The Fusion of Cloud, Fog and Network to enable IoT

Shivani Raghav, Technology Strategist,
Corporate Strategic Innovation Group, Cisco Systems

7th November, 2017

OpenFog Consortium and Trusted IoT Alliance

OpenFog®

Building the Cloud to Things Continuum.

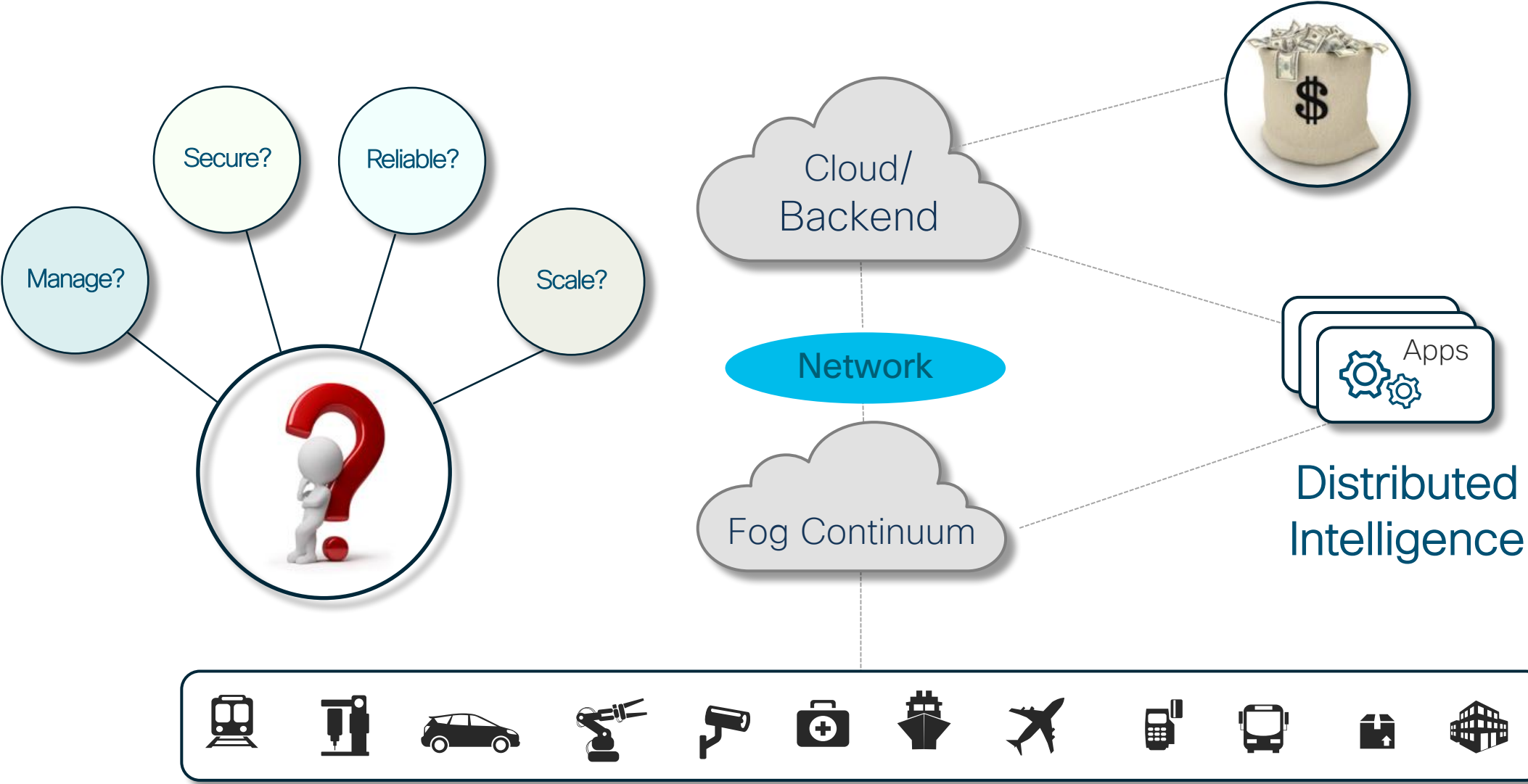| Storage | Compute | Network | Control | Accelerators |

