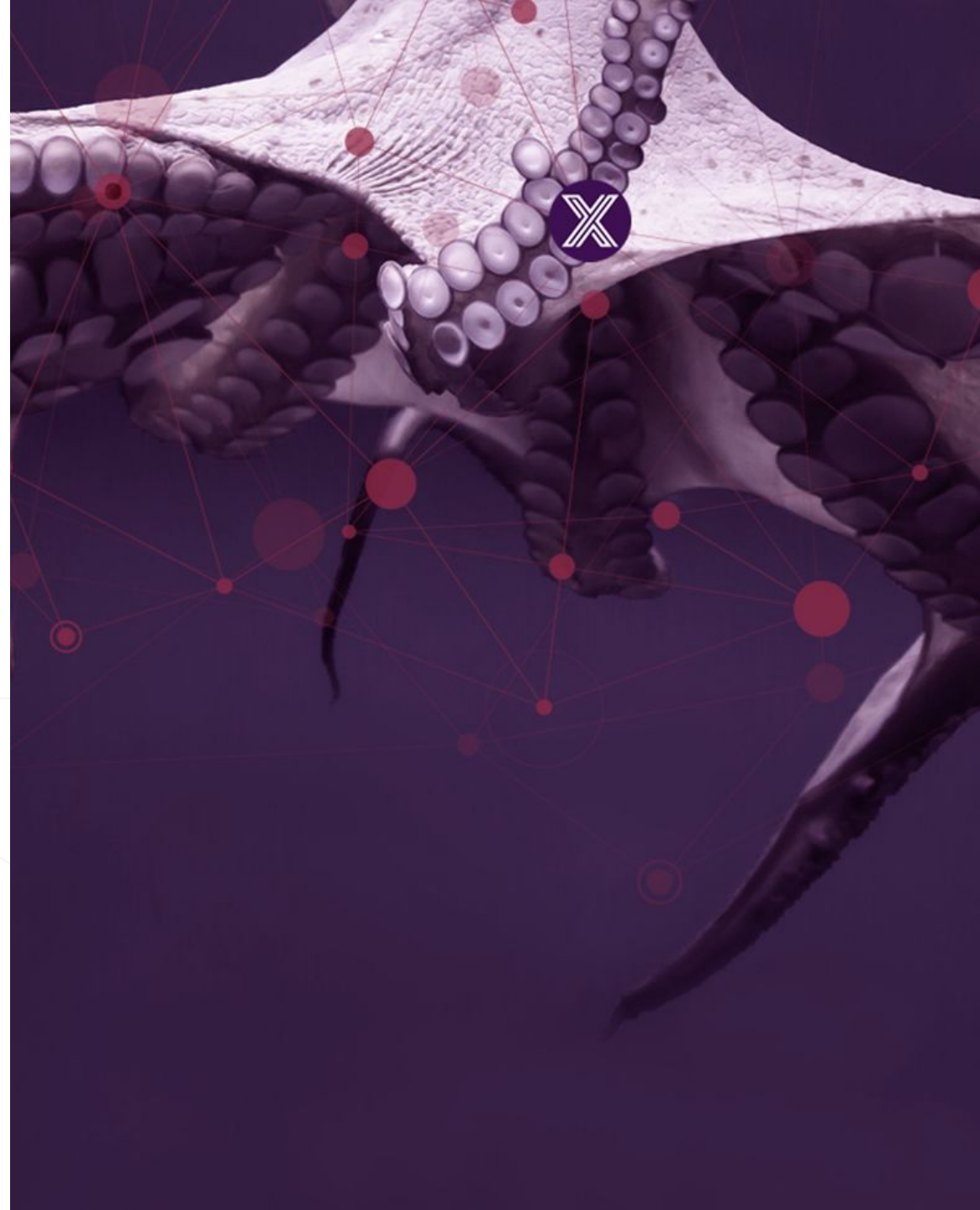


EDGE X FOUNDRY™

# TSC Meeting

June 21, 2017



# Meeting Logistics

Time: June 21, 2017 7am PDT – 8am PDT

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, and 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>
Canonical	Alex Newman	<a href="mailto:alex.newman@canonical.com">alex.newman@canonical.com</a>
Mainflux	Janko Isidorovic	<a href="mailto:janko@mainflux.com">janko@mainflux.com</a>
Dell	Jason Shepherd	<a href="mailto:Jason.A.Shepherd@dell.com">Jason.A.Shepherd@dell.com</a>
Analog Devices	John Walsh	<a href="mailto:john-j.walsh@analog.com">john-j.walsh@analog.com</a>
IOTech	Keith Steele	<a href="mailto:keith@iotechsys.com">keith@iotechsys.com</a>
Analog Devices	Michael Murray	<a href="mailto:michael.murray@analog.com">michael.murray@analog.com</a>
Canonical	Tony Espy	<a href="mailto:espy@canonical.com">espy@canonical.com</a>

*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

- EdgeX Overview
- Boston Technical F2F Recap
- Working Group Organisation & Goals
- EdgeX Release Goals
- AOB
  - Project Resources
  - Marketing
  - Events
  - Reminders
  - Next Time



