

EDGE X FOUNDRY™

TSC Meeting

November 29, 2017



Meeting Logistics

Time: November 29, 2017 7am PST – 8am PST

Join from PC, Mac, Linux, iOS or Android: <https://zoom.us/j/983155298>

Or iPhone one-tap (US Toll): +14086380968,983155298# or +16465588656,983155298#

Or Telephone:

Dial: +1 408 638 0968 (US Toll) or +1 646 558 8656 (US Toll)

+1 855 880 1246 (US Toll Free)

+1 877 369 0926 (US Toll Free)

Meeting ID: 983 155 298

International numbers available: <https://zoom.us/zoomconference?m=mkFexUxEcqHlvXHw53PqScTDRvS48PiQ>

** TSC calls are recorded and added to Wiki post-call

LF Antitrust Policy Notice

EdgeX Foundry meetings involve participation by industry competitors, and it is the intention of the Linux Foundation to conduct all of its activities in accordance with applicable antitrust and competition laws. It is therefore extremely important that attendees adhere to meeting agendas, and be aware of, and not participate in, any activities that are prohibited under applicable US state, federal or foreign antitrust and competition laws.

Examples of types of actions that are prohibited at EdgeX Foundry meetings and in connection with Linux Foundation activities are described in the Linux Foundation Antitrust Policy available at <http://www.linuxfoundation.org/antitrust-policy>. If you have questions about these matters, please contact your company counsel, or if you are a member of the Linux Foundation, feel free to contact Andrew Updegrove of the firm of Gesmer Updegrove LLP, which provides legal counsel to the Linux Foundation.

TSC – Members Present Today

<u>Company</u>	<u>Name</u>	<u>Email</u>
IOTech	Andy Foster	andy@iotechsys.com
Analog Devices	Doug Gardner	doug.gardner@analog.com
Mainflux	Janko Isidorovic	janko@mainflux.com
Dell	Jason Shepherd	Jason.A.Shepherd@dell.com
The Linux Foundation	Jeremy Phelps	jphelps@linuxfoundation.org
Dell	Jim White	james.white2@dell.com
IOTech	Keith Steele	keith@iotechsys.com
Samsung	MyeongGi Jeong	myeong.jeong@samsung.com
VMware	Salim AbiEzzi	salim@vmware.com
Canonical	Tony Espy	espy@canonical.com
Samsung	Uze Choi	uzchoi@samsung.com

Current quorum = 7 members

*Note: TSC meetings shall require a **quorum of two-thirds of the TSC total members to take a vote or make a decision.** If a TSC meeting fails to meet the quorum requirement, discussions may proceed, however there shall be no voting or decisions.*

Today's Agenda

- Welcoming New Members
- Systems Management WG Progress
- Project Haystack Presentation
- New Vertical Solutions WG Project - Oil & Gas
- TSC F2F Meeting (January)
- IIC Liaison Updates
- Core WG Update
- Security Working Group Update
- TSC Speaking Opportunity (OpenIoT Summit)
- AOB



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Welcoming New Members

Brett Preston

Welcoming New Members

- [aicas](#)
 - aicas is a leading producer of Java development and analysis tools for realtime and embedded systems. The company was founded in 2001. It is headquartered in Karlsruhe, Germany.





