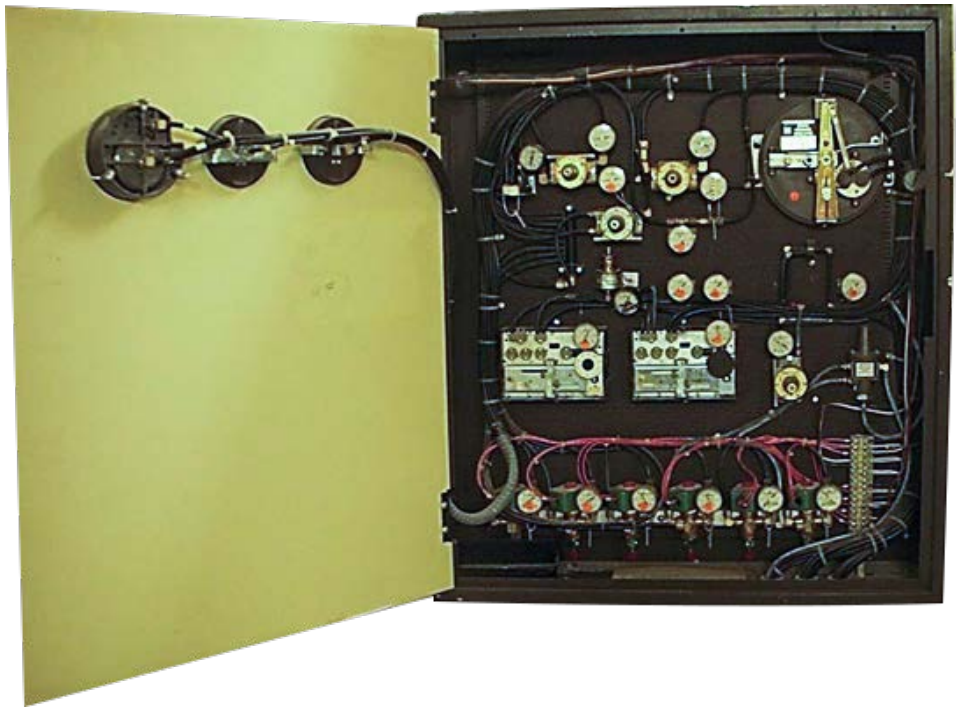
Intro to Data Modeling with Project Haystack

January 19, 2018 | The Langham Luxury Hotel, Chicago, IL

Step Changes in our Industry

Pneumatic Controls



Step Changes in our Industry

Electronic Controls

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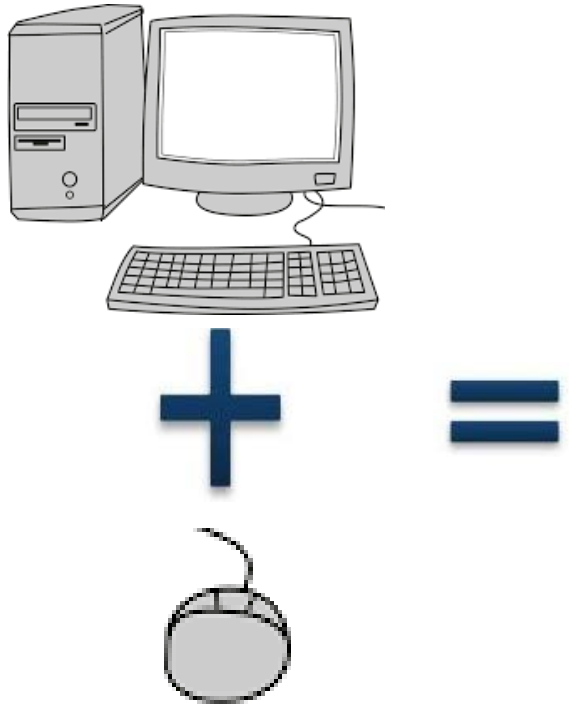
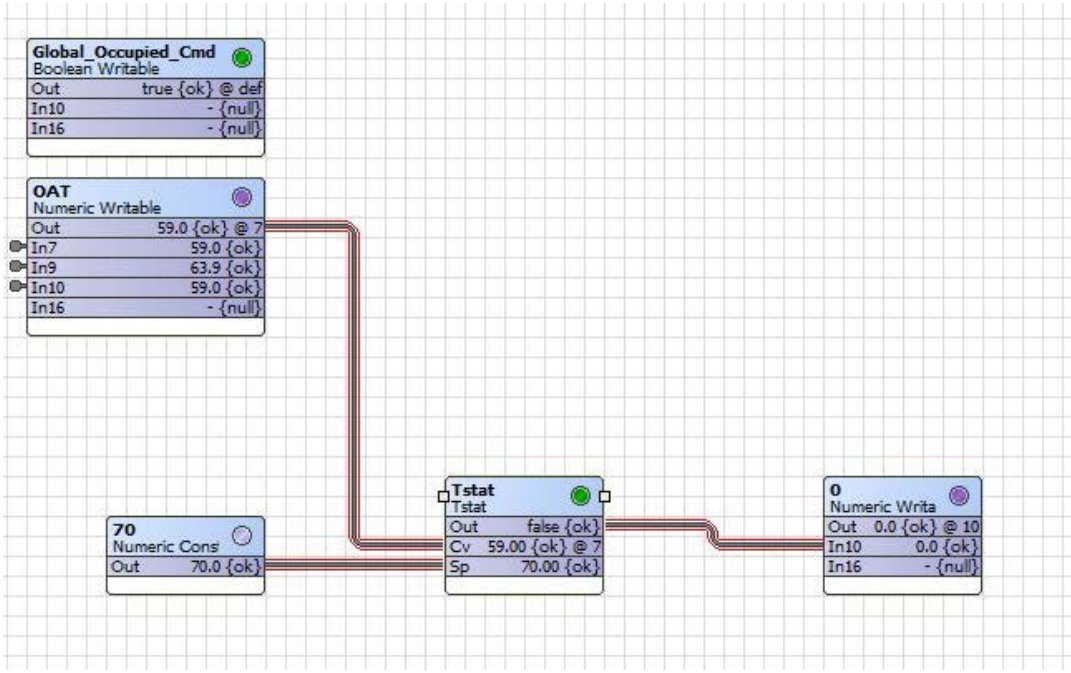
Step Changes in our Industry

