VOLTTRON MARKET ASSESSMENT

KEY FINDINGS FROM 2015 STAKEHOLDER INTERVIEWS

AUGUST 4, 2016

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PROJECT OVERVIEW

Navigant conducted a series of stakeholder interviews to help DOE and PNNL understand the key capabilities, challenges, and opportunities for VOLTTRON-based products and services in the marketplace.

- We interviewed a wide variety of stakeholders, organizations, industries, etc.:

Start-up EMIS provider

Large multi-national BAS vendors

Hardware vendor

Software vendor

Local load aggregator

T&D utility

Residential

Large commercial

Industrial customers

Energy efficiency

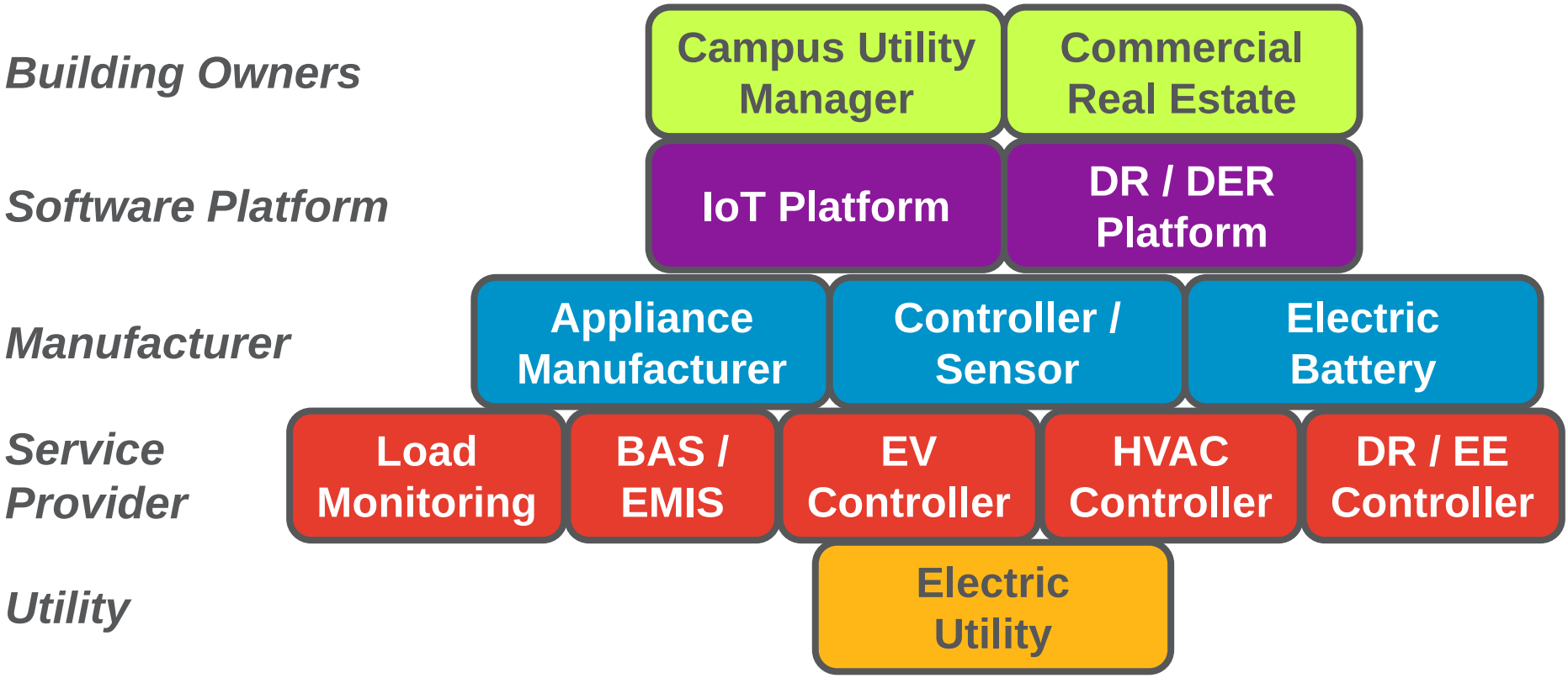
Renewable energy

Energy storage

Manufacturers

INTERVIEWEES

The set of 23 interviews captured perspectives from a wide range of organizations, industries, and company sizes.