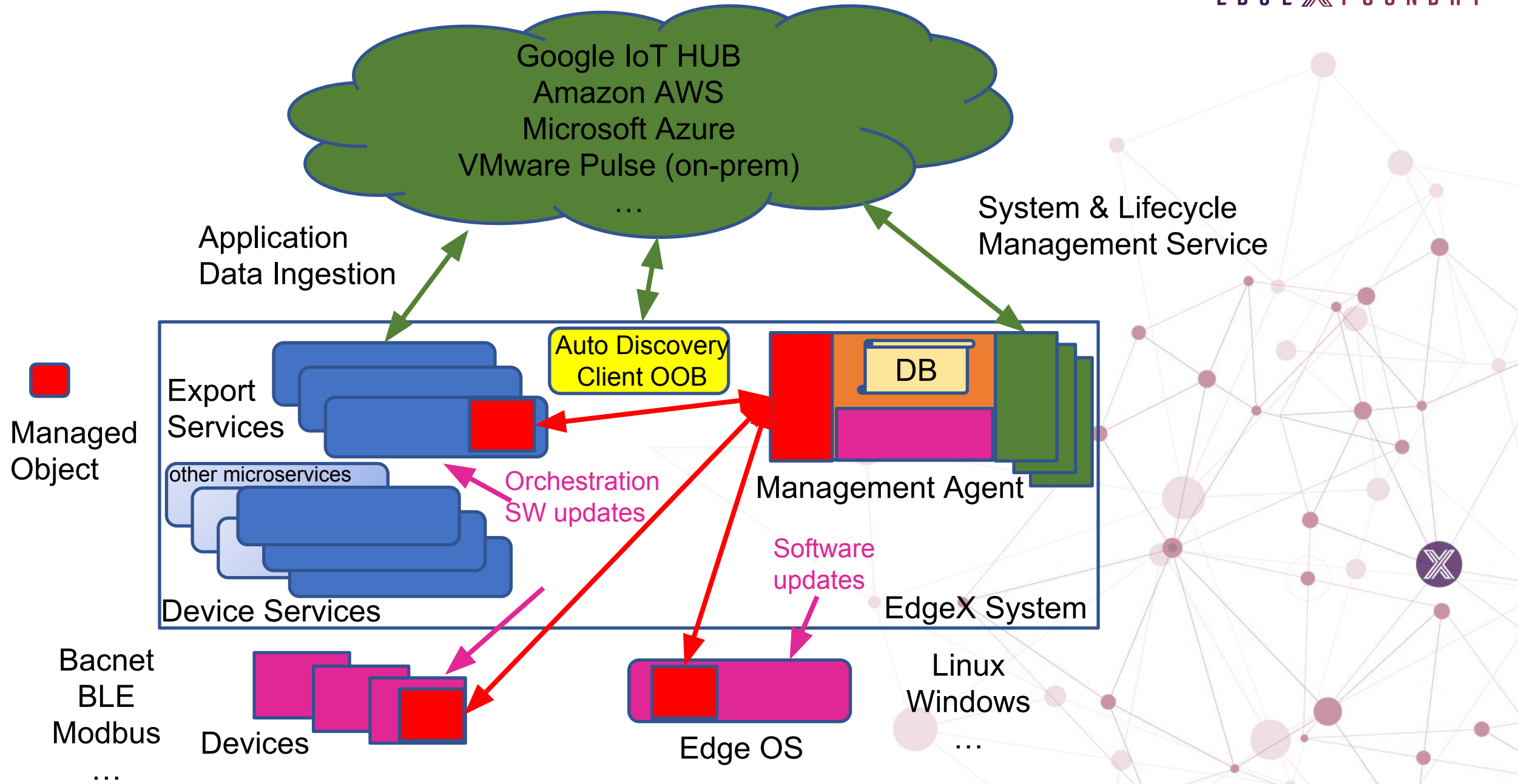
Systems Management Update

Salim AbiEzzi

Agenda

- System & lifecycle management
- Jim's proposal for microservices MO API

- Reminder to join bi-weekly System Management Working Group calls
 - Bi-weekly at 6am PST on Tuesdays
 - Email info@edgexfoundry.org to be added directly to meeting invite
 - [Mailing List](#)
 - [Wiki Page](#)

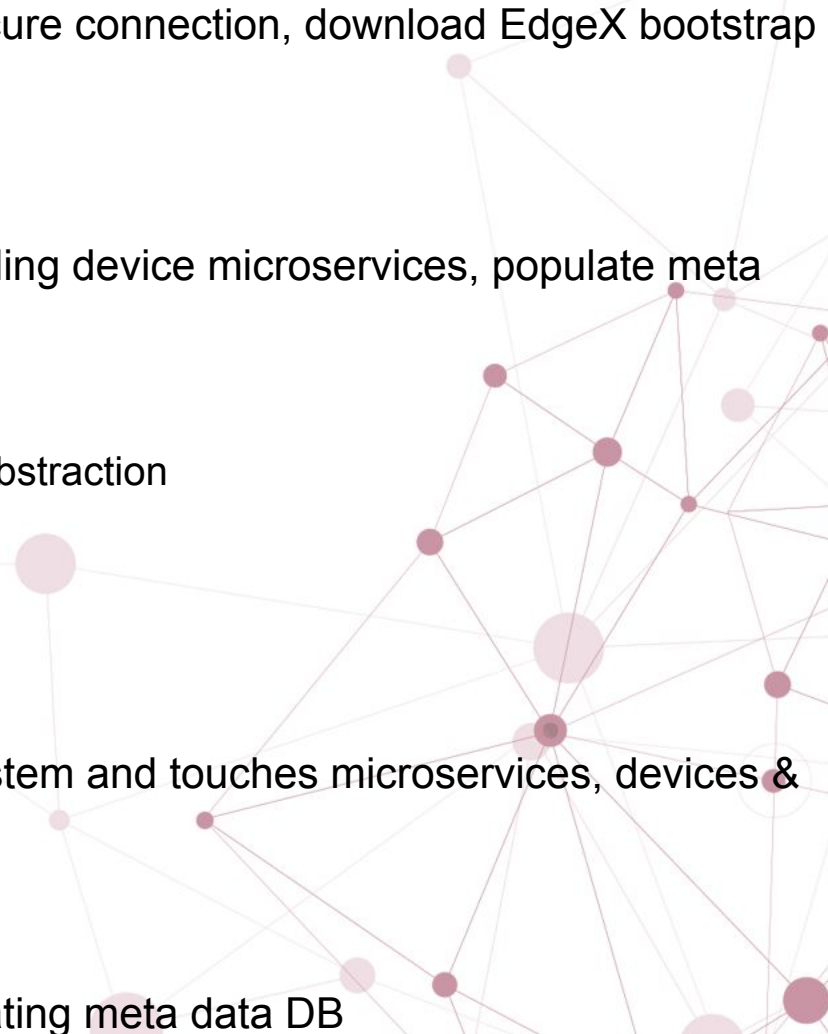


EdgeX as Collection of Bridges

- Bridging to devices
 - From different device standards to a common REST API through EX device services
- Bridging to data ingestion services
 - Metrics/time series to data processing (analytics) and storage services through EX export services
- Bridging to system management services
 - Infrastructure metrics, actions and alerting through MO APIs
- Bridging to lifecycle management services
 - Orchestration of EX microservices (Docker compose, Kubernetes, etc.)
 - Software updates and security patches through the edge system