DDC Controls

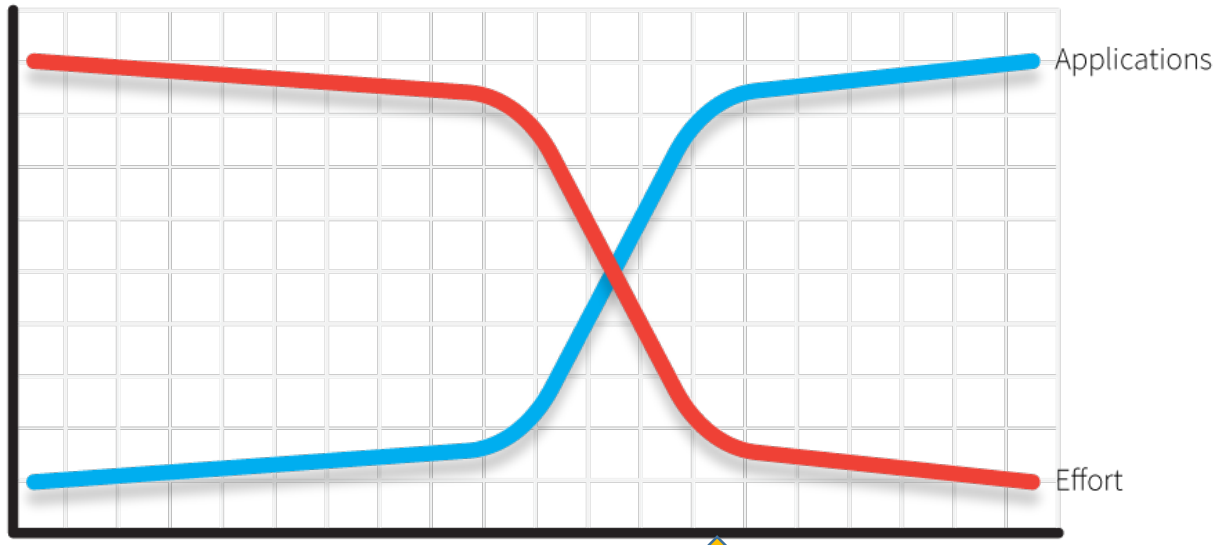




Step Changes in our Industry

Tagging and Data Modeling

Software Tools & Applications



We are Here!

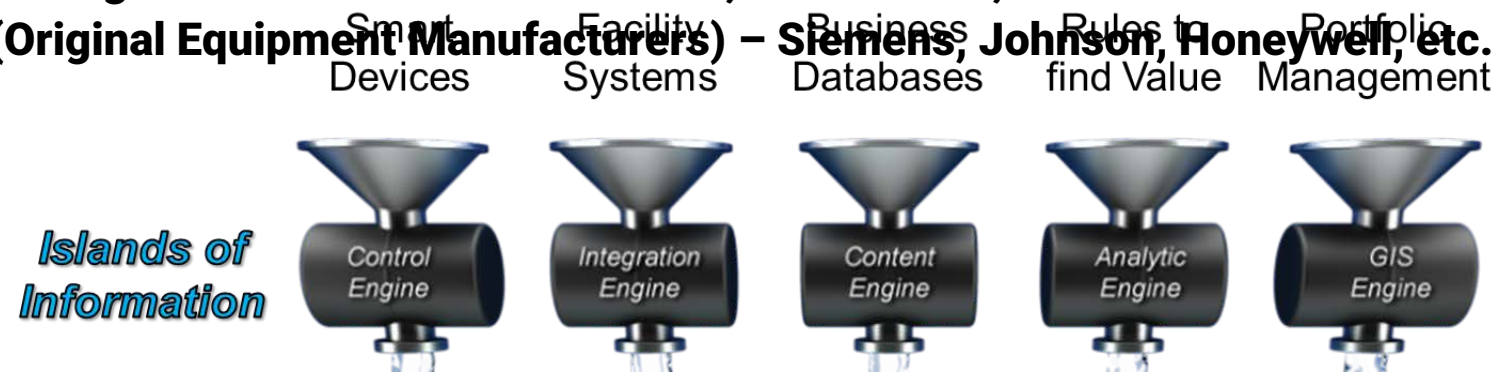
The Challenges

- **The World is Getting Smarter and more Connected, but as Islands of Information**
- **Customers want to Leverage this "Big Data" but Find it too Difficult**

  End Users – Property Managers, College Campus, Industrial Facilities, Government, Municipal
- **Solution Providers are Challenged to Deliver with Current Tech**

  System Integrators – Controls contractors, Distributors, Consultants

  OEMs (Original Equipment Manufacturers) – Siemens, Johnson, Honeywell, etc.