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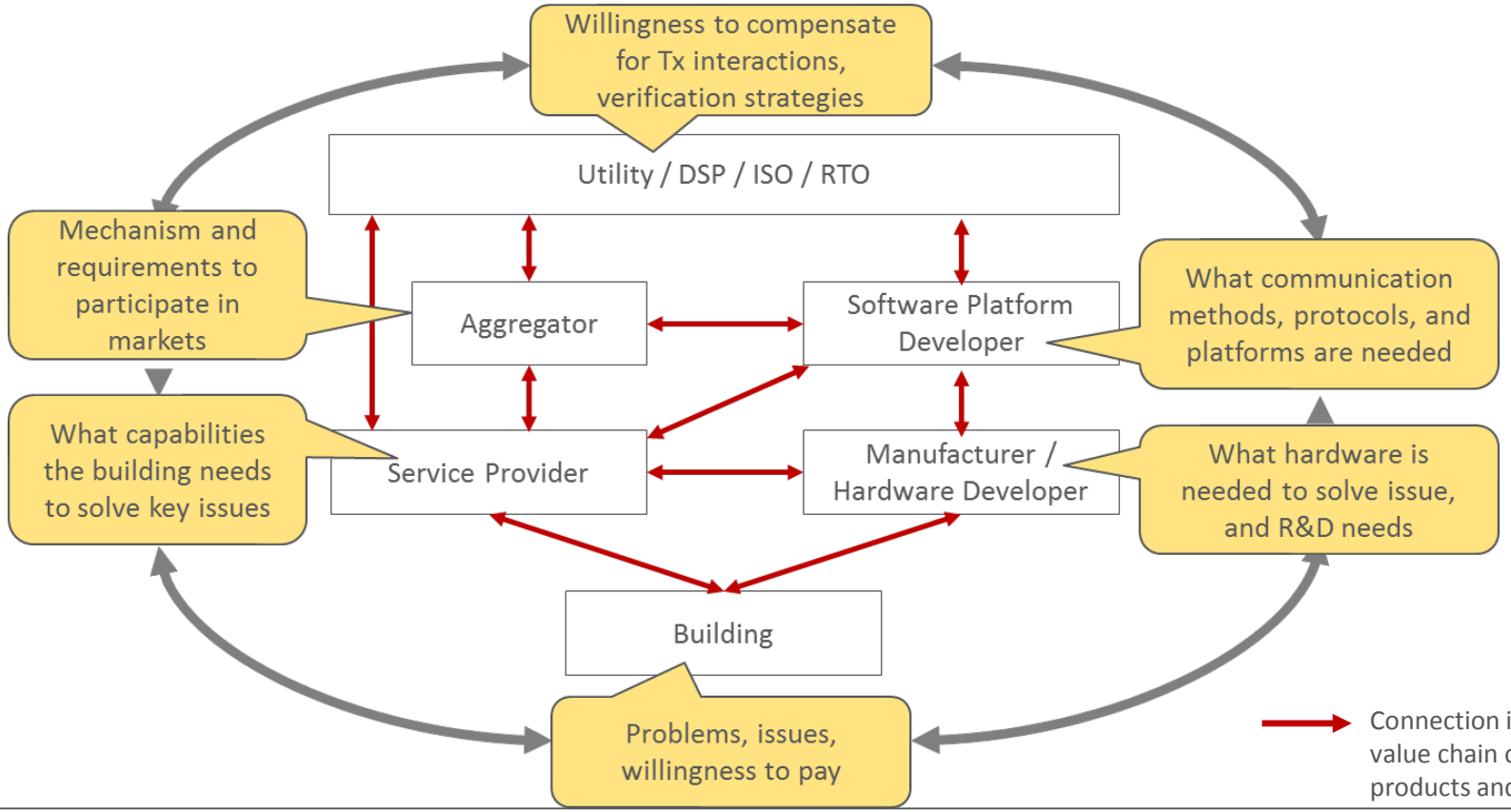
INTERVIEW OBJECTIVES

Each interviewee articulated their understanding of the market needs for transaction-based control systems based on their specific role and connections in the value chain.



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KEY CAPABILITIES

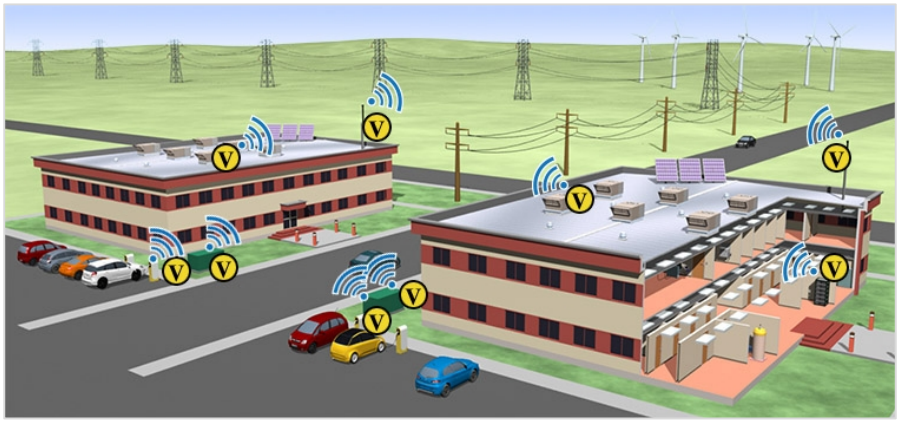
Currently Available	Extension of Current	Currently Unavailable
• Energy consumption and run-time reports • Benchmark building performance relative to historical values and peer buildings • Remote equipment access and control	• Equipment scheduling / sequencing • Fault detection and diagnostics (FDD) • Demand response (DR) and grid services • Data on occupant behavior, schedules, and energy patterns • Monitor employee productivity	• Monitor equipment operating characteristics • Aggregation of buildings and communication among nearby buildings • Integrate with more building systems

OPERATING REQUIREMENTS

Many interviewees identified the need for Tx systems to operate without significant input from, or impact on, building operators and occupants.