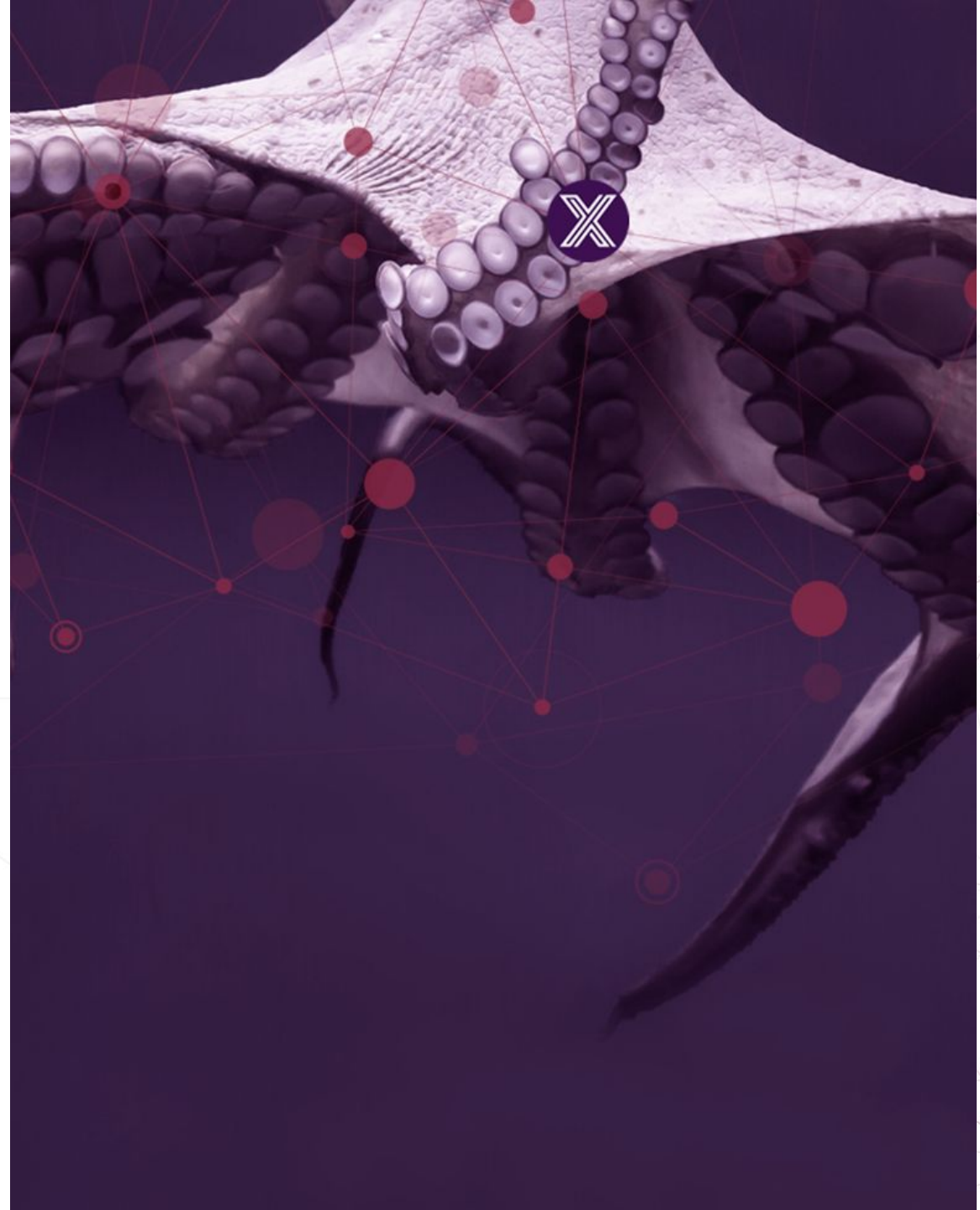
Lifecycle of an EdgeX System

1. Edge system OOB **auto-discovers config server**, establish secure connection, download EdgeX bootstrap package
 2. **Install, bring-up & orchestration** of EdgeX microservices
 3. **On-board devices**, connection to edge system, load corresponding device microservices, populate meta data DB
 4. **Monitor & manage system** thru management agent
 - Metrics, actions and alerts based on Managed Objects (MO) abstraction
 - MOs for microservices, edge system and connected devices
 - System components shown on management UI
 5. **Application metrics** transfer for data analytics and storage
 6. **Software updates & security patching**, done through edge system and touches microservices, devices & the edge system itself
 7. **Connect & disconnect devices**, alert services
 8. **New applications**, need to discover state of system by interrogating meta data DB
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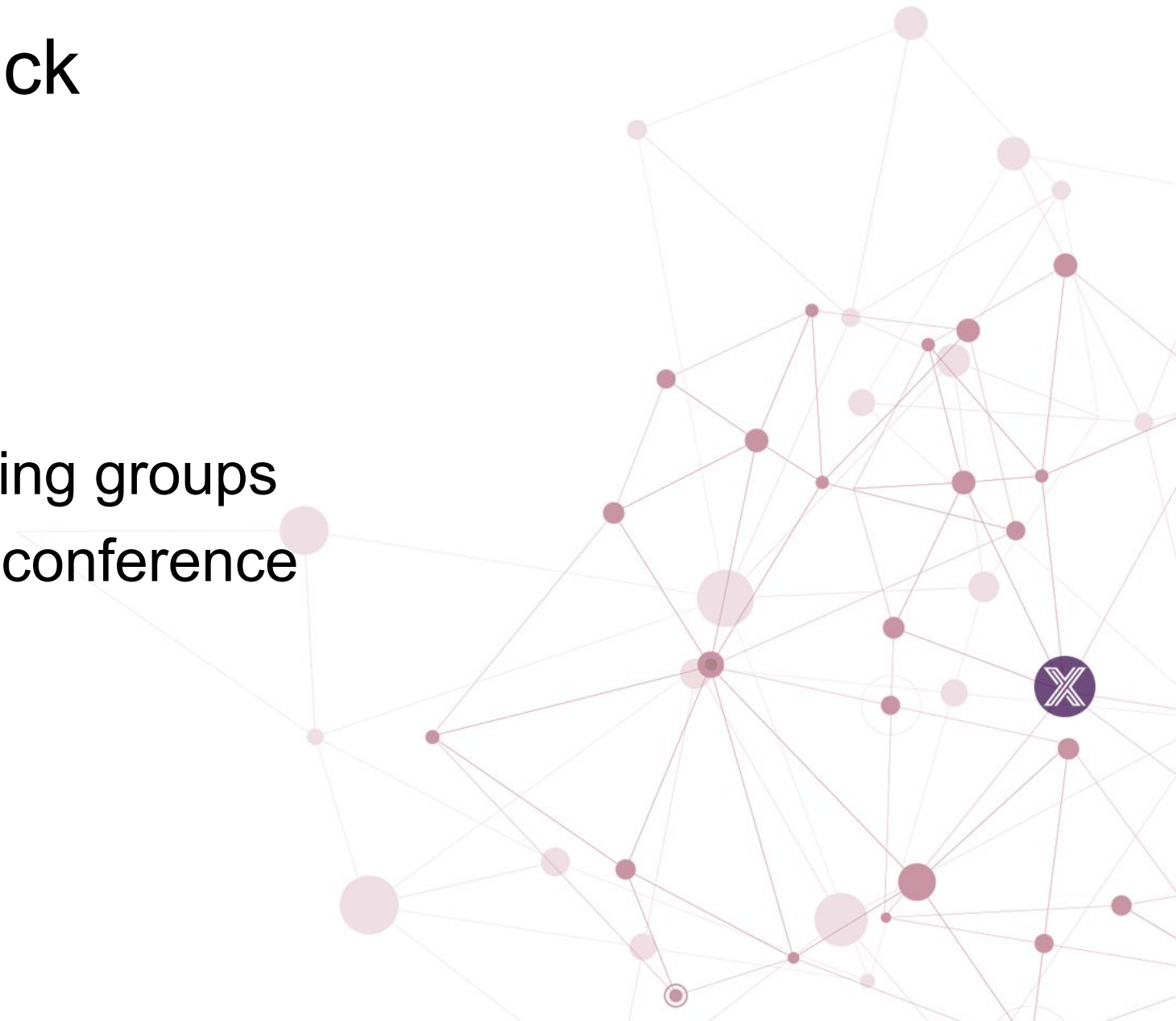
Project Haystack

Brian Frank
SkyFoundry



What Is Project Haystack

- Ontology for IoT
- Open source community
- Nonprofit 501C corporation
- Web site: docs, forum, working groups
- Haystack Connect: biennial conference
- Member of EdgeX Foundry



Domain

- Built environment and energy
- Buildings, factories, multi-site retail, education, government, military, data centers, utilities
- Distribution and interconnection: electricity, water, steam, air
- Complicated relationships between systems and spaces
- Commonality of sensor systems

Community

- Mix of end users, system integrators, consultants, and vendors
- Used in 10,000s of sites (all the different verticals)