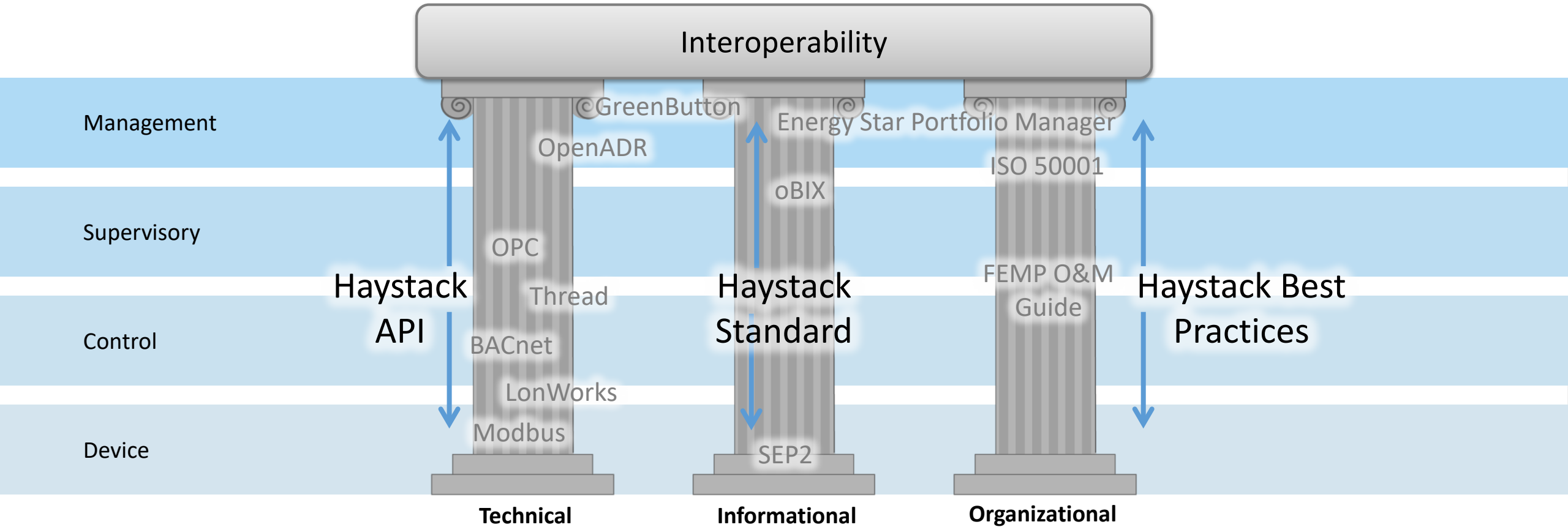
The Challenges

Open Protocols have only taken us so far:

- **Today open protocols like BACnet, LonWorks, and Modbus have significantly increased the standardization and interoperability of disparate systems.**
- **Unfortunately the information is still in many places and the higher level enterprise applications find it difficult to programmatically mine the data**

The Solution – Project Haystack

Three Pillars of Interoperability



Graphic: Marjorie Schott, NREL

The Solution – Project Haystack

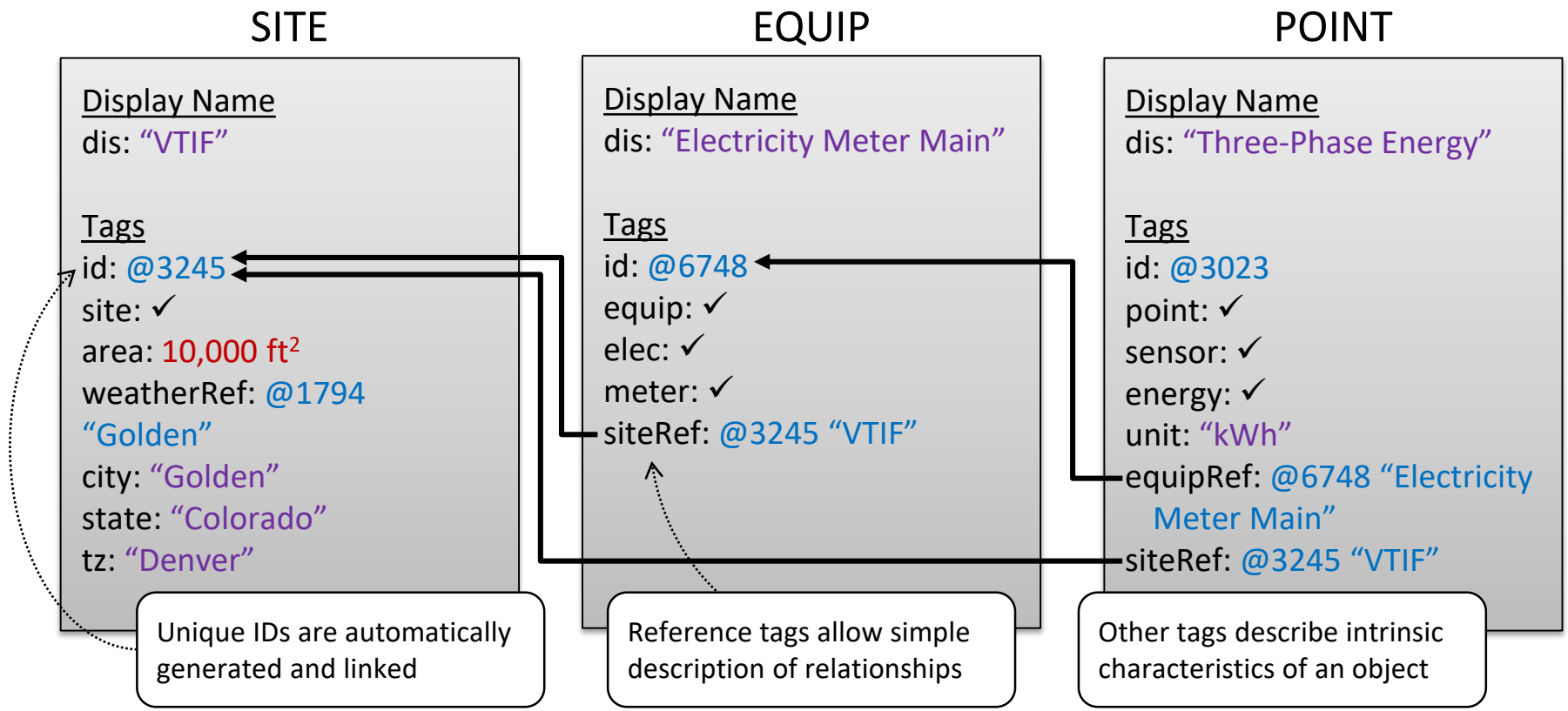
Introduction to Tagging: We use Tagging Everyday – Social Media

