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Connected Buildings Challenge
Information Webinar

Pacific Northwest National Laboratory
April 06, 1PM ET/ 10AM PT

U.S. DEPARTMENT OF ENERGY

Agenda

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About Connected Buildings Challenge (*10 minutes)*

About VOLTTRON™ (*10 minutes)*

How to Participate *(10 minutes)*

Q&A *(30 minutes)*

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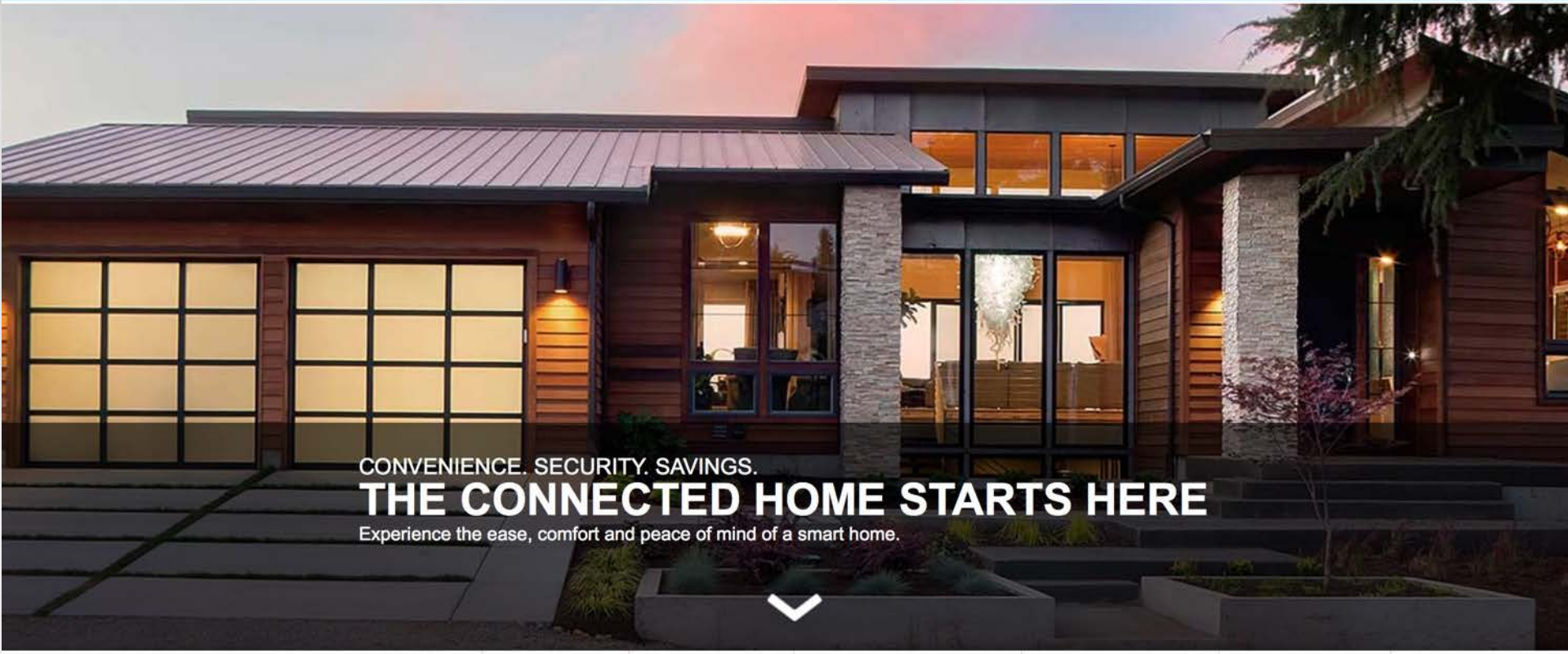
WHAT TRULY IS A CONNECTED BUILDING?
WHAT IS THE EXTENT OF A SMART BUILDING?



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WHAT TRULY IS A CONNECTED BUILDING?

Is it the simple control of your home's thermostat anywhere when using a smart phone?

SMART THERMOSTATS

Connected to your home Wi-Fi network, a smart thermostat lets you easily monitor and control your home's temperature from anywhere using a smartphone, tablet or computer. Create custom schedules to enhance comfort and optimize energy savings.


Smart Thermostat


Smart Switches


Smart Security Cameras & Systems


Smart Alarms & Smoke Detectors


Smart Door Locks


Smart Indoor Lighting


Networking Solutions

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WHAT TRULY IS A CONNECTED BUILDING?

Is it simply getting an alert or text when your house is on fire or is broken into?