- Academics and labs (NREL, UC Berkley Brick)
- ASHRAE BACnet semantic modeling
- KNX Association
- Ontology development requires unique mix of software and domain expertise

Applications

- Haystack is focused on the data!
- Layer above protocols: BACnet, OPC, SNMP, Modbus, etc
- Often overlay above control system, gateways, PLCs, etc
- Analytics, navigation, visualization
- Simple analytics example:
 - Find all the Air Handling Units across my sites
 - Find periods of time when heating and cooling running simultaneously
 - Real example worth millions of dollars

What We Model

- Site: building, factory, data center, equipment hut, geographic address
- Equip: asset, meter, AHU, tank, boiler, plant
- Point: sensor, actuator, setpoint/soft point
- Weather: stations and 14 specific weather points

Philosophy

- Information model
- Real world data is sparse and messy!
- Most sites and many devices are typically one-offs
- Decades of "profile" development
- Ontology vs folksonomy (standard vs project)
- Not everyone is a data scientist; often it's a contractor installing a system
- Often implemented with spread sheet

How We Model

- Tags: first class name/value pairs (RDF triples)
- Tag models a fact/attribute about an entity
- Entities are modeled as associative array of tags (map, dict, JSON object)
- Easily overlaid and added to existing systems and projects

Tag Model

- Standard value types: Marker, Bool, NA, Number, Str, Uri, Ref, Date, Time, DateTime, Coord
- Standard unit database (~300)
- Standard timezone database (Olson)
- Entity primary key is the "id" tag
- Relationships cross-reference to id
- Human display name is the "dis" tag (no semantics!)

