

Smart Buildings: A Manufacturer's Perspective

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Emerson Commercial & Residential Solutions

Workshop on Smart Buildings
University of Nebraska-Lincoln



Outline - Smart Buildings R&D Framework

- About Emerson
- When does a building become 'smart' ?
- Building demographics/upgrade cycle
- Building as an Ecosystem
- Smart Ecosystem architecture
- Where can we collaborate ?

Underlying theme : how do we gain mass adoption ?

Emerson Core Business Platforms

We concentrate on the most complex and important challenges facing the world in the process, industrial, commercial and residential markets.



EMERSON AUTOMATION SOLUTIONS

- Making the greatest use of the world's valuable resources
- Helping nations move their economies forward in a responsible way
- Enabling the performance and safety of industry when it matters most
- Advancing the industries that are the backbone of daily life



EMERSON COMMERCIAL & RESIDENTIAL SOLUTIONS

- Ensuring human comfort and health
- Protecting food quality and sustainability
- Advancing energy efficiency and environmental conservation
- Creating sustainable infrastructure
- Continuing momentum through our Helix Innovation Network

THE EMERSON HELIX INNOVATION CENTER

On journey to become a smart building in the future



15,300 VISITORS | 44 COUNTRIES | 846 INNOVATION SESSIONS

40,000 ft² | 5 Ecosystems | 7 STUDIOS | 3 LABS

DISCOVER

UNDERSTAND

GENERATE

SYNTHESIZE

When Does a Building Become “Smart”?



The Edge: Amsterdam, Netherlands

Utilize Sensors, Controls and IoT
for occupant comfort, efficient
operations and save energy

<https://www.bloomberg.com/features/2015-the-edge-the-worlds-greenest-building/>



Your local supermarket

Utilize Sensors, Controls and IoT to create a
comfortable shopping experience, keep food
safe and lower energy & maintenance costs

Senate bill defined Smart Buildings as a) Flexible & Automated, b) with Connectivity enabling remote monitoring and analysis, c) integrated with overall building operations for control of energy, and d) communicates with utilities and other 3rd party entities where appropriate

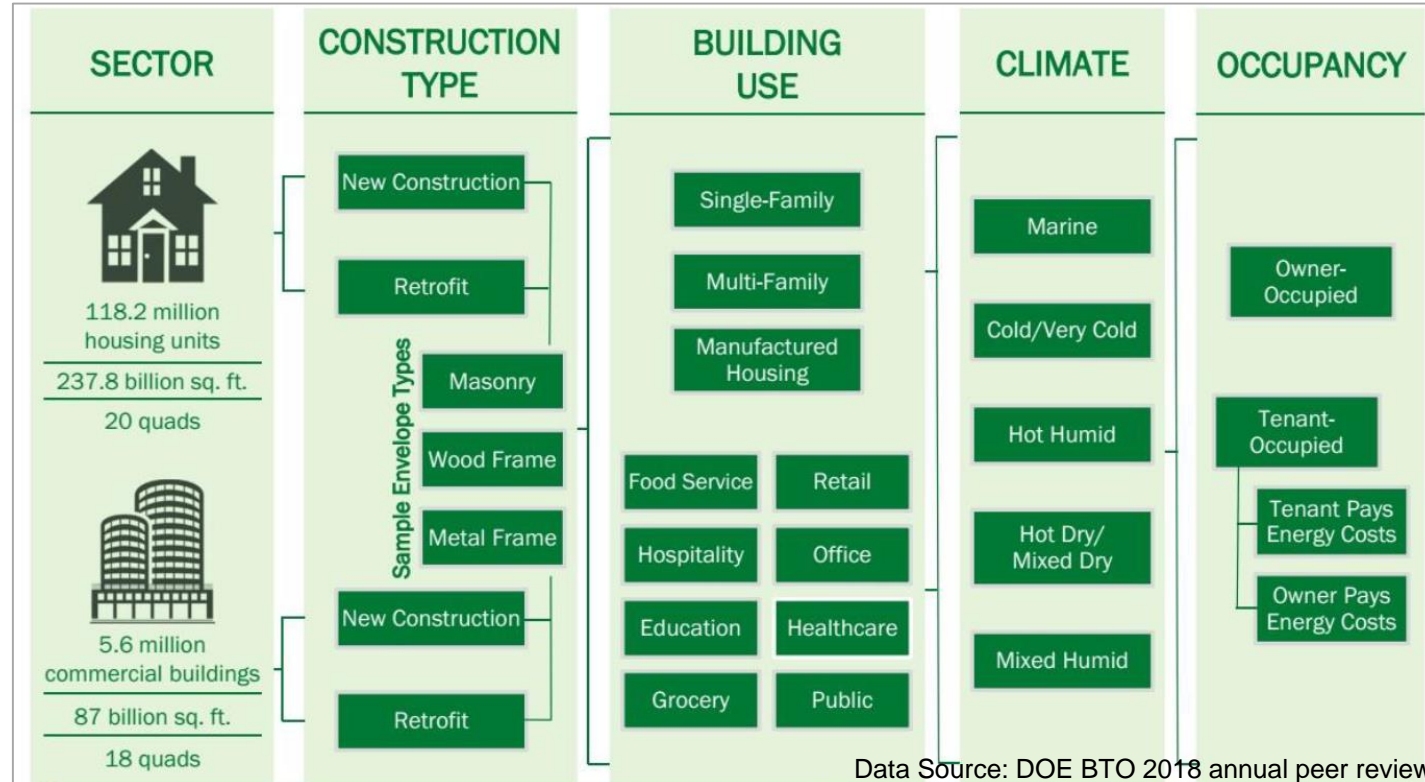
Complexity of the 5.6M Buildings & 118M Homes Market

