Hamilton: Flexible, Open Source $10 Wireless Sensor System for Energy Efficient Building Operation

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

University of California, Berkeley
Carl Blumstein, Director, CIEE

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Team:

Professor David Culler

His team has developed seven generations of wireless sensor network designs that have provided a open source platform for embedded network research world-wide.

PhD Student Michael Andersen

Designer and researcher who simultaneously works in classic aspects of the field – operating system design, computer architecture, data storage systems, massive query processing.
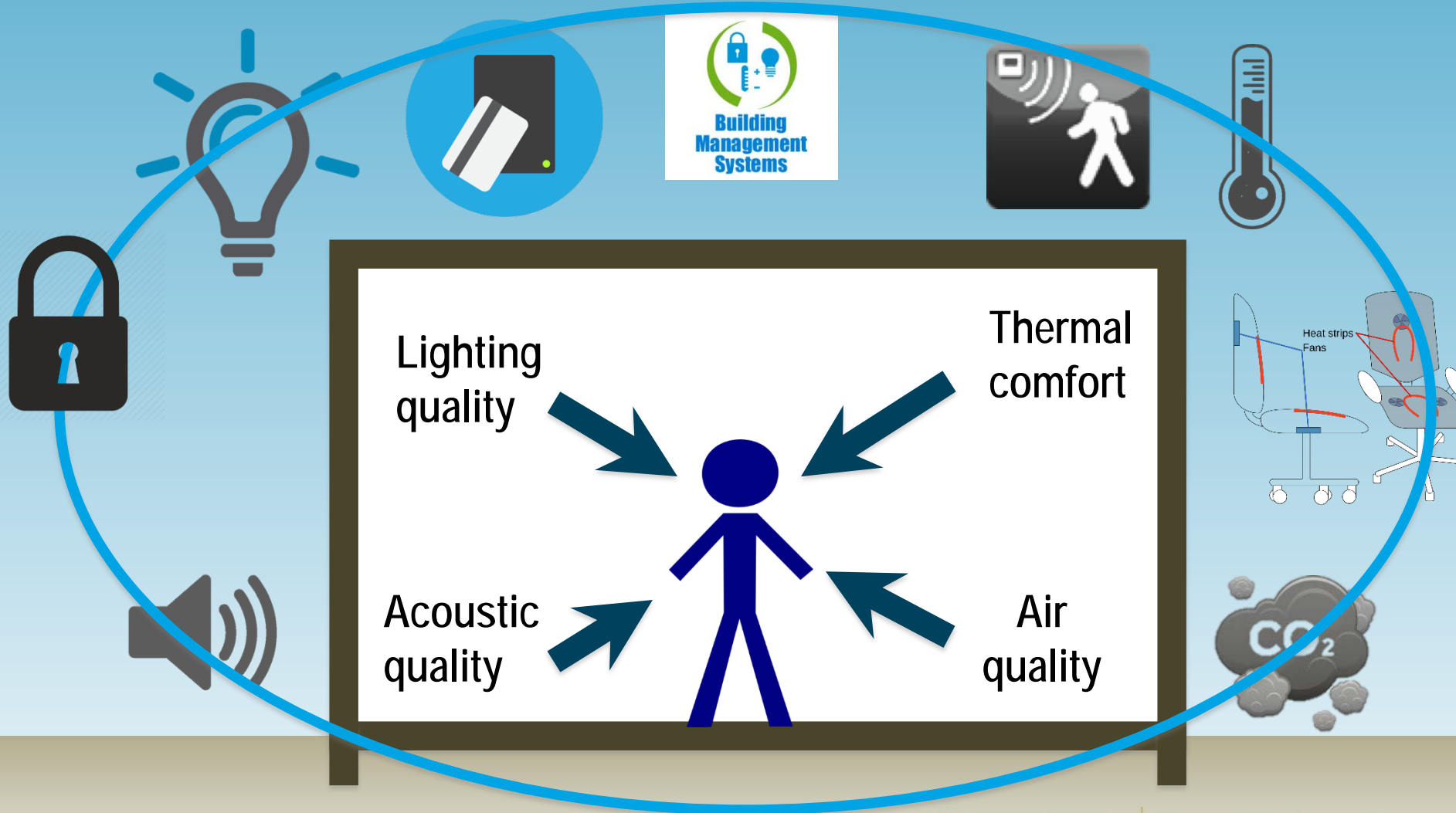
Professor Raluca Popa

Expert in cybersecurity, including computing on encrypted data.

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"What If" Future or Problem Definition

Lighting quality

Thermal comfort

Acoustic quality

Air quality

Building Management Systems

CO_2

Heat strips
Fans

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Technology Solution

Continuous demand response **A**

Occupant centric env. control **A**

Control and scheduling **A**

Data archiving and analysis **A**

ISOs, vendors, etc.