Open Fog :- To drive industry and academic leadership in **fog computing architecture**, testbed development, and a variety of **interoperability** and **composability** deliverables that seamlessly leverage cloud and edge architectures to **enable end-to-end IoT** scenarios.
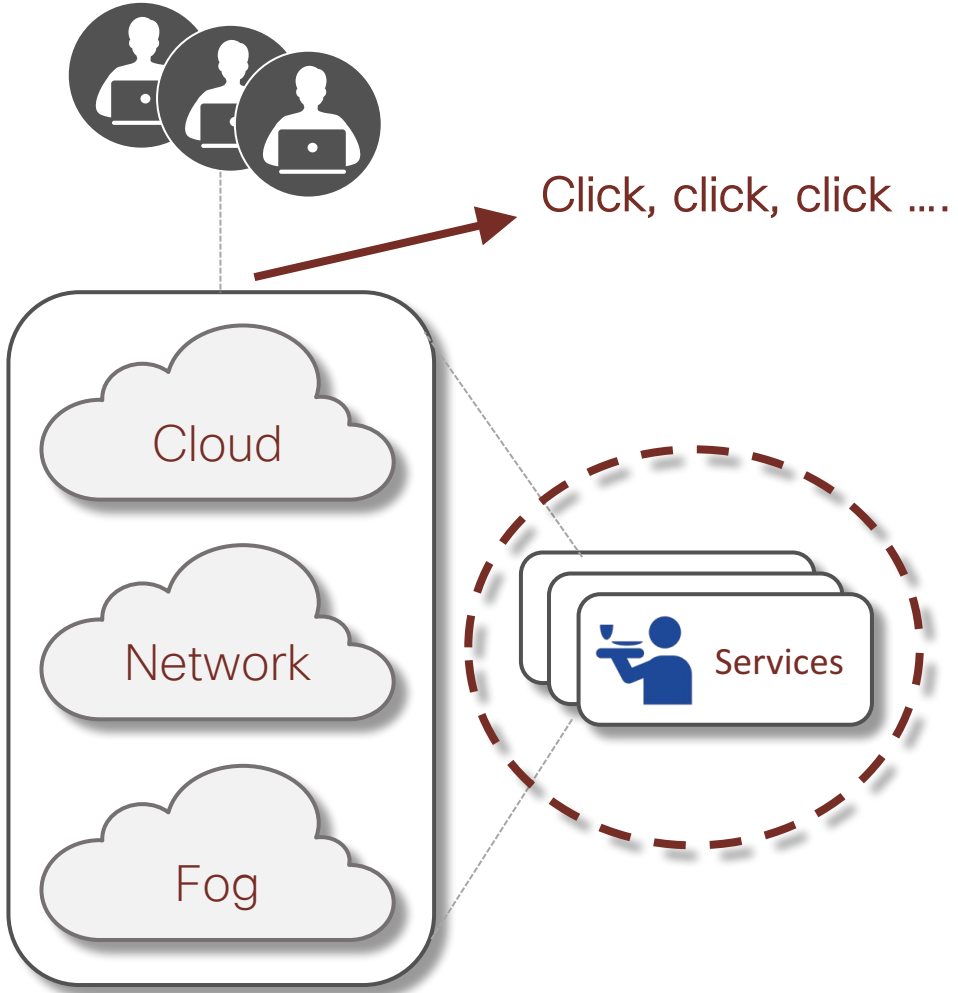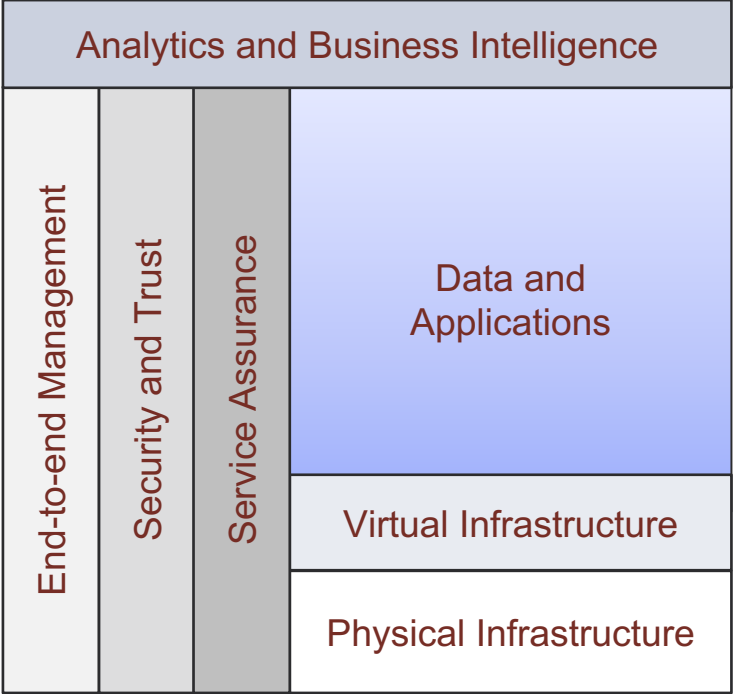
TrustedIoTAlliance