Where do we focus ?

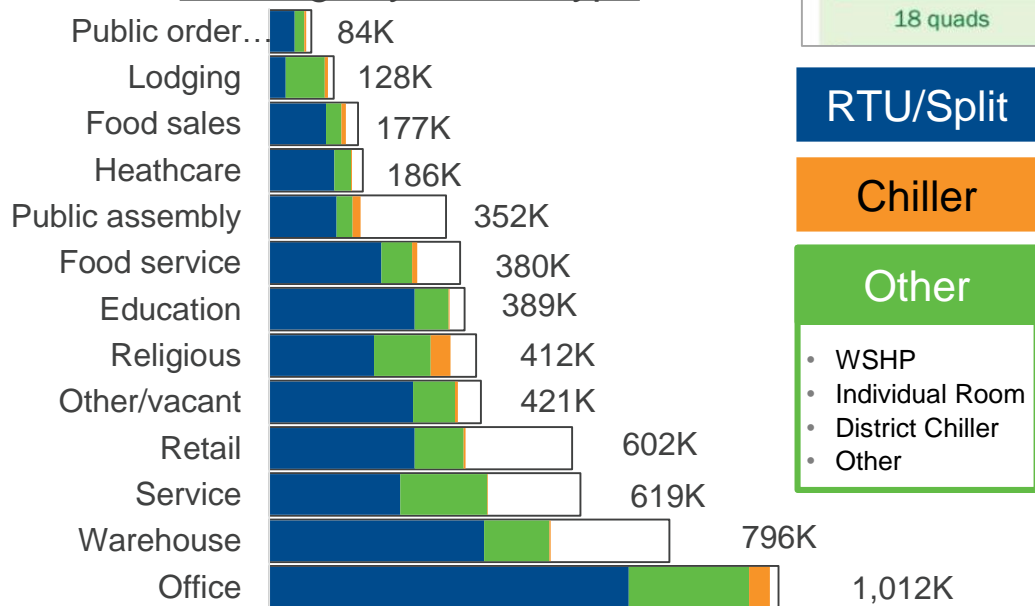
4.4 MILLION BUILDINGS W/ AC

1.6 MILLION NEW AC UNITS/YEAR

36% ENERGY CONSUMPTION HVACR SYSTEMS & 25% FROM LIGHTING



Buildings by HVAC Type



Data Source: Commercial Buildings Energy Consumption Survey (CBECS)

