VOLLTRON as an Integration platform for DERs

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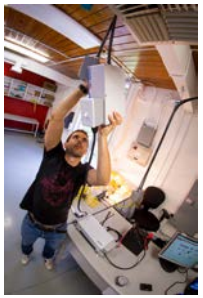
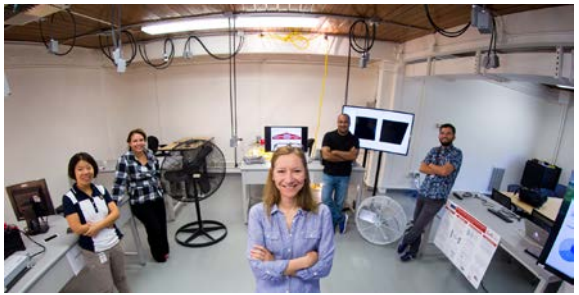
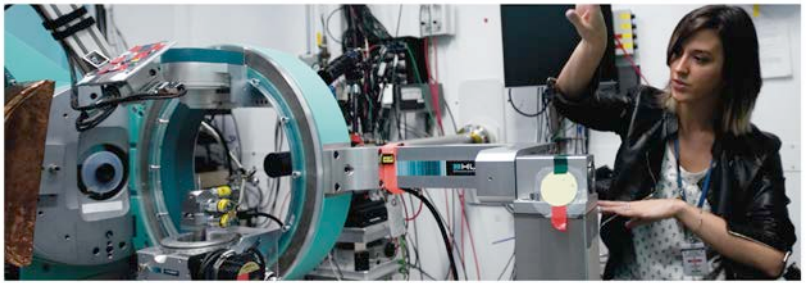
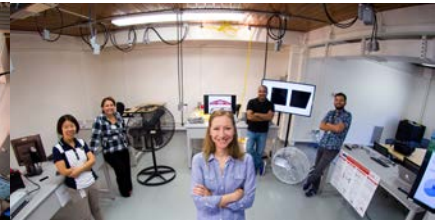
Presentation overview

- Introduction to SLAC and GISMo
- Description of VOLTTRON as a DER Integration Platform
- Research and Development Next Steps









GISMo

POWER GRID

- Distributed control
- Data-driven planning and operations with DERs
- Pricing mechanisms and market structures
- Business models
- Regulatory frameworks