- **We can use Tagging and Data Modeling in Our Facilities too!**
  - **A methodology for defining the meaning of smart device data**
  - **Also known as semantic tagging, meta data and data modeling**
  - **Open source, highly flexible, applicable to data of all types**
  - **Example of Haystack tags to describe a point in a system:**

AHU1-SAT	sensor, discharge, air, temp, deg F,	ahuRef -> AHU-1
Point Name	descriptive tags	association tag

The Solution – Project Haystack

The Power of Reference Tags



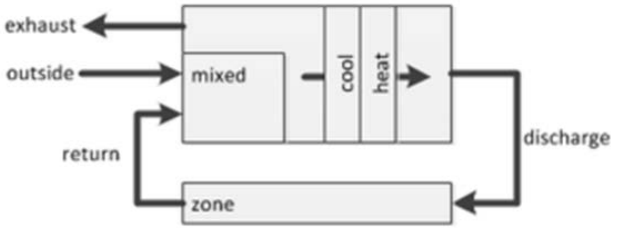
Graphic: Marjorie Schott, NREL

The Solution – Project Haystack

Leveraging Data Modeling:

- **Project Haystack is an open source initiative to develop tagging conventions and taxonomies for building equipment and operational data**
- **These data models provide the structure for powerful software tools and applications**
- **The payoff is dramatic reduction in labor and applications that work automatically**

The follow diagram shows the logical flow of air through an AHU:



Points

The following lists points commonly used with an AHU:

Discharge

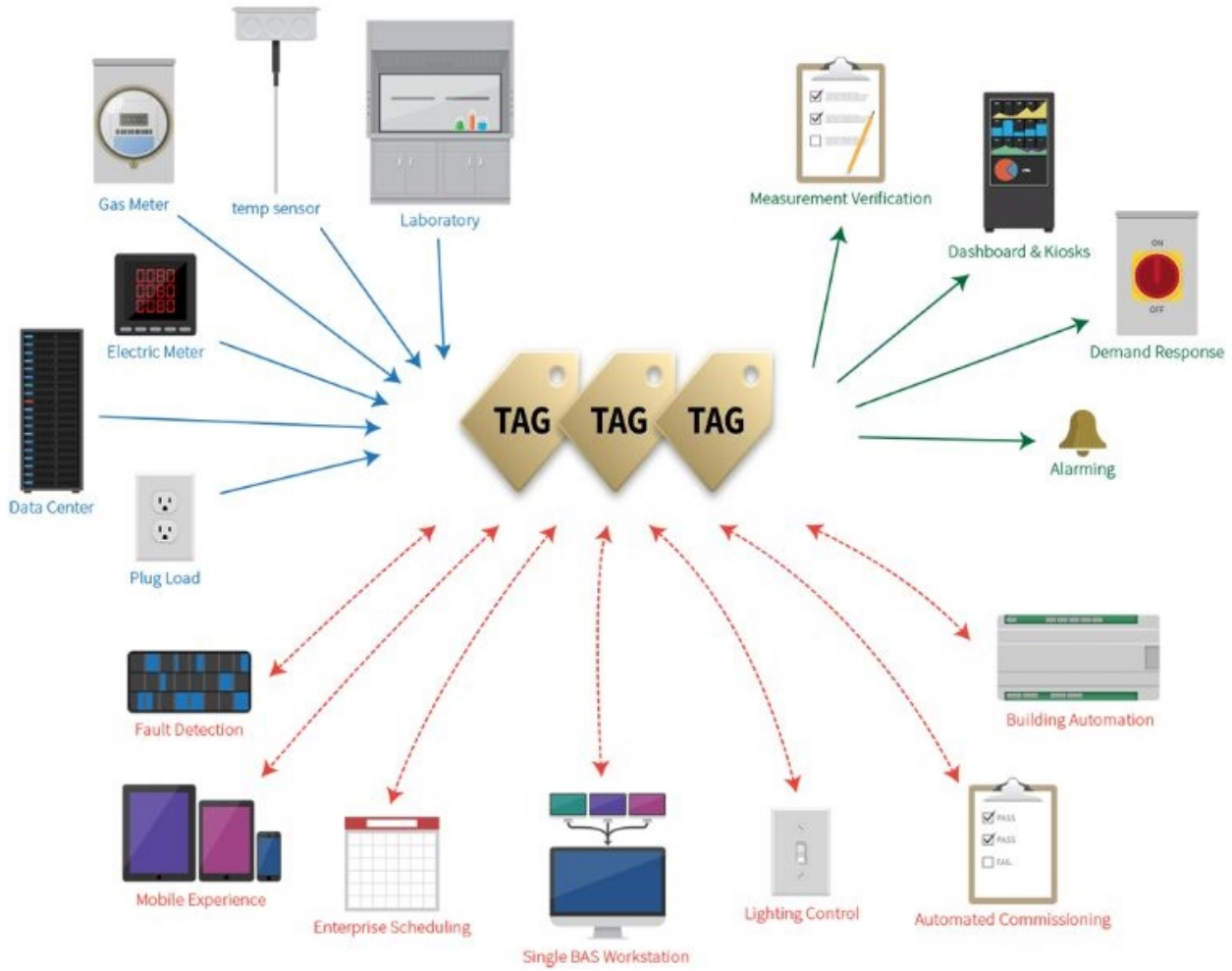
- discharge air temp sensor
- discharge air humidity sensor
- discharge air pressure sensor
- discharge air flow sensor
- discharge air fan cmd
- discharge air fan sensor