SMART ALARMS & SENSORS

Get alerts on your mobile devices if something is wrong at home. Find smart alarms that communicate with your mobile device if smoke or carbon monoxide is detected. Complete your system with smart sensors that warn you of an open door or window before you get home.

Smart Thermostat

Smart Switches

Smart Security Cameras & Systems

Smart Alarms & Smoke Detectors

Smart Door Locks

Smart Indoor Lighting

Networking Solutions

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WHAT TRULY IS A CONNECTED BUILDING?

Is it being able to magically turn off your lights while sitting on the couch or lying in your bed?

SMART INDOOR LIGHTING

Control your lights from the sofa, or when you're away from home. Set automatic on and off schedules, or tell a timer to gradually increase light intensity to ease you out of sleep. With controls right on your phone, you can come home from a vacation to a warmly lit home, or return from work feeling secure that your house is bright and safe.

Smart Thermostat

Smart Switches

Smart Security Cameras & Systems

Smart Alarms & Smoke Detectors

Smart Door Locks

Smart Indoor Lighting

Networking Solutions

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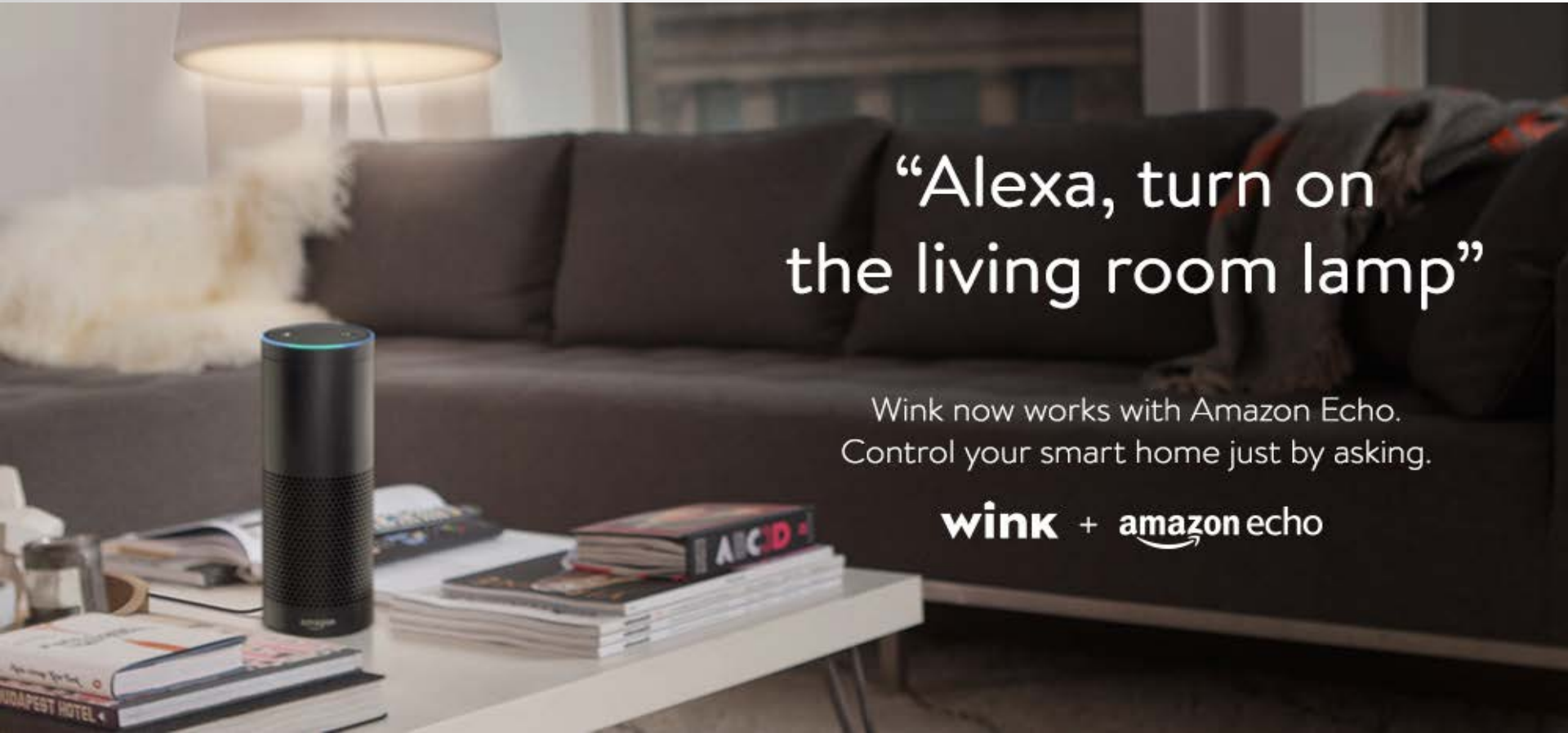
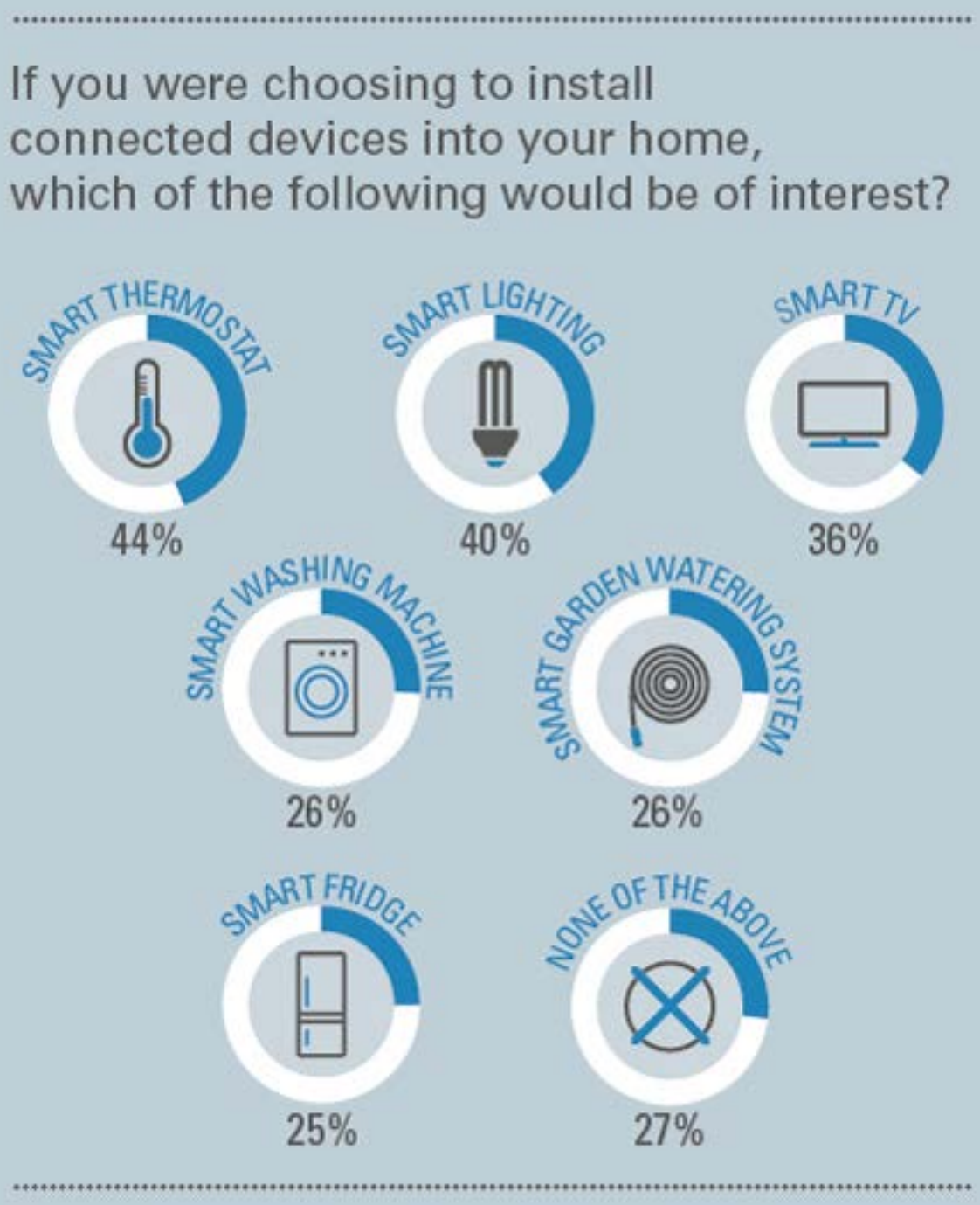
WHAT TRULY IS A CONNECTED BUILDING?

Is it being able to “talk” to your lights and appliances?