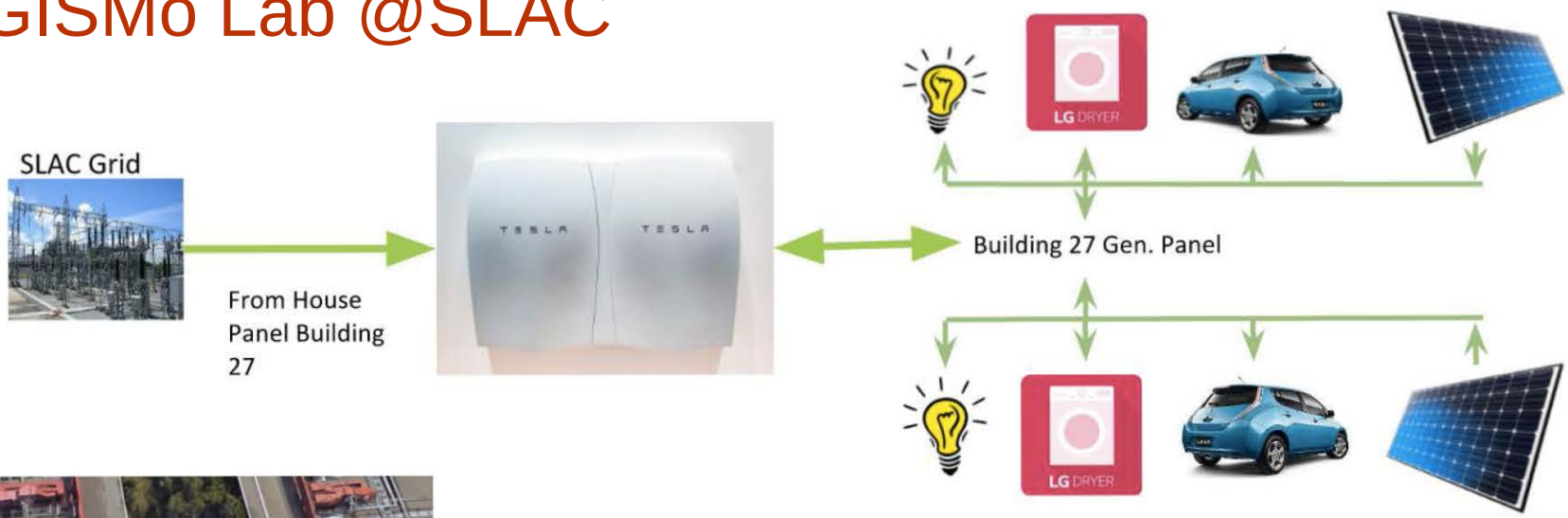
AMBIENT /BUILDING INTELLIGENCE

- Interaction design
- Seamless integration
- Embedded
- Context aware
- Personalized
- Adaptive
- Anticipatory

MOBILITY

- Mobility as a service
- Electrification of transportation
- Data-driven modeling and analysis
- Vehicle-to-building
- Vehicle-to-grid