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# EdgeX Overview

Jim White



# Project Origin

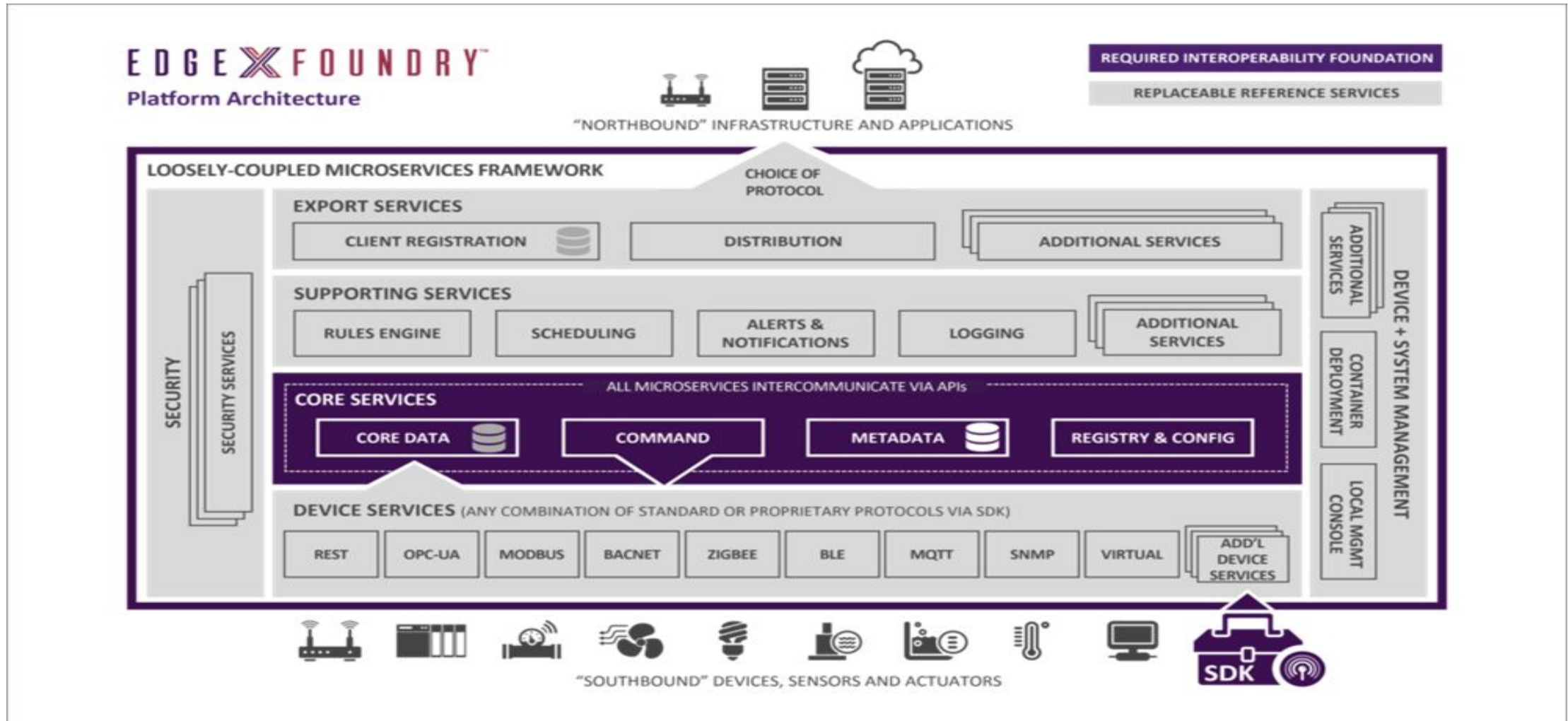
- Chartered by Dell IoT marketing in July 2015 as a Client Chief Technology Office incubation project
- Designed to facilitate an ecosystem of interoperable applications and connectivity standards at the IoT edge
- Over 125,000 lines of Dell code with references to other open source projects
  - Micro service based architecture (over 20 services total)
  - Containerized for deployment ease and platform independence
- Launched into open source through the Linux Foundation on April 24 with over 50 founding member organizations and many additional companies interested in consuming

# Architectural Tenets

- Provide an extremely flexible microservices architecture that can support the use of any combination of heterogeneous ingredients plugged into a common interoperability foundation
  - Allow services to scale up and down based on device capability and use case
  - Allow functionality to be distributed across multiple edge hardware nodes or across processors within a given node
  - Enable reference microservices (e.g., northbound message bus, rules engine, database) to be quickly replaced with a preferred alternatives
  - Allow for additional community improvements that enable performance metrics (e.g., to support hard real-time operation)
- Be agnostic to hardware CPU (e.g., x86, ARM), OS (e.g., Linux, Windows, Mac OS), and application environment (e.g., Java, JavaScript, Python, Go Lang, C/C++) to support customer preferences
  - Must provide for store and forward capability
  - Must support and facilitate “intelligence” moving closer to the edge (due to latency, bandwidth and storage, intermittent connectivity)
- Must support brown and green field deployments
  - Enable support for any combination of device interfaces (BACNet, Modbus, BLE, ...) to normalize connectivity protocols (both existing standards and proprietary) into a common API
- Support best in class industrial grade security, manageability, performance, and reliability while still maintaining extensibility
  - When in doubt keep it simple