Site Example

- id: @white-house
- dis: "White House"
- site
- geoAddr: "1600 Pennsylvania Ave NW, Washington DC"
- geoCoord: C(38.8977, -77.0365)
- area: 55000ft²
- tz: "New_York"
- yearBuilt: 1792
- weatherRef: @weather.washington

Point Example

- Most existing systems only provide display name
- Typically configured in field on ad-hoc basis
- Start off....
- dis: "Building-X Demand"
- point

Point Example – Step 1

- dis: "Building-X Demand"
- point
- sensor | cmd | sp?

Point Example – Step 2

- dis: "Building-X Demand"
- point
- sensor
- elec | air | water | steam | gas | refriger?

Point Example – Step 3

- dis: "Building-X Demand"
- point
- sensor
- elec
- power | energy | volt | current | pf?

Point Example – Step 4

- dis: "Building-X Demand"
- point
- sensor
- elec
- power
- active | reactive | apparent?

Point Example – Step 5

- dis: "Building-X Demand"
- point
- sensor
- elec
- power
- active
- phase A, B, C, AB, BC, CA | avg?

Point Example – Step 6

- dis: "Building-X Demand"
- point
- sensor
- elec
- power
- active
- avg
- unit: W, kW, MW, BTU/h, therms/h?

Point Example – Step 7

- dis: "Building-X Demand"
- point
- sensor
- elec
- power
- active
- avg
- unit: kW
- import | export | net?

Point Example – Step 8

- dis: "Building-X Demand"
- point
- sensor
- elec
- power
- active
- avg
- unit: kW
- net
- equipRef: what meter?

Point Example – Step 9

- dis: "Building-X Demand"
- point
- sensor
- elec
- power
- active
- avg
- unit: kW
- net
- equipRef: @building-x-main-elec-meter
- and more
 - sub-meters and loads to model building's electrical distribution
 - current value and status
 - historized time series data, how it was collected, etc

More (Optional) Stuff

- Formats: JSON, Zinc (typed CSV), Trio (YAML)
- RDF/linked data (Microdata, RDFa, JSON-LD, Turtle, SPARQL)
- HTTP API: read tagged data, real-time watches, history data, writes
- Libraries: Java, C#, JavaScript, Dart, Python, C++

EdgeX Integration

- How does EdgeX manage its ontology model? Meta data service?
- Allow native Haystack tagging in your meta data?
- If other ontologies? Then how to translate to Haystack?
- Importing Haystack data (south bound connectivity)
 - Much simpler HTTP API than other protocols
 - Often Importing tagged data already fully modeled (80%+ of cost)
- Exporting Haystack data (north bound connectivity)
 - Plug into many analytics and visualization products
 - Export fully modeled data instead of raw data

Conclusion

- Learn more: <https://project-haystack.org/>
- Questions?
- Next steps?
- Thank You!

Suggestion risen to do a similar intro on a Project Haystack call and look to get someone in the community to do a PoC with Haystack on the north side. Then look to do a PoC as suggested, potentially incorporating into a buildings-focused project in the Vertical Solutions Working Group.



Vertical Solutions Group - New Project Oil and Gas

Alberto Dellabianca

Proposal for TSC

- Project Lead - **Alberto Dellabianca (National Oilwell Varco)**
- Other Company to join this project - **OEM, Service Providers, Operators. Few contacts so far, no official commitment**
- Deliver Specific Market Requirements to Other WGs – **Presentation posted on wiki is a generic starting point. Specific requirements will be contextualized in EdgeX perspective (scorecard for each category / microservice)**
- Create Reference Architecture for Specified Vertical / Use Case - **Define 3 reference implementations: Single Asset, Onshore Facility, Offshore Facility**
- Develop Unique Source Code Outside of Core - **Osisoft PI Export, Native TSDB – Target California Release?**
- Liaison with Appropriate SDOs and Consortia - **Society Petroleum Engineers, Universities**

Specific collaborations with other WGs

Security Services

Provide requirements

Export Services

Export Service to Osi PI
Export Service to influxdb

Support Services

Test streaming analytics in high throughput scenarios

Core Services

Native TSDB collaboration?

Device Services

Provide requirements on which industry protocols are missing
Test high throughput scenarios with OPC UA

System Services

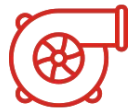
Provide requirements

Collaborate on mockups for a local management console

Define use case and workflow for backups to cloud

Reference Architecture

- Specify a reference architecture for 3 Macro Scenarios
- Recommended specs (minimum hardware & docker-compose)
- Test beds



Single Asset (Fixed/Mobile)

Up to 1,000 inputs/s



Onshore Facility

Up to 10,000 inputs/s



Offshore Facility

Up to 100,000 inputs/s

Why OSI PI Export Service?



- Enterprise historian used by majority of operators
- The platform itself comes from the refining industry and later on expanded in Upstream

Why a native TSDB?

