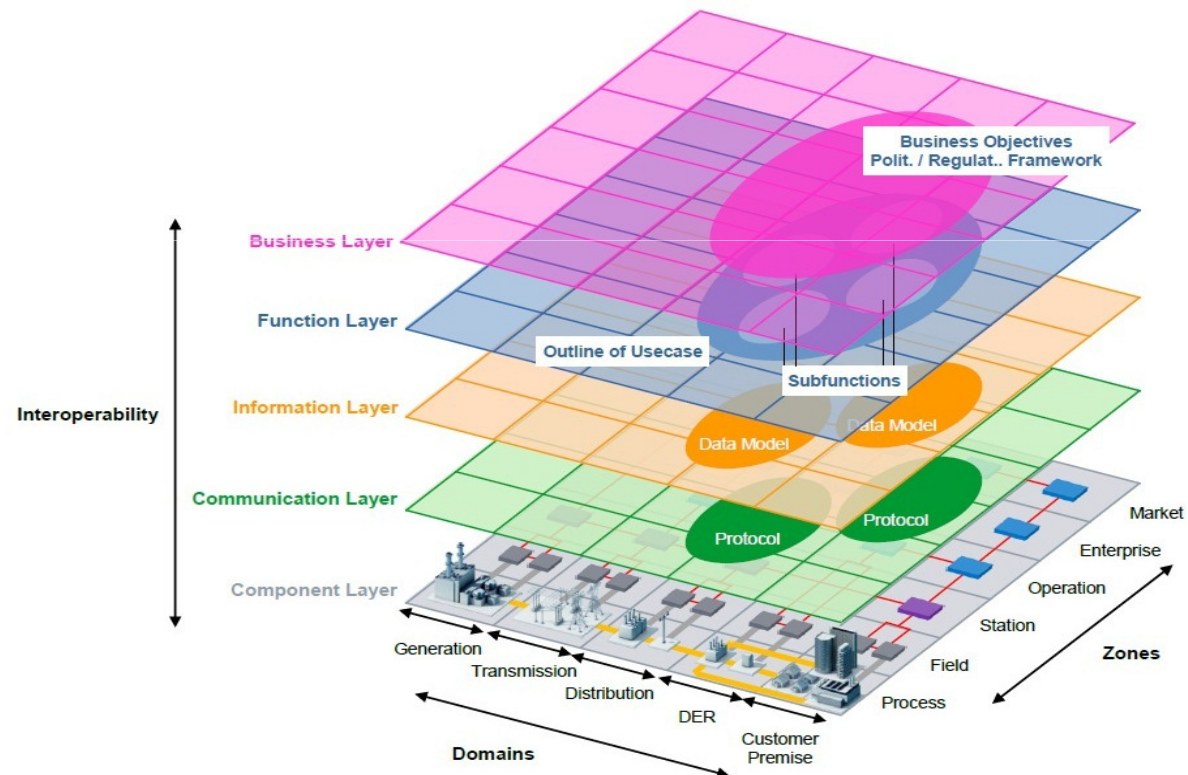
The Grid4EU project : the GWP4

- 1st deliverable in October 2012.
- Identified the set of standards that the 6 demonstrators plan to use.
- The Smart Grid Architecture Model (SGAM) provided by the European Mandate (M/490), has been used by each demonstrator to locate its standards in a particular layer and a specific domain.



