IEC 61850

Not just a protocol

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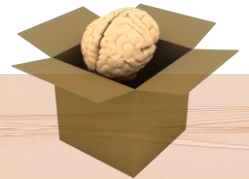
Introductory	Requirements	Objects and Base Types	Functions	Execution	Engineering / Configuration	Testing
Standard (61850-1)	General, Electrical and Environmental (61850-3)	Objects and Models (61850-7-1)	Common Functions (61850-7-4)	Mapping to MMS and TCP/IP (61850-8-1)	Configuration (61850-6)	Abstract Test Cases (61850-10)
Glossary (61850-2)	System Engineering (61850-4)	Abstract Communication (61850-7-2)	Hydro-Electric (61850-7-410)	Web Technology (61850-8-2)	Modeling for Automation (61850-600)	Functional Testing (61850-10-3)
	Information Exchange (61850-5)	Common Data Classes (61850-7-3)	Distributed Energy (61850-7-420)	Sampled Values (61850-9-2)	Role Based Access Control (TR 61850-90-19)	UCA Conformance Testing
	Redundancy for IEDs and Applications (TR 61850-90-20)		Wind Power (61400-25-2)	PTP Time Sync (61850-9-3)	HMI (TR 61850-6xxx)	
	Networking (TR 61850-90-4 and TR 61850-90-12)		Logic Modeling (61850-90-11)		HMI (TR 61850-6-2)	
			Alarm Handling (61850-90-18)		System Management (61850-90-16)	



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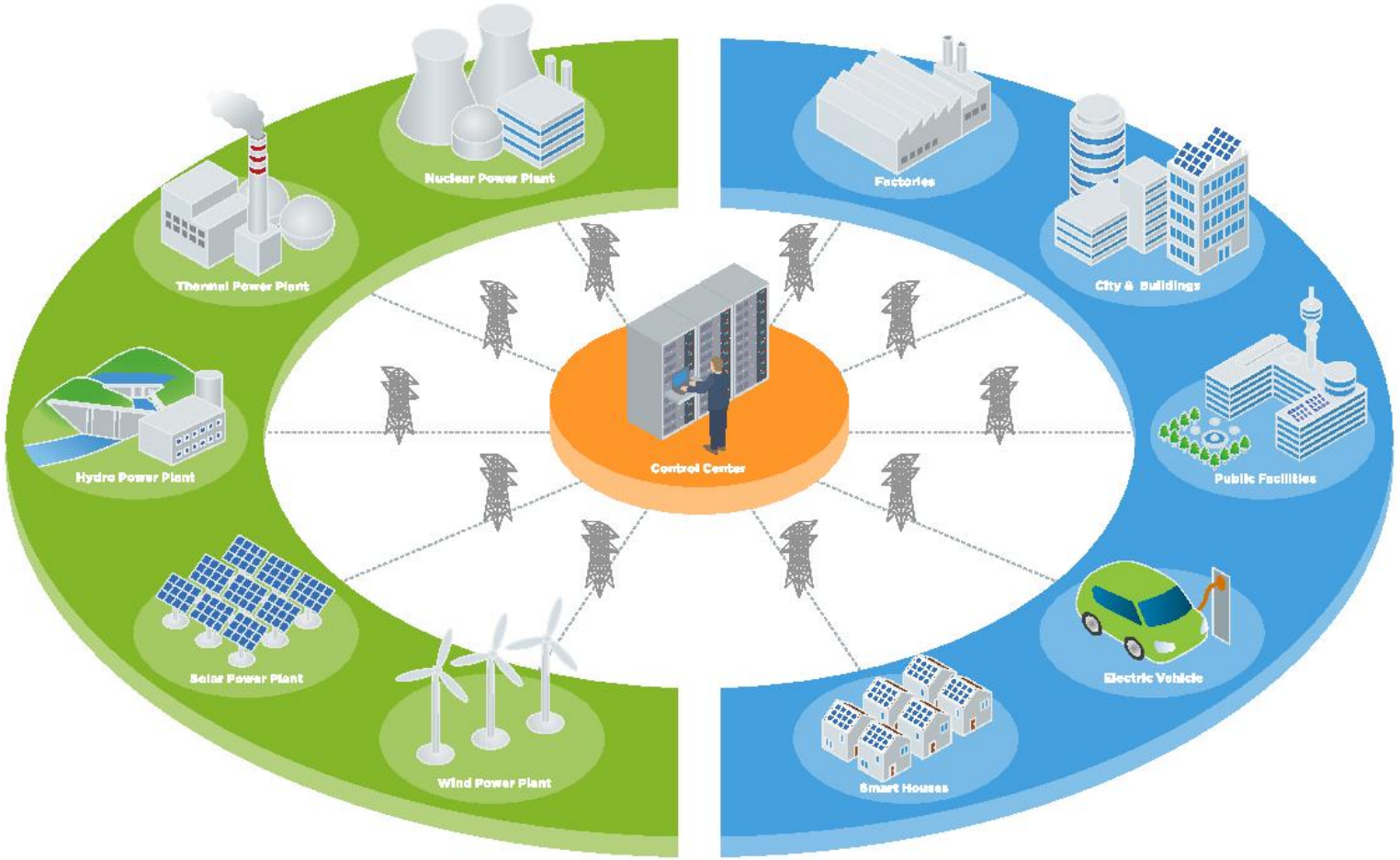
The Need



