Project Overview and Opportunity with Akraino Project

August 23, 2018

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The IoT market is inherently heterogeneous…

Domain Expertise

ANALYTICS — DATA MGMT — SECURITY — SYSTEM MGMT — SERVICES

Many different tools and skill sets are required to address myriad industry verticals and use cases

Connectivity

OPEN CONNECTIVITY FOUNDATION · AllJoyn · WEAVE · OPC UA · MQTT
ZigBee · Z-WAVE · enocean · WirelessHART · Modbus · BACnet
EEBUS · KNX · canbus · DNP3 · EtherNet/IP · IO-Link

IoT standards work is progressing, but there will always be widespread fragmentation in connectivity
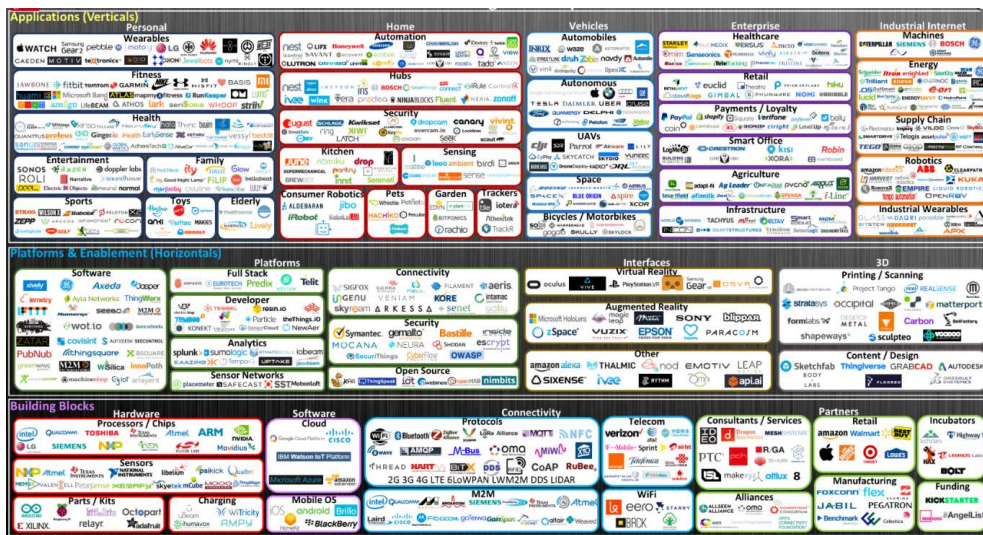
Application Environments

Java · python · JS · Microsoft .NET · GO · C/C++

Variable preferences for coding and application environments among developers

Operating Systems

ubuntu · Windows · Zephyr
WIND RIVER PULSAR LINUX · VxWorks · yocto · mynewt
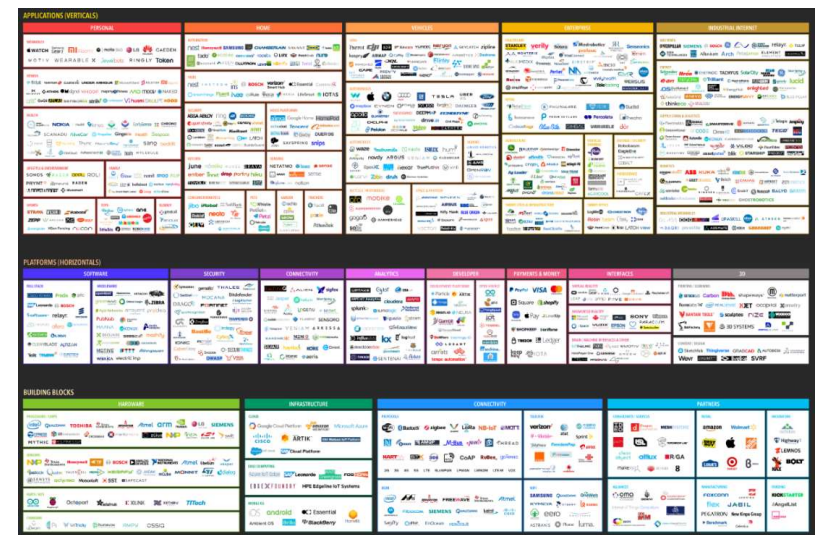debian · redhat · suse