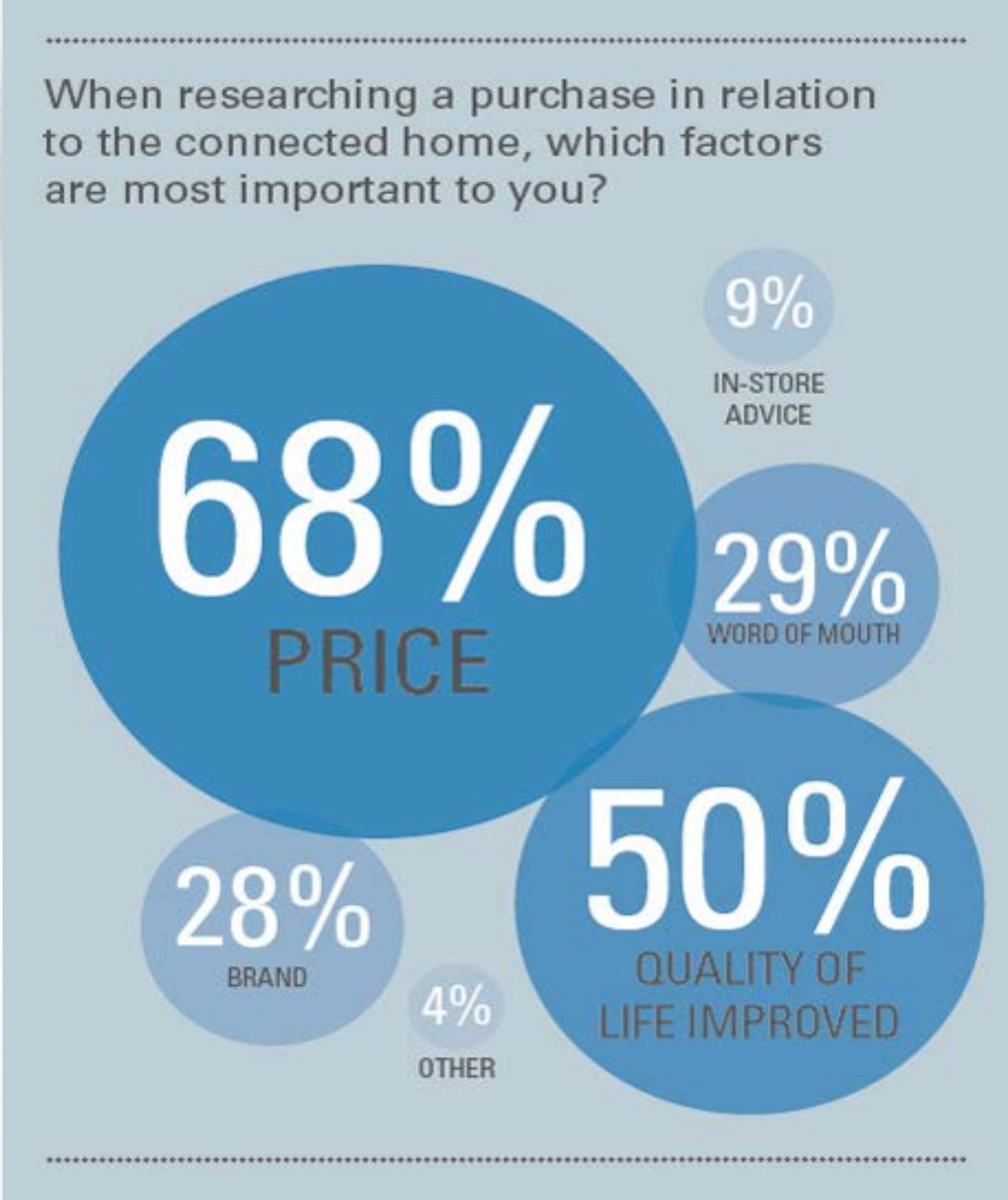


Do Connected products lack a fundamental connection with consumer benefits?