Return

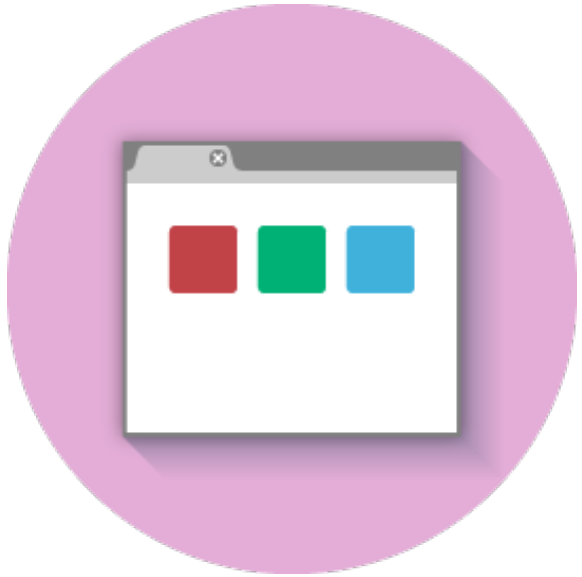
- return air temp sensor
- return air humidity sensor
- return air pressure sensor
- return air flow sensor
- return air co2 sensor
- return air fan cmd

The Solution – Project Haystack

Give Data “Meaning” across all Devices for all Apps

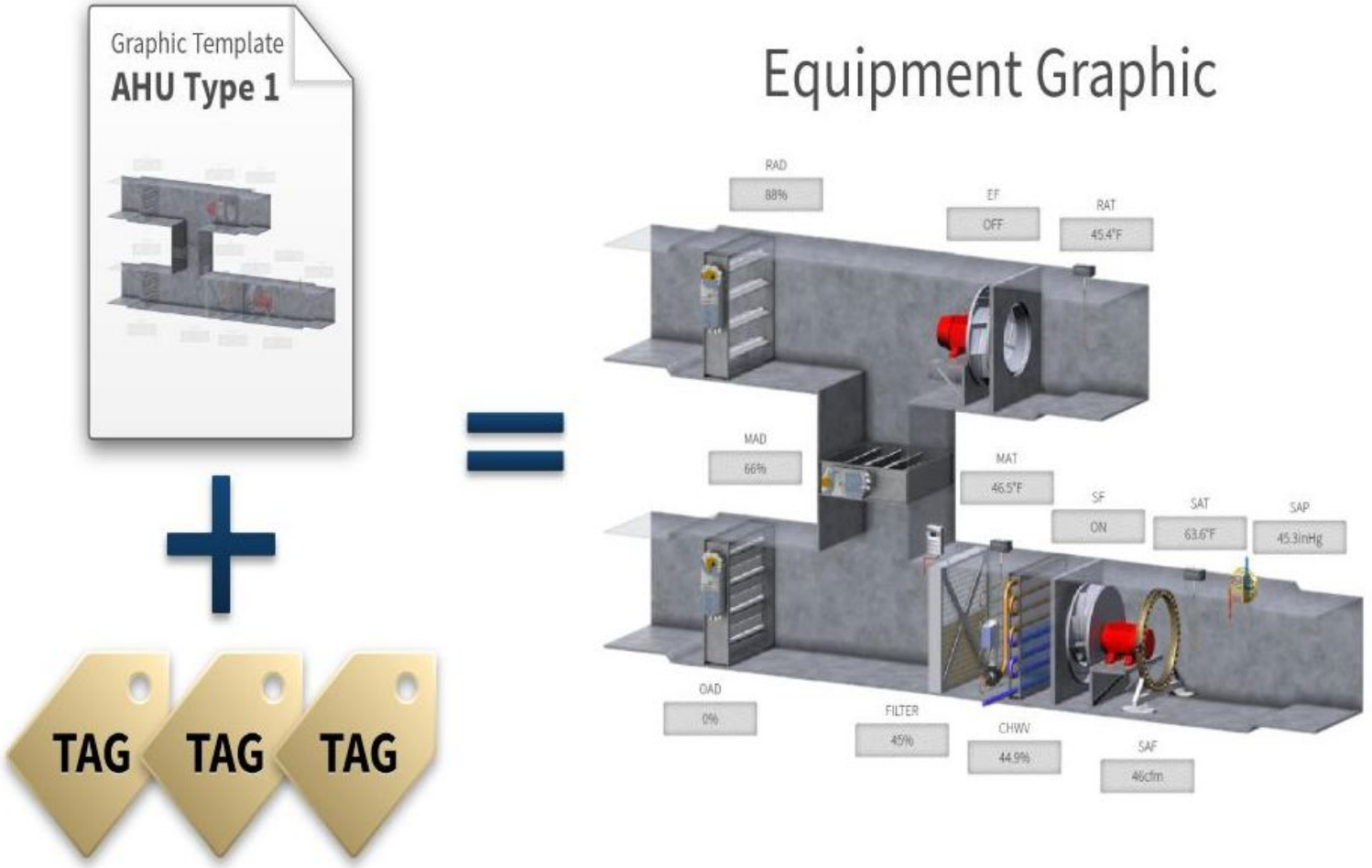


APPs-User Experience



- Client device independent – can run on a desktop, tablet, or a smart phone