No line of sight to consistent choices across Linux, Windows and embedded/RTOS variants

The Fragmented IoT Ecosystem
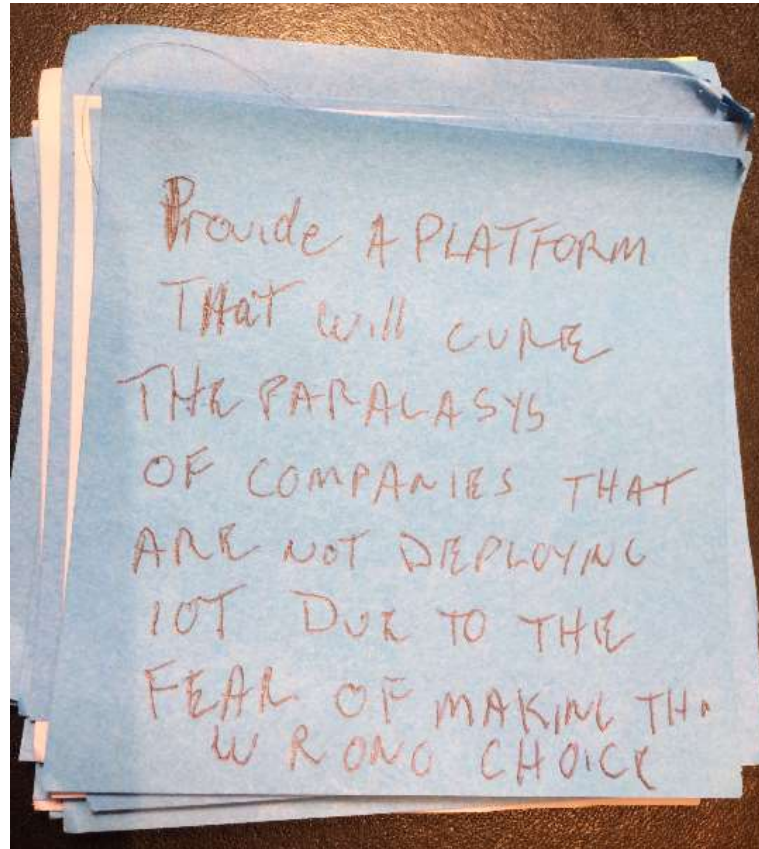
2016 IoT Landscape

2018 IoT Landscape

Source: Matt Turck, Demi Obayomi and FirstMark Capital

Curing Customer Paralysis

Bridging Standards with An Ecosystem of Applications

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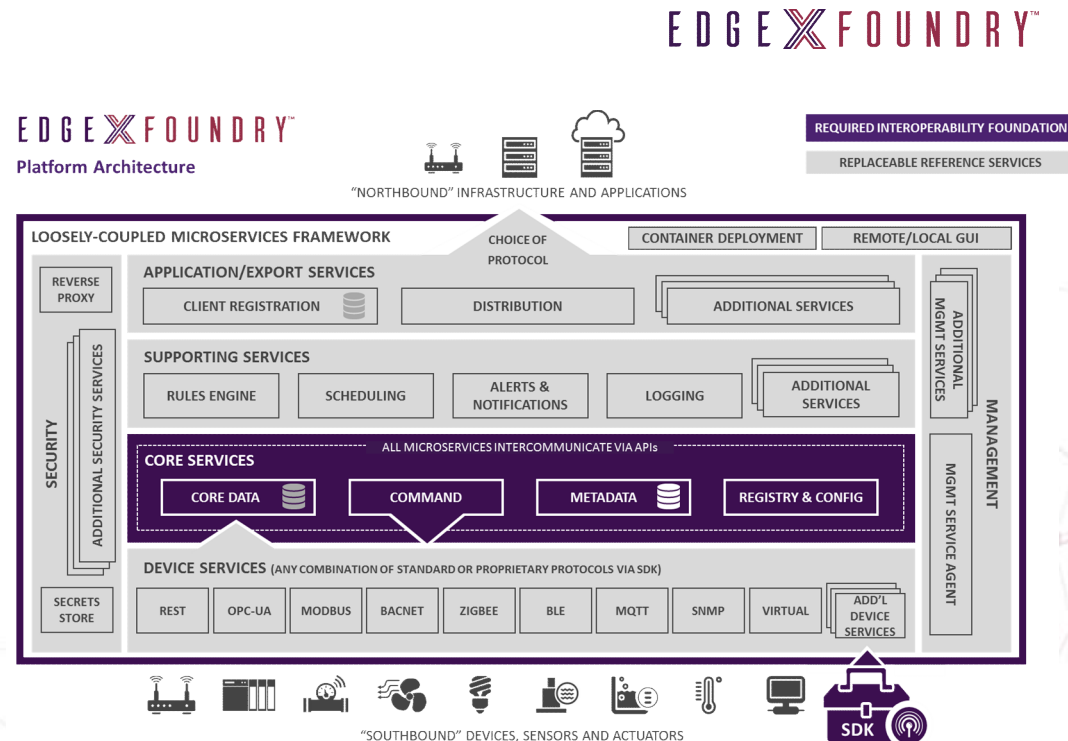
It's All About the APIs