Key Characteristics

Energy Spend

- Amount of HVAC expense/sq. ft.
- Large portion of operating cost

Ownership

- Highly fragmented
- Some concentrated

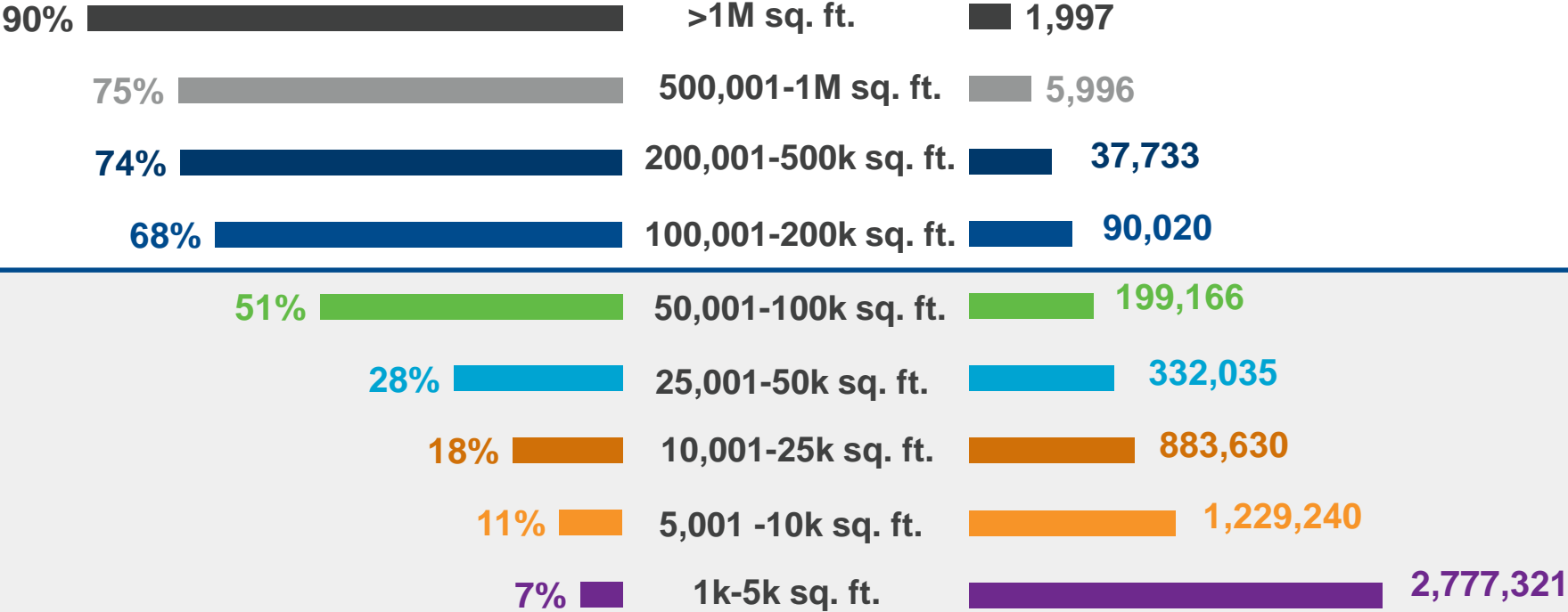
Type of Controls

- Tend to use Tstats in small bldgs.
- BMS prevalent in large bldgs.

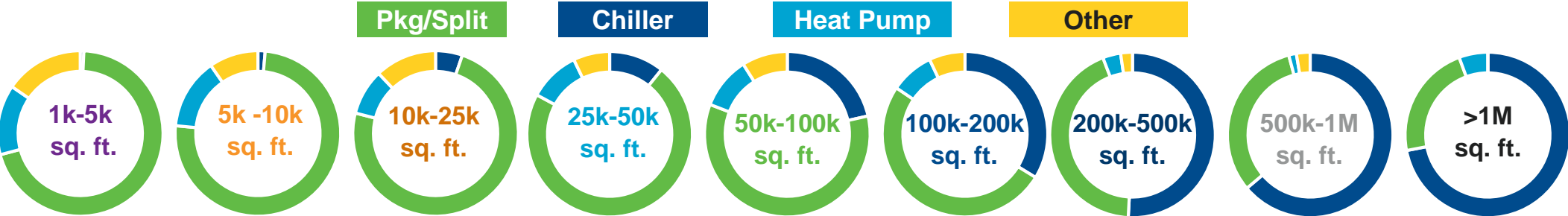
State of Building Management System (BMS) Adoption