- Massive amount of sensor and control data (ingestion volume and velocity)
- Need a local efficient persistent storage for long periods (offline scenarios)
- Need for native time series functions for local analytics
- Solution: local influxdb (Open Source, written in Go)
- 2 Options
 - Northbound Export service to influx as if it was an external microservice
 - Modify the Go version of “Core Data” in order to support as a backend influx (alternative to Mongo)

Request for TSC Approval

- Call for a vote for TSC Approval of the Oil and Gas Project, under the Vertical Solutions Working Group
- Result: Quorum not reached on call > Vote will be risen over email



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TSC F2F Meeting

Keith Steele / Brett Preston

January 16-18, 2018 - Orlando, FL

- Wiki page:
<https://wiki.edgexfoundry.org/display/FA/16-18+January+2018%3A+Orlando+Technical+Meeting>
- Venue secured:
 - [HYATT REGENCY ORLANDO INTERNATIONAL AIRPORT](#)
- RSVP by emailing info@edgexfoundry.org
 - Note if you plan to attend in-person or by dial-in
 - Current RSVP Counts: 8 in-person / 0 dial-in



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IIC Liaison Updates

Keith Steele / Jim Clardy

IIC/EdgeX Collaboration

- Under the agreement, the IIC and the EdgeX Foundry will work together to align efforts to maximize interoperability, portability, security and privacy for the industrial Internet
- Joint activities between the IIC and the EdgeX Foundry will include:
 - Identifying and sharing best practices
 - Collaborating on test beds and experimental projects
 - Working toward interoperability by harmonizing architecture and other elements
 - Collaborating on common elements
 - Periodically hosting joint seminars

Words into Action

- Joint activities between the IIC and the EdgeX Foundry will include:
 - Identifying and sharing best practices/ Technical Liaison, share common goals, agree joint positioning, identify collaboration areas e.g. Edge (do we agree what Edge is), security collaboration
 - Collaborating on test beds and experimental projects Existing Edge projects, New Edge Projects, Vertical collaboration, education
 - Working toward interoperability by harmonizing architecture and other elements Working Group? Map to IIC reference architectures?
 - Collaborating on common elements Test Beds? Security? Systems management? others?
 - Periodically hosting joint seminars - Internal joint project discussions to take forward above + external Edge Symposium for market education



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Core WG Update

Jim White

Core WG Updates

- Dot release (0.2.1) of Barcelona branch being created to deal with Consul config issue
 - California Preview Release will be 0.5.0
- GitHub Projects back up and running
 - Project Tasks now inserted as “issues” to provide visibility
 - Have a roadmap item, feature need, task you’d like to add? See <https://wiki.edgexfoundry.org/pages/viewpage.action?pageId=7602421>
- Architectural discussions
 - See <https://wiki.edgexfoundry.org/display/FA/Architecture+Issues+and+Decisions>



Security Work Group Update

Doug Gardner

Security Working Group Priorities

- Priority #1 - Inbound Connection Manager Firewall (Active Ongoing)
- Priority #2 - Key Management (Active Ongoing)
- Priority #3 - Internal Micro service Security Protocol (Waiting) - targeting completion by Jan face-to-face meeting.

- Team will select priorities 4, 5 and 6 in today's meeting

Security WG

API Manager - Next Steps

- Evaluate available options
 - Tinyproxy
 - lighttpd
 - Apache - mod proxy
 - nginx
- Resolve Requirements/Licensing/etc
- Timeline
 - Proposal to WG by Nov 30th
 - Review completed by Dec 31st
 - Proposal to TSC (@f2f)

Security WG

Key Management - Next Steps

- Evaluate available options
 - Hashicorp Vault
 - KeyWhiz
 - Confidant
 - Kubernetes
- Resolve Requirements/Licensing/etc
- Timeline
 - Proposal to WG by Nov 30th
 - Review completed by Dec 31st
 - Proposal to TSC (@f2f)

Security Work Group Meeting Today post this call

11:00 am EST

Meeting Time

- Security Working Group meetings are open to the public, and are held weekly.
- Security Working Group meetings are held on Wednesday's at 8am PST (find your local time [here](#))
- To be added directly to the meeting invitation, please email info@edgexfoundry.org
-
- -----
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- Dial-In Info:
- Join from PC, Mac, Linux, iOS or Android: <https://zoom.us/j/576218946>
- Or iPhone one-tap (US Toll): +14086380968,,576218946# or +16465588656,,576218946#
- Or Telephone:
- Dial: +1 408 638 0968 (US Toll) or +1 646 558 8656 (US Toll)
- +1 855 880 1246 (US Toll Free)
- +1 877 369 0926 (US Toll Free)
- Meeting ID: 576 218 946
- International numbers available: <https://zoom.us/join?j=576218946>



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TSC Speaking Opportunity

Brett Preston

OpenIoT Summit

- <http://events.linuxfoundation.org/events/openiot-summit>
- March 12-14, 2018
- Portland, OR (USA)
- CFP now open
 - <http://events.linuxfoundation.org/events/openiot-summit/program/callforproposals>
 - Deadline: Sunday, January 7, 2018



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AOB / Reminders

Brett Preston

Project Resources

Quick links to most commonly used Community Resources

- Code: <https://github.com/edgexfoundry>
- Documentation: <https://wiki.edgexfoundry.org/>
- Discussion: <https://chat.edgexfoundry.org/>
- Mail Lists: <https://lists.edgexfoundry.org/mailman/listinfo>
- Twitter: <https://twitter.com/EdgeXFoundry>
- LinkedIn: <https://www.linkedin.com/company/22298339/>
- YouTube: <https://www.youtube.com/c/EdgeXFoundry>

Project Contributions Welcome!

