Building Data the New Deliverable

Our Changing Building Automation Industry and our New Deliverable Data.

Speakers - Jim Sinopoli & Ken Sinclair
AutomatedBuildings.com

Building Data the New Deliverable

This unique venue/arena supplied by International Exhibition allows us to take our online service/magazine off line and Face 2 Face with you.

1. Our Changing Building Automation Industry and our New Deliverable Data.

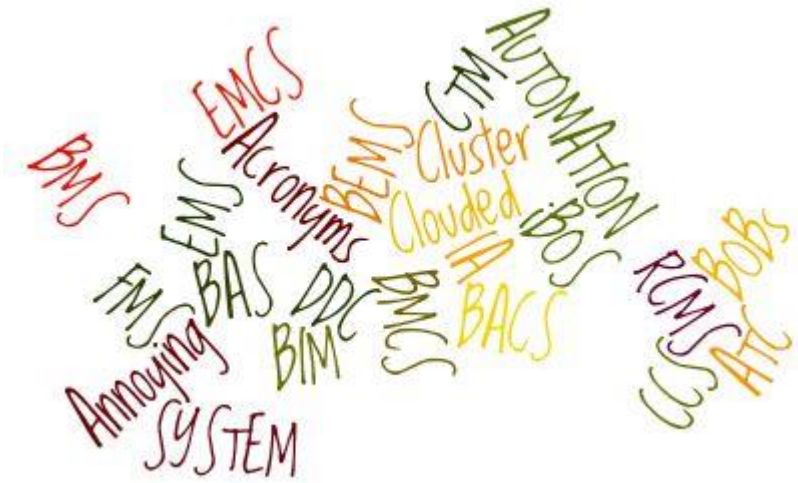
Speakers - Jim Sinopoli & Ken Sinclair AutomatedBuildings.com

2. Market Trends for Integrated and Intelligent Building Systems and the Retrofit Opportunity Tuesday January 21, 1:30 – 2:30 pm

Speakers - William Rhodes, Market Analyst, Brad White Consultant & Ken

3. Our Building Automation industry has become Data Driven.
Speakers - Jim Sinopoli, Brad White & Ken Sinclair

4. The Connected Communities Collaboration Meeting with various industry speakers will be held Wednesday, Jan. 22, 2014 1:30pm Meeting agenda has evolved on Linkedin open group `Connection Communities Collaboration'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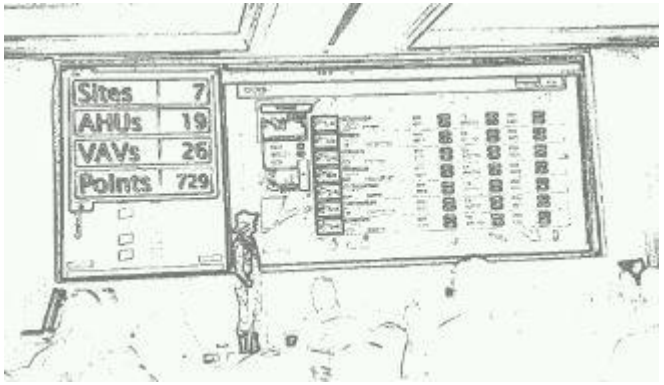
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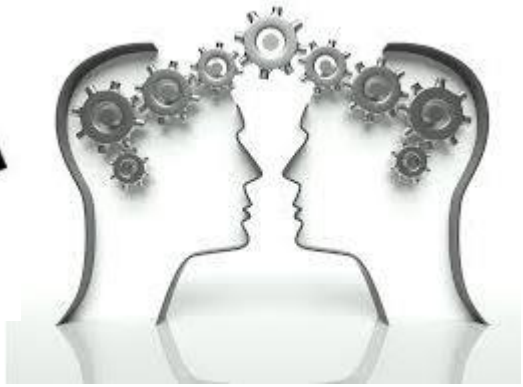
disruption



Trends That are Driving Industry

Events that Help Define Change

- RealComm events like

  IBcon – Where Facilities and IT Converge!

- IBcon is not your traditional BAS conference! It is the largest gathering of authorities with international case studies on the topic of open architected, interoperable and integrated IP centric smart, connected, high performance and intelligent buildings.