Buildings With Automation System (%)

Total # Of Buildings



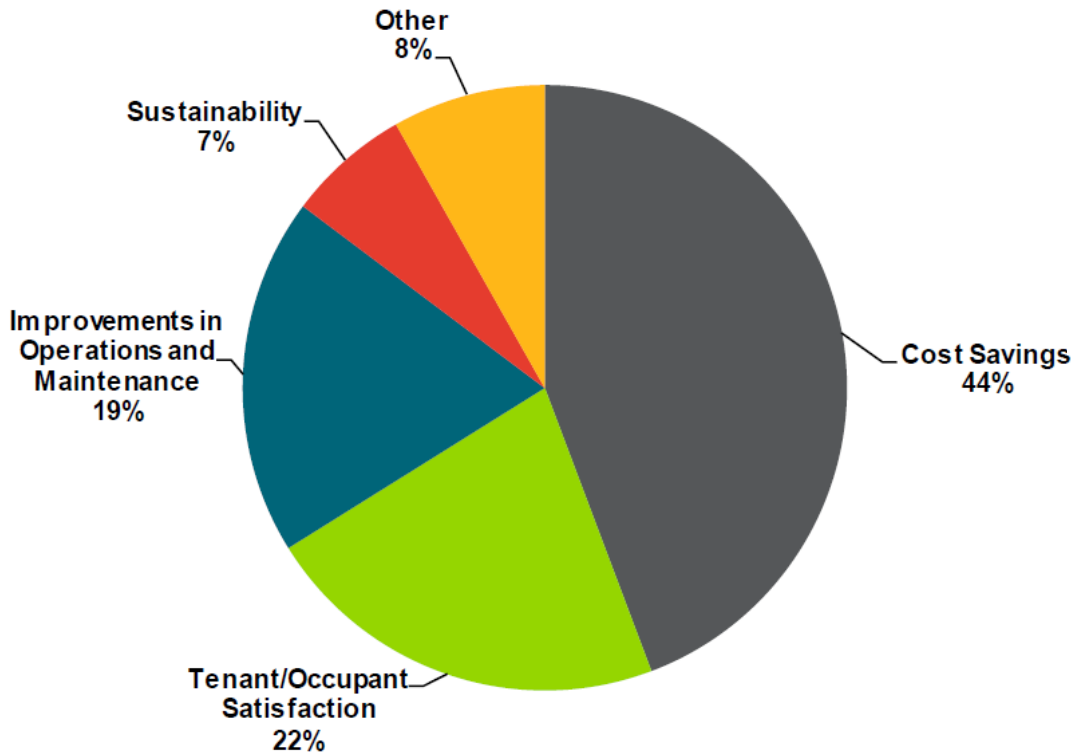
Types of HVAC Systems



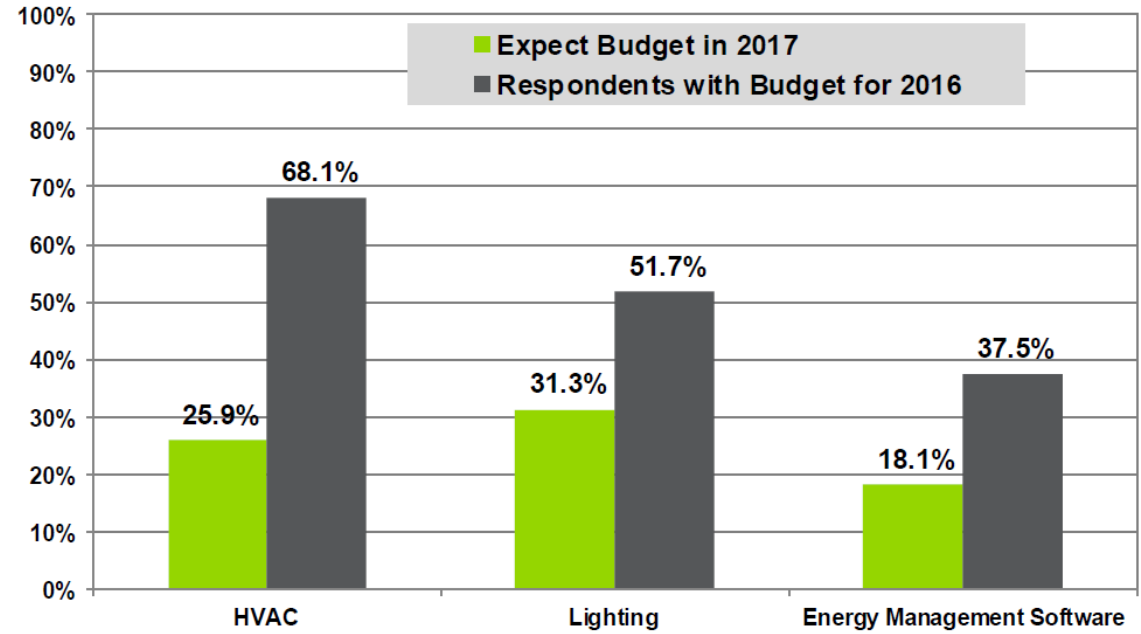
Buildings < 50,000 ft² Account For 97% Of Total Building Stock, Only 12% Have A Building Management System (BMS) Installed