Trusted IoT Alliance :- Connecting and securing the next generation of smart IoT products with blockchain technology for a more trusted, secure and scaleable internet of all things.
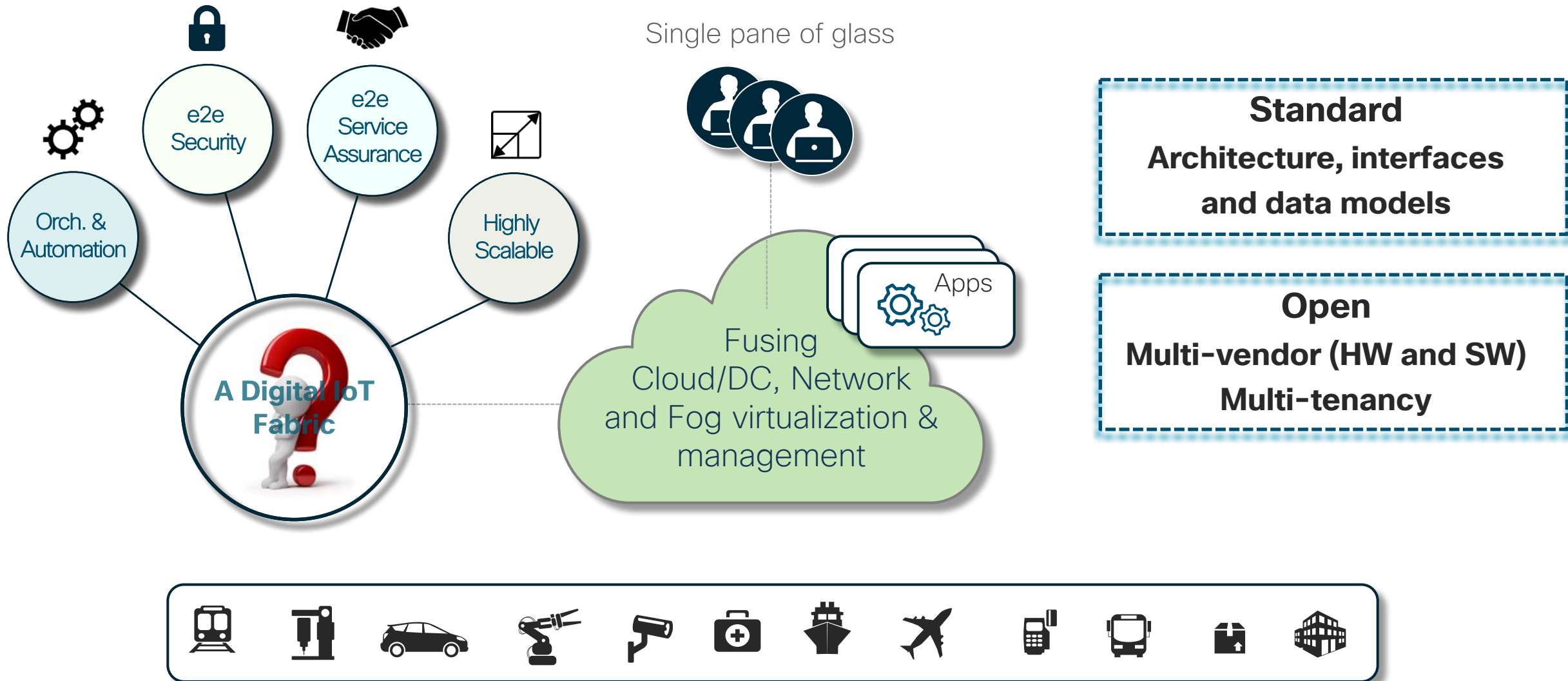
Challenges ahead in IoT space

Manage?

Secure?

Reliable?

Scale?

Cloud/
Backend

Network

Fog Continuum

Apps

Distributed
Intelligence

A Paradigm Shift is Needed

Can do both OTT and especially non-OTT for B2B

Analytics and Business Intelligence

End-to-end Management

Security and Trust

Service Assurance

Data and Applications

Virtual Infrastructure

Physical Infrastructure

Click, click, click ....

Cloud

Network

Fog

Services

Paradigm Shift in IoT

Orch. & Automation

e2e Security

e2e Service Assurance

Highly Scalable

A Digital IoT Fabric

Single pane of glass

Apps

Fusing Cloud/DC, Network and Fog virtualization & management

Standard
Architecture, interfaces and data models

Open
Multi-vendor (HW and SW)
Multi-tenancy

Why a Converged Model?