GISMo Lab @SLAC



Powernet: Power Sharing and Coordinating

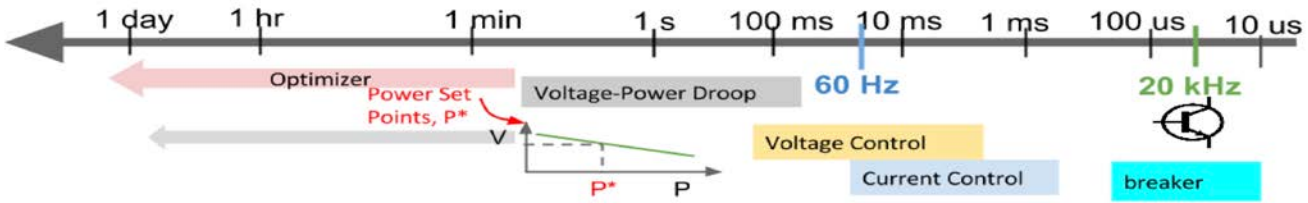
A Hierarchical and Distributed Approach

- Optimal sharing among homes
- Regulation and Ramping grid services

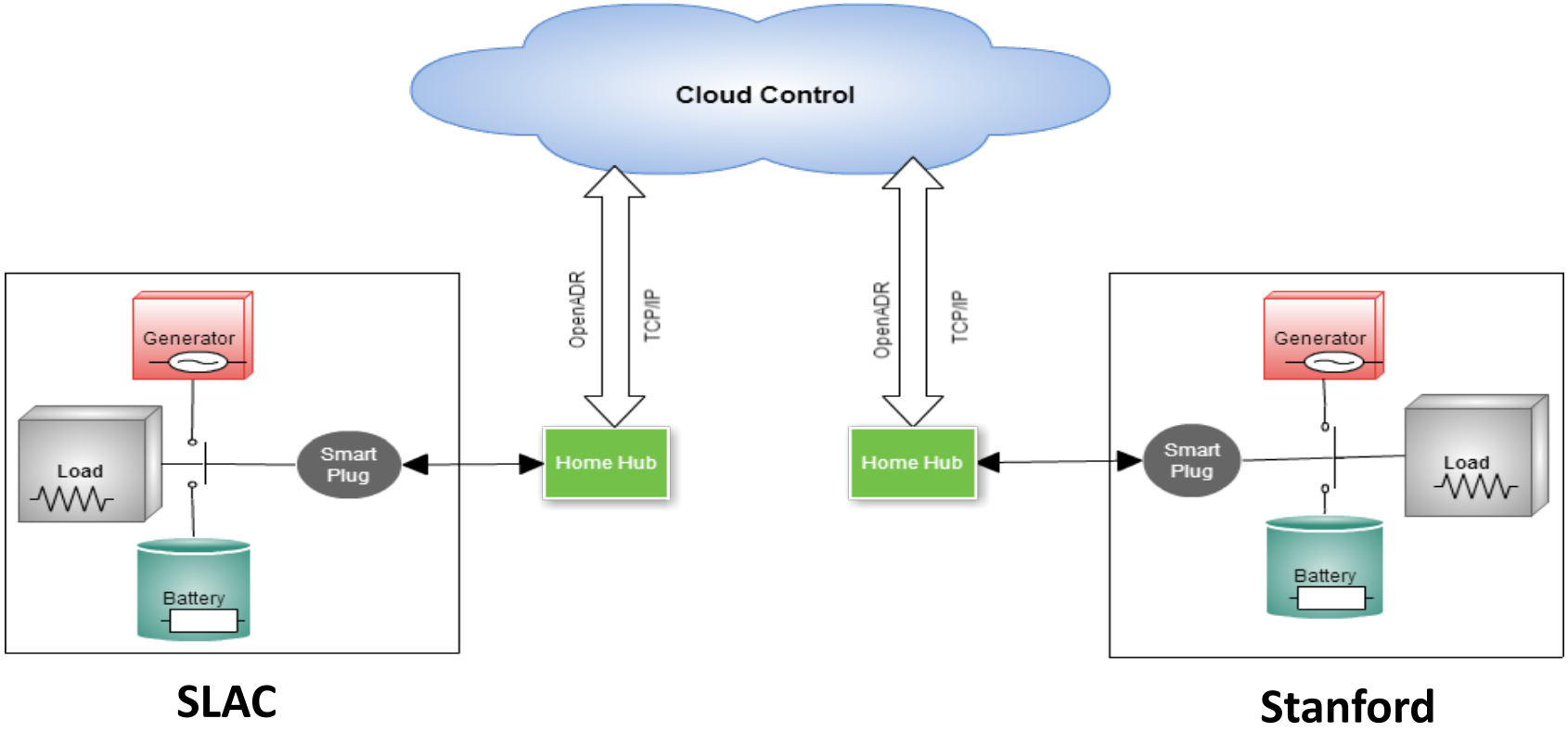
- Maintain stability
- Send data upstream