Drivers for Investment/Upgrade in Smart Building Technologies

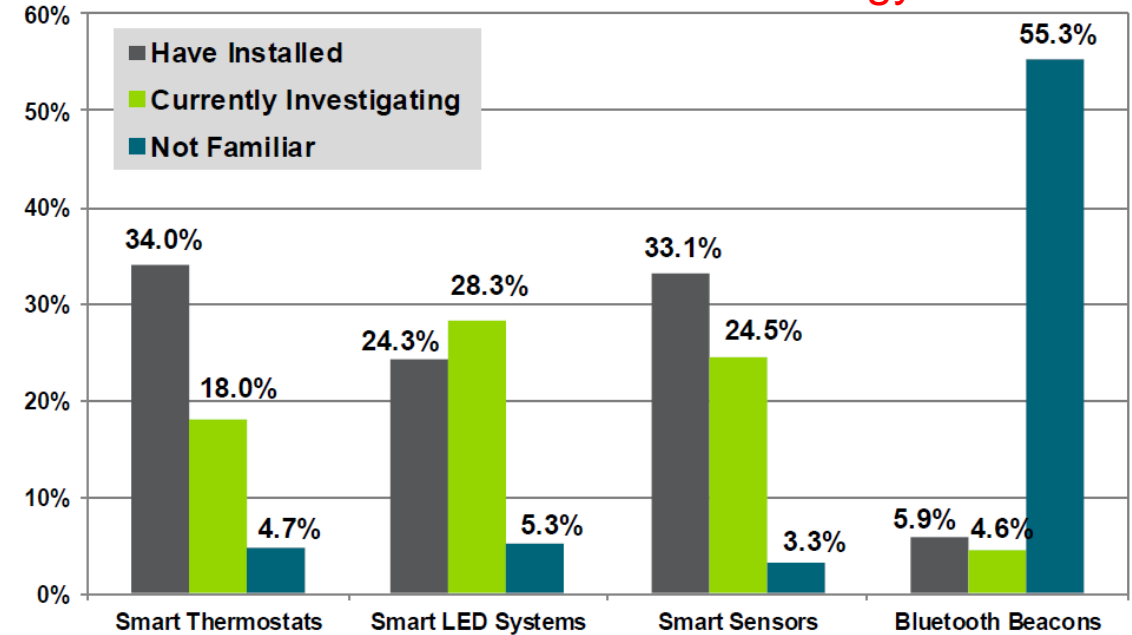
Value drivers