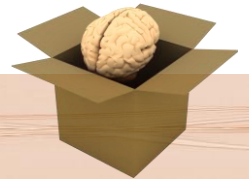
Different Domains

Different Organizations

Different Devices

Devices are Ubiquitous

- DER
- Transmission
- Distribution
- Mobile



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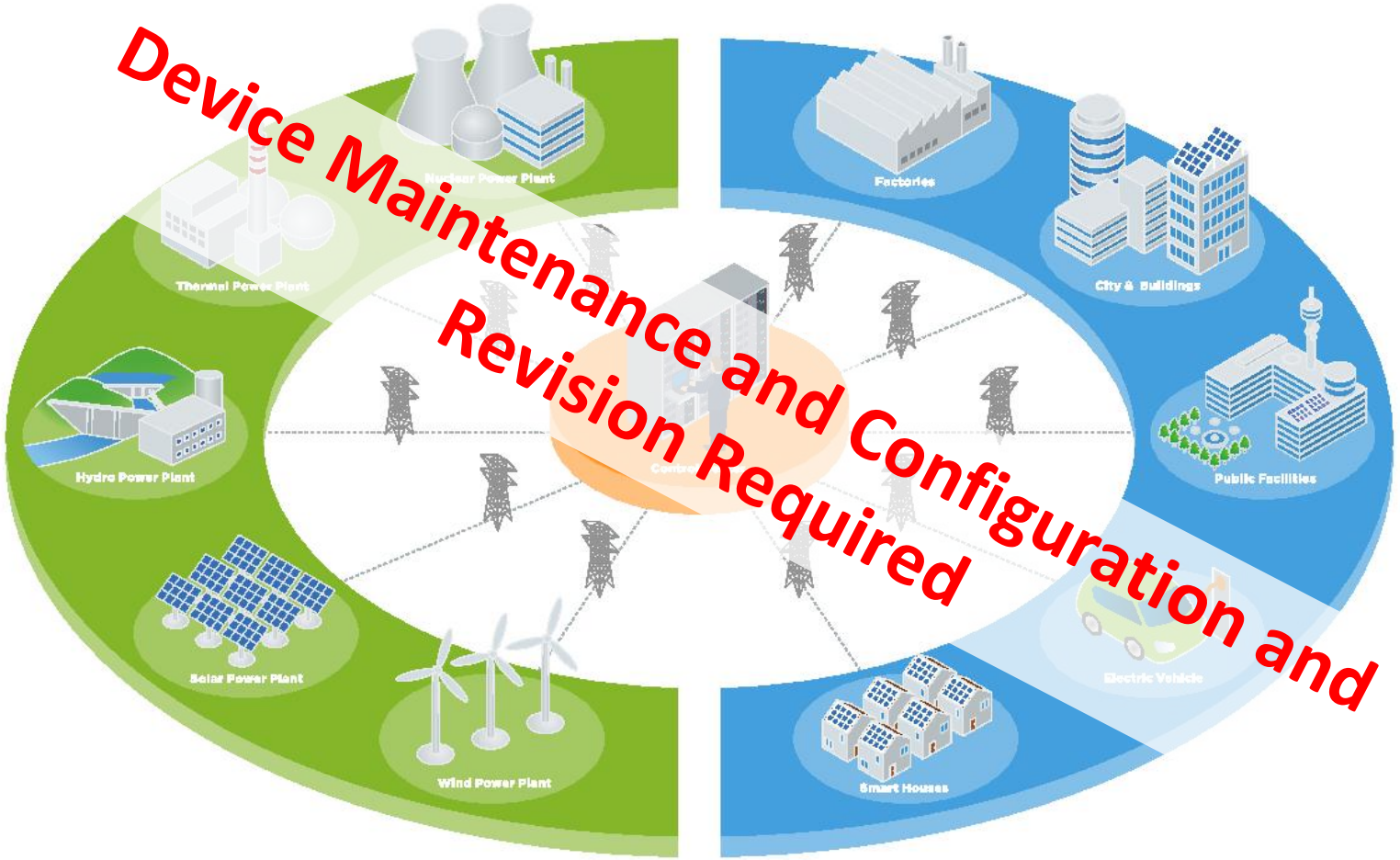