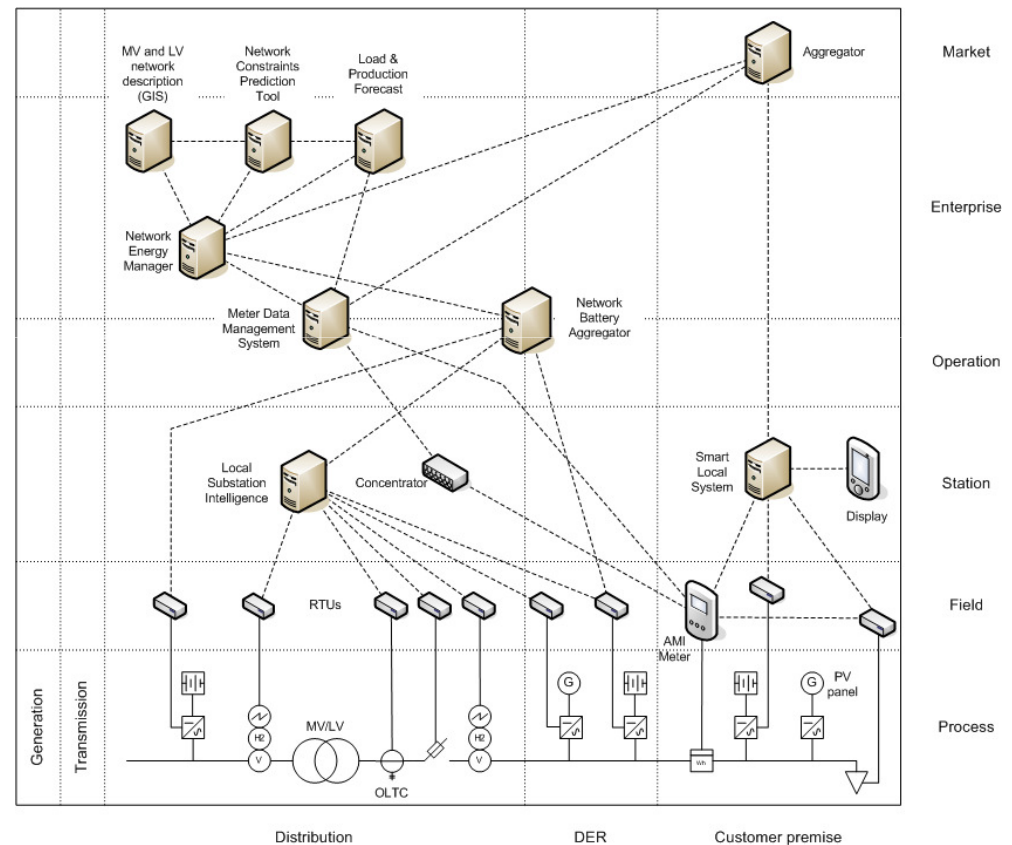
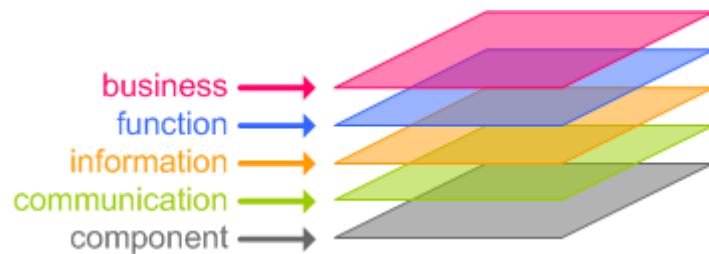
The Grid4EU project : the SGAM

- Modeling of the demonstrators with the SGAM provided by the WG Reference Architecture of the M/490.