# Architecture



# General - how EdgeX works

- A collection of a dozen+ micro services
  - Almost a dozen micro services contributed to open source today
  - Several commonly used library projects (common domain objects, client libraries, etc.)
  - Dell working to contribute more micro services (additional device services, Go replacement services, user interface services)
  - Automated build process
    - To include micro service containerization (LF working to improve)
    - Unit and integration tests per service
- EdgeX data flow:
  - Sensor data is collected by a device service from a thing
  - Data is passed to Core Data service for local persistence
  - Data is then passed to Export services for transformation, formatting, filtering and can then be sent “north” to enterprise/cloud systems
  - Data is then available for edge analysis and can trigger device actuation through Command service
- REST communications between the service
  - Some services exchange data via message bus (core data to export services and rules engine)
- Micro services deployed via Docker and Docker Compose today

# General - how EdgeX works

Contextually, EdgeX micro services are divided into 4 logical layers

- Device Services

- Communicate in native sensor/device protocol to the physical
- Transform sensor data to common format
- Translate command requests to actuate devices (in native protocol/format)
- A device service SDK (in Java) creates device service scaffolding to allow rapid development of device services in Java

- Core Services

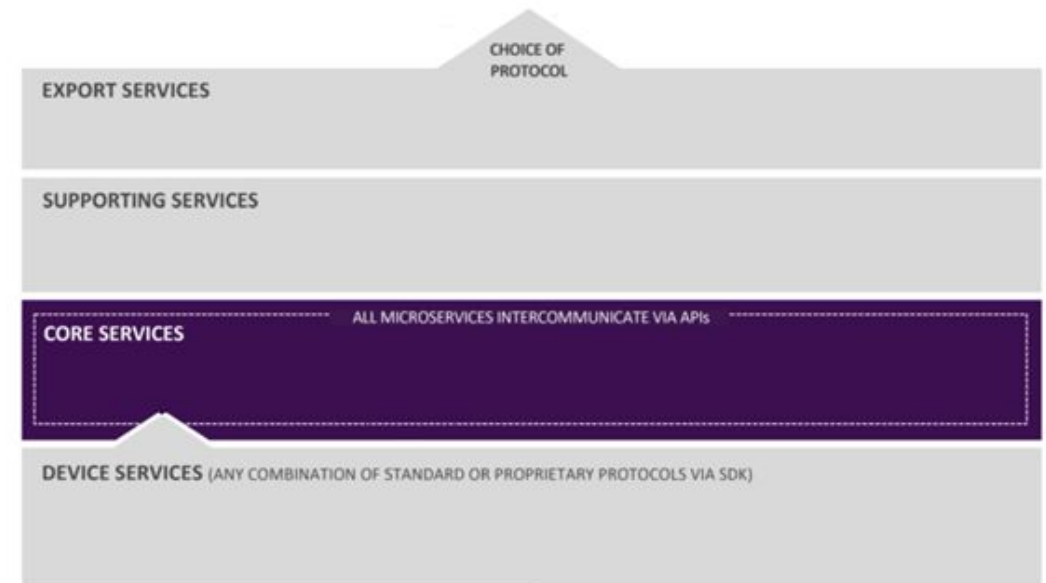
- Collect sensor data
- Understand what sensors/devices are connected how to communicate with them (metadata)
- Provision facility for new sensors/devices (and device services)
- Manage device actuation requests to device services/devices
- Provide micro service registry
- Provide micro service configuration

- Supporting Services

- Logging
- Notifications and alerting
- Scheduling and clean up
- Rules engine

- Export Services

- On or off box client registration of data
- Distribution center of sensor data to clients



# To Be Added

- Security services & API hooks
- System management services & API hooks
- User interface assistance\*
  - Local Management Console
  - Export Registrar
  - Rules Creation
  - Docker Compose File Creation

\*Dell looking to contribute PoC UI to the project pending code scan

# EdgeX - Where to learn more

- Email

[james\\_white2@dell.com](mailto:james_white2@dell.com)

- 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

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

Thursdays @ alternating times (6pm & 9am EDT)

First call Thursday, June 29 @ 6pm EDT

Email [info@edgexfoundry.org](mailto:info@edgexfoundry.org) to request to be added directly to meeting invite



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# Boston Technical F2F Meeting Recap

