

APRIL 15 - 17 | ANAHEIM, CA

TAGGING & ONTOLOGIES Tap into Their Full Power & Value



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Why Tag?

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When each point is tagged correctly, the performance of the whole building or the whole building portfolio can emerge via data analytics.

AGENDA: Questions to be Answered

For Building Owners: - Why pay for the work of tagging? - Why adopt a standard ontology? - Where and when will the payback come?



"tagId": "n:name",
"tagValue": "SummerWinterSetpointRemote"

"tagId": "n:displayName",
"tagValue": "SummerWinterSetpointRen

TRIDIUM

cagId": "n:input"
"tagValue": "M"

td": "hs:cur", "_M"

For Systems Integrators: - How can tagging expertise lead to better relationships with customers? - How can it help to build and future-proof your business?

d": input", lue": "M"



tagValue": "0"

"tagId": "hs:id",
"tagValue": "55d6"

"tagId": "hs:maxVal",
"tagValue": "Infinity"

ml) Know-how is practical knowledge and ger companies have the money, but they don't e know-how to get the job done right. o I can uter, but I don't have any technical know-to.
"Do they know it's Christmas?" (title of a Bob Geldof and Midge Ure to raise money 4) • "I don't, she added, 'know anything illy. But I know what I like" (from the comic obson by Sir Max Beerbohm, 1911)

 $n[U] \bullet If$ someone is in the know, rmation about something secret: It must ne who is in the know **about** the project who out it.

'nəu·ə·b!, \$'nou-/ adj • Philosophers try to 40 is knowable (= can be known) and what is

n 00.1η , \$'n00.7 adj • Knowing means ou know what someone is really thinking, ve not directly expressed it: As soon as I 45 colin started giving me knowing looks.

 f^{\pm} 'n $\cup \cdot$ in \cdot in \cdot in $\circ \cdot f$ and \bullet she smiled m (= in a way showing that she knew what thinking). • The shop assistant talked ve lots of information) **about** the technical achine. • If you do something knowingly, wareness, esp. of its likely effect: They are ingly dealing in stolen goods.

MILIAR WITH $f n \partial U$, $f n \partial U$, $f n \partial U$ v [not bea command] past simple knew f n j u;55t known $f n \partial U$, $f n \partial U$, $f n \partial U$, $f n \partial U$ 55t known $f n \partial U$, $f n \partial U$, f n

guine even y she jell over one. • "Knowing Me, Knowing You" (title of a song by Abba, 1977) • "Know thyself" (saying, written on the ancient temple of Apollo in Delphi) known /£ noun/ adj [not gradable] • Something or someone that is known is familiar to or understood by people: These people are known criminals. • There is no known reason for the accident to have happened. o It is a little known fact that he was married before. • He is known to the police because of his previous criminal record. • If someone or something is known as a particular name, they are called by that name: And this is Terry, otherwise known as 'Muscleman'. • These chocolate bars are known as something else in the US, but I can't remember what. • If you make known something/make something known, you tell people about it so that it becomes publicly known: Local residents have made known their objections to the proposed new road. o I made it known that I was not happy with what had been decided. . If you make yourself known (to someone), you tell them who you are: Just go to the hotel reception and make yourself known (to the receptionist). See also WELL-KNOWN.

know-ledge /£ 'nol.1d3, \$ 'na:.1ld3/ *n* [U] understanding of or informatic bout a subject which has been obtained by idy, and which is either in a person's mind y people generally • Her knowledge of

English gram r i s. • Human know ig hour and in this hour. • In this can also mean a

35

ur knowledge

r is very extensive. • I have no knowledge of r is very extensive. • I have no knowledge ts. • He has a limited knowledge of French. Ige of planets outside our own solar system he details of the scandal are now common iliar to most people). • She started to ocuments, safe in the knowledge that he wouldn't be disturbed for at least an in there are only a couple of restaurants wledge (= judging from my personal prmation) serve good food. • Knowledge reness: The owner claims the boat was her knowledge. • The Government deny affair. • It has come/been brought to We have discovered) that several missing • "Knowledge itself is prome"

For the Whole Ecosystem: - Why are ASHRAE, the **DOE**, and National **Research Laboratories so** involved in the work of semantic tagging standardization?



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Diverse Integrations Present Challenges

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Platform

- 🔻 🎽 Station (
 - 🌲 Alarm
 - Onfig
 - Services
 - Drivers
 - NiagaraNetwork
 - BcpBacnetNetwork
 - Local Device
 - ▶ 旦 Bacnet Comm
 - Monitor
 - X Tuning Policies
 - Plant
 - 🕨 🖹 AHU
 - 🕨 🛅 FCU
 - VAV
 - 💌 🛅 LowRise
 - 💌 🛅 1st Floor
 - 💌 🚔 Vav1 1
 - Alarm Source Info
 - Points
 - ActCoolSP
 - ActFlow
 - ActFlowSP
 BalancingOvr
 - Balancin
 - CO2Sensor
 ComSensorMaxCoolSP
 - ComsensorMaxCoolSP
 On SensorMinCoolSP
 - ComsensorMinCools
 M ComSensorSpOffset
 - ComSensorSp01
 - CoolModeTempErr
 - B DamperDir



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- Platform
- 🔻 🎽 Station (
 - Alarm
 - G Services
 - Orivers
 - Niagara Network
 - ConNetwork
 - ConNetwork2
 - 🕨 💼 Local Lon Device
 - 🔻 着 FPVAV_2_36
 - Alarm Source Info
 - Device Data
 - Points
 - N nciDuctArea
 N nciKFactor
 - nciMinFlowSetpt
 - Note Not Not Network Networ
 - N nciMaxFlowSetpt
 - InviTodEvent_currentState
 - N nviSupplyTemp
 N nviSetPoint
 - nciWallModCom HighSetPt
 - Note: Not
 - Note: Not
 - Note: Not
 - NoiTempSetpoints_standbyCool
 - Image: Contract of the second seco
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 - Note: Not
 - SpaceTemp
 - nciWallModCom_UseWmStPt
 - InvoEffectMode