Budget uncertainty



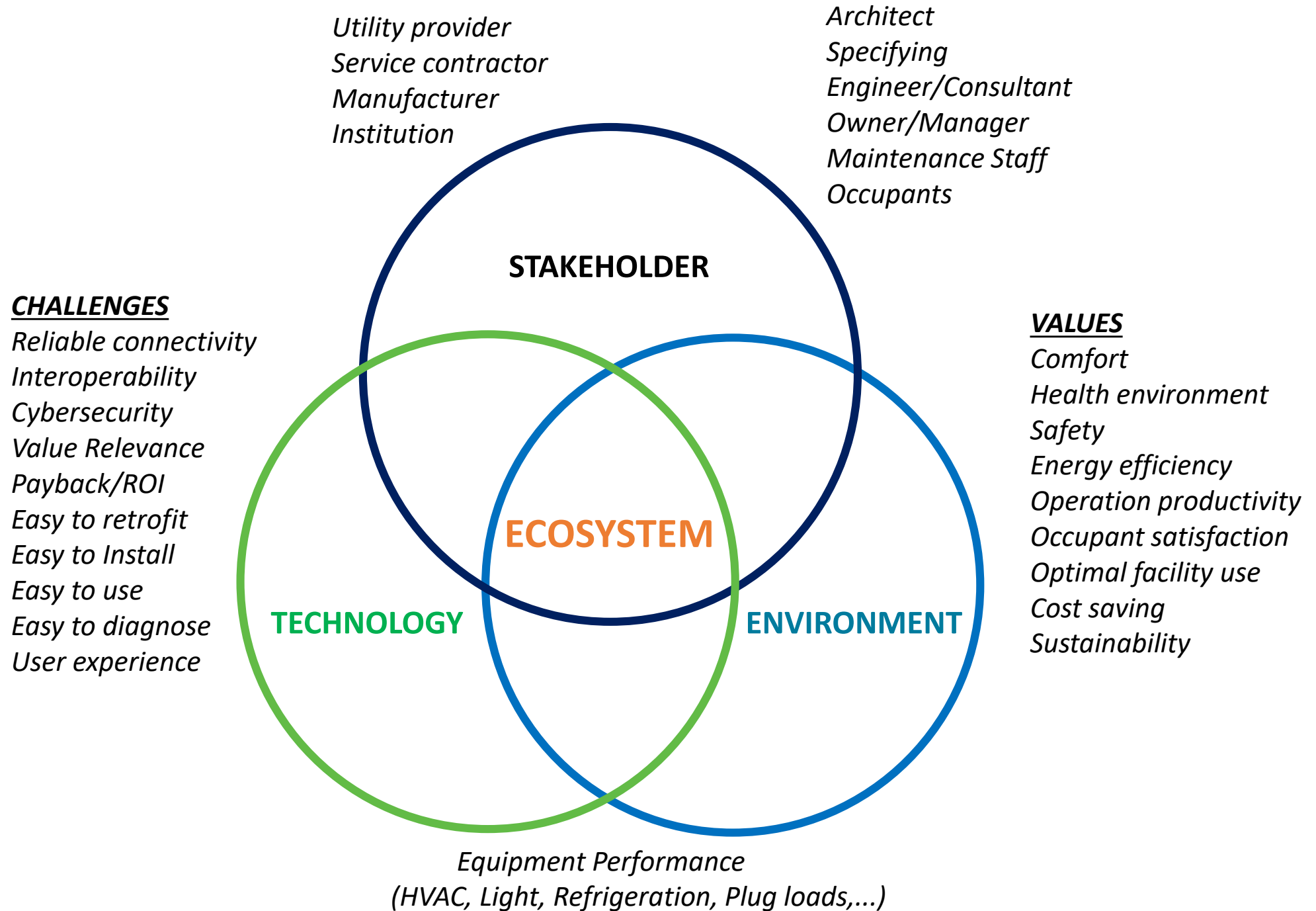
Common smart technology



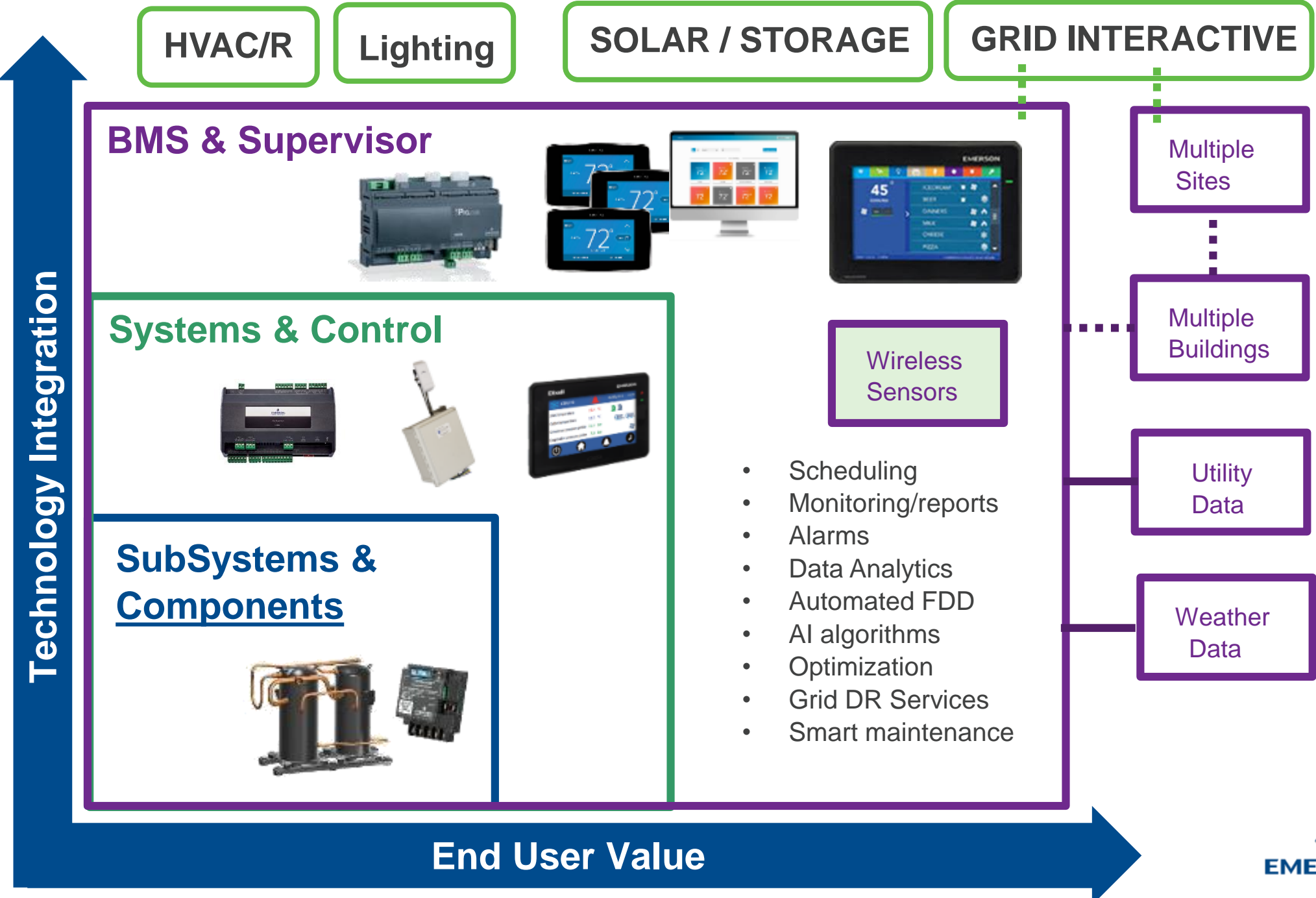
Source: Navigant Research, 2016 intelligent buildings survey

The 'Smart Building' as an Ecosystem

How do we increase adoption ?