Keith Steele



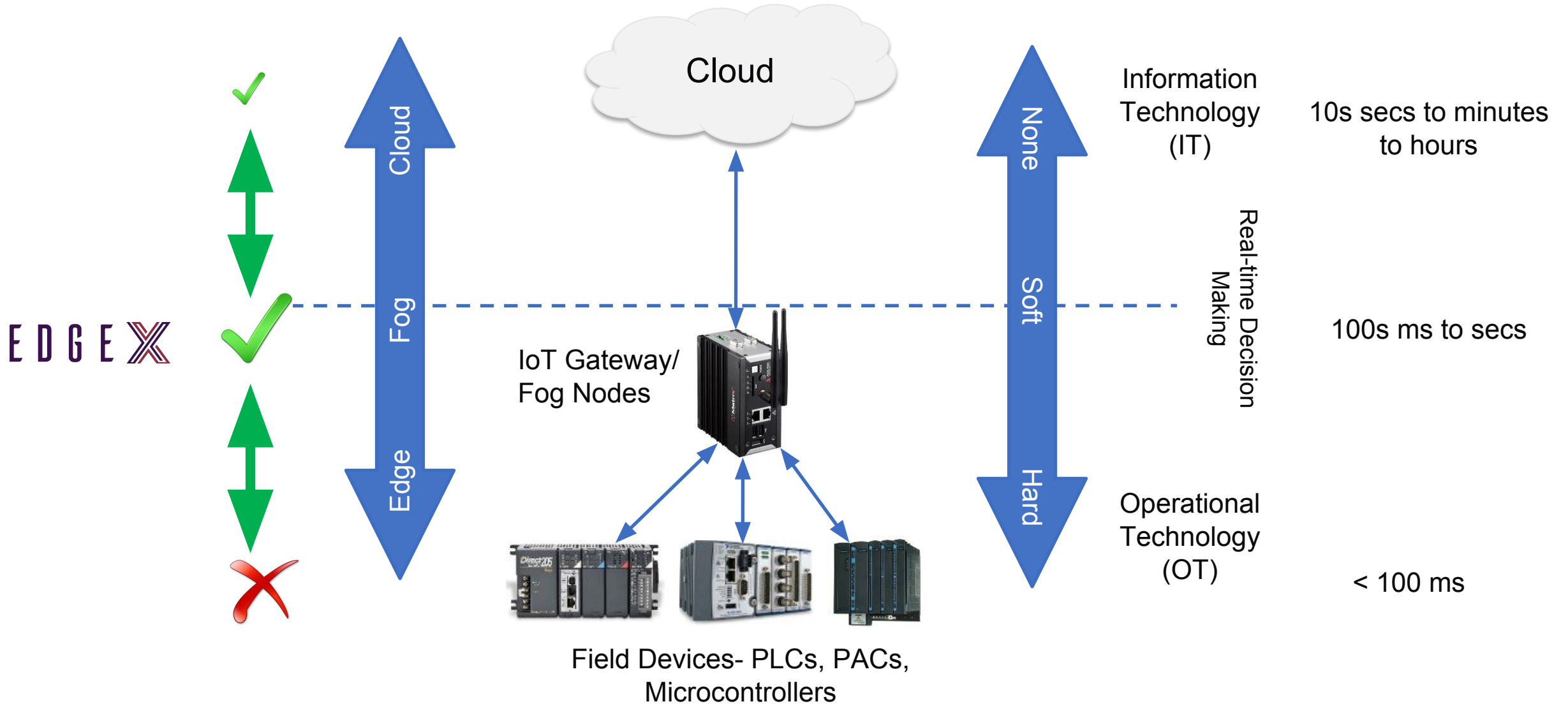
# Boston Technical Face to Face

- Hosted at Analog Devices' Norwood (Boston-area) Thanks to AD!
- 53 attendees in-person plus another 20+ remote attendees

## Key Outputs:

- Set up workgroup structure & elected initial chairs
- Agreed on project goals & potential deliverables
- Held initial workgroup technical meetings
- Agreed on initial target deliverables for a Minimum Viable Product (MVP) release
- Initial hardware, software and resource contributors identified

# EdgeX Current Implementation



# General Agreements

- First new release of Edgex to focus moving current version to product quality
- Focus on performance, footprint and usability
- Stable and right APIs right highest priority to protect future application investment
- Target existing Java services for now - GO and C versions in the plans!
- Concept of Minimal Viable Product (MVP) introduced and this MUST include base security/sys management services
- Java services performance targets to be confirmed: <2GB memory; Initial start/boot time < 2 mins; Latency times (300ms to export; 500ms from capture to actuation)
- Target first release towards appropriate use cases for performance characteristics
- Next Release
  - Barcelona Release (October 2017) Target functionality tbd

# Consensus Minimum Viable Product (MVP)

- Confirm initial use cases
- Product quality including full version management
- Key requirement a test process/framework (general QA effort)
- MVP security services and system management services and hooks into the other services
- Review and stabilize the APIs of the other services
  - Including native data model
- Provide an export SDK or extension capability
  - Make it easier to get data in and out
  - Determine initial protocols / standards we need to support to start?
- A collection of device services from the SDK to support intended forgiving use case(s)
  - Virtual Device service (already done) also MVP
- Test laboratory
- Improve the install process
- Improve and increase the examples and documentation
- **Action: MVP to Project Plan – TSC (Keith Steele)**