- Loosely-coupled microservices bound by common APIs established through vendor-neutral collaboration in Linux Foundation

- HW, OS- and protocol-agnostic

- Polyglot: microservices can be written in any programing language (e.g. Java, Python, Go Lang, C) and deployed in containers or VMs

- Curating in open source community as a full reference platform surrounding the core interop framework allows granularity in API definition for key functions

- **Once key APIs are established, entire subsections can be replaced, combined, etc. with proprietary, differentiated "EdgeX-compliant" versions, even Core Services**

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EdgeX is architected to enable commercial value-add around a lowest common denominator interoperability framework.

EdgeX Foundry Governance Structure

EDGEX FOUNDRY MEMBER COMPANIES (60+)

GOVERNING BOARD (GB)

Composed of appointed and elected individuals; manages the business of the EdgeX Foundry.

TECHNICAL STEERING COMMITTEE (TSC)

Leads the technical work of EdgeX Foundry. Oversees and aligns working groups.
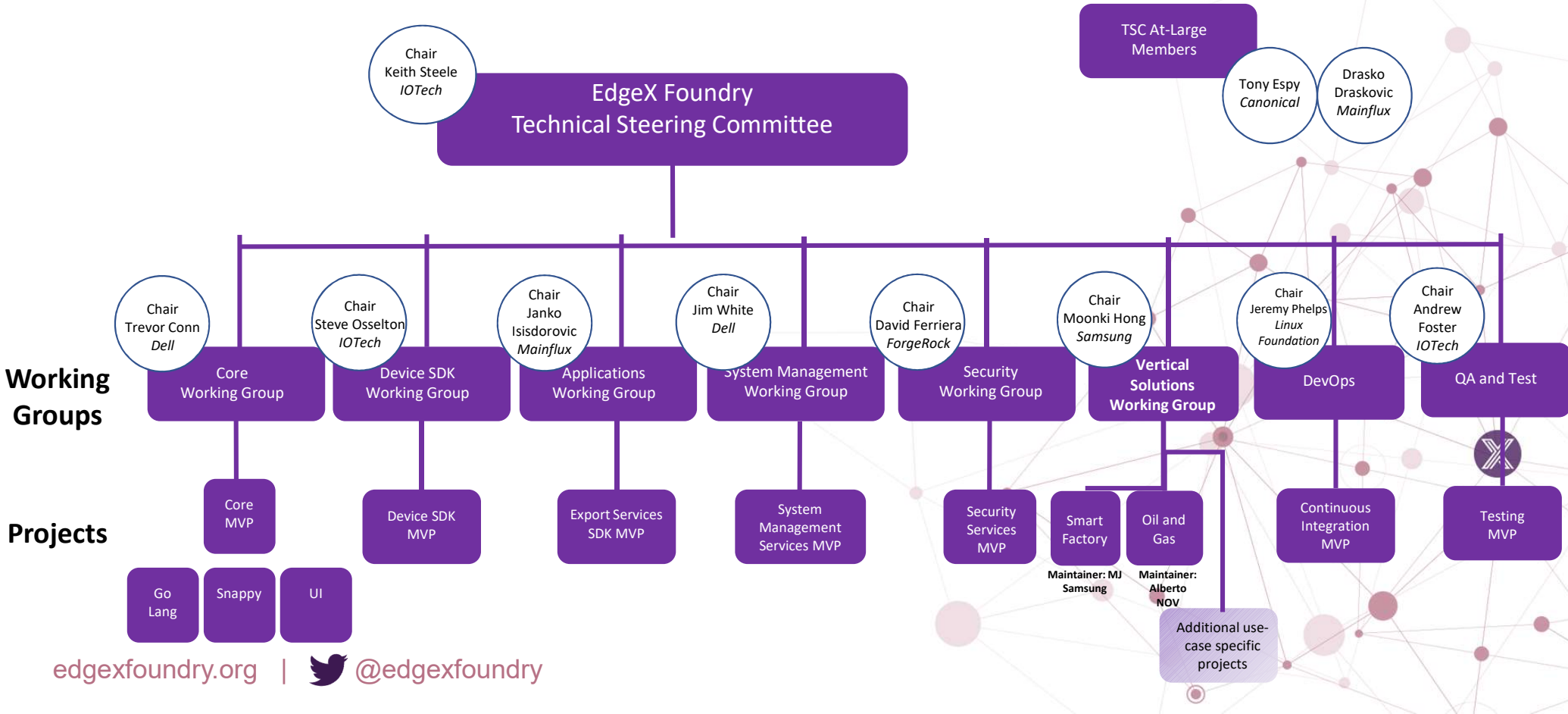
WG WG WG