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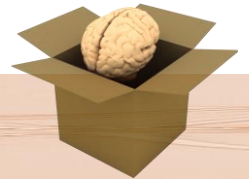

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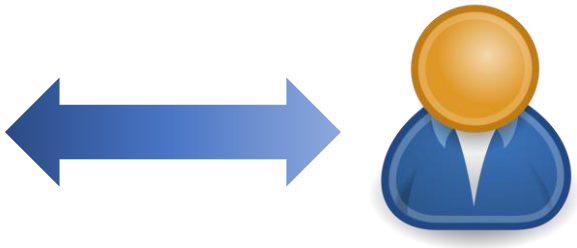
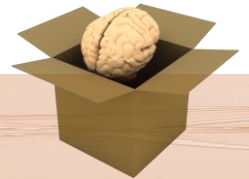
How its Done Today: Repository



Settings, Cyber, Programming

Communication Flow

Virtual Input/Output



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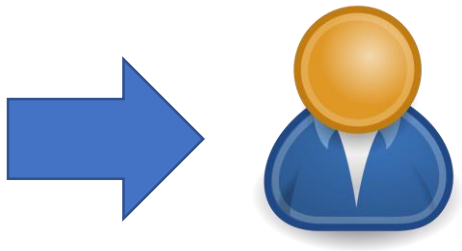
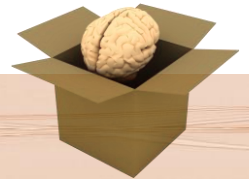
How its Done Today: Pull Version



Settings, Cyber, Programming
Communication Flow
Virtual Input/Output



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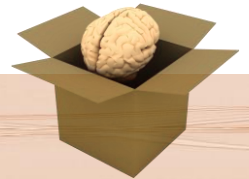
How its Done Today: Test?

Test Device

Problems

Verified Set

Gold Standard



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How to Distribute

Option 1: Roll Them Trucks

- What is the cost to roll a truck
- Accidents on the trip
- Accidents in the substation
- What about weather?