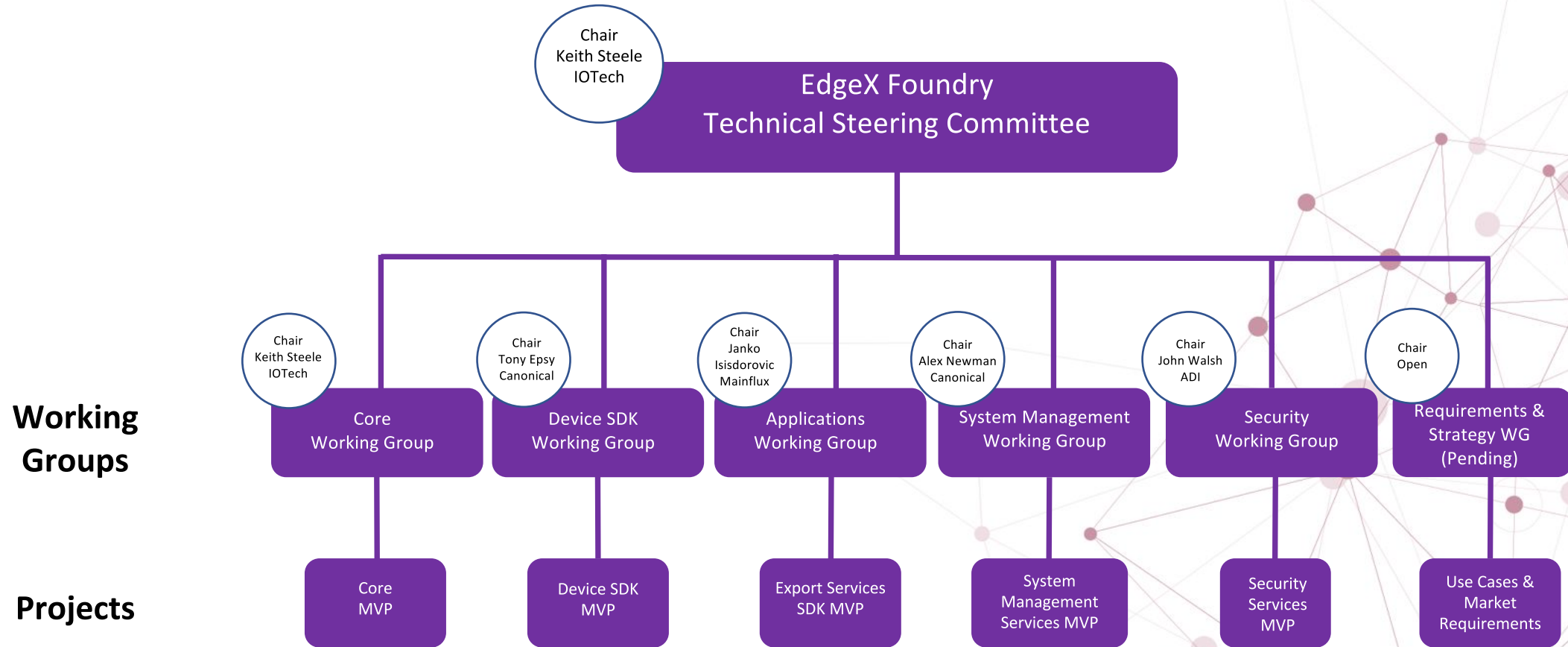
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# Working Group Organization and Goals