- Visualization for awareness – kiosks and digital signage
- Unique user experiences for different audiences – C suite, Facilities, and tenants
- Leverages tags and data models to automatically generate graphics and navigation
- Data is bound using queries verses links. Example - summaries automatically update as new devices are added

APPs-User Experience



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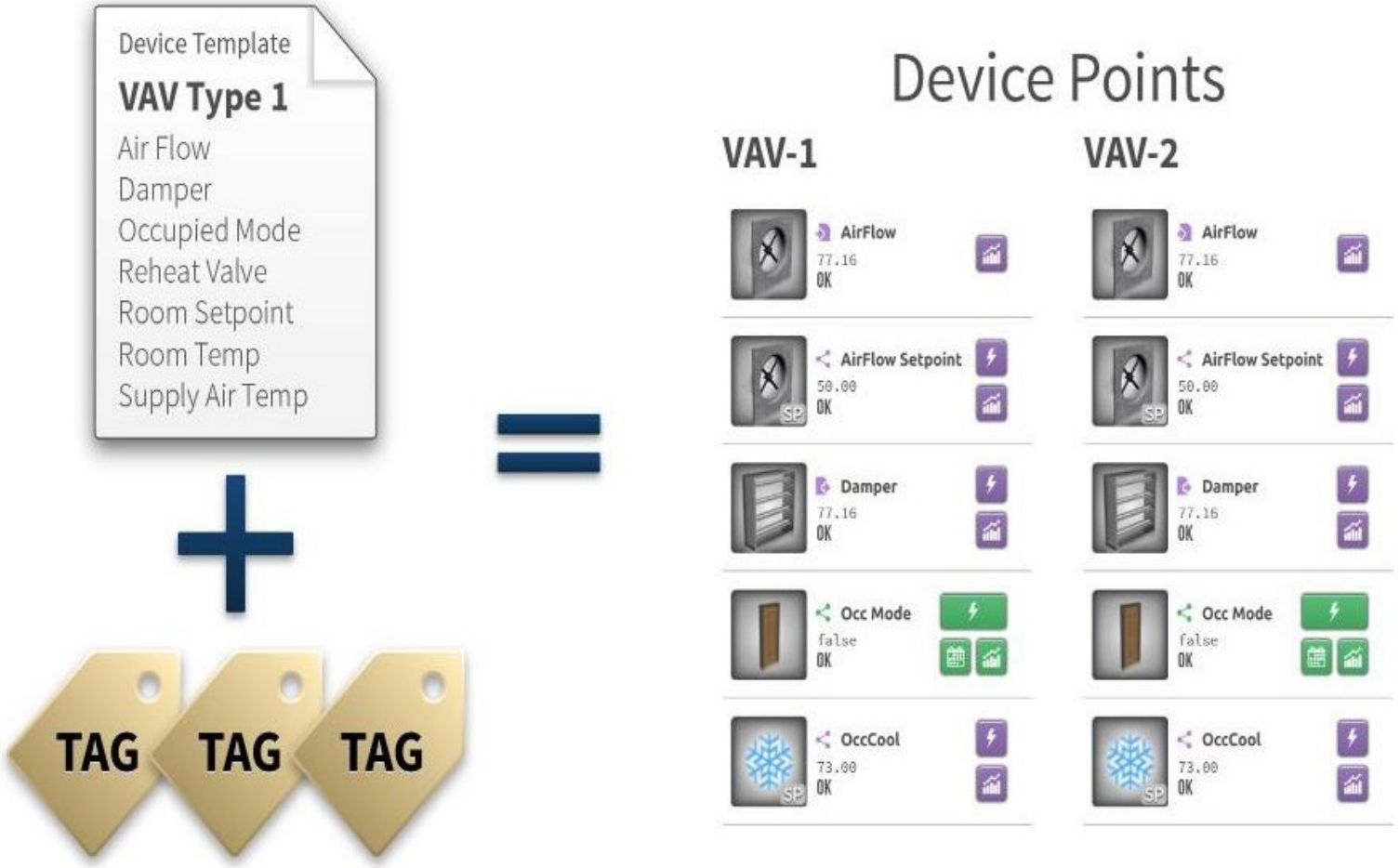