- Tx systems should operate seamlessly with existing systems, so that there is no apparent change in normal building activities.

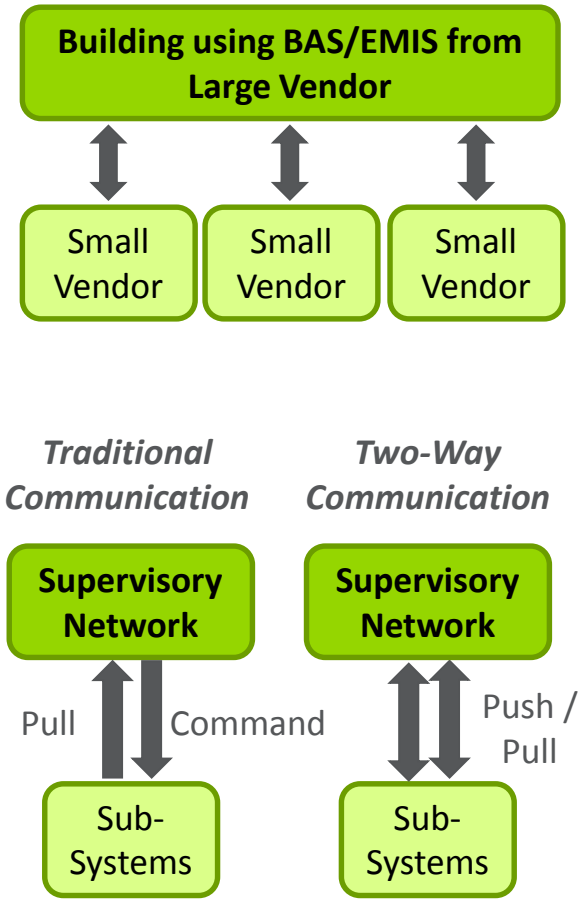
- Once configured, systems should not require active intervention by building operators, who have very limited time and resources.



Tx operations should not require end-user involvement

SMALL VS. LARGE BAS/EMIS VENDORS

- Start-ups and smaller vendors cited working with existing BAS/EMIS systems as their largest challenge.
- Larger existing BAS/EMIS vendors explained their limitations on 3rd party connectivity by emphasizing the difficult requirements of:
  - Maintaining system integrity,
  - Operational availability,
  - Building safety, and
  - Customer relationships.
- Also, they explain two-way communication is costly and difficult (especially in retrofits).



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COST REDUCTION STRATEGIES

- Flexible, expandable, and “future-proof” standards
- Accessible cybersecurity protocols that meet stringent utility standards.
- Open-protocol and open-architecture platforms that are well documented.
- Software or agent libraries that enable plug-and-play capabilities.
- Wireless sensors with simple installation, self-commissioning, and self-aware capabilities.

Many of these activities are available or underway to address cost reduction issues

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KEY CHALLENGES

Technical	Market	Regulatory
• Strong need for retrofit solutions • Adaptable and “future-proof” hardware to prevent obsolescence • Maintaining cybersecurity • Compatibility across multiple vendors and systems	• Limited on-site resources to address even simple problems • Reliability, safety, and availability are often greater than energy and cost savings • Market confusion over Tx products and services	• No universal standard • Utility industry must have a major role to guide rate, program and incentives • Utilities in different areas have inconsistent data sharing and connection standards

DOE / PNNL LEADERSHIP ROLE

- **Labeling Program** – A national organization could create a labeling program that certified products that meets certain communication and connectivity criteria.

- **Demonstrations** – Utilities, regulators, and other policy makers need demonstrations to understand the value and economics of VOLTTRON's capabilities

- **Participation** – Greater utility and regulator participation can ensure that technologies operate within a utility's regulatory, security, communication, and compensation frameworks.

KEY VOLTTRON DEVELOPMENT ACTIVITIES

Universal Adaptor	• VOLTTRON can act as a “universal adaptor” or translation layer between a variety of systems
Multiple Protocols	• Enhance VOLTTRON’s interoperability and adaptability with newer communication protocols, wireless standards, and other platforms
Design for Retrofit	• Improve current VOLTTRON agents to leverage existing hardware and communication systems on-site, to lower costs, especially for retrofit projects

CONCLUSIONS

- **Stakeholders across the building and energy industry see the value and advantages that VOLTTRON can provide.**
- **Continued development of VOLTTRON-based products and services is necessary to overcome cost, integration, and interoperability issues, especially for retrofits.**
- **The utility and regulatory community will play a key role in the success of Tx networks and should be the target of demonstration and outreach efforts.**

CONTACTS

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