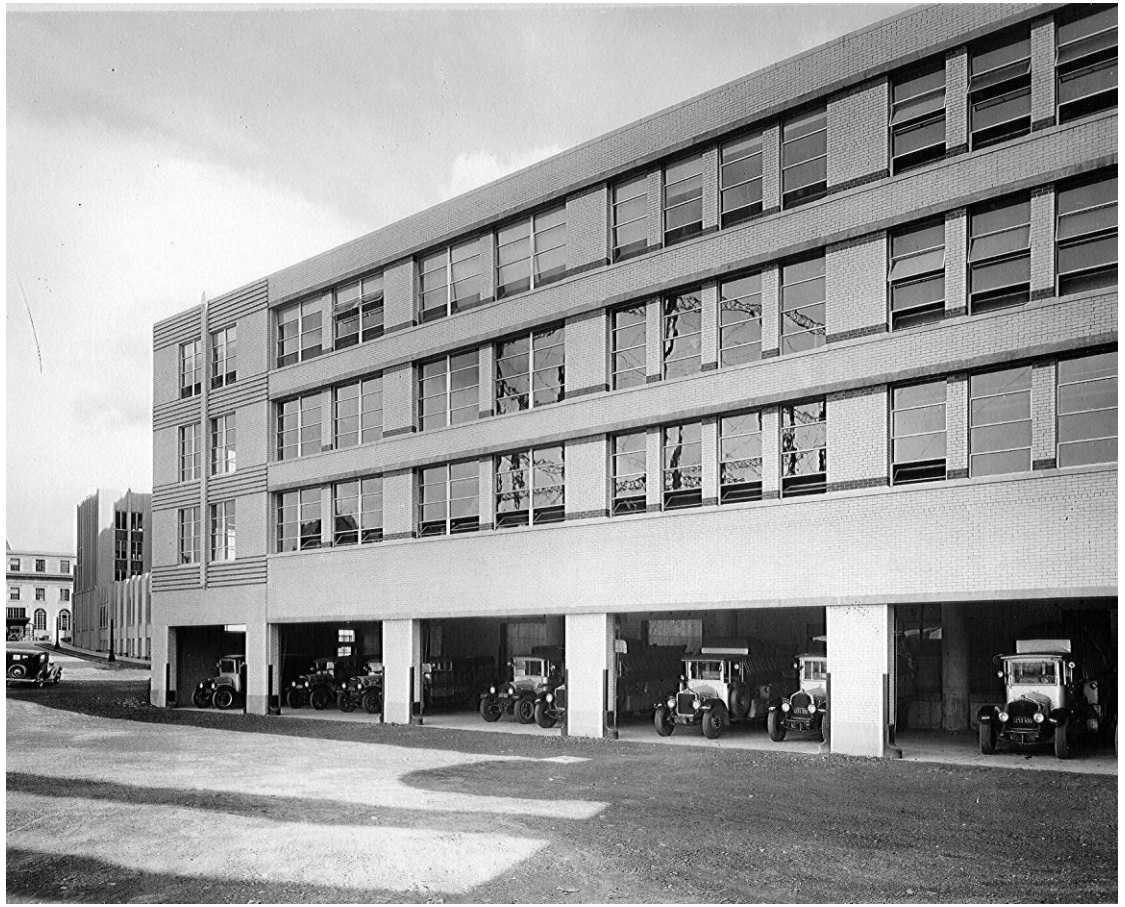
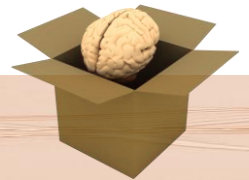


Image Courtesy of National Grid



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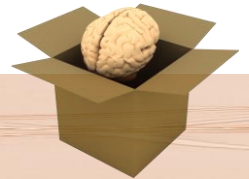
How to Distribute