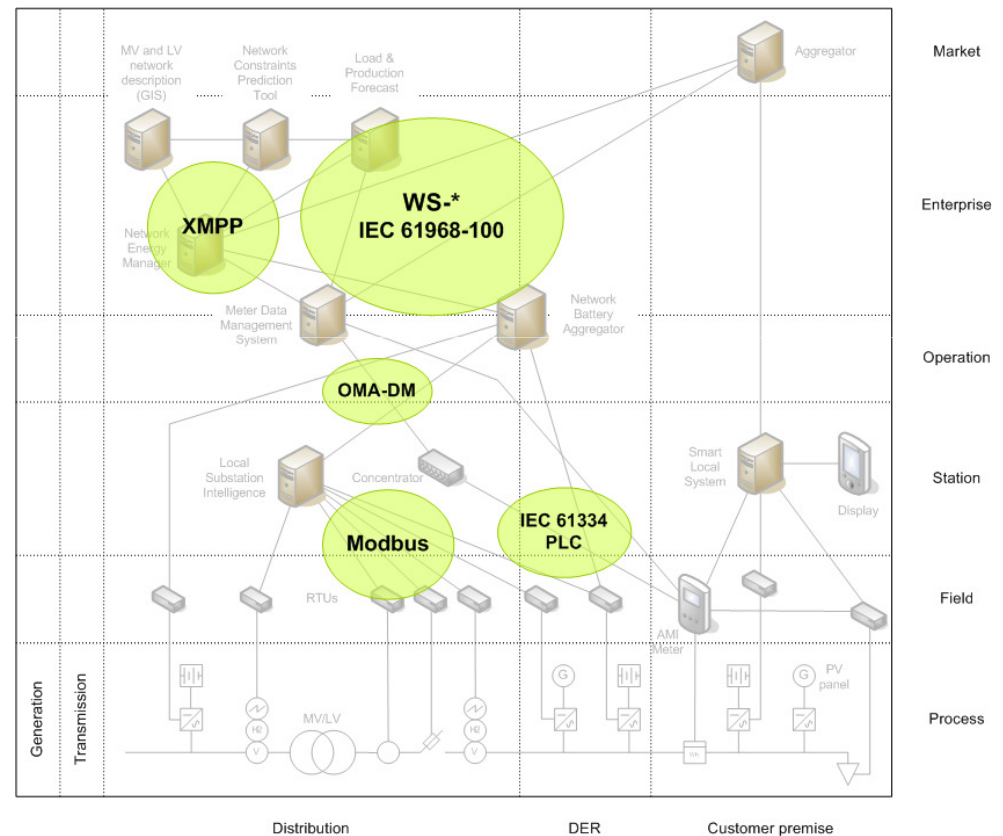
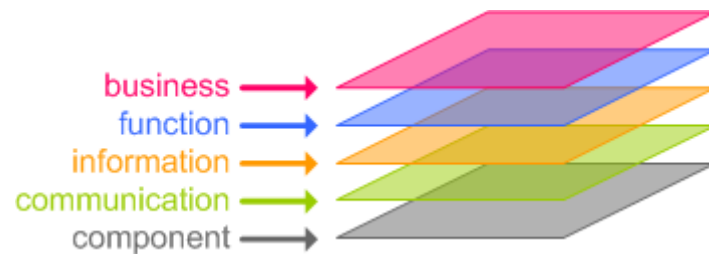
The Grid4EU project : SGAM usage example

- The component layer



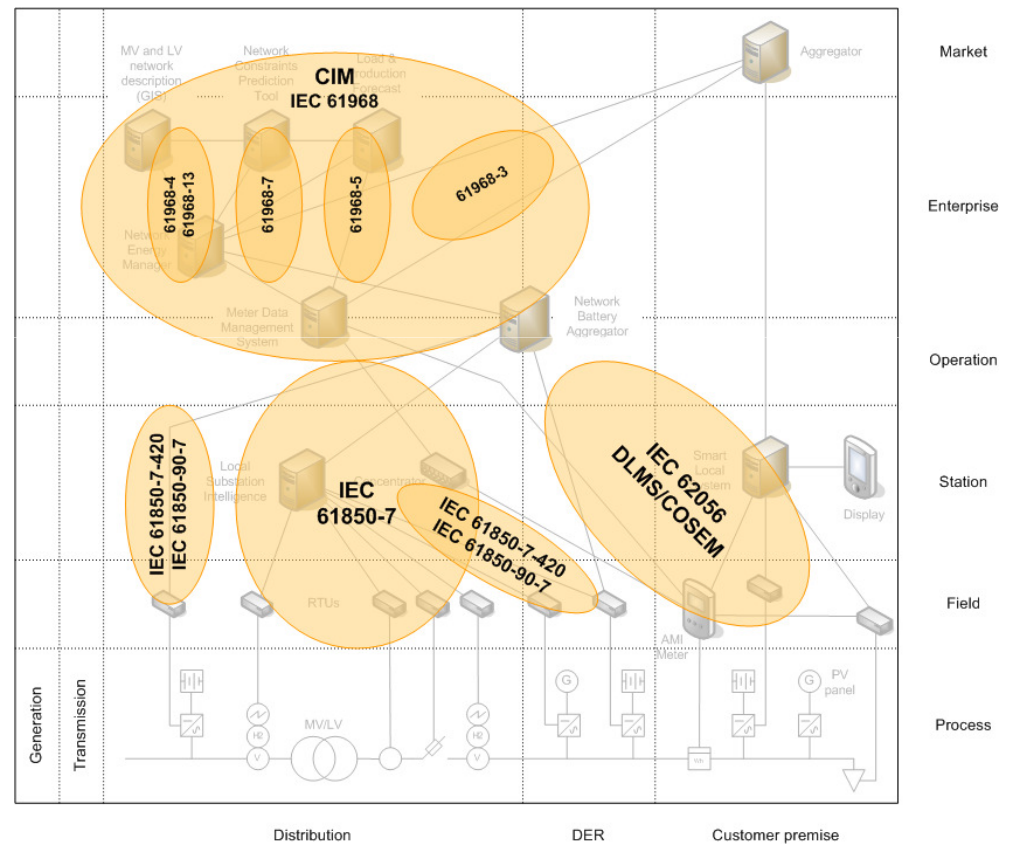
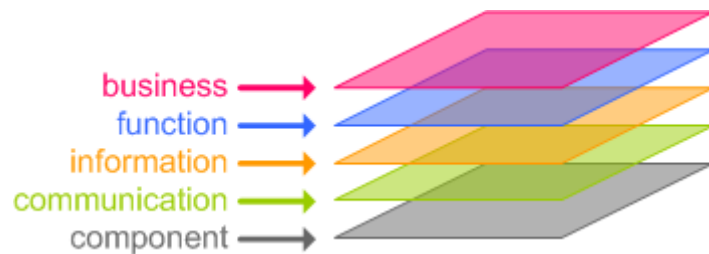
The Grid4EU project : SGAM usage example

