Haystack

• Official...

• “…to develop a standardized approach to representing and using [data and] metadata

• Common methodology for defining metadata (tags) and common vocabulary (community defined tag libraries)

• Started in building automation community, general IoT potential
  • machine-understandable description for apps and services, e.g., analytics

• An open-source styled, community contribution of tag definitions
Haystack Model

• Haystack components
  • Entities: things to describe, like sites, points, equipment
  • Tags: name/value pairs, describe a fact or attribute of entity
  • Entities are modeled as collection of tags

• Can be used to define
  • Sites (location, address, geo coordinates, year built, function, tz)
  • Equipment (ahu, hvac, vav, zone, chiller, pipe, installed…)
  • Points (sensor, discharge, air temp, unit, tz, siteRef, equipRef)
Sensor data and meta-data use

- Sensor “zn3-wwf14” “77.6” ??
- Apps and services, like analytics, would benefit from add'l info
  - Is a zone temperature
  - Is an exterior zone
  - Is South facing
  - Is supplied by VAV box
  - Is served by AHU-1
  - Is operated on occupancy schedule #1 (7:30 am – 6:30 PM)
  - Has an occupied setpoint of 74 F
  - ... geographic location, date (season), building type, constructed...
- All of these can be expressed in Haystack
Haystack example, “legacy” annotation

```
"id": "150a3c6e-bef0ee0e",  //RecId
"dis": "zn3-wwf14"  //str, for UI
"sensor": "m:",  // marker is Haystack notation for metadata
"temp": "m:",  // meta, measures temperature
"air": "m",  // of air
"curVal": "n:77.60",  // current value
"unit": "F",  // measurement unit, F
"zone": "m",
"floor": "n:4",
"scheduleRef": occSchedule1,
"equipRef": "@AHU-1"
... yearBuilt, primaryFunction, area, geoStreet, geoCity..
```
Haystack, simple end-points example (POC)

```
// used to denote comments, not official syntax

"id": "r:ghay.ahu1.cwt", // identifier
"dis": "Air-Handling Unit 1, Chilled Water Temperature" // for UI
"sensor": "m:", // marker is Haystack notation for metadata
"temp": "m:", // meta, measures temperature
"water": "m:", // meta, water (temperature) designation
"unit": "F", // measurement unit, F
"curVal": "n:42.18", // current value
"minVal": "n:34", // minimum value
"maxVal": "n:45", // max value
"DateTime": "t:2017-07-05T17:37:25 Paris" // time stamp

---

"id": "r:ghay.lobby.co2s",
"dis": "CO2 Sensor, Lobby"
"sensor": "m:",
"co2": "m:", // meta, sensor measures CO2
"unit": "ppm",
"curVal": "n:460.21",
"DateTime": "t:2017-07-05T17:37:26 Paris" // time stamp
```
Observations, interop

- Descriptive, not prescriptive
  - Does not mandate which tags to use with which entity **BUT**
  - defines how to name and structure tags when used
- Not a fixed object-model structure
  - ID and units
  - Meta-data added as desired, tags
  - Has linking mechanism, named ...Ref
- Common tag naming = pragmatic (almost) semantic substitute
  - Apps and services can use tags to infer meaning
Q&A

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Qs

• What do you work on?
  • Domain, scope (foster interoperability)

• How do you work?
  • Open source (crowd sourcing…)
  • Working groups led by domain experts draft proposals, acceptance by consensus

• How far did you get?
  • Working on defining and extending tags for 5 years, current release 3.02
  • Fairly sophisticated models for commercial buildings, HVAC systems, power meters
Qs

- **Opportunities for Reuse/Integration**
  - Open for reuse/integration
  - Tagging model simple, flexible for use in other standards
  - Adopt naming and modeling conventions of other standards?

- **Opportunities for collaboration**
  - All IP licensed under open source, easy to reuse
  - Have many domain experts, straddle multiple domains to collaborate...

- **Opportunities for research**
  - WGs on data centers, fume hoods, access security, refrigeration systems, vertical transportation