Keith Steele & Chairs



# EdgeX Project Organization



**Working Groups**

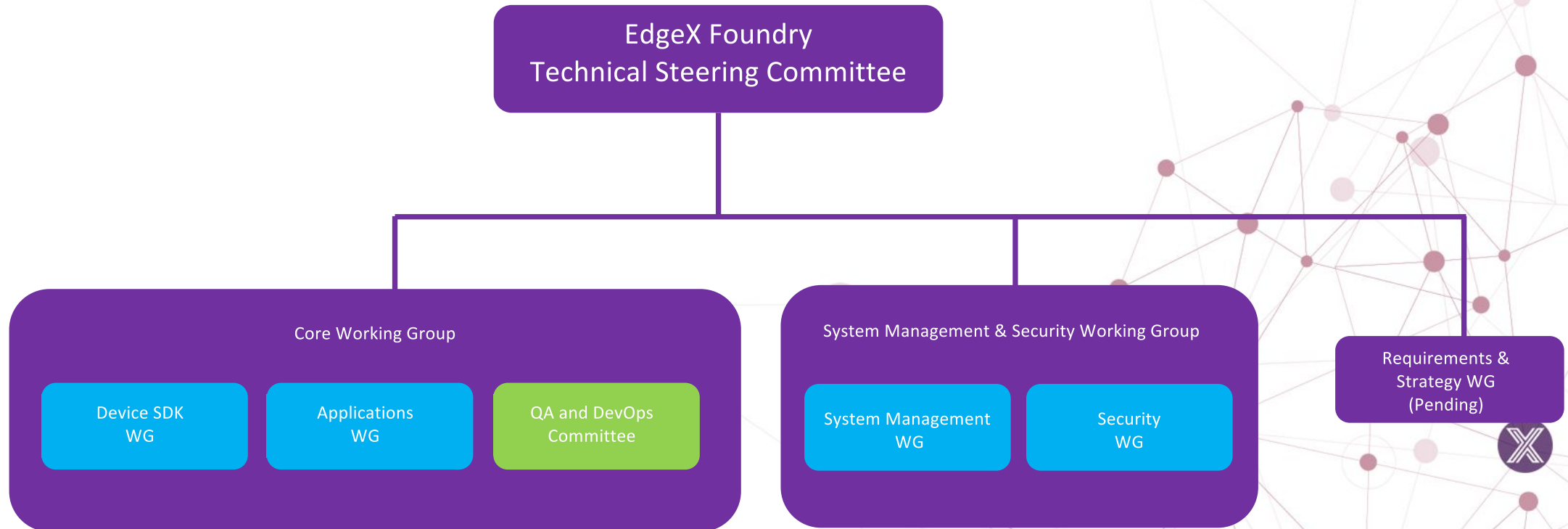
**Projects**



# TSC and WGs Meeting Structure June 2017

*Combined Meetings during MVP 'Design Phase'*

## Meeting Groups



- Please register Interest for working groups where you'd like to participate: Mail lists @ <https://lists.edgexfoundry.org/mailman/listinfo>
- You will automatically receive notifications of all meetings and events

# Core Working Group - Chair Keith Steele

- Core WG

- Initial focus is on delivering a product quality Minimum Viable Product including formal version control
- Overall EdgeX build management responsibility
- Review/stabilize core & supporting services APIs and internal data model, stabilize APIs
- Responsible for overall EdgeX footprint, performance and scalability targets and achievement
- Add security & system management hooks into core services, incorporate new APIs to core services
- Add/improve core and supporting services installation, docs/examples set standard for future releases
- Plan and coordinate Core Roadmap for post MVP release including but not limited to:
  - East to West Communications
  - Data Model
  - Real time
- Overall EdgeX QA & Dev Ops Committee
  - Develop Test Harness/Framework
  - Provide means to measure performance, footprint, etc
  - Improve installation

# Core Working Group

## • Quality Assurance

Define and implement a test suite for Edge X:

- Black box testing of micro service implementations:
  - A test micro service framework that allows for the individual testing of service implementations via their external (EdgeX defined) APIs
  - Supports multiple service implementation languages
  - Implementation as docker based framework Provides appropriate performance metrics (system resource usage, throughput, latency, start-up time etc)
- White box testing of micro service implementations
  - Implementation language specific tools to test service implementations
  - Code and branch coverage
  - Static code analysis (e.g. Coverity) and metrics
  - Performance analysis
  - Leak, memory usage analysis (where appropriate) (eg Valgrind for C/C++)
- Testing integrated with source code repository supporting mix of triggered (i.e. on code update) and scheduled testing
- Integrated dashboard for displaying test results and analysis (e.g. Jenkins or equivalent).

# Device & Device SDK WG - Chair Tony Espy

- Device & Device SDK WG
  - Review APIs & SDK and recommend API changes
  - Determine supported devices/protocols based on forgiving UC for first release
  - Initial target supported devices:
    - BACnet\*, Modbus\*, EnOcean, BLE\*, Zigbee\*\*
  - Build first Device Services
    - Virtual DS improvements as required
  - Add security & system management hooks into device services (and SDK)
  - Add/improve DS docs/examples

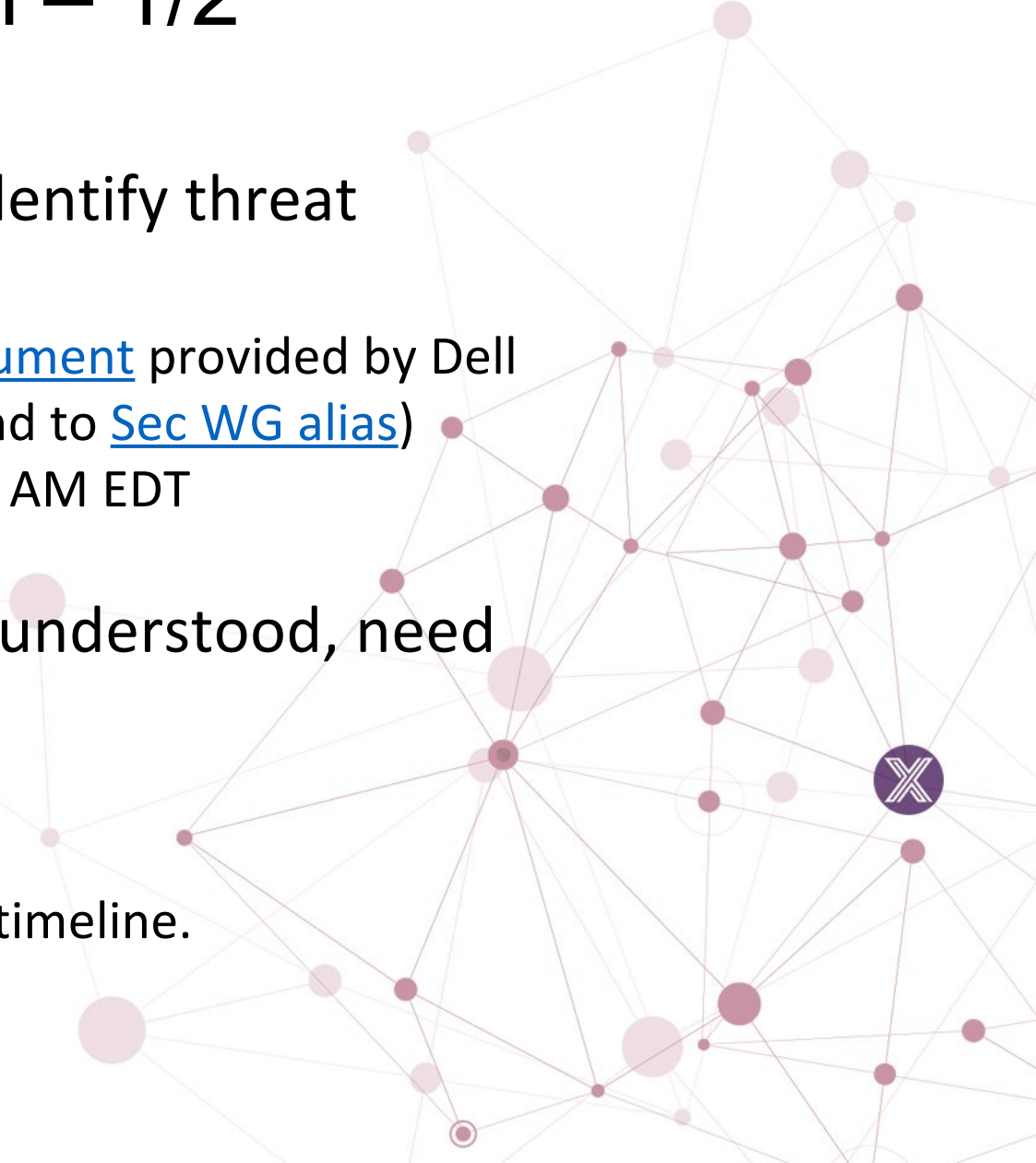
# Systems management WG Chair Alex Newman