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- △ Platform
- 🔻 🎽 Station (👘)
- 🌲 Alarm
- Config
- Services
- Drivers
 - NiagaraNetwork
 - JciN2Network
 - Terminal_Units
 - Elevent
 Sth Floor_Southwest
 - VAV29_5SW
 - Alarm Source Info
 - Points
 - 👻 🖽 VAV
 - Occupancy_Schedule
 - Effective_Occupancy
 - N Zone_Temp
 - None_Temp_Setpt
 - Warm_Cool_Adjust
 - Effective_Cooling_Setpt
 - Number Number
 - Nupply_Flow_Setpt
 - Nupply_Velocity_Pressure
 - 🕨 🕔 Damper_Output
 - Damper_Position
 - Cooling_Max_Flow_Setpt
 - Occupied_Cooling_Min_Flow_Setpt
 - Unoccupied_Cooling_Min_Flow_Setpt
 - Occupied_Cooling_Bias
 - Unoccupied_Cooling_Bias

- - Platform
 - Station (
 Alarm

G Services

NiagaraNetwork

CommFourNetwork

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- Depints

Alarm Source Info

- El Input

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input_activeHeatSetpnt

Input activeCoolSetpht

Input spaceTemp

B input heatActive

B input fanCmd

Input damperPosition

Input minCoolFlow

Input minHeatFlow

M input_maxFlow

Input airFlow

Control

- 16

Input thumbWheelSetpht

input spaceTempComposite

Input activeMinFlowSetpht

Control occHeatSetpht

Control_occCoolSetpnt

Control_unoccHeatSetpht

Control unoccCoolSetpht

Suite 135

ConNetwork

Drivers

- Oconfig

Tags and Relations Enhance Data Integration

Metadata adds queryable definition to data, apart from entity naming and database structure

63 ● ../ 🖓

Tags and Relations Enable Scalable Deployments

Data Querying For Optimizations



Tag-Based Graphics

Niagara Analytics Based FDD







Why an Ontology?

- Apply **structure** to unstructured and messy point data
- Make building data **machine-readable** for applications
- Create a **rich data model** about a building





Project Haystack's Objectives

- Create a validation framework for Haystack semantic models
- Establish a public repository for the "Specs"
- Deploy a certification/accreditation system for semantic interoperability
- Provide associated open-source tools
- Project Haystack Leading DoE's Funded Project 2021-2025







What is Xeto?

A new facility called XETO (eXtensible Explicitly Typed Objects)—part type system, part template system, part query language, part API

- Type system for data based on "Specs"
- Simple TypeScript-like text format
- Validate Haystack models
- Templates to build models (unitary controllers)
- Share in a cloud-based community repository
- Path to Interoperability with Brick (RDF, SHACL)



Semantic Model Validation Engine

- Building owners and others will have confidence knowing how their building is tagged and what requirements are met
- Demarcating the tagging process will create tagging specialist that will be expert at modeling buildings without having to know all aspects of the entire system.
- Validation methodology will dramatically increase the clarity and quality of implementations
- Associated tools sets will increase speed and lower costs of implementations





WHAT IS OAP?

- Ontology
 - Data about the data (meta data)
 - Standard set of entity definitions and attributes
 - Standard set of relationships between entities

Alignment

- Roots in Project Haystack
- Translatable to other building metadata schemas

• Project

• Open-source, living, evolving standard built with internal and external contributions









ASHRAE standards and guidelines for digitization and interoperability

- Standard 135 (BACnet)
 - Communication protocol
 - Does not specify meaning of the data
- Guideline 36
 - Best-in-class sequences of operations
 - Not digitized (300+ page word document)
 - Very complex
- Standard 231P
 - Language to codify sequences in vendor-neutral format
 - Vendors can import and translate from open-source code
- Standard 223P
 - Semantic Model
 - Representing detailed equipment layout, compatible with Haystack and Brick



Communication

Protocols

Std 135

Control

Description

Language

Std 231(p)

(BACnet)

High Performance

Sequences of

Guideline 36

nteroperable

Semantic

Std 223(p)

Models

Operation



DOE-supported tools □ lbl-srg / ctrl-flow X Welcome to ctrl-flow, the High Performance Controls Design Tool E Systems 🛱 Configure I Results

....

Energy standard

ASHRAE 90.1

After inputting project details, the tool will produce a detailed

CONTINUE

ASHRAE climate zone

Zone 1A, Very Hot and Humid ~

CONFIGURE PROJECT

×

sequence of operations document.

Ventilation standard

ASHRAE 62.1





DOE/NREL Open-Source Tool: BuildingMOTIF





Writing a detailed and accurate control sequence is hard to do!

sequences following ASHRAE Guideline 36 and best practices.

This tool makes it easy to design high performance control

Project Configuration

International system of units ~

Unit system





State-of-the-Art and Best Practices in Semantic Tagging for Smart Buildings today?

- Tag in the BMS or Tag in the Overlay? Does it matter?
- Tag with confidence in eventual interoperability, ease of translation, between semantic modeling standards?
- Tag sufficiently, i.e. a 'sufficient' model is one that contains enough information to support the class of applications required by the endcustomer (today and tomorrow)

TRIDIUÂ



Will AI solve all problems?

Can you get a bot to do the tagging for you? How soon can we expect that? What are the obstacles?





Questions?