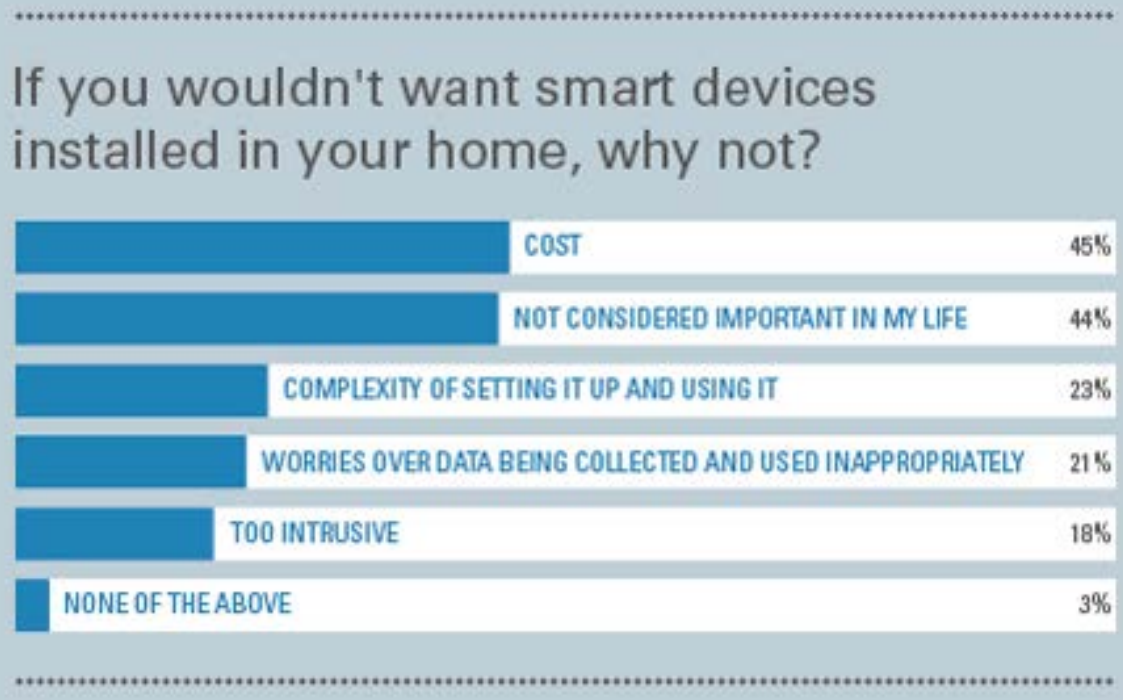
Source: Marketing Week, survey of 2,000 UK-based adults, conducted by field marketing agency Gekko.

Or are the simply too expensive and thus inaccessible?



Source: Marketing Week, survey of 2,000 UK-based adults, conducted by field marketing agency Gekko.

Or are they fundamentally not useful and exist only as a novelty?



Source: Marketing Week, survey of 2,000 UK-based adults, conducted by field marketing agency Gekko.

A connected building should be more than just being a remote control from a mobile app.

Devices, appliances and equipment can talk to each other;
Buildings can talk to each other;
Connected buildings make people happier, healthier, and more productive;
ALL without needing more intervention.
They should simply work -- every time -- to benefit their users.

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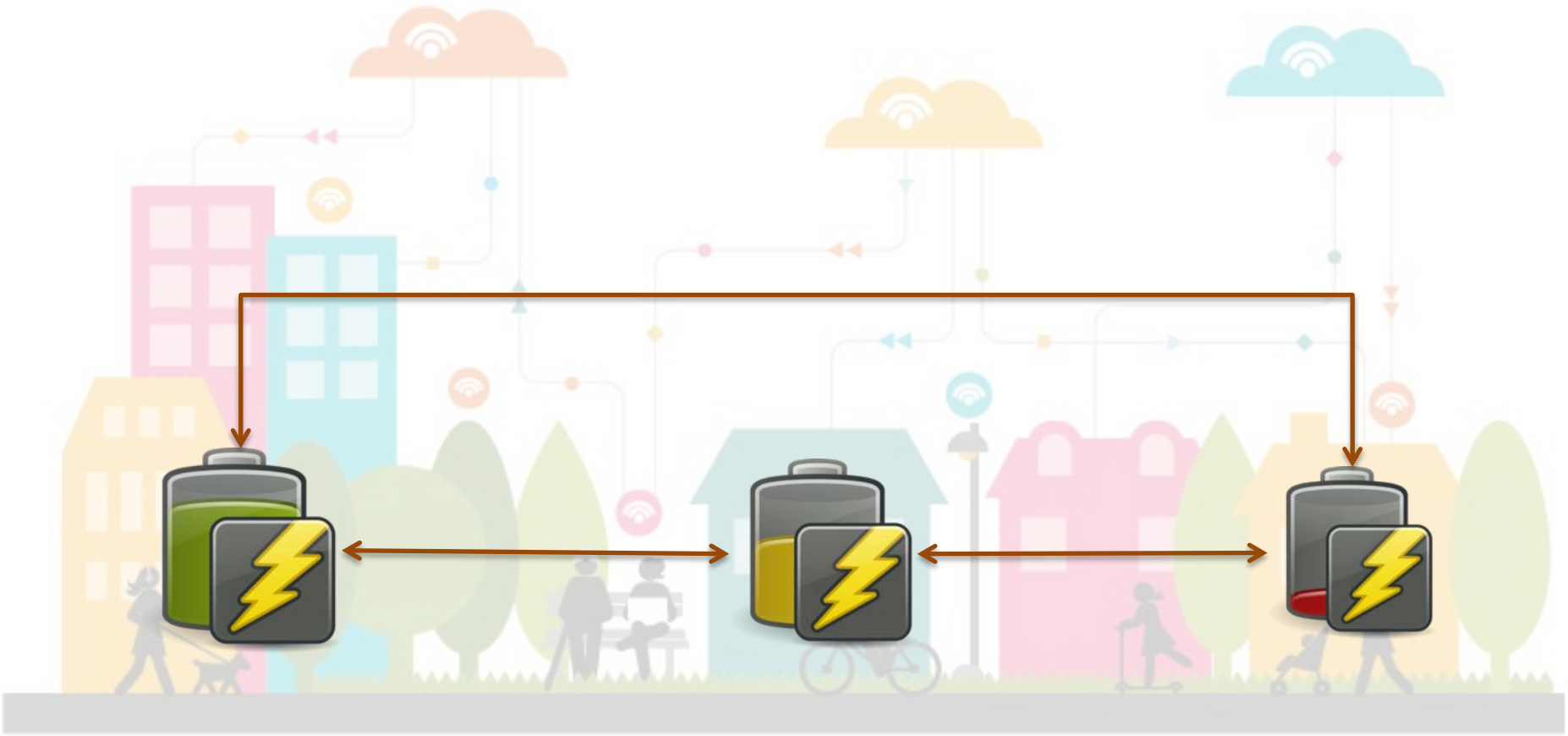
Connected buildings make people happier, healthier, and more productive;
ALL without needing more intervention.
They should simply work — every time — to benefit their users.
Moreover, they should be more resilient and reliable for the larger community as a whole — strengthening the grid.