Option 2: Remote Software Updates

- Vendor Proprietary Solutions
- Information may need to be transformed
- Representation of Information Inconsistent

IT “knows” and does this every day

Microsoft® System Center Configuration Manager



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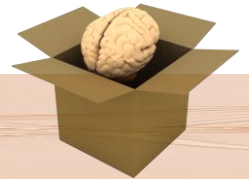
Borrowing Concepts from SCCM

- Manifest of Information
- Contains a single set of files

- IEC 61850-90-16 File Set Contains:
  - CID
  - Settings Files
  - Security/Cyber
  - HMI Screens
  - Logic
  - More…

Gold Set Must be maintained in Repository



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More in-depth look at 61850-90-16

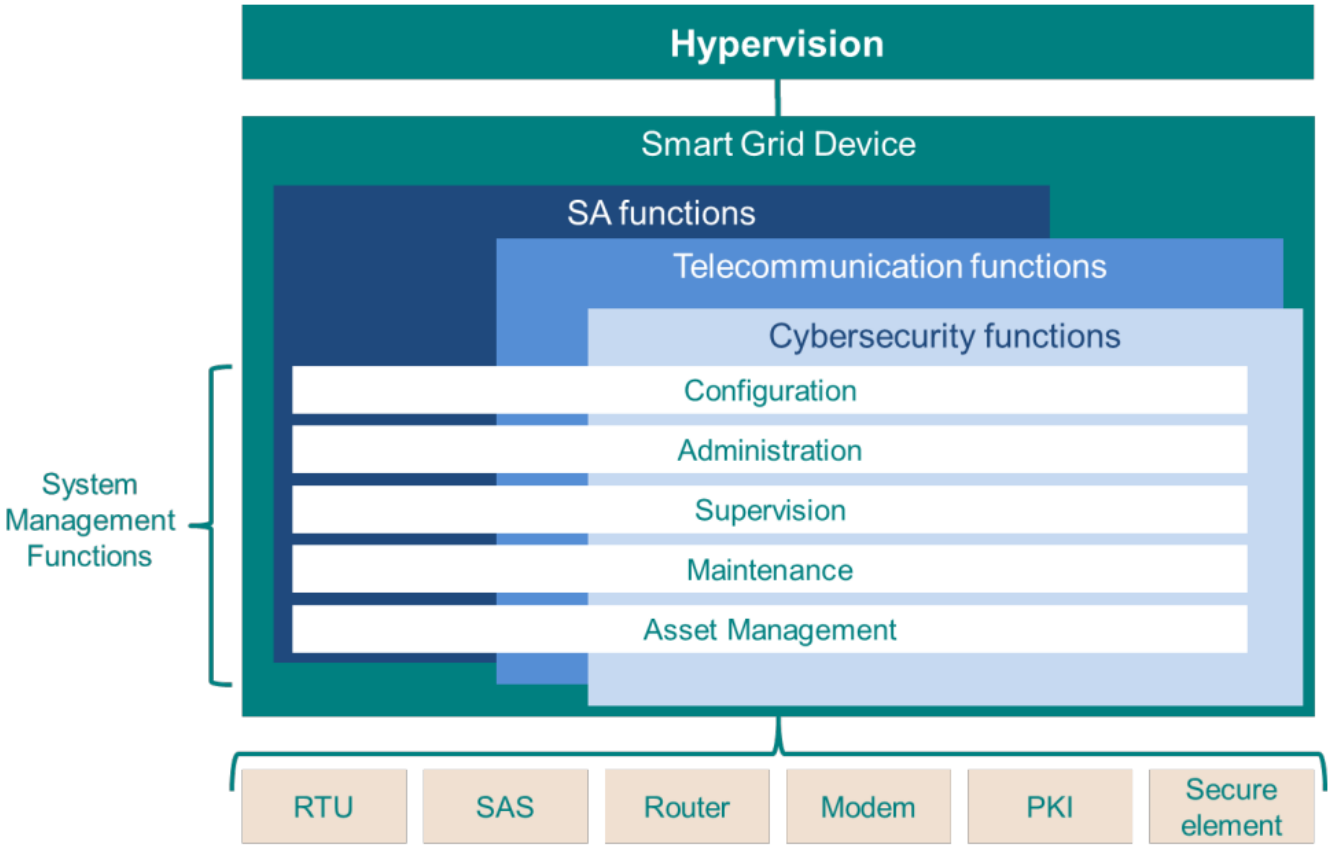

Figure 1 - Scope of the functions and objects covered by the Smart Grid Device Management

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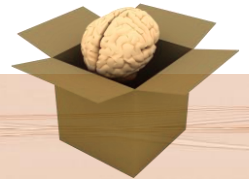
Use Cases Being Addressed

Automation Systems

- Update Configuration File and Firmware
- Synchronization of multiple IED updates

Asset

- Addition of an IED
- Replacement of an IED



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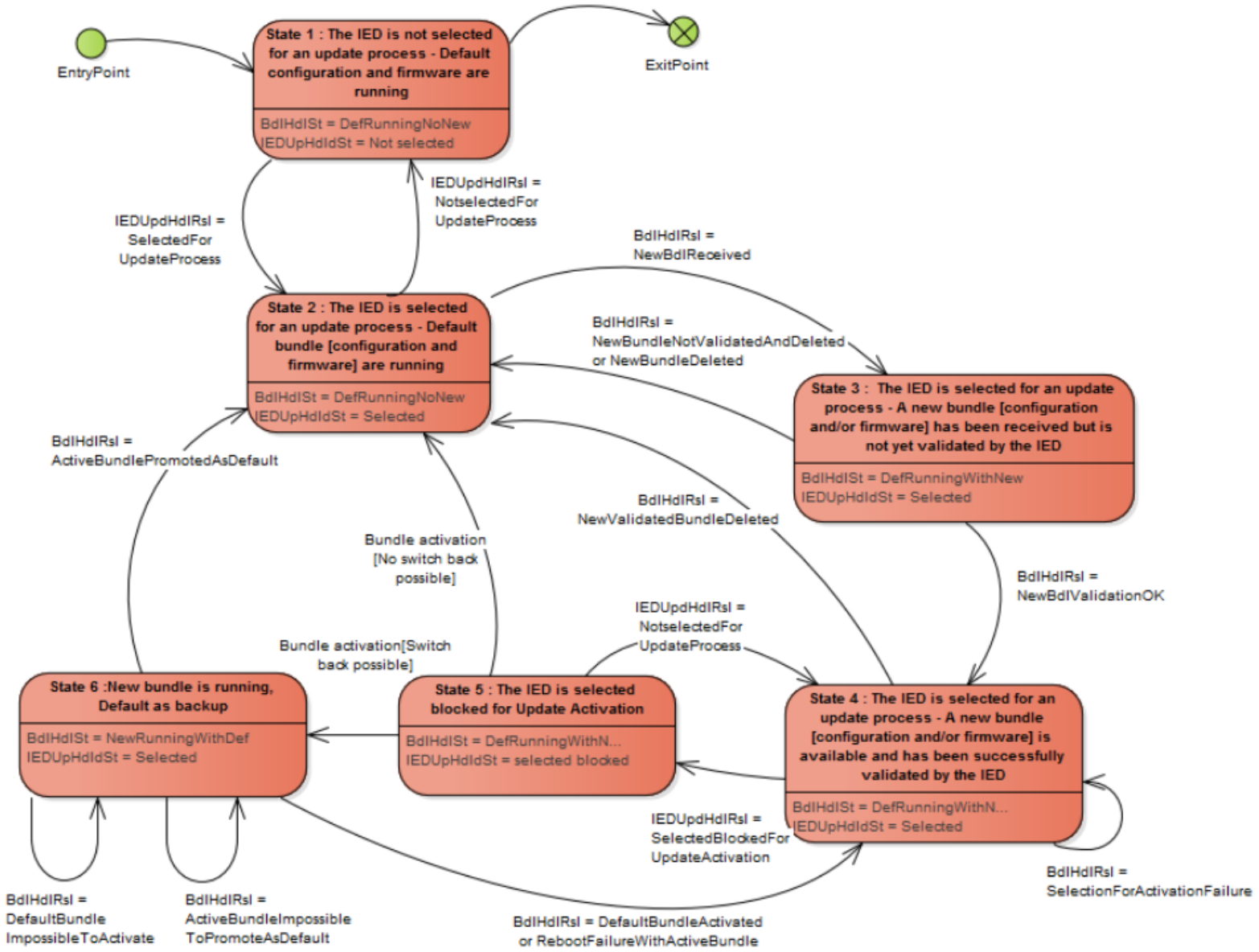