- Turn circuits on/off
- Send data upstream

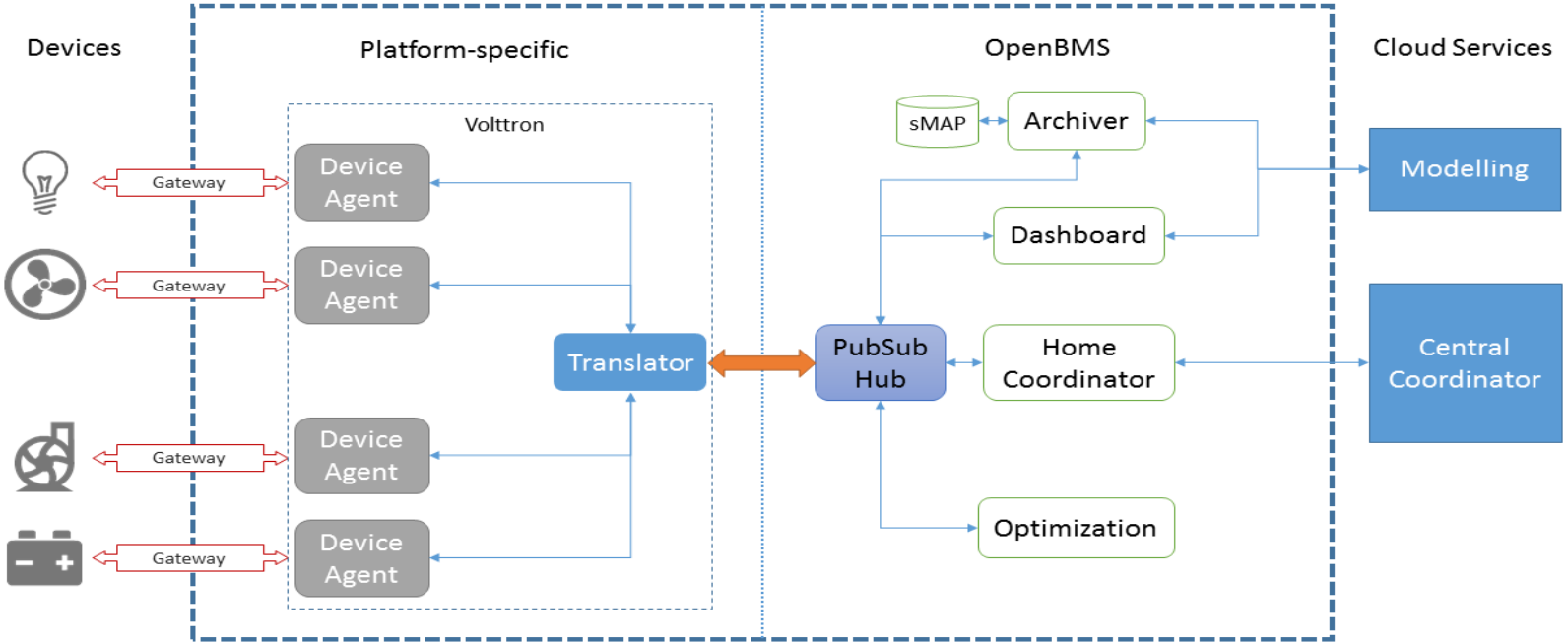
Cloud Coordinator | Home Hub | Smart Dim Fuse