nest hup wemo arlo august Swann NETGEAR Geek Squad canary

The Connected Buildings Challenge is to engage the active marketplace of diverse players to make buildings truly connected, smart, and beneficial to users and the grid.

NETGEAR LINKSYS D-Link

LOREX CHAMBERLAIN Kwikset

iSmartAlarm logitech ecobee LIFX NIGHT OWL rachio motorola

Defining the problem-opportunity-challenge,

NATIONAL ASSOCIATION OF REALTORS®
The Voice for Real Estate®
REALTOR®

NEEC Northwest Energy Efficiency Council

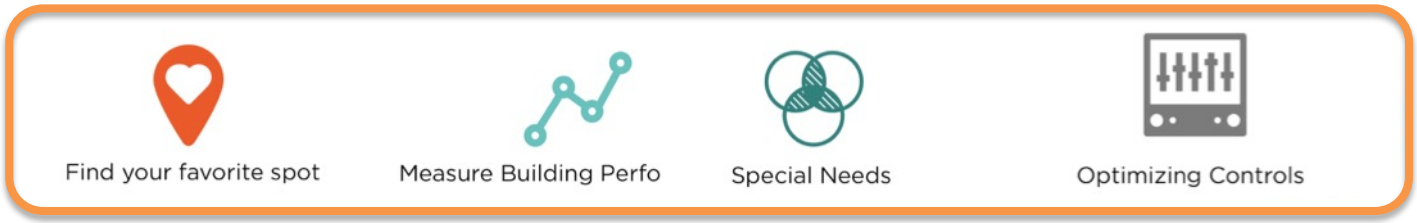
EMERSON

City of Seattle

More partners coming…

Create real solutions,

Demonstrate success, and



Launch new businesses and sustain success.

What is the Challenge?

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Integrate **VOLTTRON™**—an open-source software platform to connect energy management devices—with **smart building devices, sensors, or appliances** (*such as heating and cooling equipment, hot-water heaters, washers and dryers, refrigerators, lighting controls, weather stations, thermostats, humidity sensors, etc.*) to create innovative solutions for **residential and small commercial buildings**.

Smart Environment
e.g., monitor and control indoor air quality

Smart Metering
e.g., monitor energy consumption and mange energy use

Energy Generation and Storage
e.g., monitor and optimize performance photovoltaic, electric cars, batteries, etc.

Data Analytics and Visualization, Communication
e.g. translate data to actionable strategies and communicate to users in a fun and effective manner

What is VOLTTRON?