- The communication layer



The Grid4EU project : SGAM usage example

- The information layer



The Grid4EU project : standards overview

Standards		DEMO1	DEMO2	DEMO3	DEMO4	DEMO5	DEMO6	JWG	NIST	IEC SG3 ²
<i>Communication technologies</i>										
Wired	RS485 (twisted pair)					X				
	Ethernet (IEEE 802.3)				X	X				
	PLC		X	X	X		X			
Wireless	Zigbee (IEEE 802.15.4)			X						
	GPRS		X			X	X			
	WiMAX (IEEE 802.16)				X	X				
	LTE				X					
<i>Communication protocols</i>										
	G3 PLC (ITU G.9955/G.9956)						X			
	Meters & More (PLC)				X					
	LonWorks PLC (ISO/IEC 14908-3)		X							
	PRIME (PLC)			X						
	IEC 60870-5-104		X	X	X	X				high
	IEC 61850				X	X				core



The Grid4EU project : standards overview

	IEC 62056 (DLMS/COSEM)			X			X			high
	Modbus					X	X			
	OMA-DM/OMA-DS						X			
	TCP/IP				X	X				
	XMPP						X			
	WS-*		X	X			X			
<i>Information models</i>										
	CIM (IEC 61968, 61970 & 62325)		X	X	X	X	X			core
	DLMS/COSEM (IEC 62056)			X			X			high
	IEC 61850-7				X		X			core

The following backgrounds are used for NIST statuses for standards:



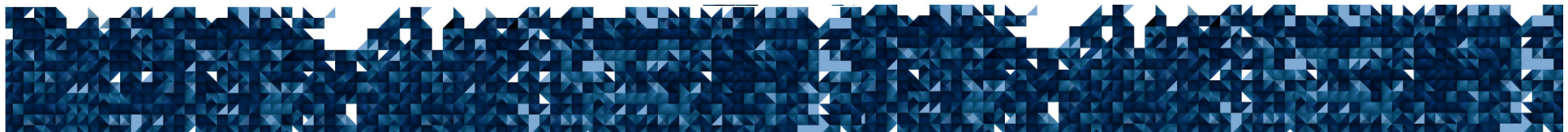
Current list of standards identified by NIST.

Current list of standards subject to further review³.



The Grid4EU project : the GWP4

- 2nd deliverable planned in October 2013.
- Monitor and validate standards implementation in each of the demonstrations.
 - Capture conformance testing results performed by partners' products.
 - Standard usage analyzes and conformance testing on laboratories.
 - Support from the WG of the European Mandate (M/490) on Interoperability.