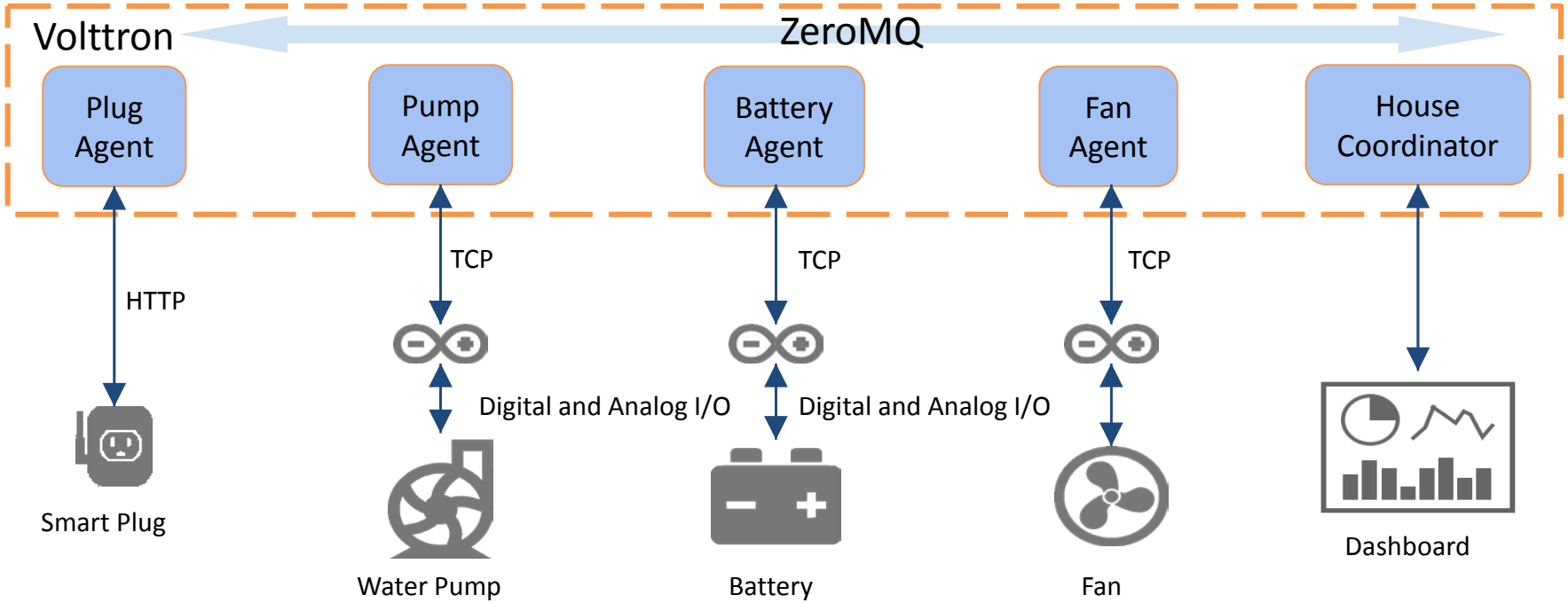
Vision: Cloud Coordinated Transactions



Implemented Architecture



Communication



Actual Implementation

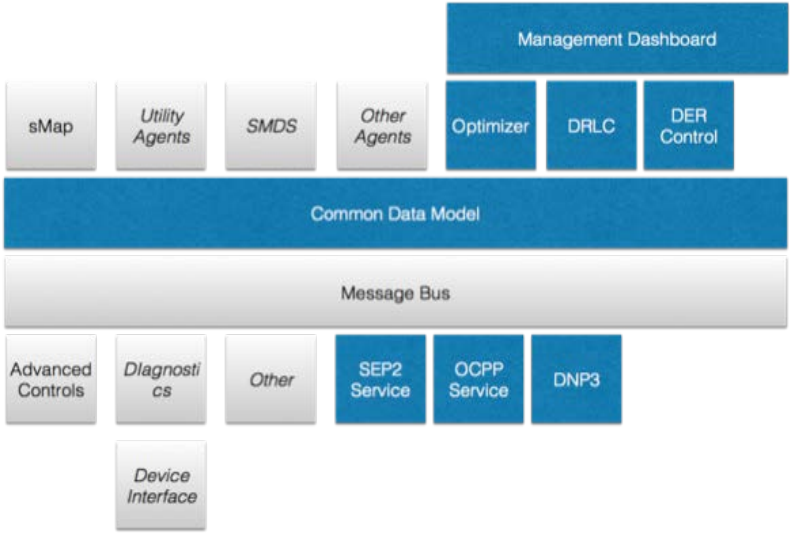
Lessons Learned

- VOLTTRON provides a general purpose message bus but does define message content or processing semantics.
- Missing key drivers for grid integration (SEP2, DNP3, etc.)
- Diverse developer community or user community within DER integration area.
- Difficult to develop applications or drivers without a supported Test Tool Kit.

How are we planning to make VOLTTRON better?

Development of a Common Data Model

- Extend the VOLTTRON platform with a common data model and include support for SEP2, DNP3 and ChargePoint EVSEs, which are the most commonly used protocols or systems for grid transactions, storage and electric vehicle charging management.
- Deploy reference implementations at GISMo@SLAC, ESIF@NREL, FLEXLAB@LBNL that are connected to live loads, energy resources and storage to provide geographically distributed references to the relevant industry.



KISENSUM

Development of a VOLTTRON Test Toolkit (VTTK)

- Simulation testing framework and development
- Visual debugging tool
- Reference application(s)
- Hosted VOLTTRON instance in the cloud
- Hack-a-thons on San Francisco Bay Area