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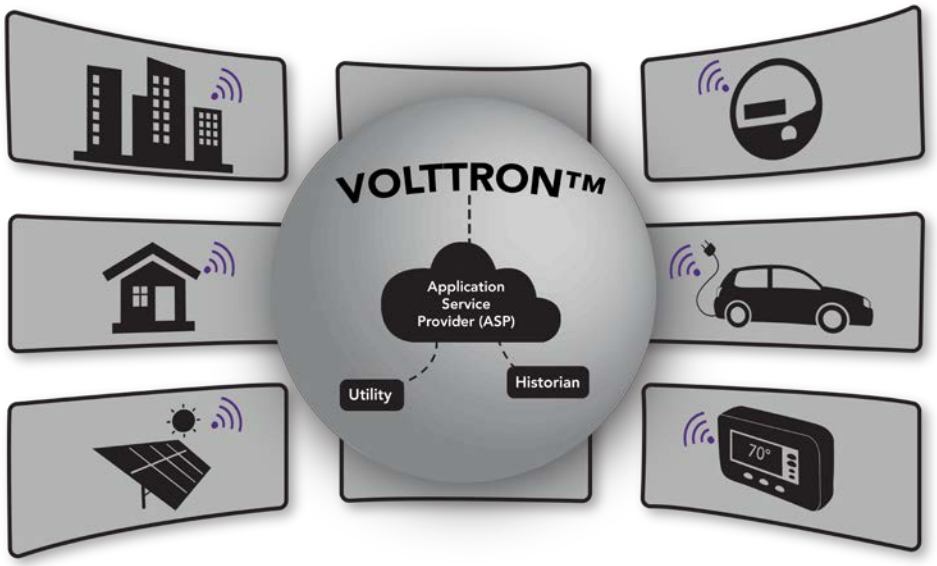
VOLTTRON Introduction

- VOLTTRON is an open source platform developed by DOE's Building Technologies Office for distributed sensing and control of buildings and building-grid integration
- Written in Python
- Designed to run on small form factor boards
- Goals are to maximize:
  - Flexibility
  - Usability
  - Scalability
  - Security
  - Interoperability



VOLTTRON Attributes

- Provides a single point of contact between applications, devices, and external resources
  - Isolates applications from the details of devices being controlled
  - Additional resources can easily be added and utilized through the message bus without requiring changes to existing resources/agents
  - Applications can specify data of interest
  - Applications can publish their own events/data for use by other agents or for storage
- Device communication
  - Drivers for communicating with Modbus and BACnet enabled devices
  - Custom communication schemes can be supported

VOLTTRON Attributes

- Platform Features
  - Scheduler – Prevent simultaneous control of devices
  - Ease of application development
  - Collection of utilities and base applications to simplify development
  - Goal is to allow researchers to focus on implementing their algorithm, not dealing with the specifics of the platform
  - Data historian – devices readings and application results stored to a historian

Resources

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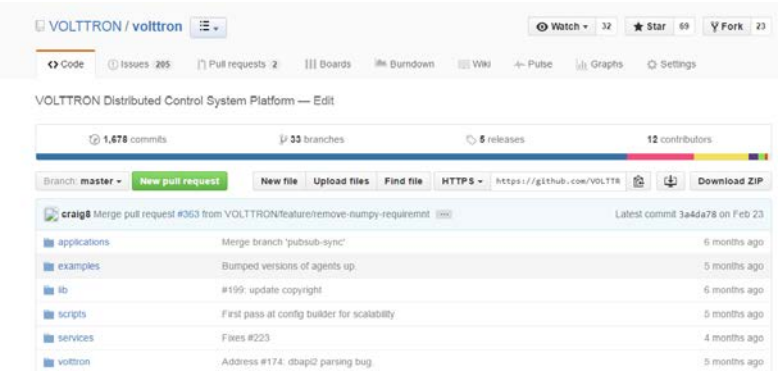
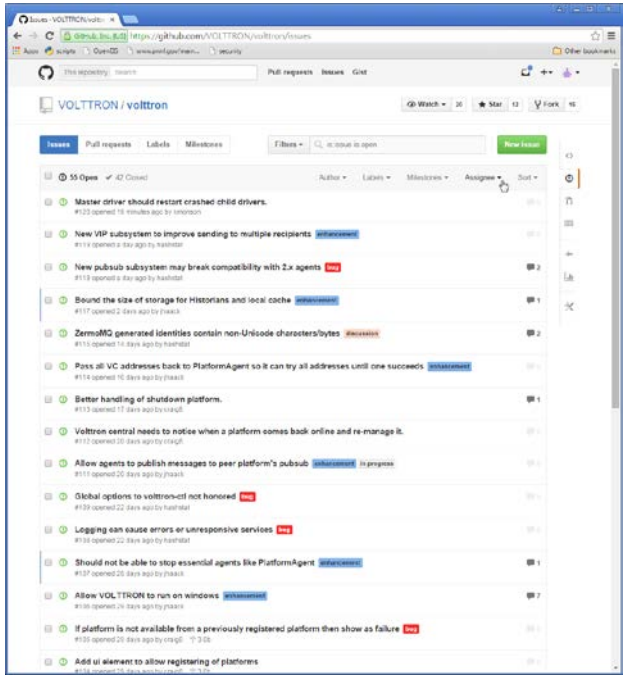
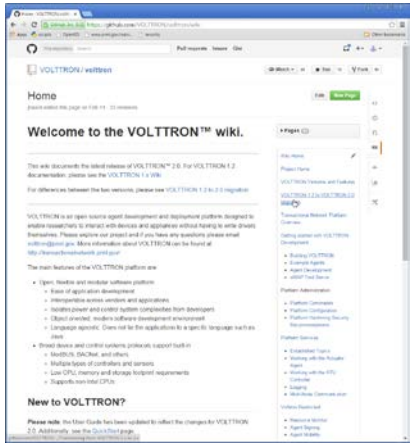
GITHUB https://github.com/VOLTTRON/volttron