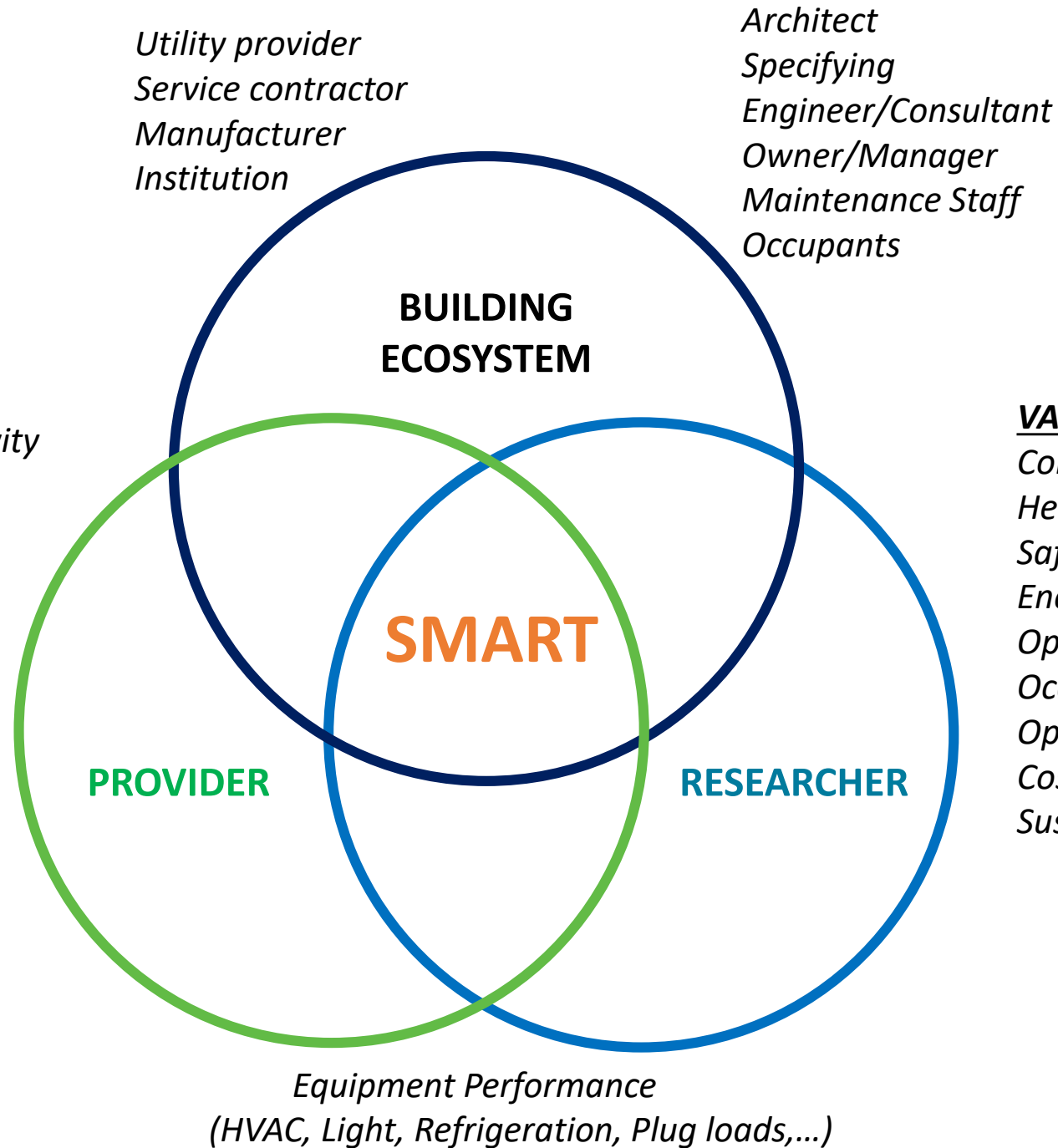


Can the building ecosystem architecture be smart without integrated smart subsystems ?



Where is the potential for us to collaborate ?

Key challenges/barriers for mass adoption ?



Questions

always the more beautiful answer

who asks the more beautiful question

e.e. cummings

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