- System Management WG
  - Define scope for System Management services
    - Identity (Centralized, decentralized, HW dependent...)
    - Provisioning
    - Basic set of actions (Start, Stop, Restart)
    - Basic monitoring (Are we alive?)
  - Evaluate LwM2M as protocol for management
    - Alternative approaches?
  - Coordinate with Security WG on constraints
    - Shared meetings w/ Security until the services are specified
  - Build basic management Client services/Server for MVP



# Security WG - Chair John Walsh – 1/2

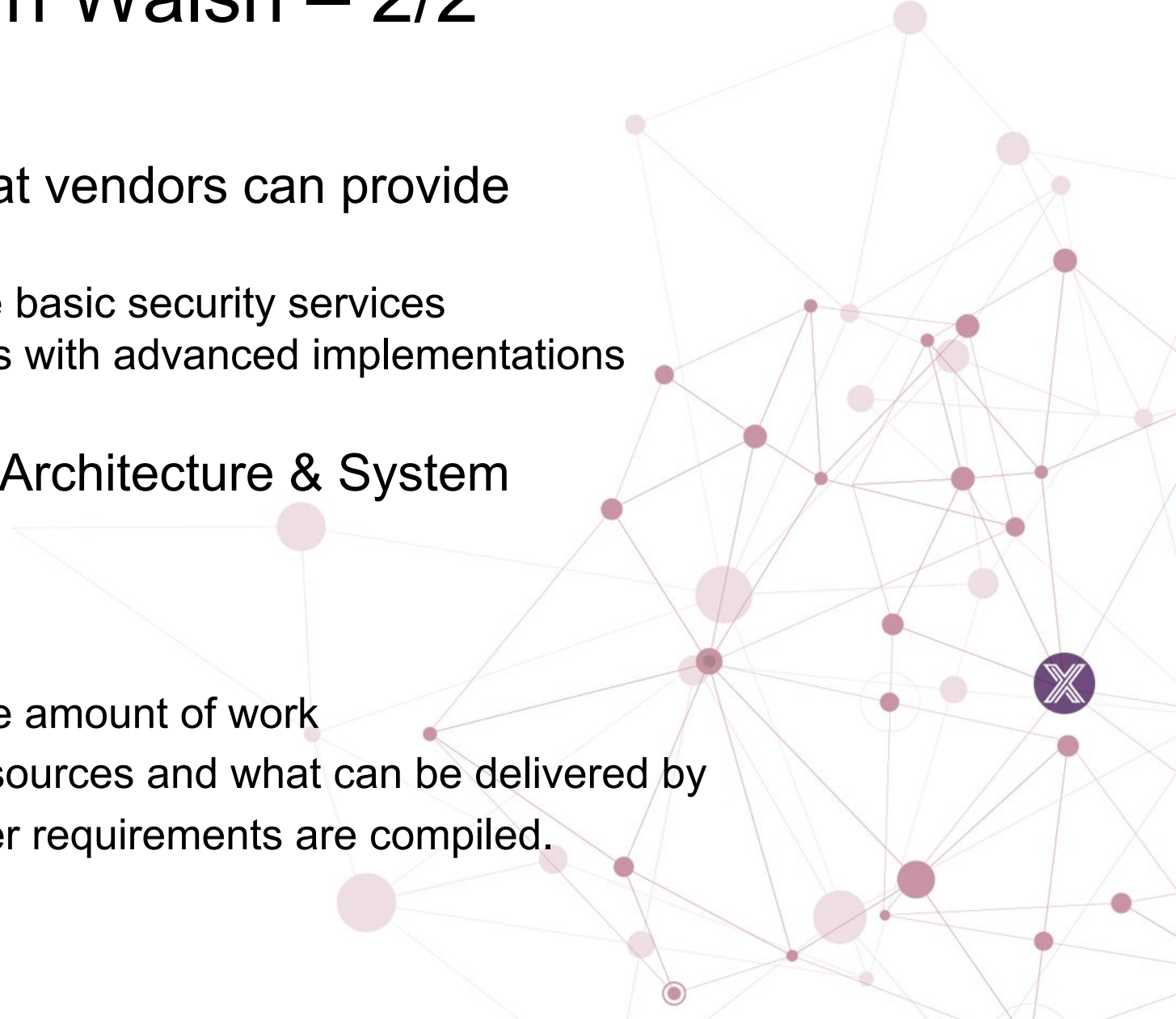
- Initial Focus: review the architecture, identify threat surfaces and define a mitigation plan
  - Starting point: the [Security Requirements document](#) provided by Dell
  - All review comments due by July 11, 2017 (send to [Sec WG alias](#))
  - Conference call to discuss: July 18, 2017 10:00 AM EDT
- Next Steps: once the requirements are understood, need to:
  - Prioritize requirements
  - Identify security MVP functionality for beta
  - Define milestones according to EdgeX project timeline.
  - Assign owners and implement features