The Bullitt Center – Interactive View

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Darrell Smith is the Director of Energy and Building Technology for Microsoft's Real Estate and Facilities group
Extracted from interview on our site

Smith: Our HQ campus in Redmond, Washington has the same scale of a small city. The Campus consist of 15 Million square feet, 125 buildings and 58,000 housed personnel. We are connected to two million data "points" across 35,000 building assets, and over a 24 hour period, we collect 500 Million data transactions every day. Historically we have not had the ability to leverage this "Big Data" to optimize our Campus.

- Smith: When I first started my research in this area in 2009, my concern was the solutions on the market were not mature enough and we would need to pause our procurement process until the market matured. After completing our gap analysis with Smart Buildings Inc

Microsoft

- Redmond Campus
- Corporate mandate of energy management
- FDD Deployment
- Discover faults and aspects of their HVAC system they were not aware of

Microsoft Results - FDD

- Engineers saved significant time in addressing operational issues.
- Tool provided information for a remedy and corrective action of fault
- Faults were “monetized”.
- Microsoft’s typical 5-year retro-commissioning cycle accomplished in just one year.
- Annual energy cost savings for Microsoft exceeded $1 million.

Quote from Microsoft:

“demonstrates that a smart building solution can be established with an upfront investment of less than 10 percent of annual energy expenditure, with an expected payback period of less than two years”

Monetizing the Fault

			Reference
1	Economizer Disable Set Point =	68 degrees	EMS
2	Average Occupied hours OAT > Economizer Disable	1561	(DOE weather file)
3	Occupied Hours =	0800 - 2000	
4	Average OAT during occupied hours	74.5 degrees	(DOE weather file)
5	Minimum outside air ratio	15%	Code minimum
6	Fault is triggered and calculated only when calculated OA ratio exceeds minimum 10%		
7	Average Detected OA Ratio	60%	
8	Design CFM	22500	
9	Average VFD speed	62%	
10	Average CFM	13950	
11	Extra cooling load:	68790226 BTU/cooling season	
12	Seer	12	
13	Extra compressor energy:	5732.5 kwh/cooling season	
14	Electricity Cost	$0.08/kwh	
Annual Extra Cooling Cost		**$458.60**	

MICROSOFT

Illustrative example of fault detection and diagnosis output (simplified)

Building	Bldg. Cluster	Equipment	Fault and Diagnosis	Priority	Estimated Savings*
Bldg 58	Cluster E	AHU - 012	Leaking chilled water value	High	$11,291
Bldg 58	Cluster E	AHU - 003	Damper position fault	High	$4,782
Bldg 53	Cluster E	VAV - 022	Over cooling	Hign	$2,235
Bldg 58	Cluster E	CHI - 002	Changes to set points	Medim	$895

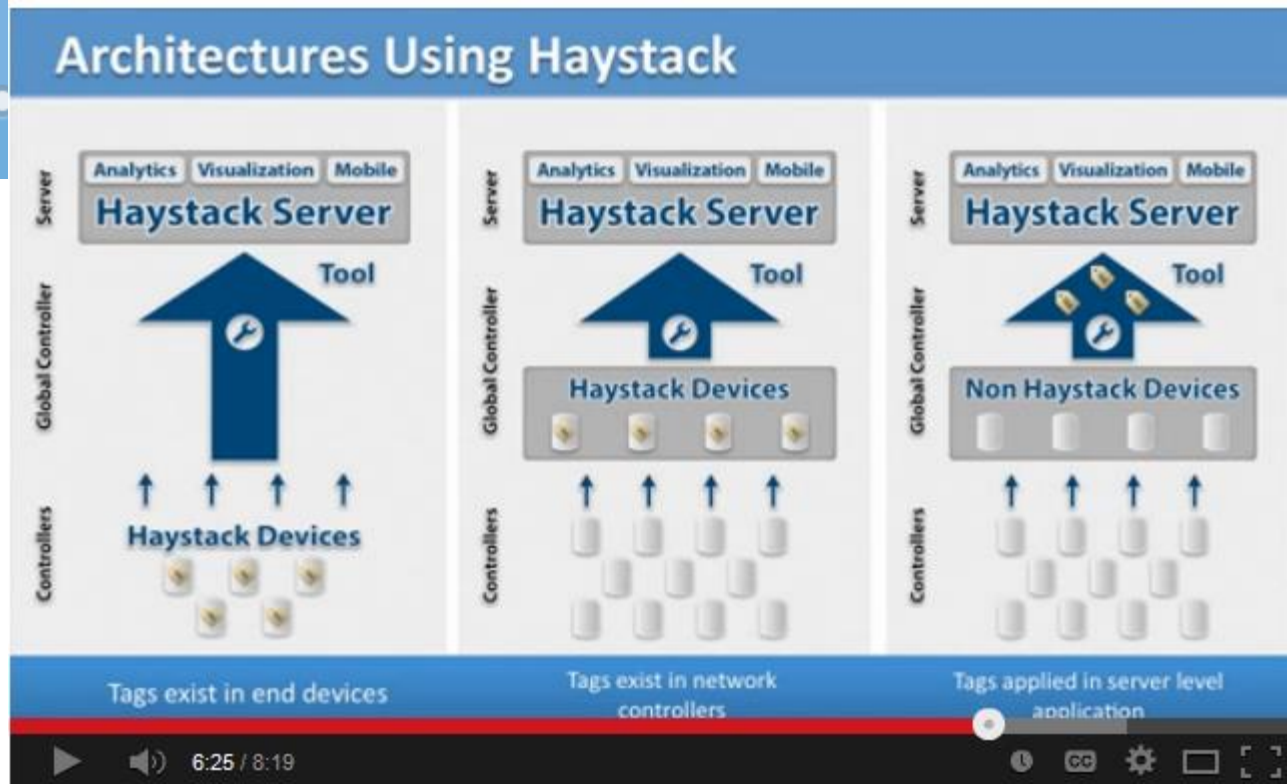
* Estimated savings potential, expressed an annual cost of wasted energy if not fixed.