ETSI NFV MANO

- Uniform mgt. of IoT services across Cloud/network/edge
- e2e automation (orch.)
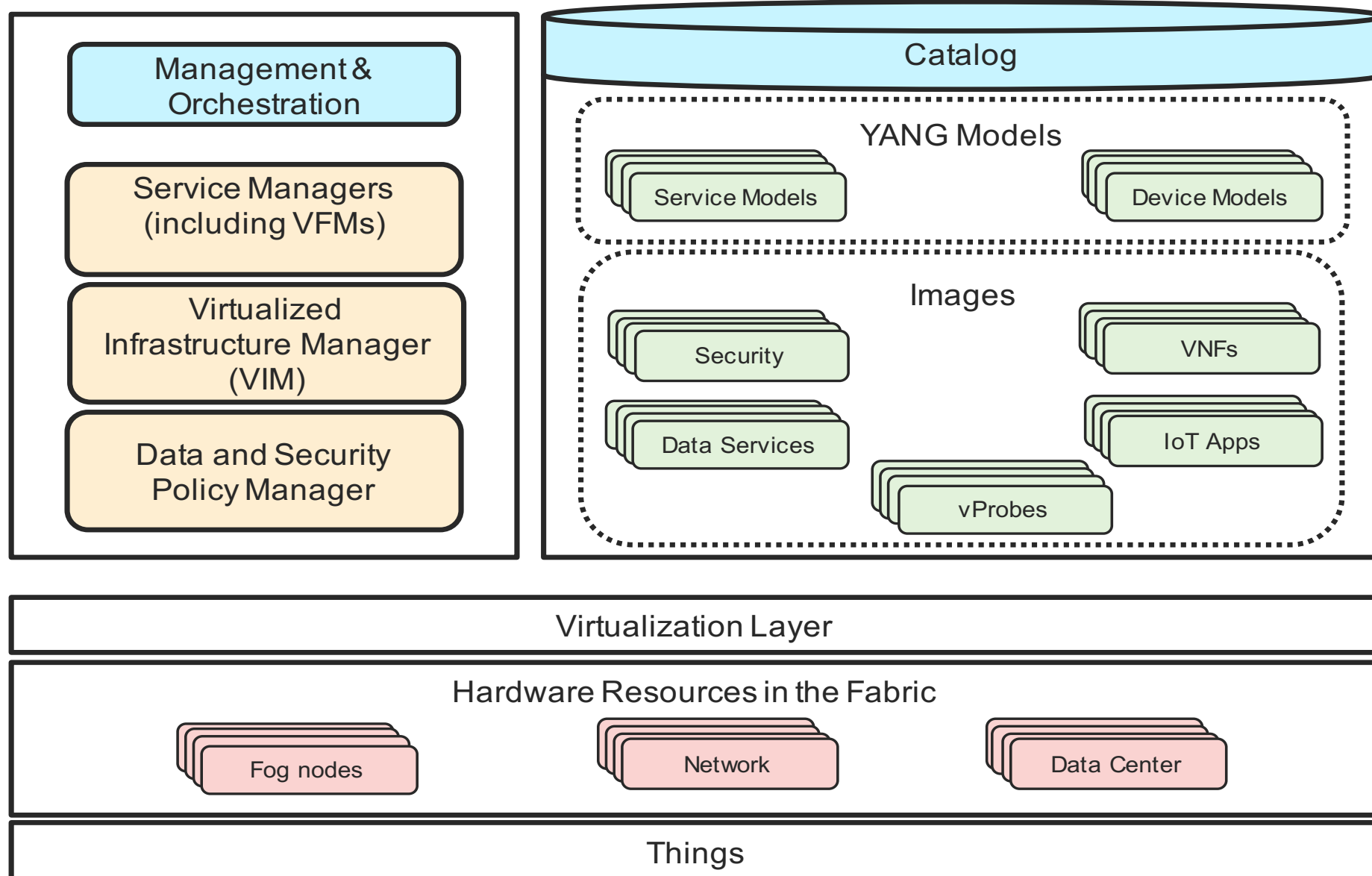- e2e security
- e2e service assurance
- Multi-tenancy