Authenticated distributed namespace

BOSSWAVE **R**OUTER **R** Secure, resilient, distributed information **R** s

Encrypted secure link

Uniform, secure interface

BOSSWAVE **A**GENT

A Sensor gateway

A A A A roxy/Driver

Complex/diverse links

low cost wireless sensors

Building Management Systems

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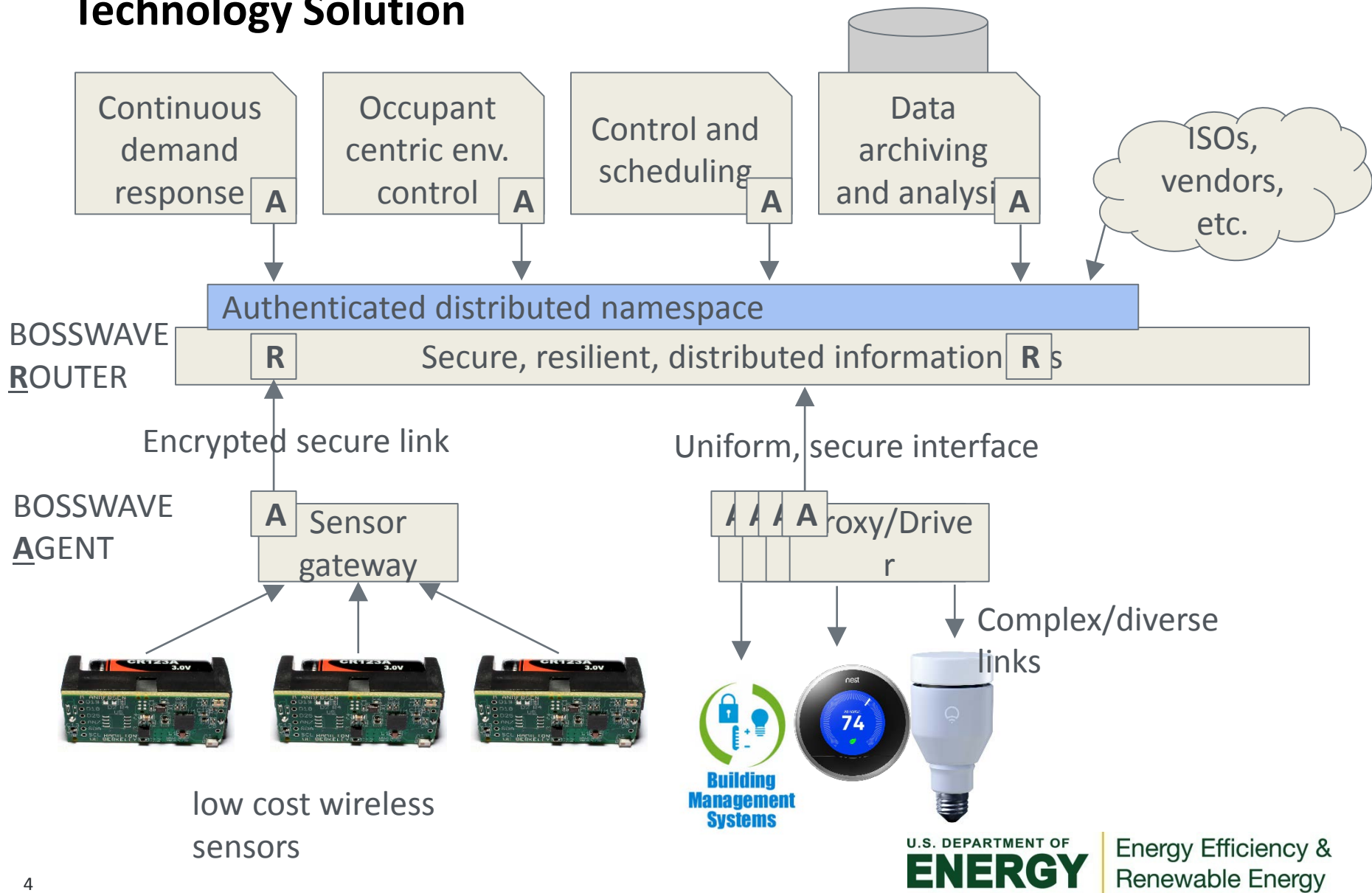
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Advantage, Differentiation, and Impact

1. More general than existing sensors
Fully programmable, powerful MCU combined with rich IPv6 mesh network model. Modular design allows new sensors to be added

2. Low cost, including installation
Unit is self contained, no wires required. Lasts 5 years on a battery. Total cost of ownership is lower.

3. Low-effort security by default
End-to-end encryption, fine grained, scalable access control. Decentralized infrastructure resilient to cyber attacks, but security does not increase installation/commissioning time.

4. Powerful, secure application platform
Increasing impact of sensor data by utilizing it in building control for energy savings and occupant comfort, without compromising occupant privacy and building cyber security

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