WG WG

CERTIFICATION COMMITTEE (WIP)

Develops and oversees the certification program for EdgeX Certified components.

LF SUPPORT TEAM

EdgeX Project Organization

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EdgeX Foundry Technical Steering Committee

Chair Keith Steele *IOTech*

TSC At-Large Members

Tony Espy *Canonical*

Drasko Draskovic *Mainflux*

Working Groups

Chair Trevor Conn *Dell* — Core Working Group

Chair Steve Osselton *IOTech* — Device SDK Working Group

Chair Janko Isisdorovic *Mainflux* — Applications Working Group

Chair Jim White *Dell* — System Management Working Group

Chair David Ferriera *ForgeRock* — Security Working Group

Chair Moonki Hong *Samsung* — **Vertical Solutions Working Group**

Chair Jeremy Phelps *Linux Foundation* — DevOps

Chair Andrew Foster *IOTech* — QA and Test

Projects

Core MVP

Device SDK MVP

Export Services SDK MVP

System Management Services MVP

Security Services MVP

Smart Factory

Oil and Gas

Continuous Integration MVP

Testing MVP

Go Lang

Snappy

UI

Maintainer: MJ Samsung

Maintainer: Alberto NOV

Additional use-case specific projects

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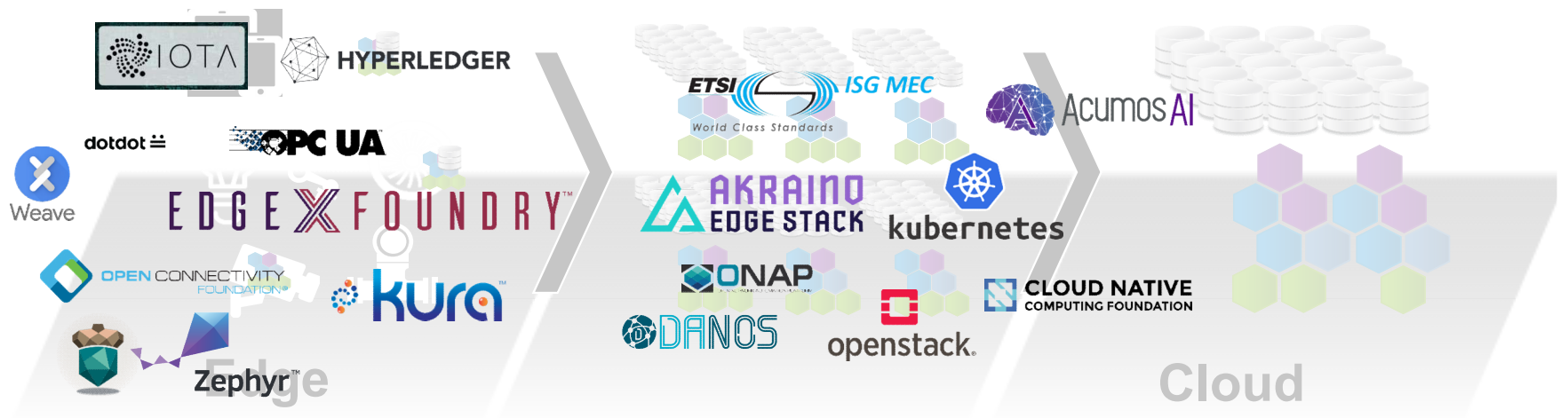
Backed by Industry Leaders