- Analytics
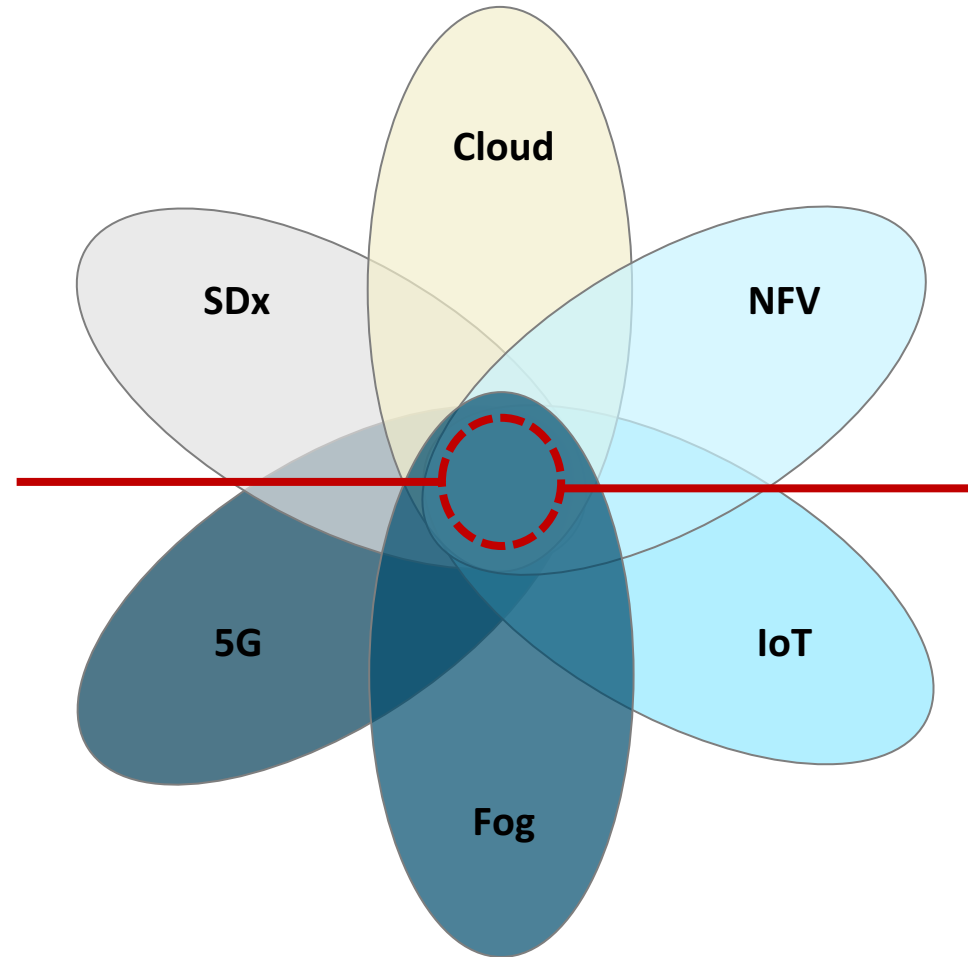
Where industry is heading: open, programmable, mobile, IoT native, flexible, cost-effective and scalable
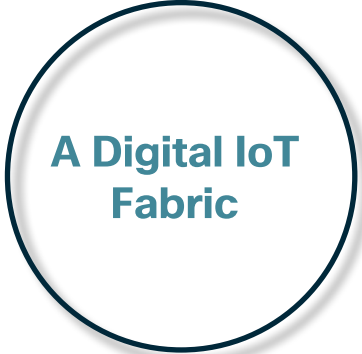