- Our objective is to make EdgeX use & deployment pervasive!
- EdgeX success is 100% dependent on the vibrancy of a proactive community
- Getting Involved
 - Project membership growing - want to join contact Philip DesAutels at LF (pdesautels@linuxfoundation.org)
 - First Priority is the MVP - potential contributors please contact keith@iotechsys.com (people, equipment, technology)
 - If interested in adding new projects please contact the relevant working group chair

EdgeX - Where to learn more

- EdgeX Foundry Wiki

<https://wiki.edgexfoundry.org/display/FA/EdgeX+Foundry+Project+Wiki>

- EdgeX Foundry Rocket Chat

<https://chat.edgexfoundry.org/home>

- [Weekly EXF Technical Spin up calls](#) by Jim White, Dell (james_white2@dell.com)

30 minute deep-dive topics followed by 30 minute open Q&A

Call recordings are available on the [Wiki](#)

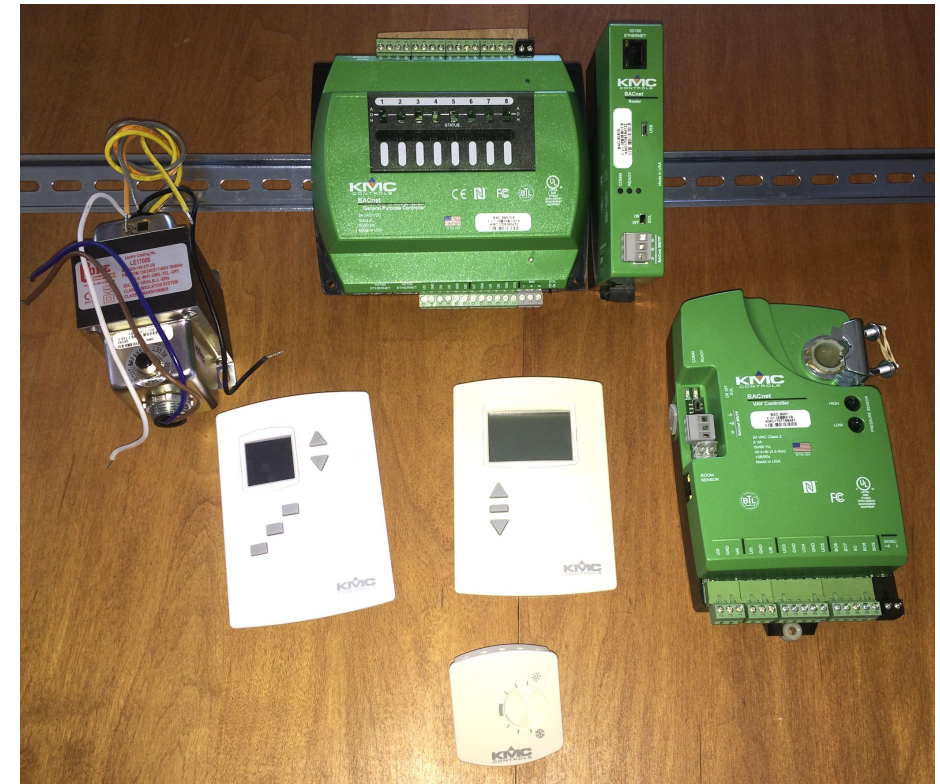
What is the Device Exchange?

- A great way to put your products in the hands of other members so they can help build a better EdgeX!

- <https://wiki.edgexfoundry.org/display/FA/Device+Exchange>



Special thanks to [Dave Bohlman](#) and [KMC Controls](#) for making this awesome kit and how-to guide available to members!!



Hackathon Events

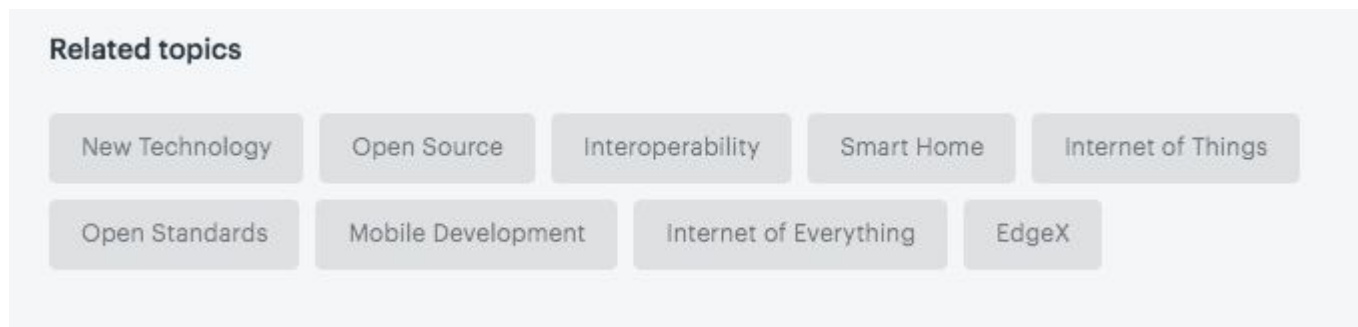
- Dec 1st, regional Startups and Entrepreneurs summit in Cairo.
- Jim White and Tyler Cox putting together hackathon starter kit.
- More coming

Hackathons: How can you help?