Other Organizations

- Study on monitoring-based commissioning
- Established an average energy savings of 10% to 25%

- Use FDD tool supporting the commissioning of buildings
- Tool generates reports for LEED Online including diagnostic and faults during the building's performance period

Project Haystack. This 8 minute video provides a great overview describing what it is about and why it is needed." Link: http://youtu.be/5C6GwLbYqTw



Project Haystack Supporter

SMART BUILDING PREDICTIONS FOR 2014

Jim Sinopoli, PE, RCDD, LEED AP
Managing Principal
Smart Buildings LLC

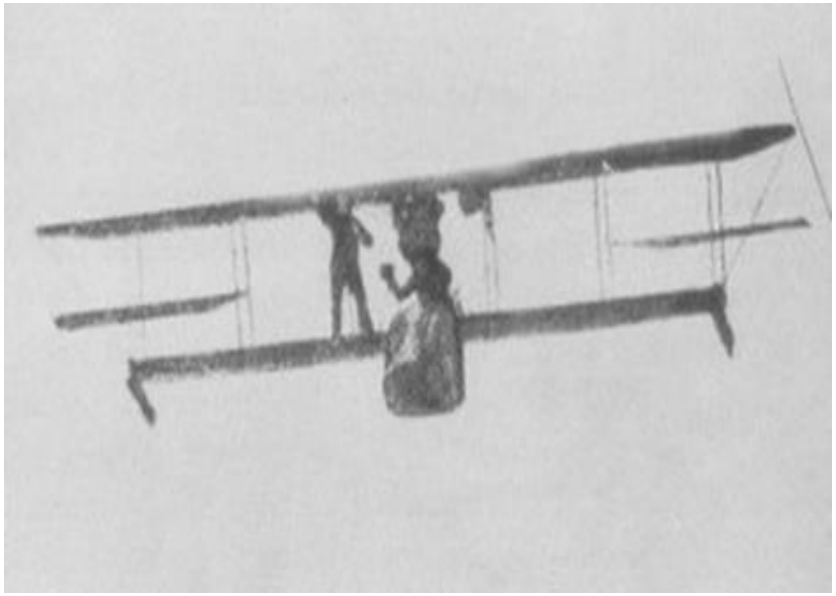
Prediction #1
All Day All System Analytics

- Automatic Fault Detection and Diagnostics (AFDD)
- Primary focus has been HVAC systems
- Monetization of faults
- Used for re-commissioning buildings
- Verified Results

- What will happen in 2014?
  - Upsurge of similar analytic software for other building systems
  - The AFDD template will be applied to almost every building control system.

Automated Fault Detection and Correction

"If an airplane can operate eight miles above the earth on "autopilot" why can't a building on the ground do so?"