# Security WG - Chair John Walsh – 2/2

- Agreed to focus on APIs so that vendors can provide implementation plug-ins
  - The Open Source core will provide basic security services
  - APIs allow replacing basic services with advanced implementations
- Need to collaborate with Core Architecture & System Management WGs
- Concerns
  - The scope seems broad with large amount of work
  - Not clear if group has sufficient resources and what can be delivered by beta deadline. Need to assess after requirements are compiled.



# Requirements and Strategy WG (Pending)

- Requirements and Strategy WG
  - Would focus on requirements, implementation proving grounds, and strategy eg:
    - Focused on 'Users' of EdgeX
    - Provide Use Cases to the TSC
    - Provide Requirements to the TSC
    - Establish Vertical market segmentation
    - Demo Requirements for tradeshows etc
    - Beta Test Feedback
    - Test beds for EdgeX
- TSC voted unanimously to approve creation of Requirements and Strategy WG
  - **AI: Brett** - Create Rocket.Chat channel + Mail list

# Applications WG - Chair Janko Isidorovic

- Northbound (Export Services)
  - Should new services be done in Java only?(we can evaluate using Go Lang)
  - Review/stabilize export layer APIs
  - Define supported MVP export protocols/standards for 1<sup>st</sup> release
  - Implement Export Services extensions (SDK?) & client registration to meet MVP
  - Add/improve export service docs/examples
  - Evaluate how to handle Application Security and how to plugin to EdgeX Security Module (Sync with EdgeX Security WG).
- Supporting Services
  - Define Supporting Services Required for MVP.
  - Define Security for Supporting Services (Sync with EdgeX security WG).

# Applications WG - To Do List - Export Services

- Current Reference Export Services Implementations:
  - Microsoft Azure MQTT
- Evaluate additional Export Services Connectors (Proprietary / Commercial):
  - AWS / Greengrass
  - Google IoT Core
  - SAP HANA
  - IBM Watson IoT
- Reachout to those companies and ask them to contribute to project.





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# EdgeX Next Steps

Keith Steele

# MVP Status & Plan

- MVP Draft Project Plan in Progress First draft target for end June
  - Use cases defined, Human & Physical Resources, skill sets timing of need identified, broken down by working group
- July Face to Face in UK Tentative date week of 17th July:
  - Approve MVP plan
  - Make technology choices & contributions
  - Confirm contributors & roles and responsibilities
  - Agree QA regime & Dev Ops
  - Agree development process
  - Agree deliverables and Timing of releases



# Project Contributions Welcome!

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

# Potential Resource Contributors to date

- Impact Labs – interest in device & core services
- NetFoundry – interest in core and export services
- IBM – global interest
- Switch Automation – interest in drivers, fault detection
- Mainflux – interest in potential code contribution as well as device and core services
- RFMicron – interest in device (specific sensor types) and core services
- RFMicron – interest in device (specific sensor types) and core services
- IoTech – interest in device SDK, core and export services
- Linaro – interest in device and core services
- Canonical – interest in device services
- Dell – global interest



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## AOB / Reminders

# 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-beta/22298339/>

# Marketing

- **CTA:** If your company will be demoing technologies that utilize the EdgeX framework, please email [events@edgexfoundry.org](mailto: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](mailto:pr@edgexfoundry.org) so that we can help promote

# AOB/Cadence

- Meeting Cadence Reminder
  - Currently held weekly at 7am PDT on Wednesday's
  - Calls without TSC quorum will still be used to review issues
- **Next Meeting: 6/28/2017**





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Thank You