Issue tracking: bugs, enhancement requests, development planning



Wiki and User Guide



Email volttron@pnnl.gov for assistance and to join the bi-weekly office hours.

https://docs.google.com/document/d/1A7NBMGoh6Fphlf9VQW_VA9LXXSgP58Ctzz2ZqoOmjd4/edit

Challenge Tracks

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- **Student Challenge Track**

enrolled college students and/or recent college graduates are eligible to apply

- **Non-Student Challenge Track**

private entities and individuals are invited to participate

The tracks are separate and the judging committee will select one project from each track on the demonstration day.

Rewards and Opportunities

The Challenge does NOT provide any cash prizes. We will provide the following opportunities to further support the projects selected by the judging committee:

- Test beds through our demonstration sites
- Technical and possibly financial support to improve the developed product
- DOE fellowship support for academic startups
- Showcase opportunity and publicity through DOE, PNNL, and our partners
- Commercialization

Open Challenge #1 Schedule

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- **03/23**: Challenge Announcement
- **04/06**: Information Webinar
- **04/06 - 04/22**: Registration
- **04/25 - 04/29**: Team Selection
- **05/02**: Challenge Begins (8 weeks)
- **06/XX**: Demonstration in Seattle (expected in the last week of June, at the Smart Buildings Center)

The Smart Buildings Center (SBC) is located in the iconic Pacific Tower building in Seattle (formerly the corporate headquarters for Amazon).

- **July –** Product improvement*
- **August –** Product testing*

* Coordinated with the winning team(s) and partners.

Open Challenge #2 will be announced in July.

How to Participate

Step 1: Submit your idea online

Registration will open on April 6, 2016. Visit
http://bgintegration.pnnl.gov/connectedbuildings/registration.asp

- Project name, team members, contacts, and qualifications.
- Describe the problem that your project will solve.
- How will you solve the problem?
- How do the chosen smart building devices connect to VOLTTRON™?
- What are your milestones during the 6-8 week Challenge?
- 2-page graphic presentation as supporting a document.

How to Participate

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Step 2: Selected teams will be notified by May 02, 2016.

- Team will receive a start kit including a Raspberry Pi3 with VOLTTRON™ installed and basic instructions.
- Team can choose to bring their own devices.
- More products and services may be available with more partners joining the Challenge.

Team Selection Criteria

Strength of Concept
originality in addition to potential to create efficiency, reduce emissions, or grow the economy

Execution of Idea
user experience, functionality, and design

Use of Featured Input
how well does the application leverage the APIs, standards

How to Participate

Step 3: Work from your location and at your pace (eight weeks)

- PNNL will provide additional training (as requested) and technical support for VOLTTRON™.
- Team can schedule office hours with PNNL and partners.
- Team will report their progress and milestones.

Thank you!

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Useful links:

For more information, visit http://bgintegration.pnnl.gov/connectedbuildings/about.asp

Participant Factsheet http://bgintegration.pnnl.gov/connectedbuildings/pdf/ConnectedBuildingsChallenge-PARTICIPANT.pdf

Partner Factsheet http://bgintegration.pnnl.gov/connectedbuildings/pdf/ConnectedBuildingsChallenge-PARTNER.pdf

Open Call Flyer http://bgintegration.pnnl.gov/connectedbuildings/images/ConnectedBuildingsChallenge-EVENT.jpg

Challenge Rules: http://bgintegration.pnnl.gov/connectedbuildings/rules.asp

For questions related to the innovation challenge please contact CBChallenge@pnnl.gov