- Cloud
- SDx
- NFV
- 5G
- IoT
- Fog

Kill various birds with 1 stone

ETSI model of NFV MANO

Management & Orchestration

Service Managers (including VFMs)

Virtualized Infrastructure Manager (VIM)

Data and Security Policy Manager

Catalog

YANG Models

Service Models

Device Models

Images

Security

VNFs

Data Services

IoT Apps

vProbes

Virtualization Layer

Hardware Resources in the Fabric

Fog nodes

Network

Data Center

Things

A model-driven approach

IoT Services

A Digital IoT Fabric

Multi-vendor devices (Physical or Virtual)

Data Services
- Messaging As-a-Service
- Analytics As-a-Service

Management Services
- Zero Touch Provision
- Plug-and-Play devices

Network services
- VPN, VLAN
- Firewall

Standardized Service Models

Mapping Functions

Device Models (YANG)

Single Point of Control

Fog/Edge

Network

Cloud & Data center
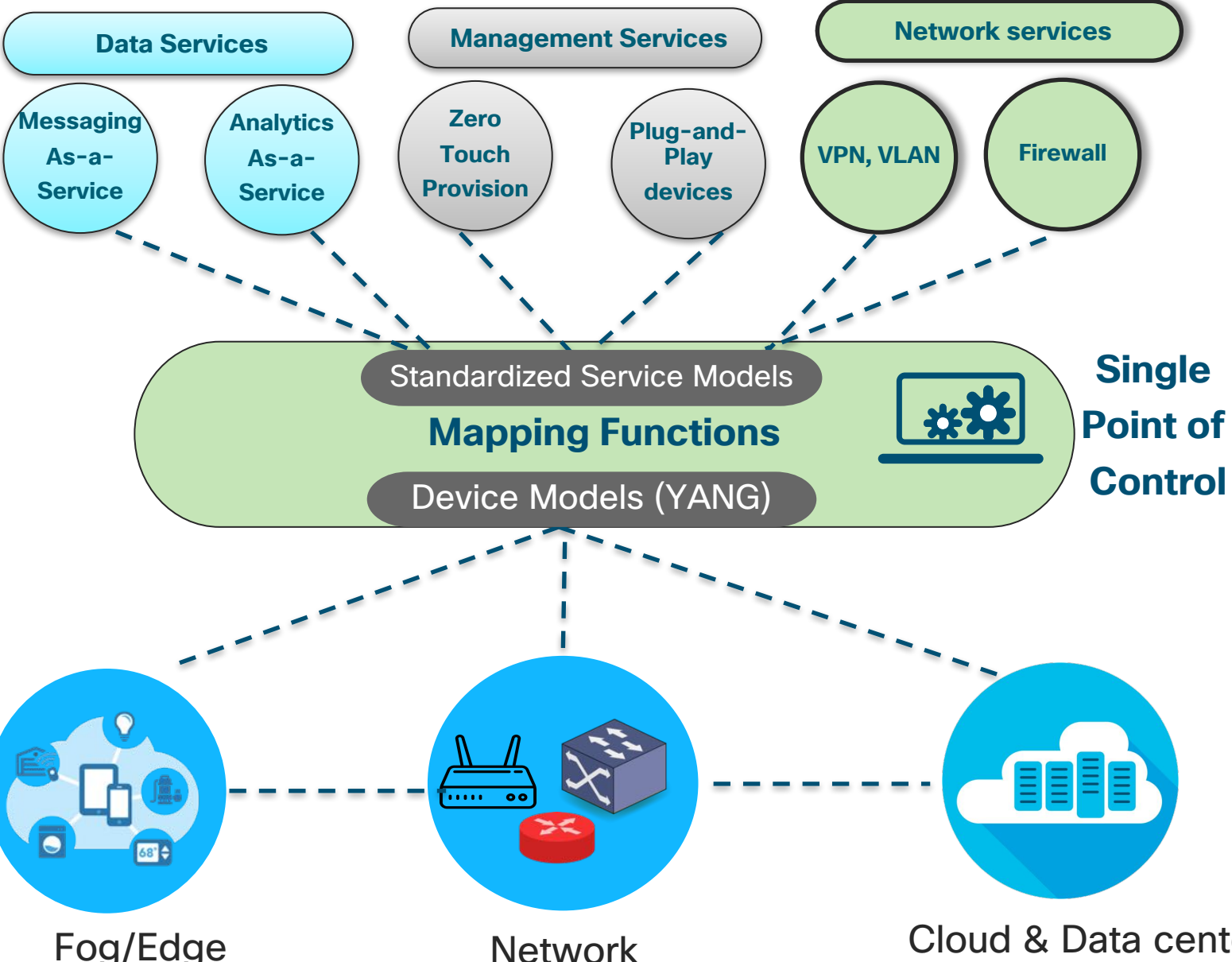
Cities: from Silos in the 1980s to Silos in the 2020s