Must have Recovery Capability

Two phase commit

Allow Atomic CID (ACID) transaction sets:

Gold

Allowing Subsets in discussion

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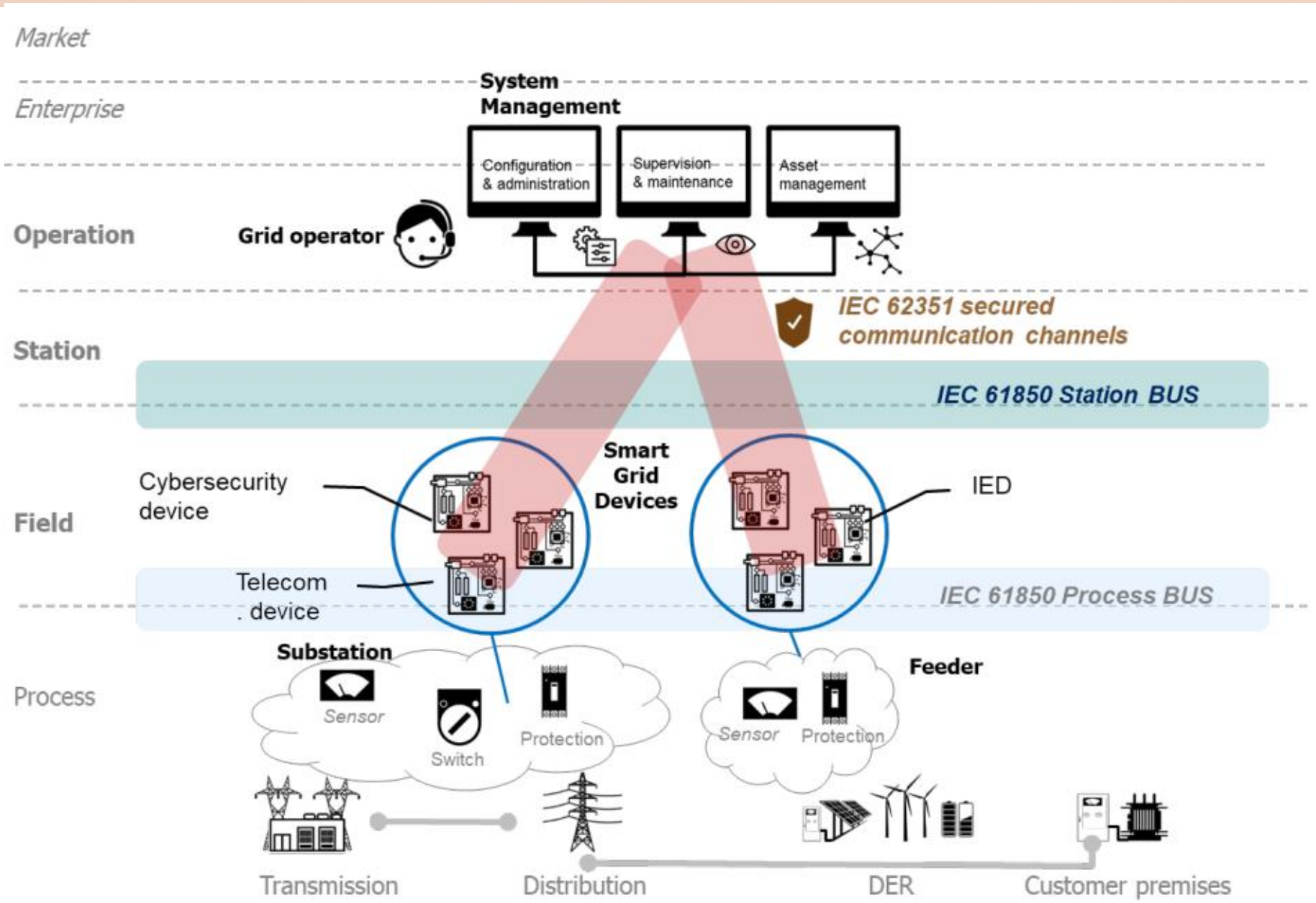