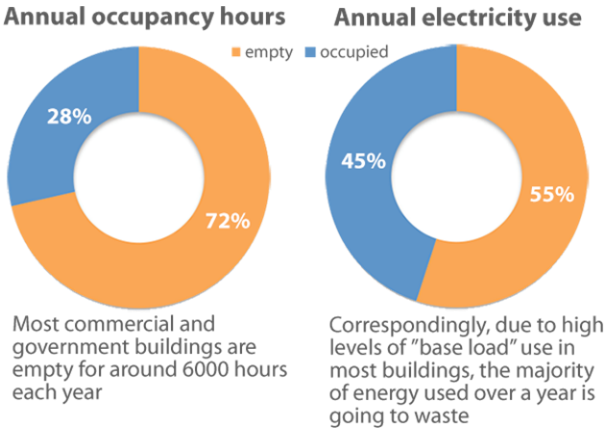
Prediction #2
Photovoltaic Windows

- **Transmit more than 70% of the visible light**
- **Power conversion for the initial designs is low but is expected to reach over 12% efficiency.**
- **Research calculated that even with 5% efficiency the windows could generate over 25% of the energy needs of a building.**
- **Also reduce infrared radiation, thus reducing thermal loads.**
- **Could add to DC Infrastructure**

Prediction #3
Real Occupancy Metrics

Occupancy and Energy

Space Type	Savings
Private office	13-50%
Conference room	22-65%
Classroom	40-46%
Restroom	30-90%
Corridor	30-80%
Store areas	45-80%



Walking Sensors

Smartphone Sensors - Present & Future	
Present	
Type	*Measurand*
3-axis Gyroscope	Rotation in space - Roll, Pitch, Yaw
3-axis Magnetometer	Location direction (compass)
Accelerometer	Acceleration in the X, Y, & Z axes; Vibration
Ambient Light	Illuminance (brightness of light)
Camera	Images, Video
GPS	Location
Humidity	Humidity
Microphone	Audio
Pressure	Pressure (used to determine altitude)
Proximity	Nearby objects, without any physical contact
Temperature	Temperature
Near Future	
Type	*Measurand*
6-dimensional Microscale Motion Accelerometer	Combination of accelerometer and gyroscope
9-axis motion sensor	Combination of accelerometer, compass, and gyroscope
Biochemical	Biochemical agents

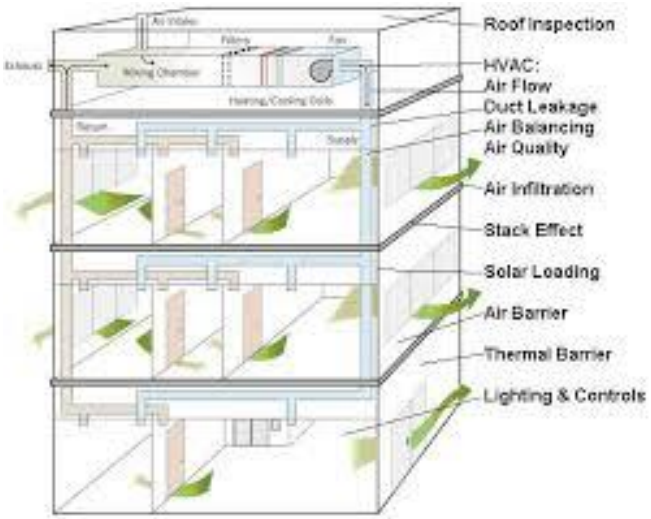
Prediction #4
STRUCTURAL MONITORING

- You generally will not see the words “building automation” and “building envelope” in the same sentence.

- Moisture Intrusion
- Air Leakage
- Structural Loads
- Seismic Monitoring
- Openings in the Structure - Fenestrations

Monitoring the Envelope

SENSORS FOR THE BUILDING ENVELOPE	
*	**Strain Sensor/Gauge** - Stretched, Bent, or Deformed
*	**Tilt meter** - Changes In Horizontal Level; Ground or Structure
*	**Accelerometer** - Moving or Vibrating
*	**Deformation Sensor** - Fatigue, Vibration, Flex, Torsion, Bending
*	**Temperature Sensor**
*	**Piezometer** - Measuring Pressure or Compressibility
*	**Displacement Sensor** - Movement Between Expansion Joints
*	**Humidity Sensor**
*	**Extensometer** - Changes In The Length of an Object; Stress, Strain, Tensile
*	**Corrosion Current Sensor** - Corrosion Initiation and Corrosion Rate
*	**Inclinometer** - Slope, Tilt, Elevation or Depression With Respect to Gravity



Sample of International projects

King Abdullah University of Science and Technology

Cleveland Clinic Abu Dhabi

Uganda Revenue Authority

Saudi Arabia Ministry Of Higher Education

El Salvador World Trade Center