79.8 °F

bicing

Quadruple Silo Problem

Management Systems

Budget and Roadmaps

Boxes

Data
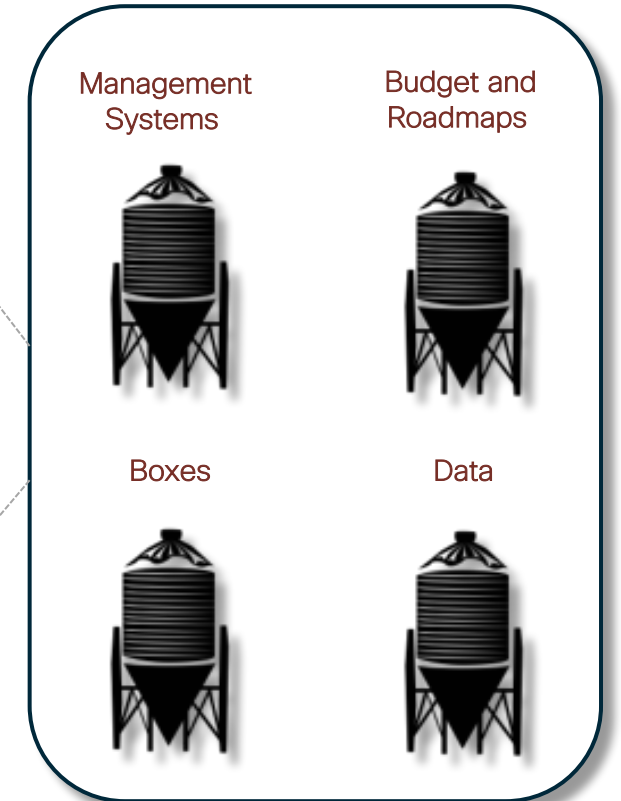
Digital IoT Fabric in Barcelona
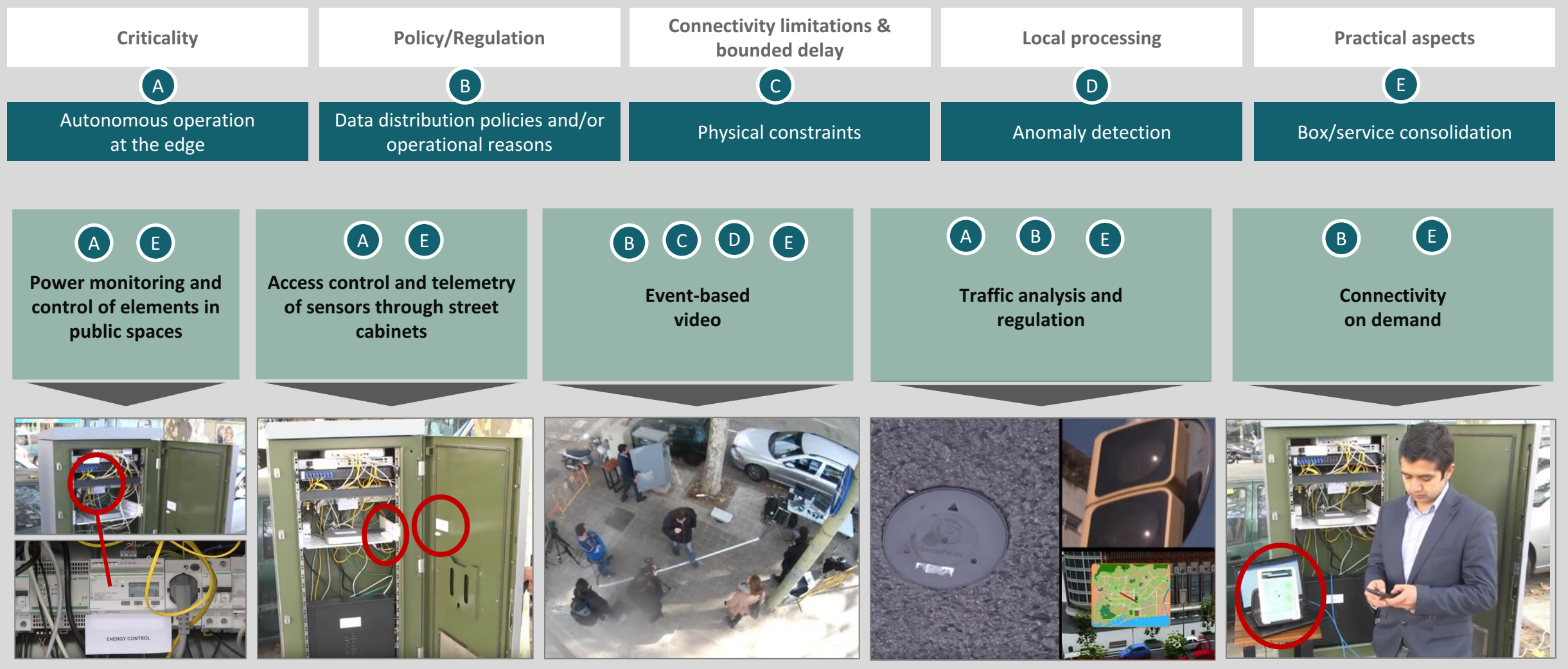
Implementing the Use Cases