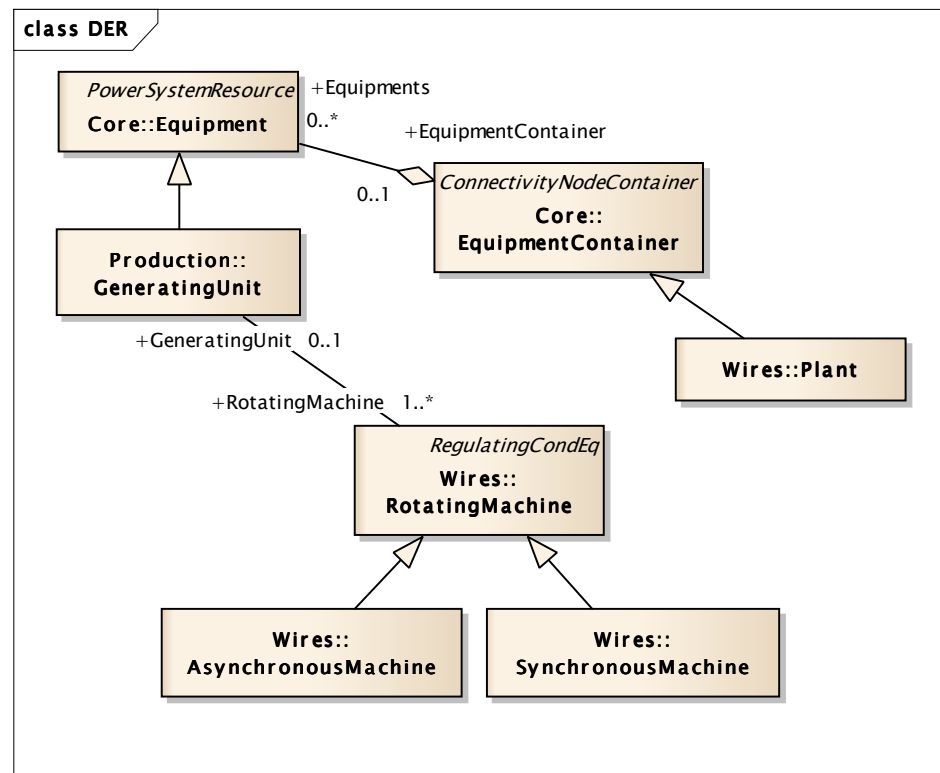
The Grid4EU project : about DER

- 4 of the 6 demonstrators include DER.
- 2 of the 6 demonstrators include electric vehicles.
- Standards identified among the demonstrations :
 - Communication protocols
 - IEC 61850 parts 8 & 9
 - IEC 60870-5-104
 - Information models
 - IEC 61850 part 7
 - IEC 61850 part 7-420
 - IEC 61850-90-7
 - IEC 61968



The Grid4EU project : about DER

- The CIM is not complete for DER description, mainly :
 - PV panels.
 - Batteries.



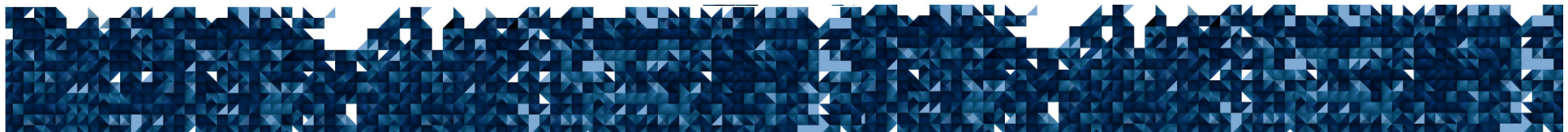
The Grid4EU project : about DER

- DER description is an on-going work of the IEC TC57 (WG14).
- Some proposals have been done :
 - PV panel : *StaticMachine* class associated with an *Inverter* class.
 - Battery : generic class *EnergyStorageUnit* associated with *Battery*, *Flywheel* or *FuelStore* classes.
- The WG have to determine de granularity between *Plants*, *Units* and *Machines* classes.



The Grid4EU project : about DER

- Also linked with the DERri project.
- DERri JRA3 : Real-time Simulation.
 - Definition of a Common Reference Model (data model) for the offline and real-time simulation of DER components and devices (based on the Smart Grids Standards “Common Information Model” and “IEC 61850”) .
 - The definition of the CRM should be based on existing solutions and standards (e.g., CIM, CIM for Dynamics, IEC 61850, etc.).



The Grid4EU project : about DER

- Production forecast description with CIM.
- CIM proposes basic classes for schedules (*RegularIntervalSchedule, RegularTimePoint, Curve,...*).
- But limited by the number of plots (3 per *Curve*, 2 per *Schedule-s*).
- The ADDRESS project (FP7) improved the model to define any number of plots (*Axis* classes).
- The ADDRESS project made CIM extensions for active demand schedules and flexibility (*ADSchedule,...*).