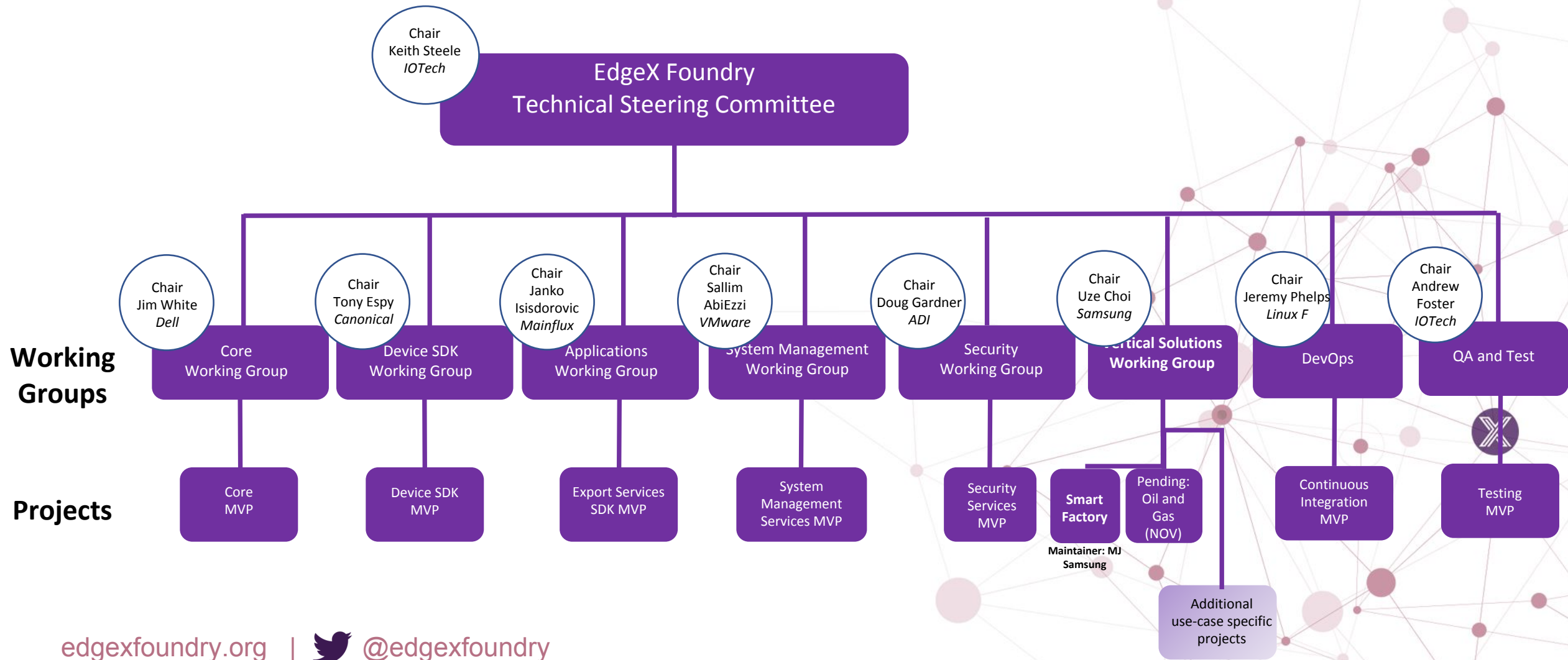
- <https://wiki.edgexfoundry.org/display/FA/Hackathons>
- Provide any local volunteers onsite to help with technical work, potentially help judge, etc. (see list below of known hackathons coming up and locations)
- Sponsor breakfast/lunch/dinner for the participants (usually things like donuts/coffee, pizza lunch or cater sandwiches)
- Sponsor \$ rewards (incentives) for teams that successfully implement projects (these could even be projects that particular sponsors want to see accomplished - we just need them scoped appropriately so as to be something that can be accomplished in a 2 day period)
- Help provide or resource hackathon winner prizes
- Sponsor or provide any swag (t-shirts, mugs, etc.)
- Provide marketing assistance

Meetups

- Help us grow awareness!
- Present, and Tag, EdgeX in your local IoT Meetups
- <https://www.meetup.com/topics/edgex/>
- Email info@edgexfoundry.org for assistance



EdgeX Project Organization



Marketing

- **CTA:** If your company will be demoing technologies that utilize the EdgeX framework, please email events@edgexfoundry.org so that we can add to <https://www.edgexfoundry.org/events/>
- **CTA:** If your company will be presenting EdgeX at an upcoming event/webinar/other, please email pr@edgexfoundry.org so that we can help promote

AOB/Cadence

- Meeting Cadence Reminder
 - Currently held weekly at 7am PST on Wednesday's
 - Calls without TSC quorum will still be used to review issues

- **Next Meeting: December 6, 2017**



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Thank You