Backend

Fog node

nearbysensor

Things

BARCELONA
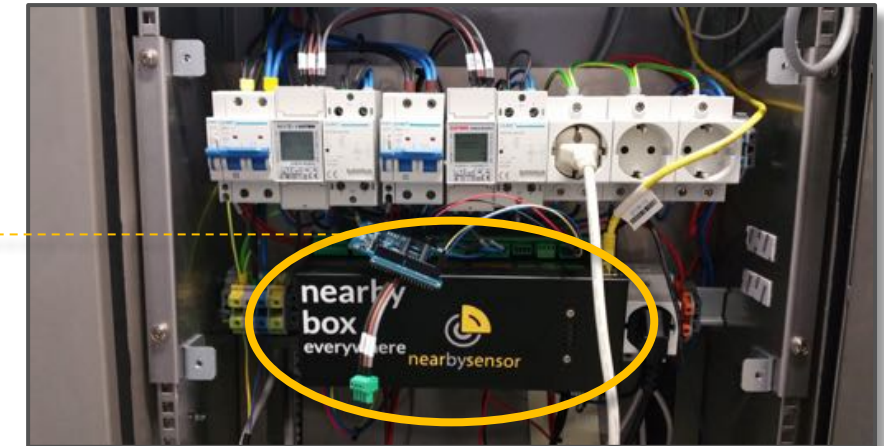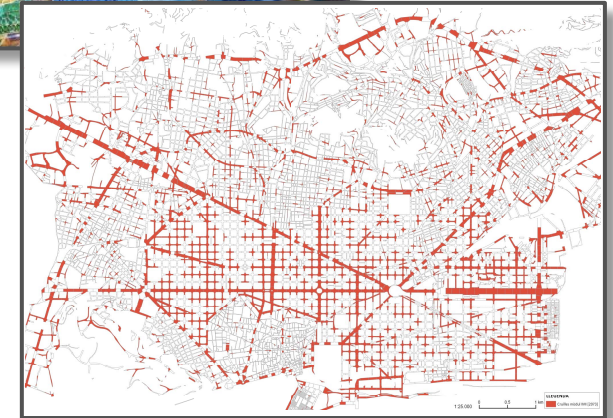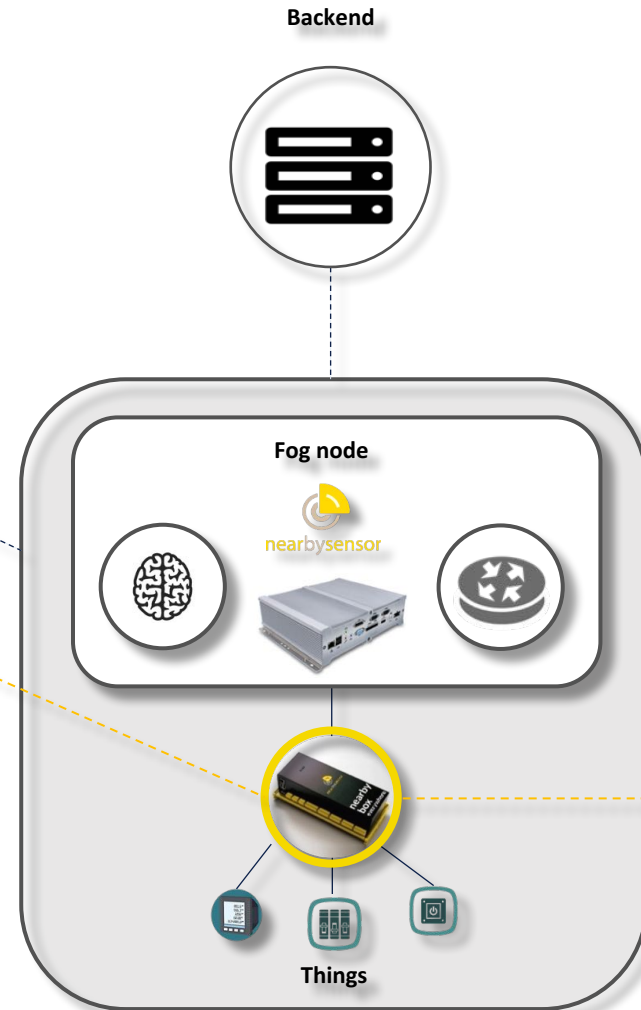
Ongoing/Future work :- Convergence across multiple use cases and verticals

Operational dashboards (different tenants & views)

Cloud based Backend

Network

Street cabinets

Industrial PC (Fog node)

Protocol transformation

Internal sensors/devices

External Sensors/devices

Mobile (fleets)

Ruggedized customized PC (Fog node)

Internal Sensors/devices

Utilities

Raspberry Pi (Fog node)

Internal Sensors/devices

Thank You