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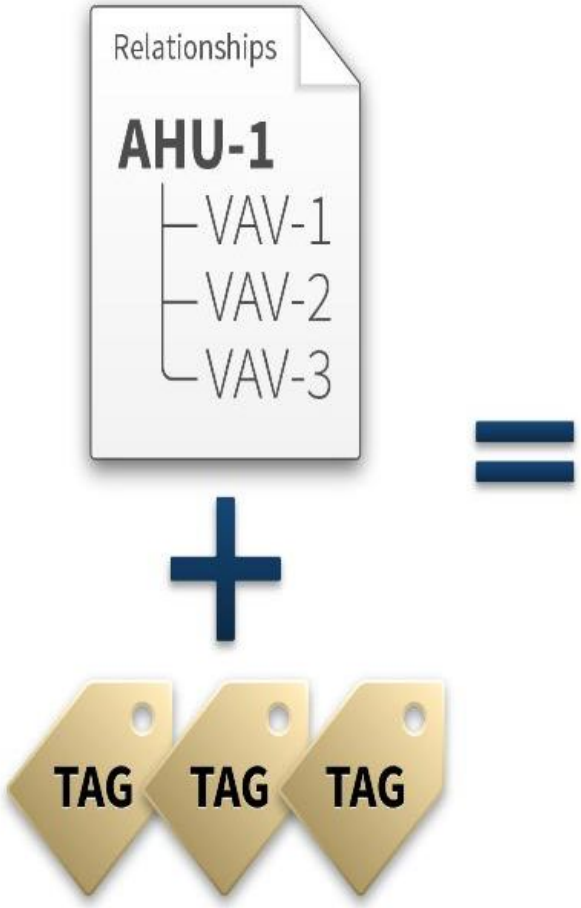