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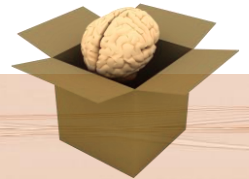
Standard Representation of Settings: IEEE H27

- Work started around UML Model
- Final standard will have SCL like XSD version
- May have CIM RDF version
- Have explicitly ignored program logic temporarily



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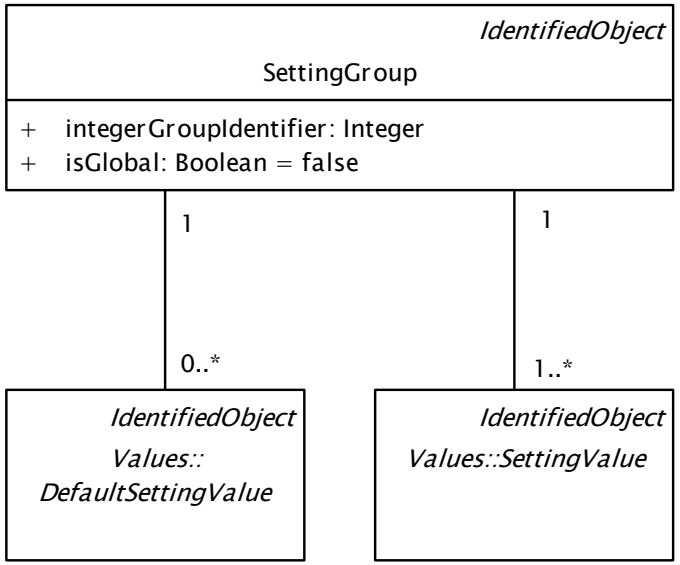
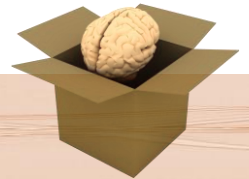
Important Discovery when doing UML



Deleted SettingGroupCollection, as well as the derived Global and NonGlobal SettingGroup classes.



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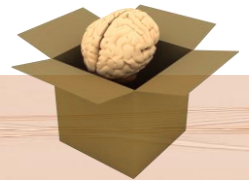
IEC 61850-6 XSD

Decimated

- Removed the requirement for LN0
- Removed the requirement for a Communication Section

Extended

- DO's used to be required to be CDCs. Now can be CDCs or baseTypes
- Added isDefault for <Val>
- Need to add a GSET LN and a pre-defined Logical Device for non-61850 settings



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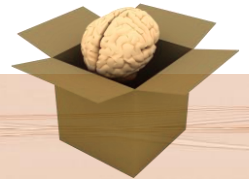
Example

testSettings.ICD

Non-IEC 61850 Device



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Information Transfer

Is over!

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