EDGE X FOUNDRY

With more in process!

Key EdgeX project accomplishments since April 2017 launch

- **Bi-annual release roadmap established** and first two release dates met

- Now **64 individual code contributors**, 5X increase from January 2018

- **Refactored entire code base to Go Lang**
  - Full seed platform was ~2.5GB memory, booted in minutes; now ~128MB and boots in ~5 seconds

- Established **security + management plan**, 1st features in July + October releases

- **IIC alliance formed and first IIC test bed in process** from Wanxiang Group

- **Entire documentation base refreshed** @ https://docs.edgexfoundry.org/

- Now at 63 project members with **numerous marquee names joining in at SWC**

- **Increasing number of end customer PoCs** in various industries

- Numerous tech providers **integrating into commercial offers**
  - IOTech announced Edge Xpert (Red Hat model) and xRT as a licensed real-time variant

Sampling of Key Industry Efforts

Open Source, Standards

Best Practices, Reference Architecture, Testbeds

EdgeX and Akraino projects are focused on complimentary aspects of edge computing solution needs

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AKRAINO EDGE STACK

Focused on the <u>application plane</u>

- Goal: facilitate secure and manageable interoperability between application-level device interfaces and value-add edge applications

- Agnostic to infrastructure (transport protocol, HW, OS, container tech) and applications (e.g. plug-ins for security, management, analytics)

- Agnostic to market domain and use case but leveraging Vertical Solution Working Groups to drive requirements into the common core and catalog unique needs

Focused primarily on the <u>infrastructure plane</u>

- Goal: facilitate optimal networking and workload orchestration for underlying edge computing infrastructure

- Agnostic to applications in the content plane but will facilitate interoperable applications for NFV functions and interop between compute edges

- Starting w/ Telco/MEC use cases but plans to expand to various different domains / use cases through "blueprints"

EdgeX and Akraino are complimentary efforts that would benefit from close coordination of APIs

Potential collaboration areas between EdgeX and Akraino projects!

- Ensure that both projects are valuable independently but curated to work well together as a full edge stack

  - Context awareness between EdgeX application-level APIs and Akraino edge infrastructure-related APIs

  - Coordinate efforts for VSWG's (EdgeX) and domain-specific "blueprints" (Akraino)

  - Potentially tying in other key edge projects

- Jointly bridge to edge efforts within IIC, OEC, etc.

- Integrate with distributed ledger standards for monetization of both data and compute resources

- Let's discuss!

Join the next EdgeX F2F TSC, in Edinburg October 23-25

Lots in the works for EdgeX at IoT Solutions World Congress! *Oct 16-18 in Barcelona*

- Launch of **Delhi code** (available late Oct – early Nov)
  - 1st manageability features, more security tools, reference GUI and Device Service SDKs in Go and C
- **Launch of EdgeX-based developer kits**
  - Further accelerate adoption and build the foundation for an open IoT marketplace!
- Launch of **additional Vertical Solution Working Groups**
  - Targets: Building Automation and Transportation, open to others
- Debut of **community demonstrator**
  - Initial focus on building automation with more use cases to come
  - Will serve as an evolving foundation for plug-fests and test bed efforts
- **Website and messaging refresh**
- Several **marquee names joining as new project members**!

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Thank You!