Equipment Summary

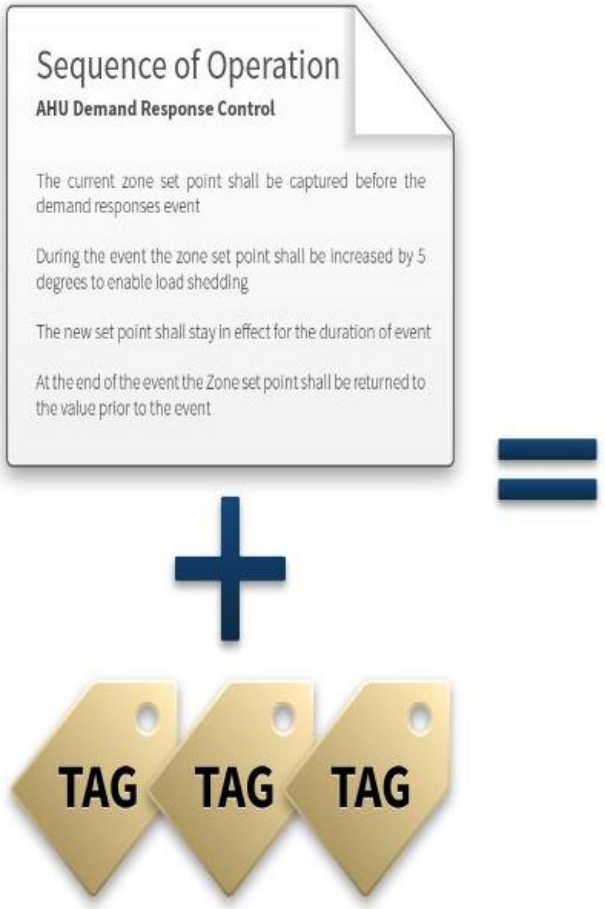
Summary : Ahu VAV Summary

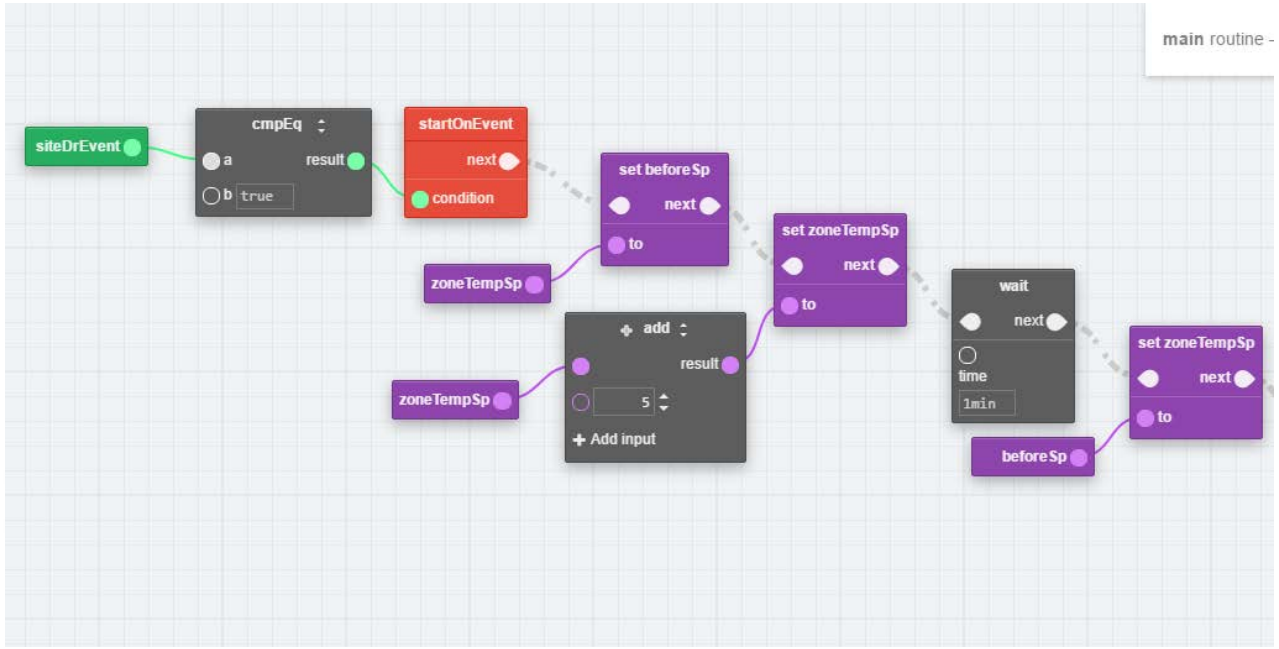
EQUIP	Damper	Occ Mode	Room Setpoint	Room Temp
City Center Vav-01	47%	False	73.0°F	75.5°F
City Center Vav-02	47%	False	72.5°F	69.9°F
City Center Vav-03	47%	False	73.0°F	87.0°F
City Center Vav-04	47%	False	72.5°F	75.5°F
City Center Vav-05	47%	False	73.0°F	69.9°F
City Center Vav-06	47%	False	72.5°F	69.9°F
City Center Vav-07	47%	False	73.0°F	87.0°F
City Center Vav-08	47%	False	73.0°F	75.5°F
City Center Vav-09	47%	False	73.0°F	87.0°F
City Center Vav-10	47%	False	73.0°F	75.5°F

APPs-Command and Control

- Provide command and adjustment capabilities from any mobile device
- Abstract control strategies to simple sequence of operation readability
- Give the flexibility in programming approach for developers (line programing or block programing)
- Standardized sequences that can be deployed across entire enterprise without copy>paste>linking
- More cost effective to deploy, therefore faster ROI

APPs-Command and Control

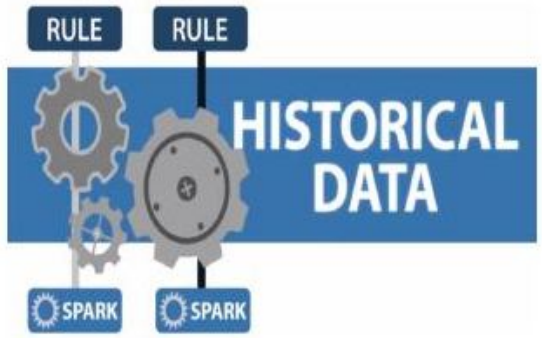




APPs-Automated Analytics

- Rules emulate an experts analysis
- The Rules engine automatically looks for conditions outside the parameters of the rules
- The results can be discovered using simple tag based queries
- Value can be assigned to conditions to help prioritize next actions
- Results can be combined with other data into comprehensive visualizations

APPs-Automated Analytics



Analytic Summary

Sites	Rules	Dur	Timelines
Carytown 1 sparks	AHU Fan Failure	16h	
Gaithersburg 6 sparks	AHU Cool Failure	0.5h	
	AHU Cool/Heat Mode Cyc	1.5h	
	AHU Fan Short Cycling	2.25h	
	AHU Group Cool and Heat	0.25h	
	AHU On and Fan Off	1h	
	KW Exceeds Target	3h	

12p 1p 2p 3p 4p 5p 6p 7p 8p 9p 10p 11p

Wrap-up: Collaborative Community

Project Haystack

- Open standards and data modeling are the glue that enables collaboration
- Provides options for customer to choose the best combination of apps that meets their needs
- Collaborative communities will drive innovation, no one solution provider can do it all
- New solutions and services are more rapidly available, the industry as a whole evolves faster together

Q&A

Q & A

Q. **Where can I find out how Haystack unlocks value in the real world?**

A. **Haystack Connections Magazine has case studies from real buildings:**

http://project-haystack.org/download

Q & A

Q. So are all these magical tags and data models documented somewhere?

A. Yes! We're so glad you asked:

http://project-haystack.org/doc

http://project-haystack.org/tag

Q & A

Q. I’m a developer. How do I get started?

A. You should try out a reference implementation of the Haystack API:

http://project-haystack.org/download

Q & A

Q. I have more questions. Is there a community that can help me?

A. Project Haystack has a vibrant online forum. You can find it here:

http://project-haystack.org/forum/topic

Q & A

Q. This is great! Can I contribute?

A. Please do! You can get involved in a Haystack working group, and suggestions are always welcome on the forum. Plus, contribute code at: https://stackhub.org/

B. Scott Muench
VP Business development,
J2 Innovations

Thank you!

Gamification Code: