Planning an architecture for the Internet of Things

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Sumit Sharma
Director, API Solutions

sumit.sharma@mulesoft.com

Leading connectivity platform for enterprise applications, mobile and IoT

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3,500+ on-premise enterprise deployments

25,000+ cloud deployments

50% of the Global 500

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Agenda for today's session

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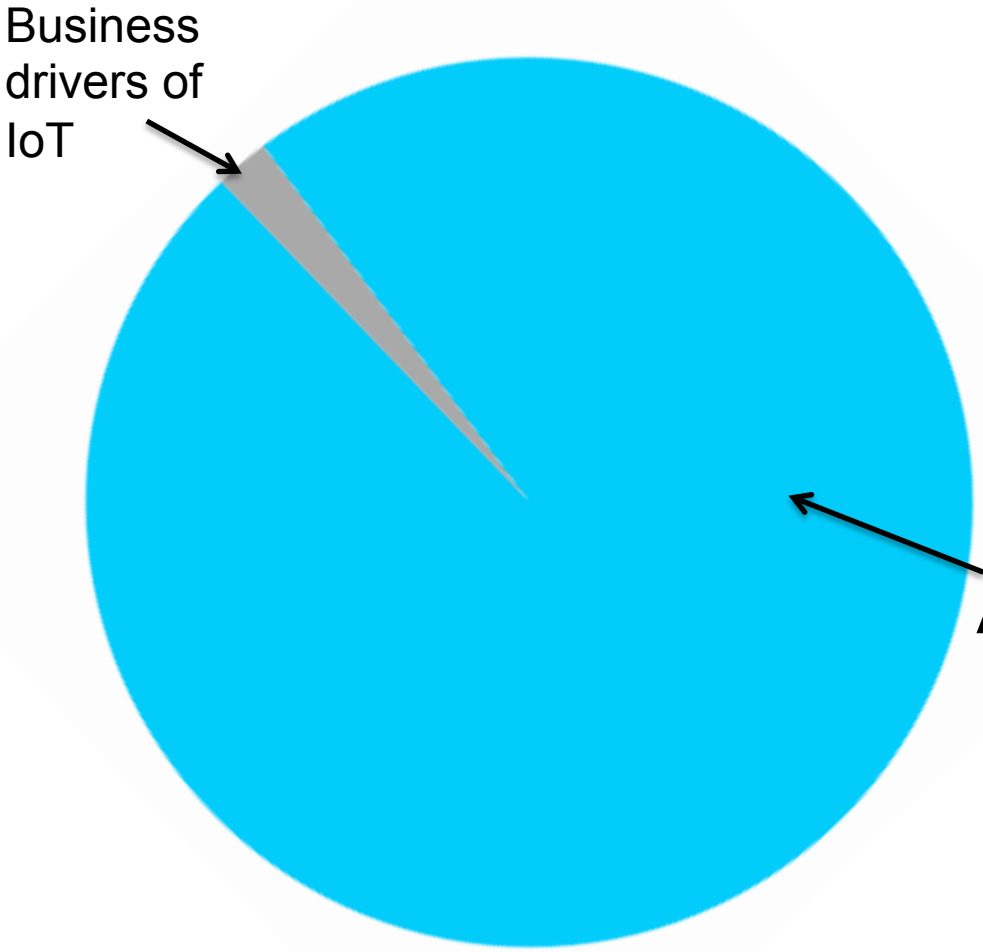

Architectural Patterns in an IoT Stack

Why plan for an IoT stack?

Everything needs to connect

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50,000,000,000+
connected devices

Connecting the physical world to the Web

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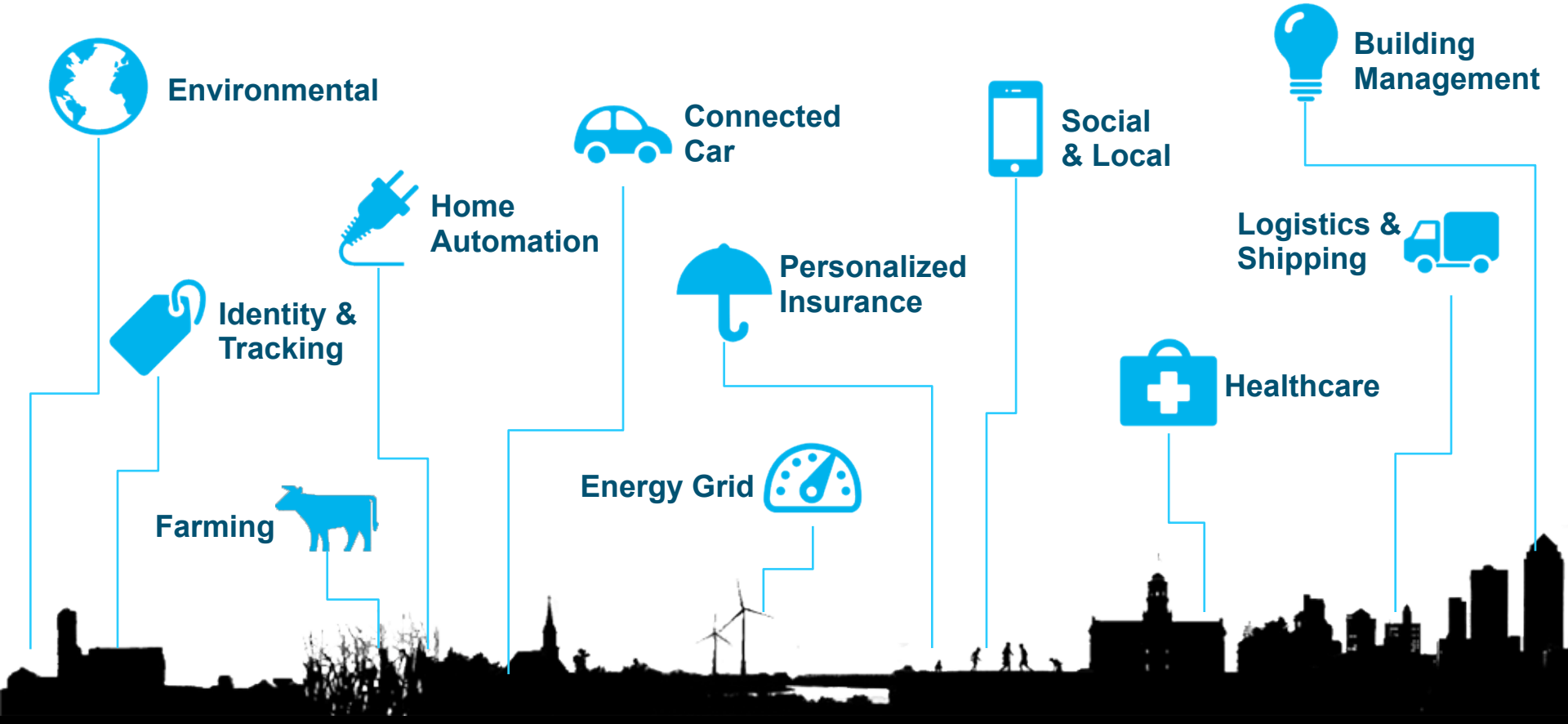
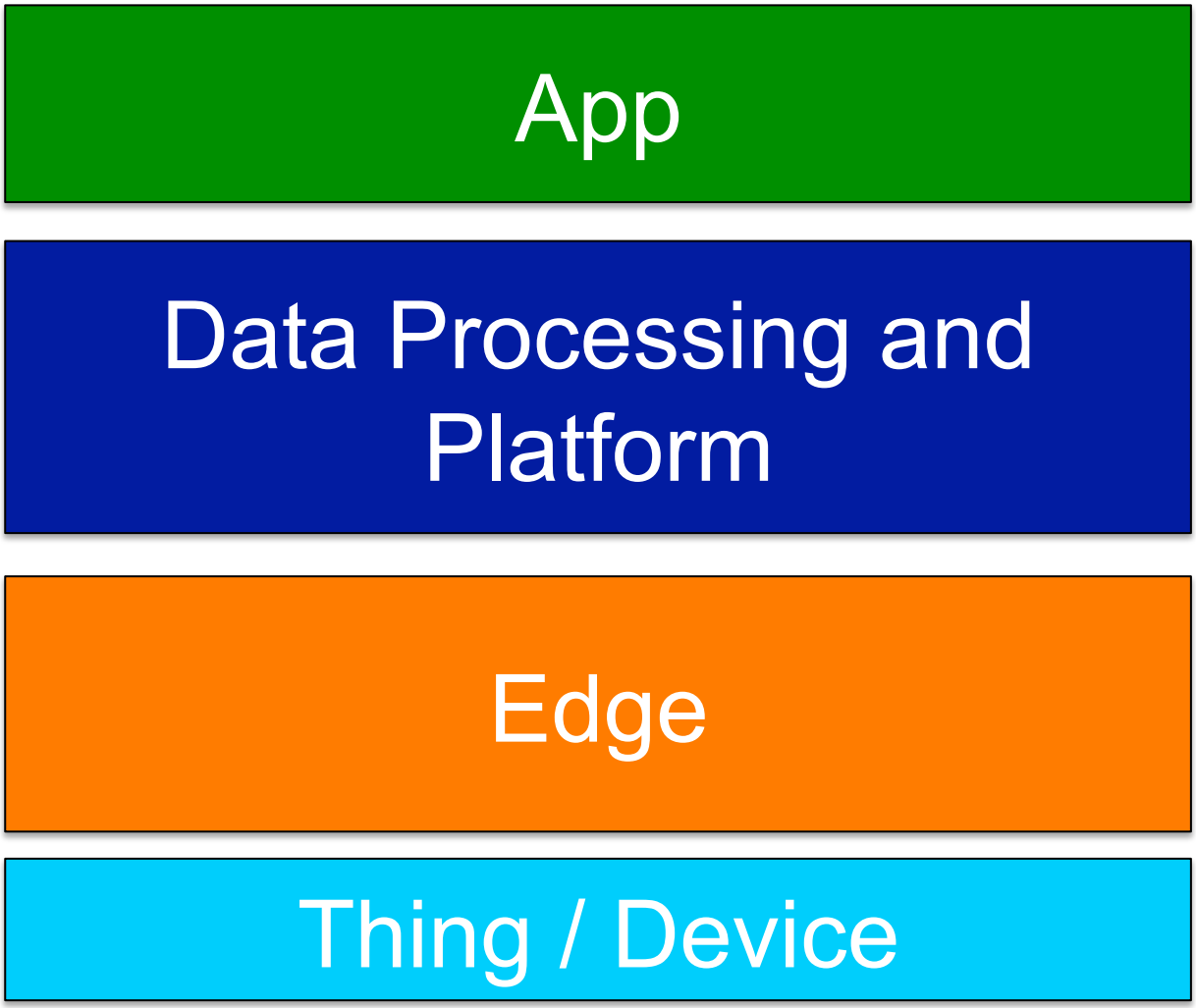


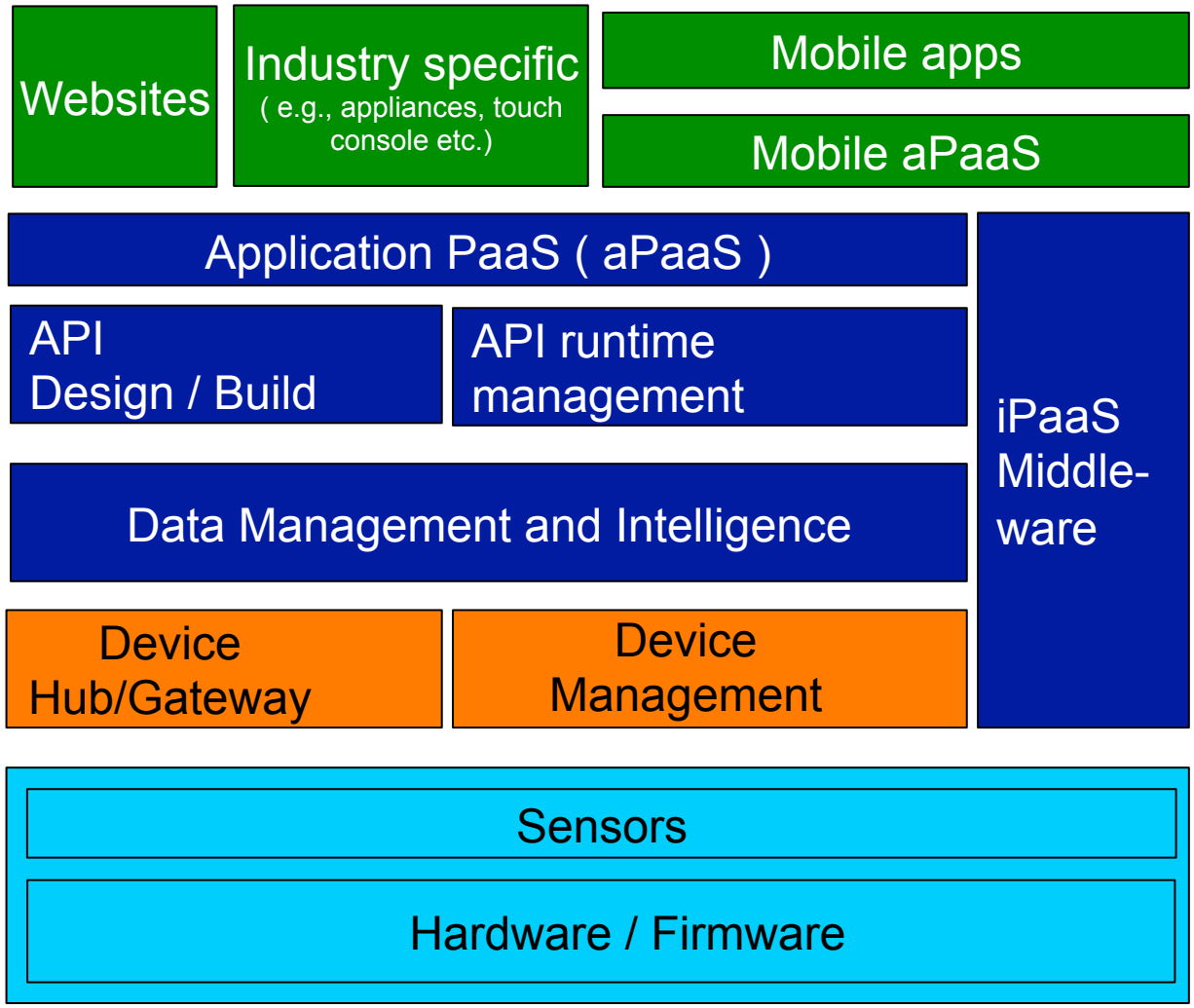
Architectural patterns in an IoT stack

At a high level this is the general IoT stack

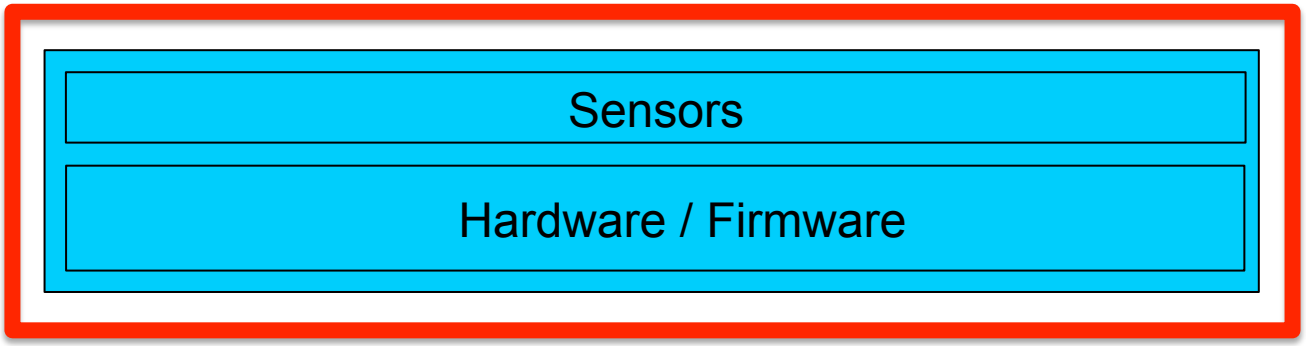


Breaking down the IoT stack

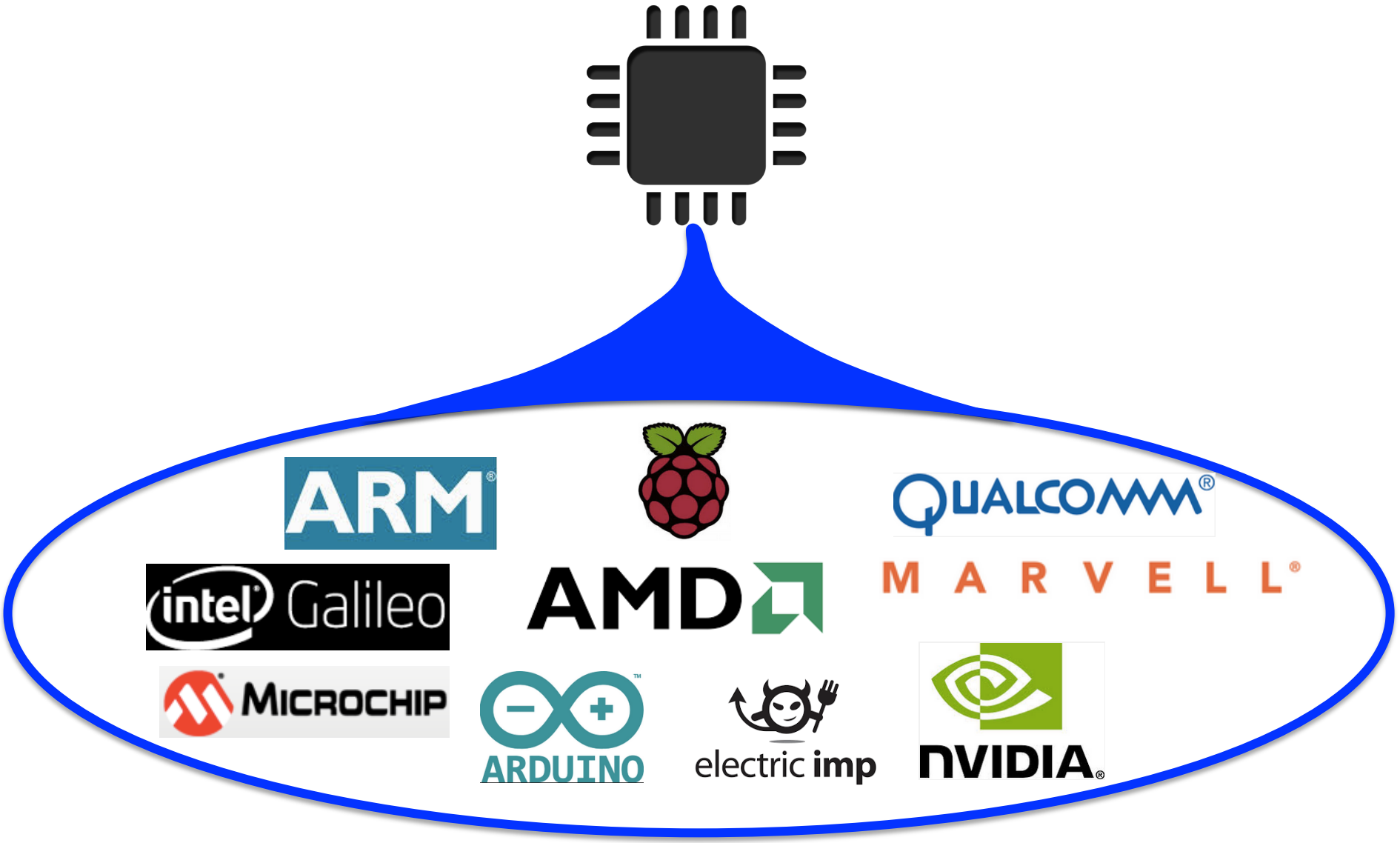
The IoT Stack



IoT Stack: Devices / Things



Devices: Many chipsets / platforms to choose from. (Becoming more and more vertically integrated with software stacks).



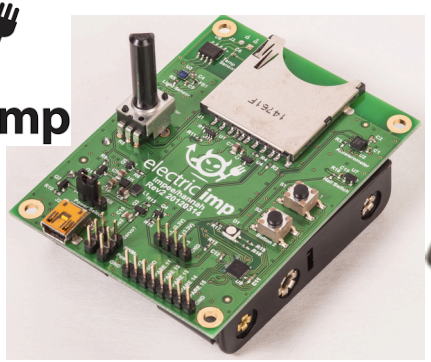
Big focus on prototyping:
Lots of tools to cater to the makers and tinkerers

Integrated SDKs to speed development, testing and optimization.

MARVELL

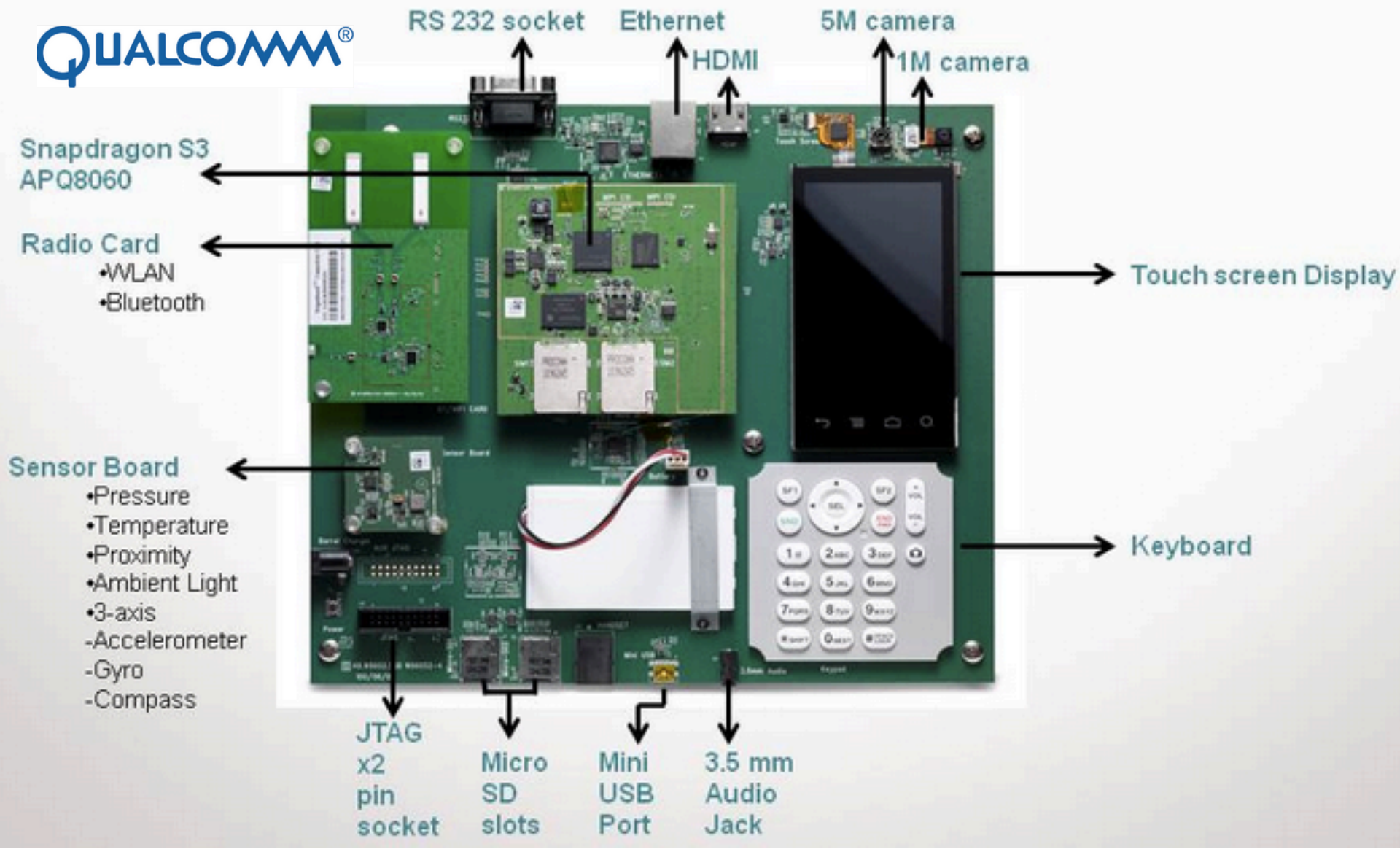
intel Galileo

electric imp



QUALCOMM®

Dragonboard based on Snapdragon processor (many more like this from many vendors)



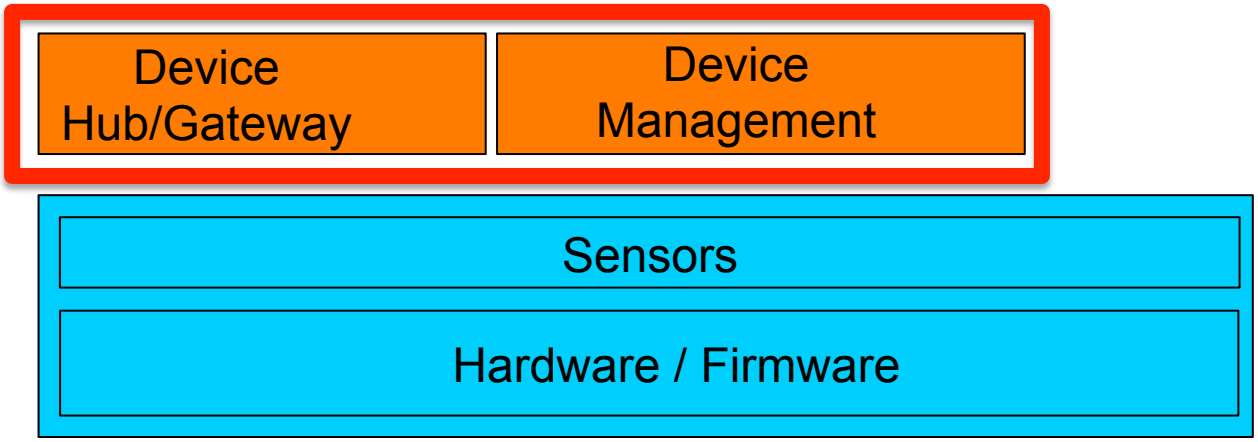
Sensors: Smart or Simple

Smart Sensors

Onboarding	Receive Notifications
Receive Config	Send Data / Events

Simple Sensors

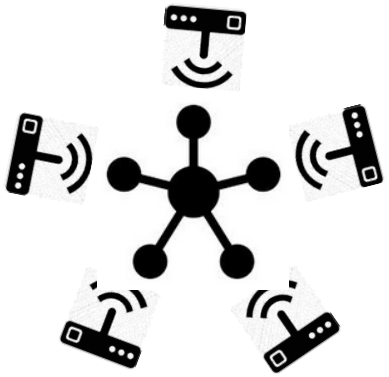
IoT Stack: Device Edge

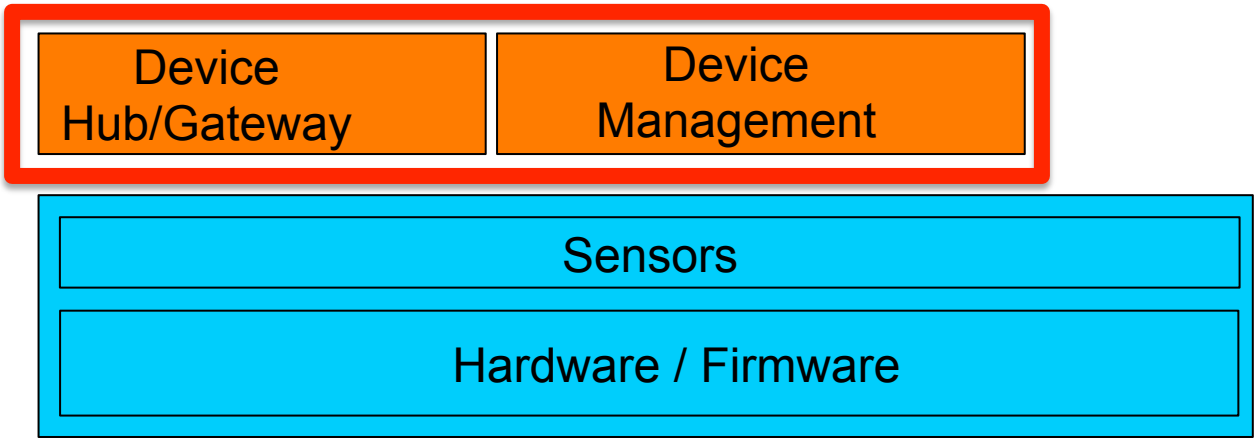


IoT Stack: Device Edge

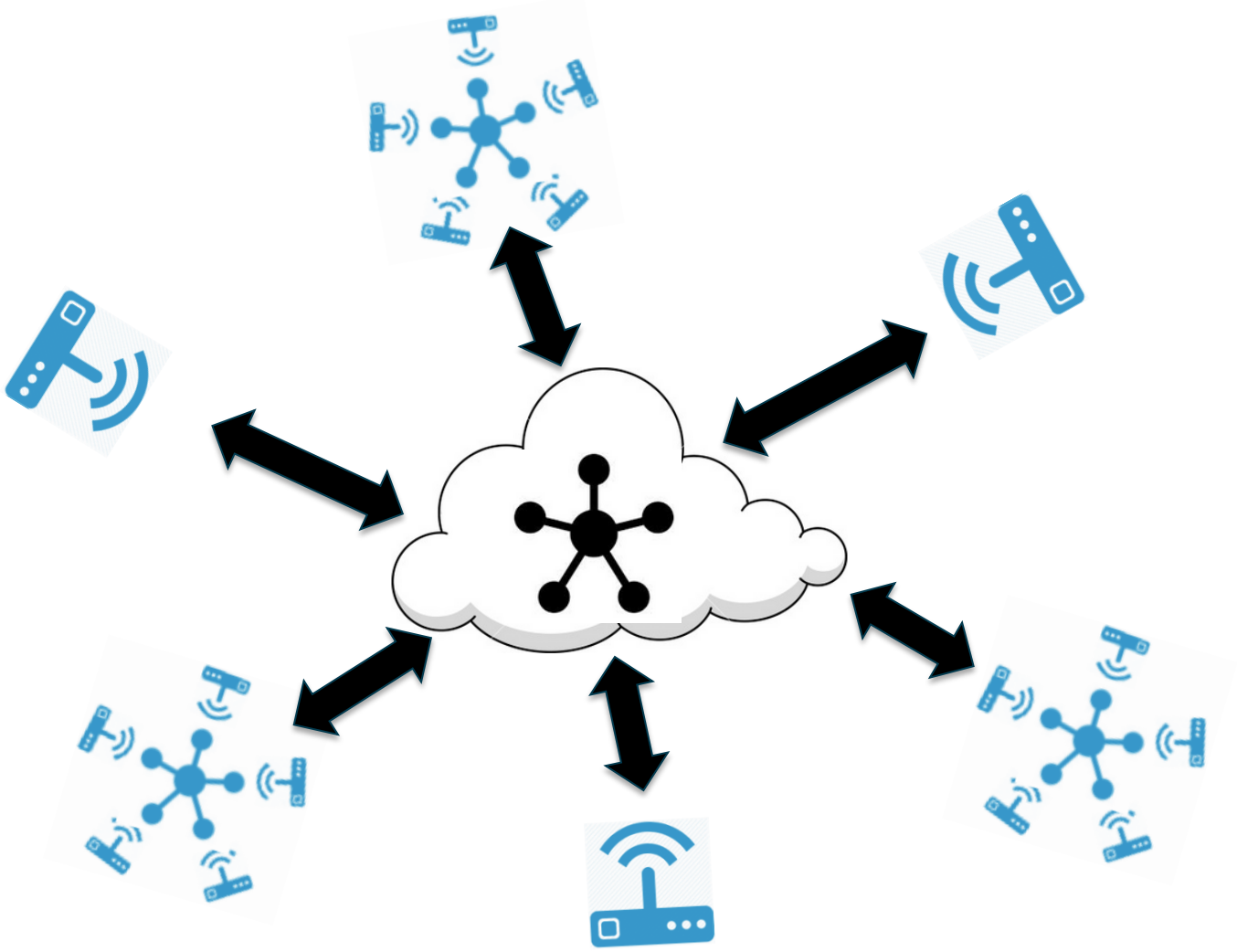
Key charter is to establish and maintain a secure, robust, fault-tolerant connection between the cloud and the edge devices in order to:

- Collect and aggregate device data
- Manage the device

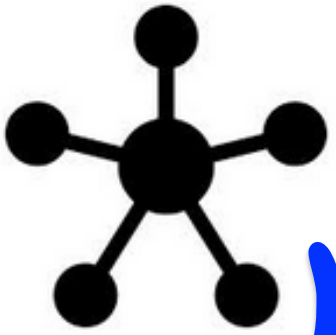




Typically a combination of a localized gateway, and a cloud based gateway, at the edge



Reference capabilities for a gateway



Enable scalable, real-time, dependable, high-performance and interoperable data and device management related exchanges between publishers and subscribers

Connectivity

Software mgmt

Registry

Routing

Control Events

Actuator

Aggregation

Transformation

Provisioning

Device, and Device gateway sprawl is going to be a challenge

Solution to the sprawl: A hub of all hubs

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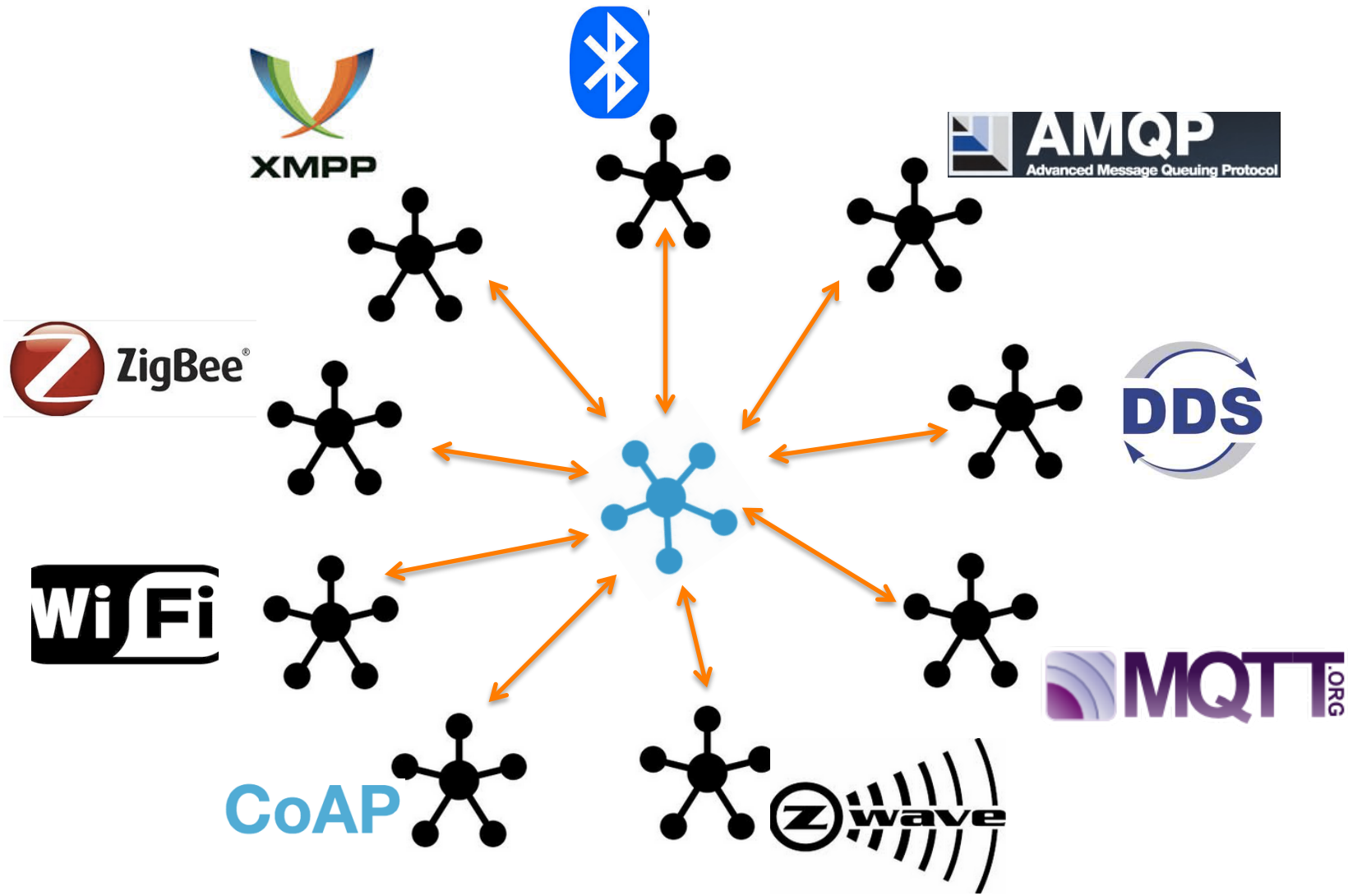
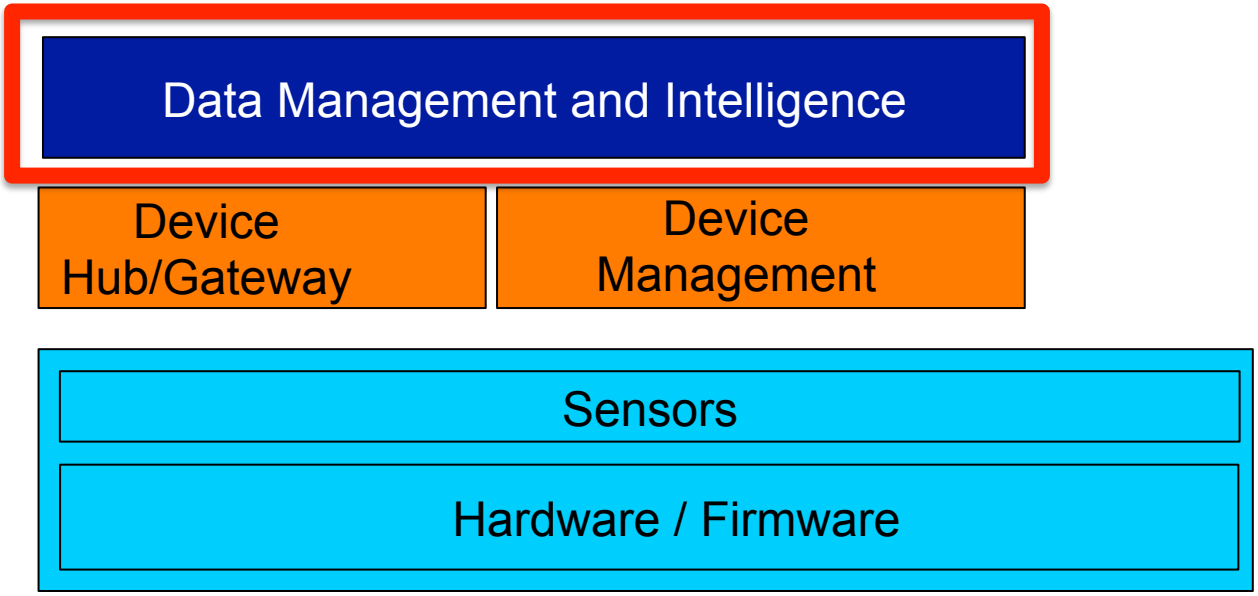
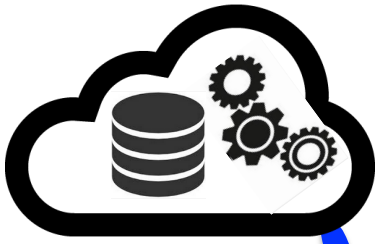


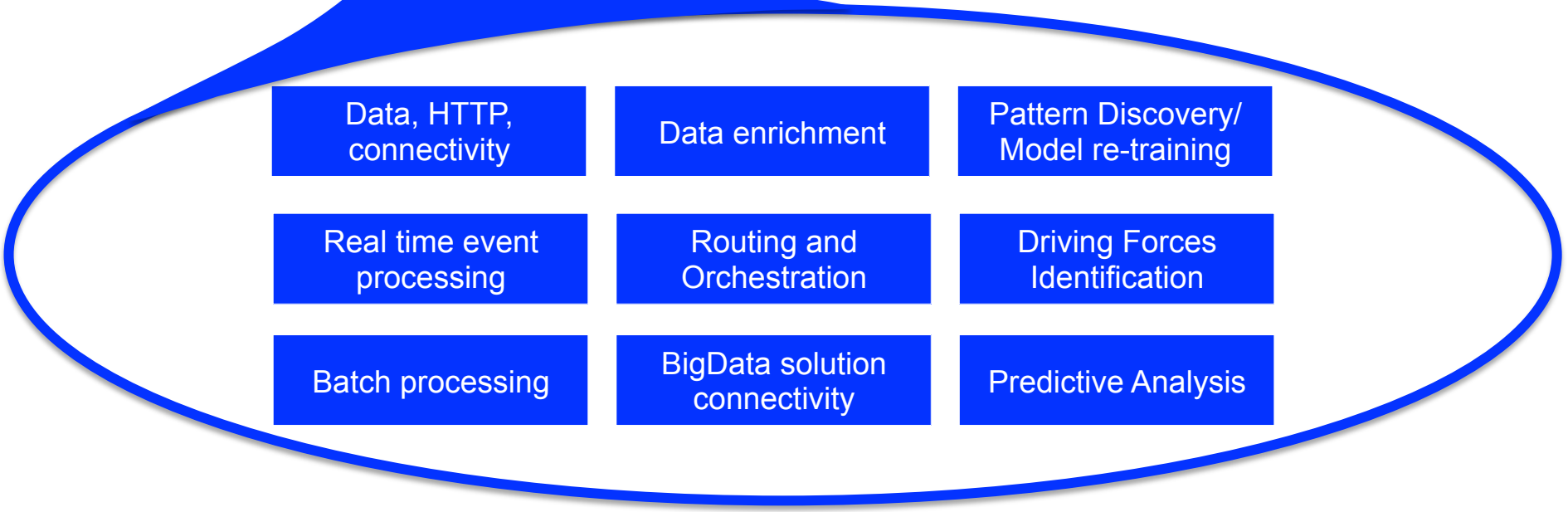
IoT Stack: Data management and intelligence



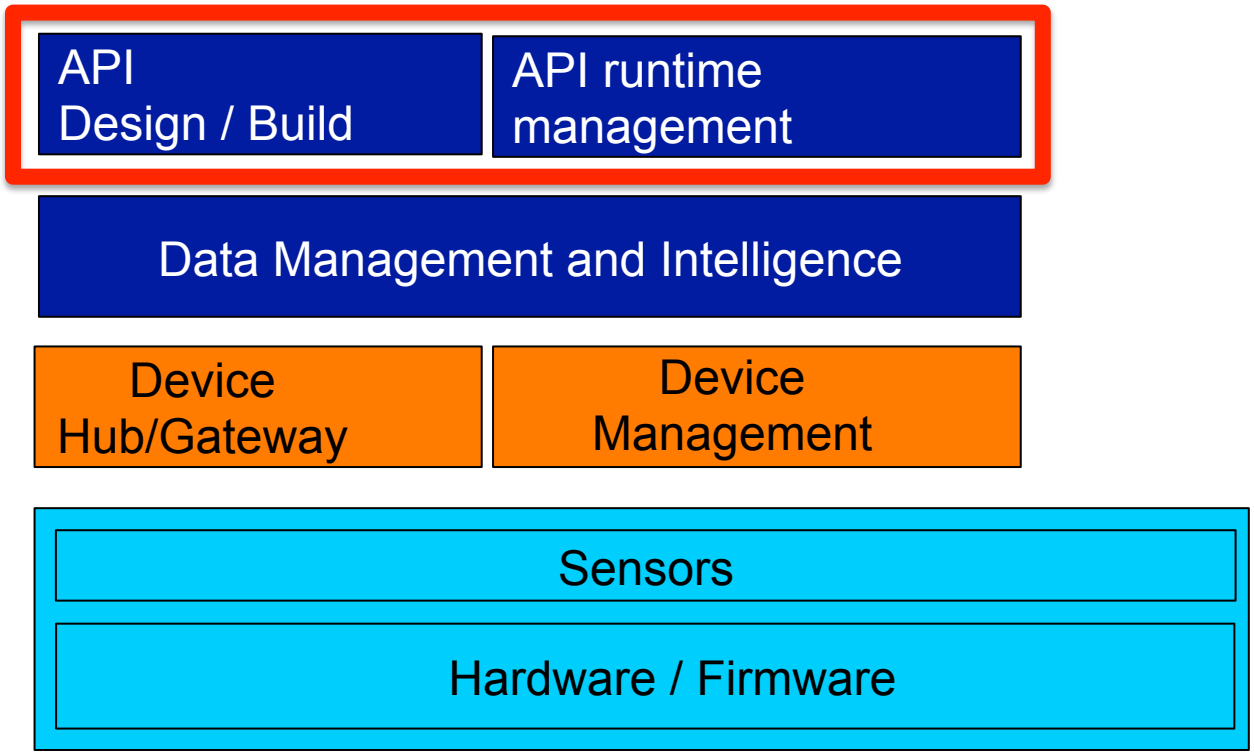
Capabilities required for Data Management and Intelligence



- Data collection, storage, and analysis of sensor data
- Run rules on data streams
- Trigger alerts
- Advanced analytics/machine learning
- Expose HTTP (REST) APIs



IoT Stack: API lifecycle tooling and platform



API lifecycle tooling can be split between design time and runtime

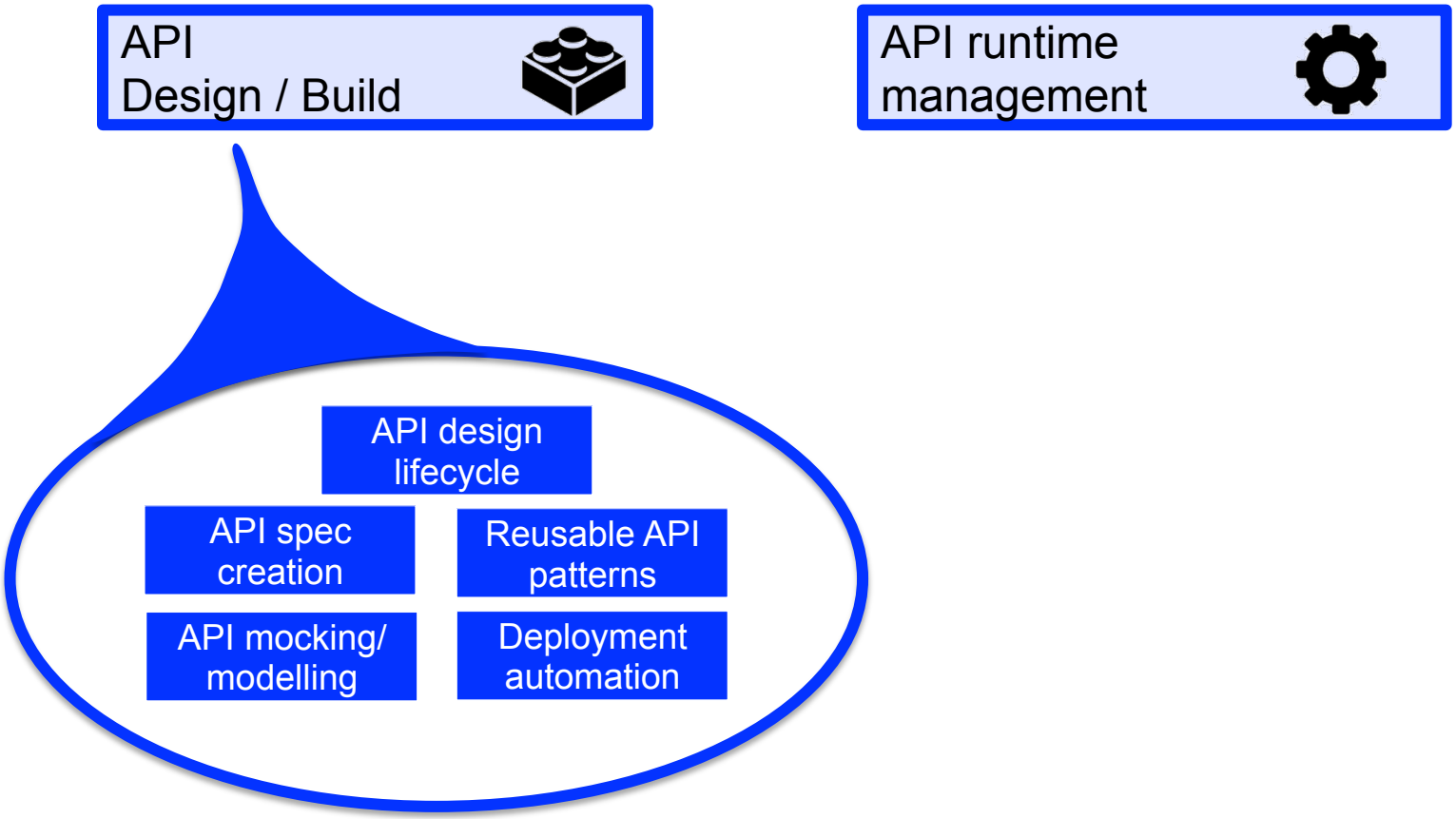
Rapidly design, deploy and publish APIs

API
Design / Build

API runtime
management

API lifecycle: Design time capabilities

Rapidly design, deploy and publish APIs



Outside In API development: What if we could whiteboard an API ? Springboard for optimizing “APX”

API
Design / Build

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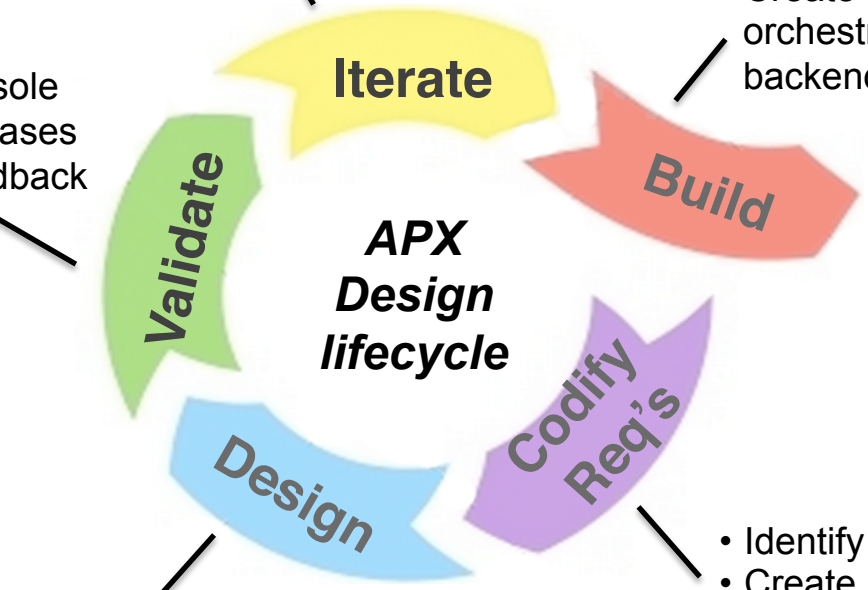
APX Design Lifecycle

API
Design / Build



- Modify API design as appropriate based on developer feedback.
- Continue to validate

- Create and implement orchestration logic for backend connectivity

- Identify process and biz reqs
- Create logical data model
- Translate into logical service/API groupings

- Model API resource models
- API operations/methods
- Request/response payload/codes

- Mock up the API
- Publish interactive console
- Create Notebook use cases
- Receive developer feedback

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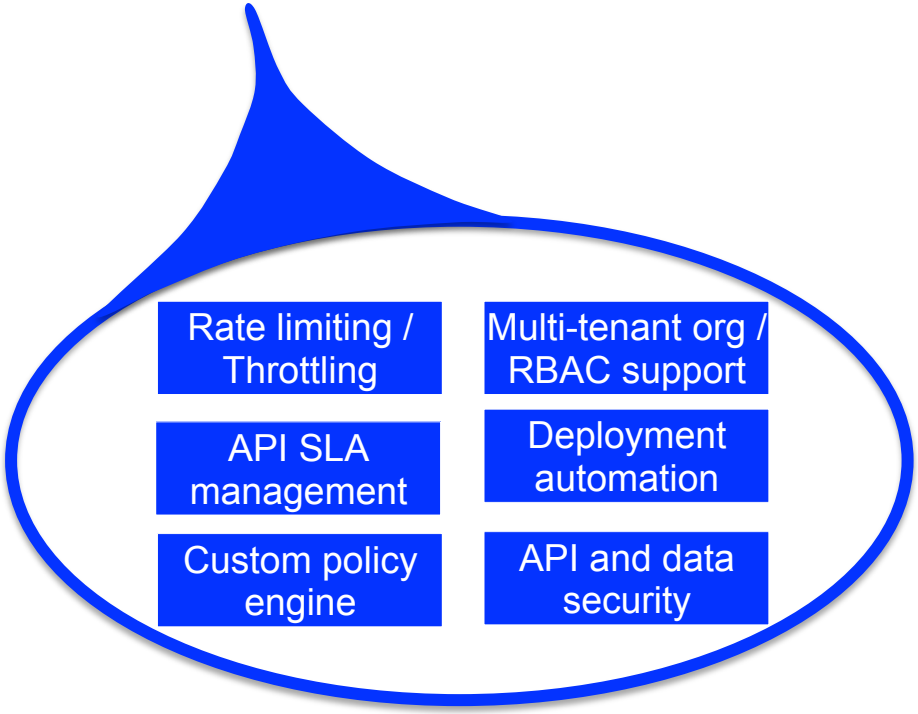
API lifecycle: Runtime capabilities

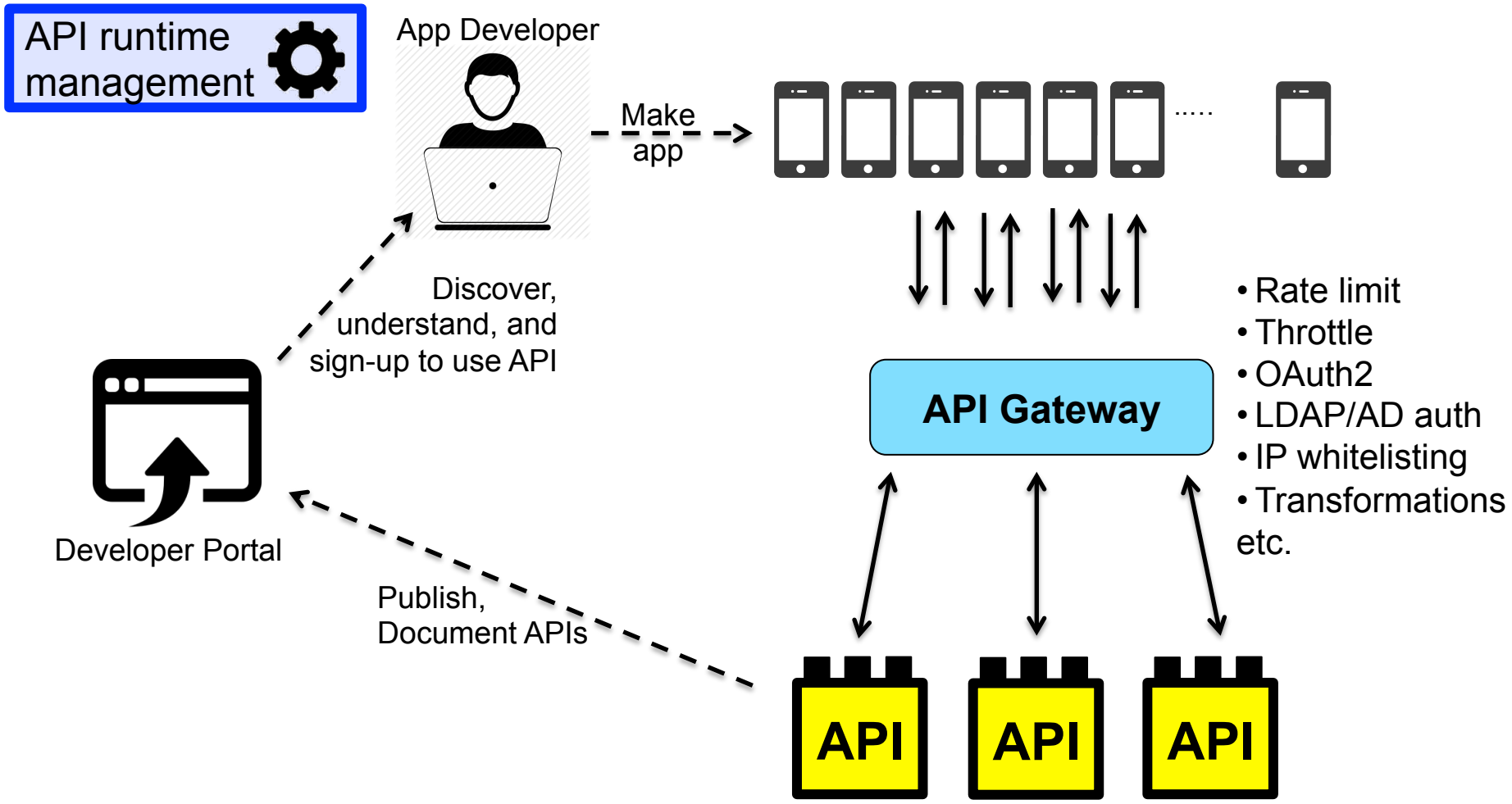
Rapidly design, deploy and publish APIs

API
Design / Build

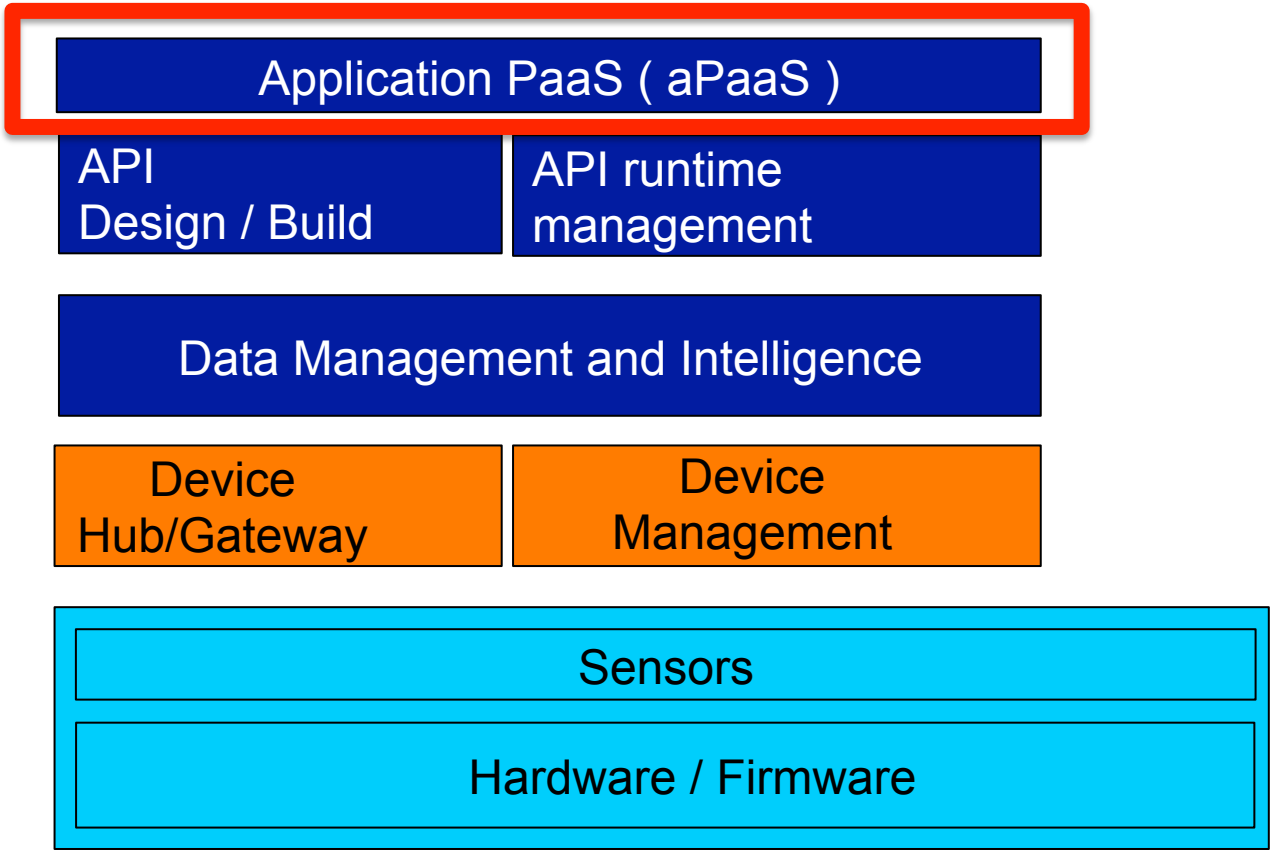
API runtime
management



API runtime management



IoT Stack: Application PaaS (aPaaS)



aPaaS capabilities

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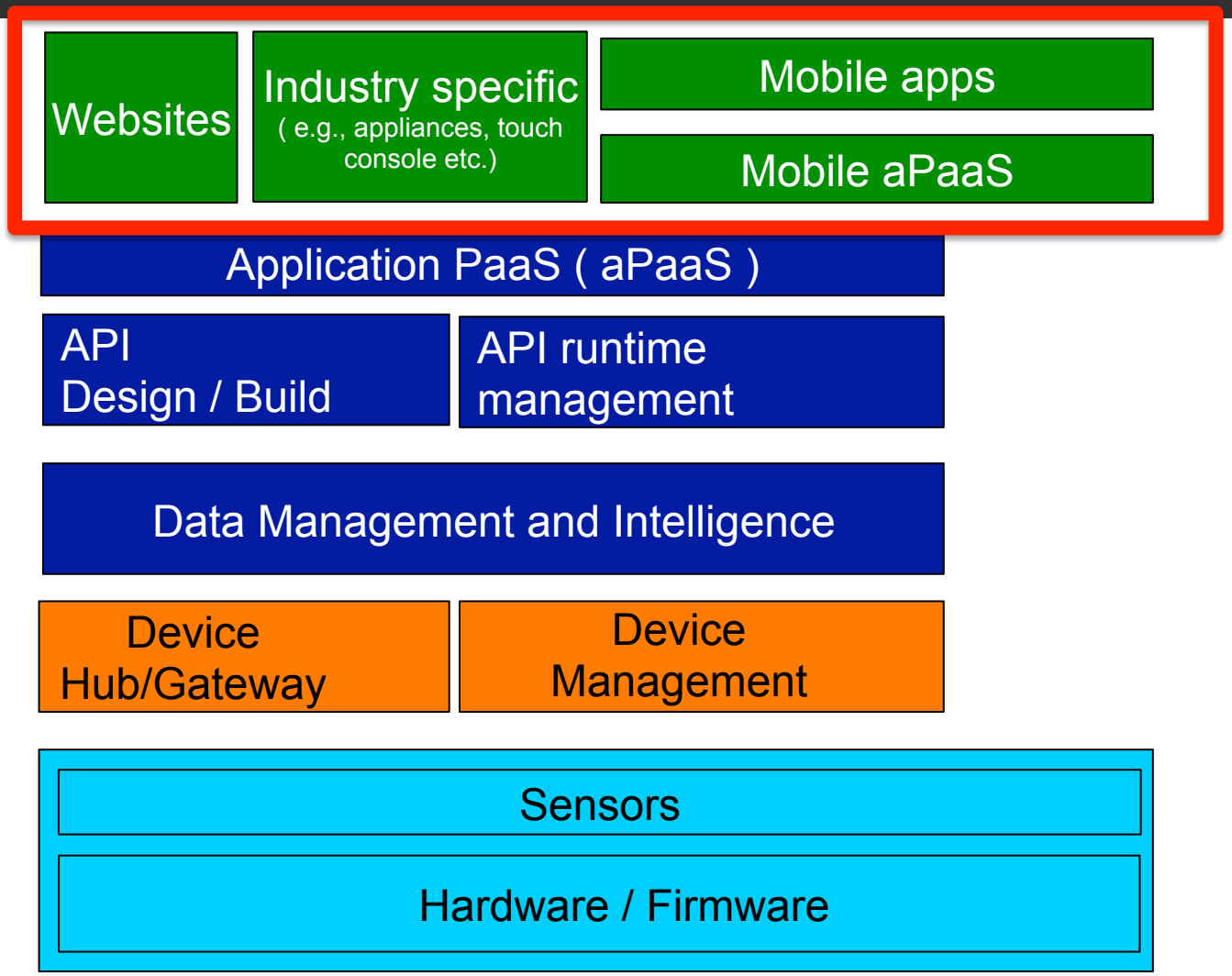
Application PaaS (aPaaS) </>

- Hosted in the cloud
- Provides platform to build applications.

OS/DB, Storage, Server, Network	Design and Development tooling	Management and analytics tooling
Routing, transform, orchestration services	Web, Database, Application Server	Administrative portal

IoT Stack: End applications



IoT/IoE is a driver of mobile / tablet interfaces

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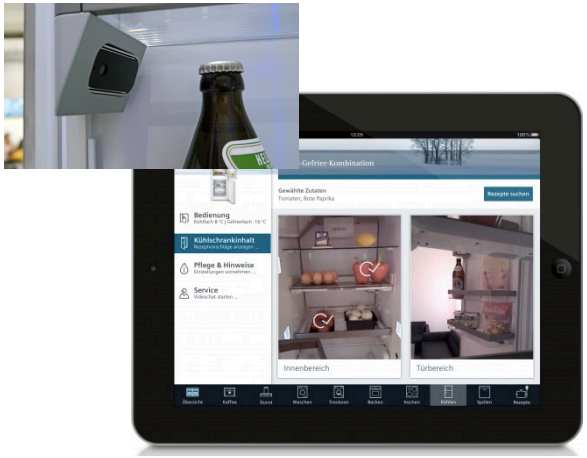
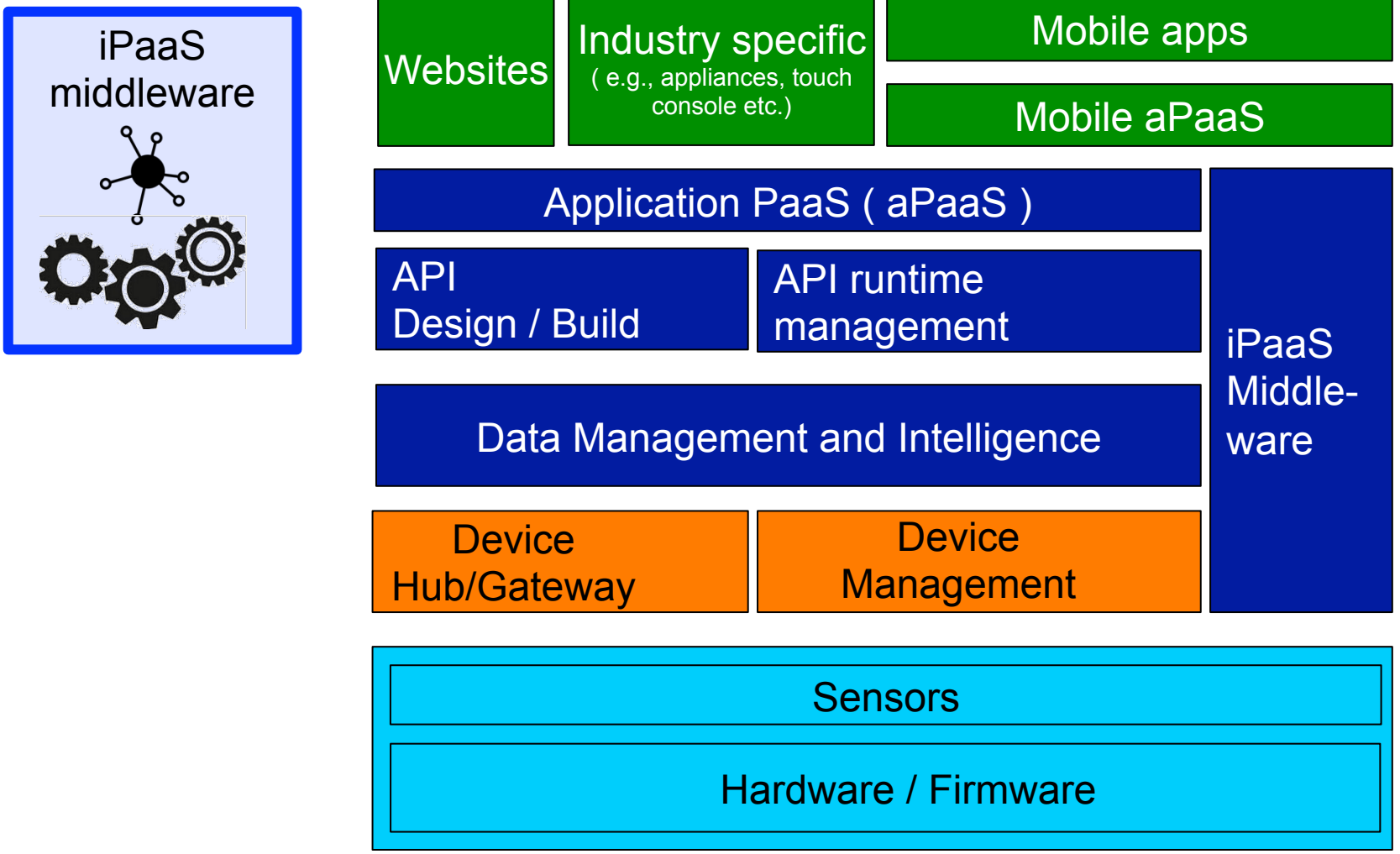
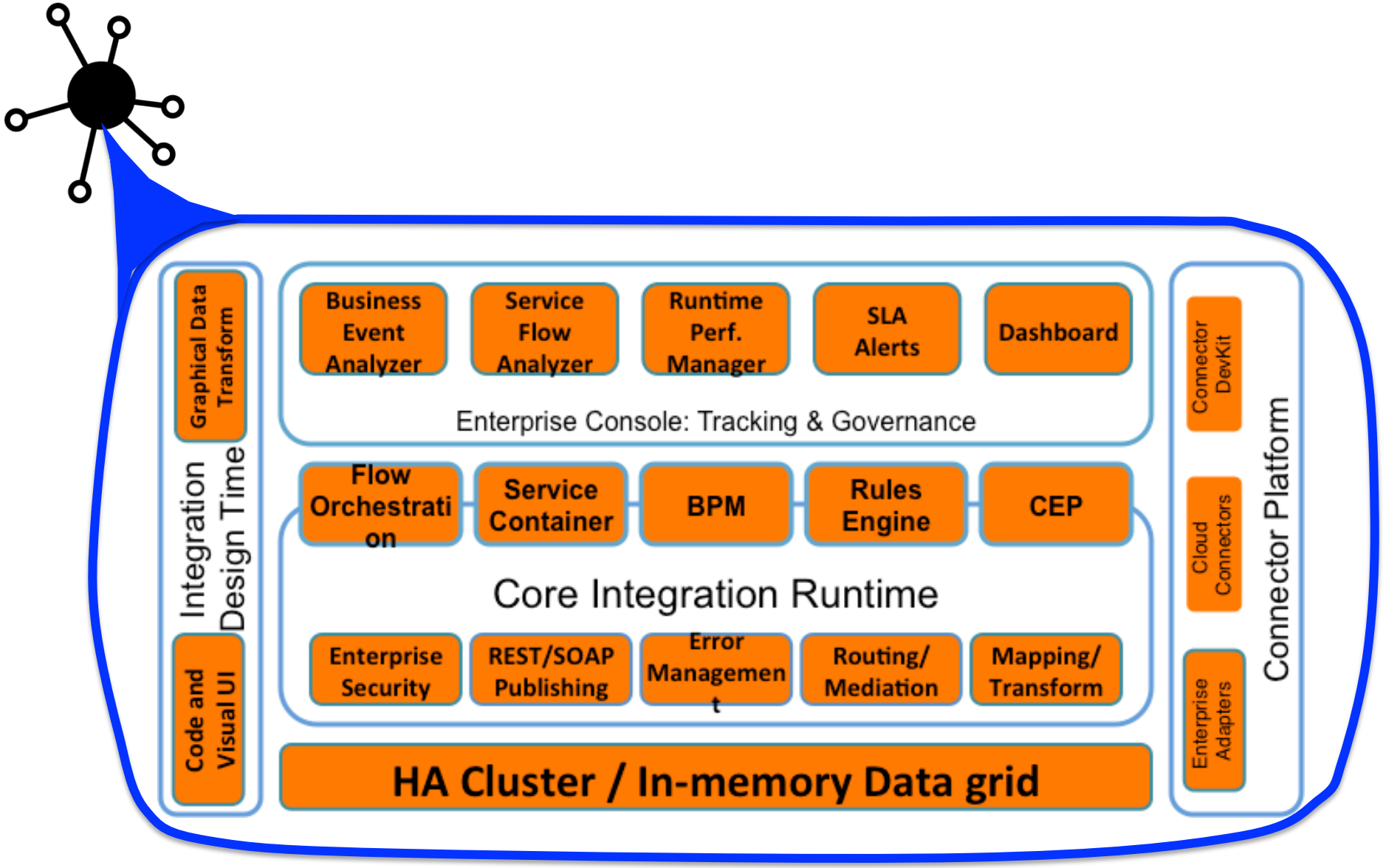


IoT Stack: iPaaS integration – middleware: Don't forget to integrate!

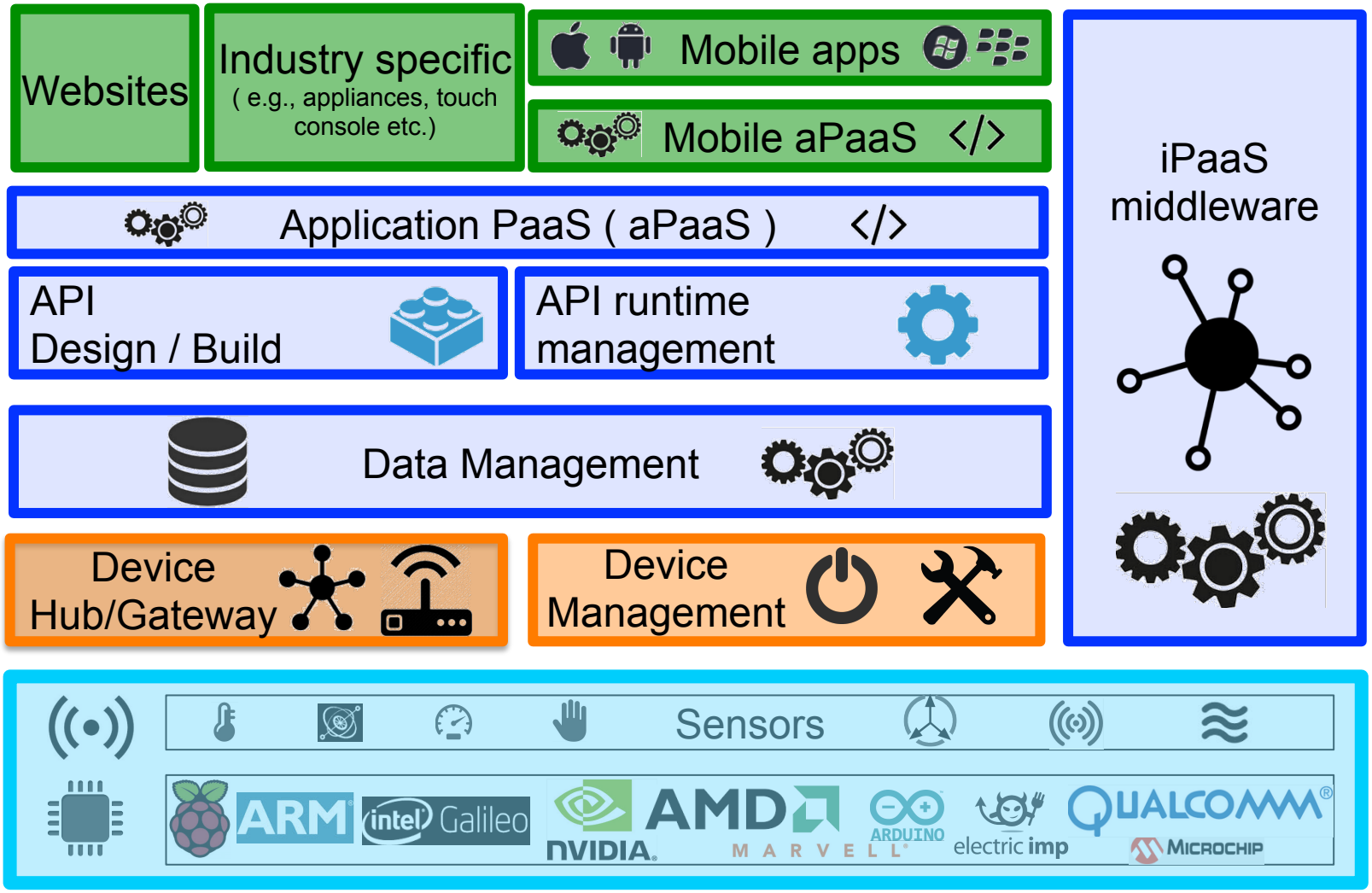


iPaaS Capabilities: Don't forget to integrate!

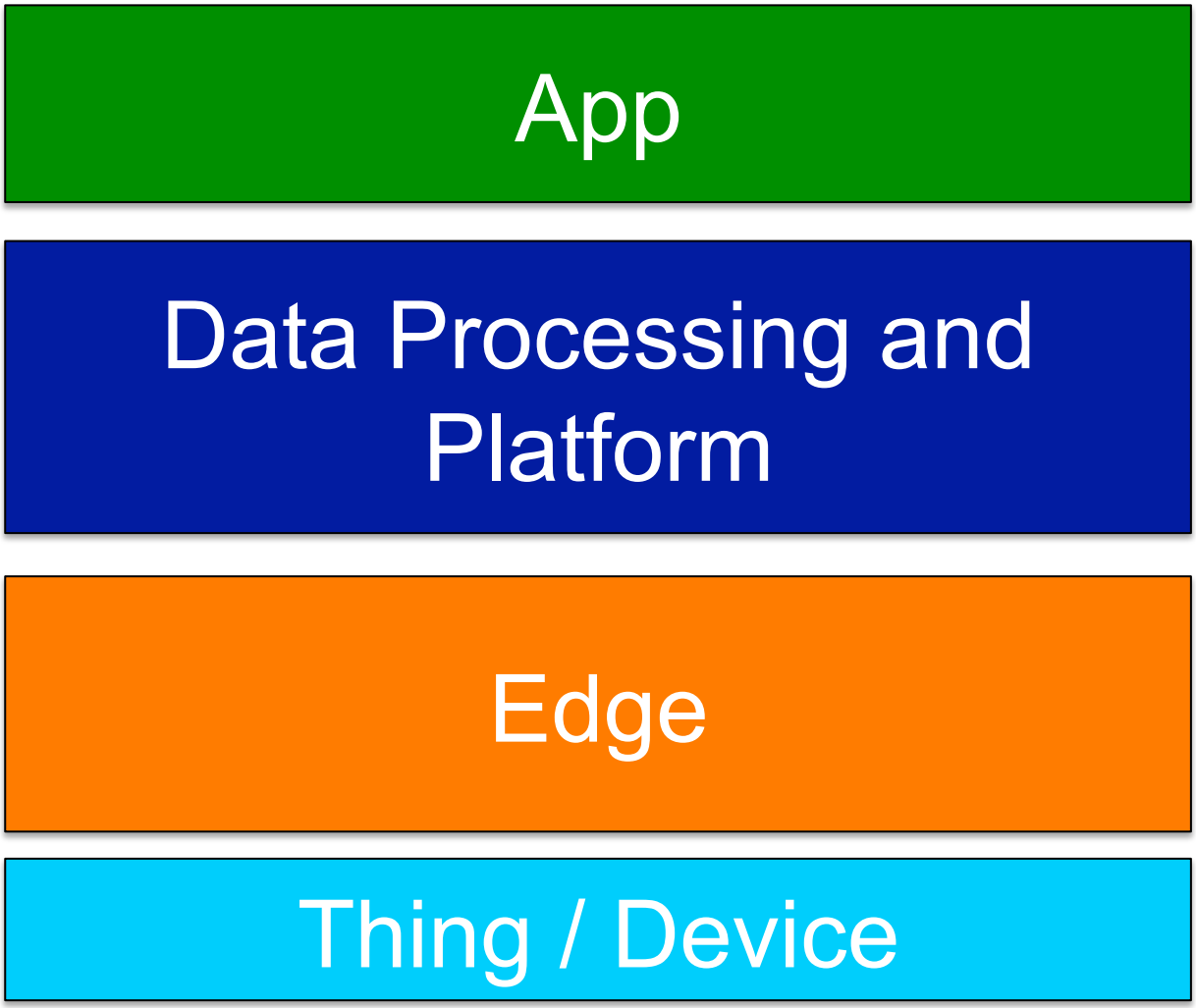


Summary

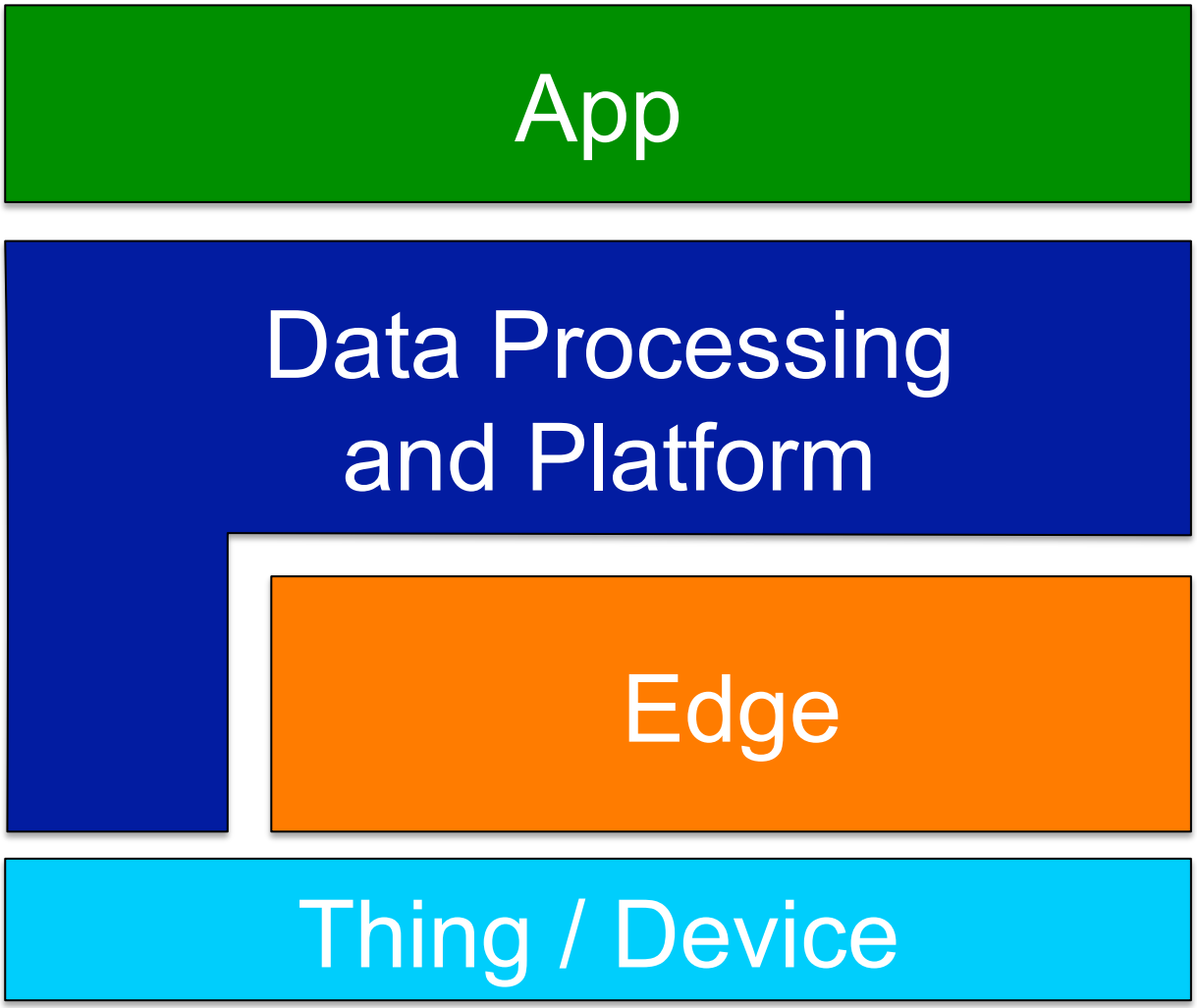
IoT Stack



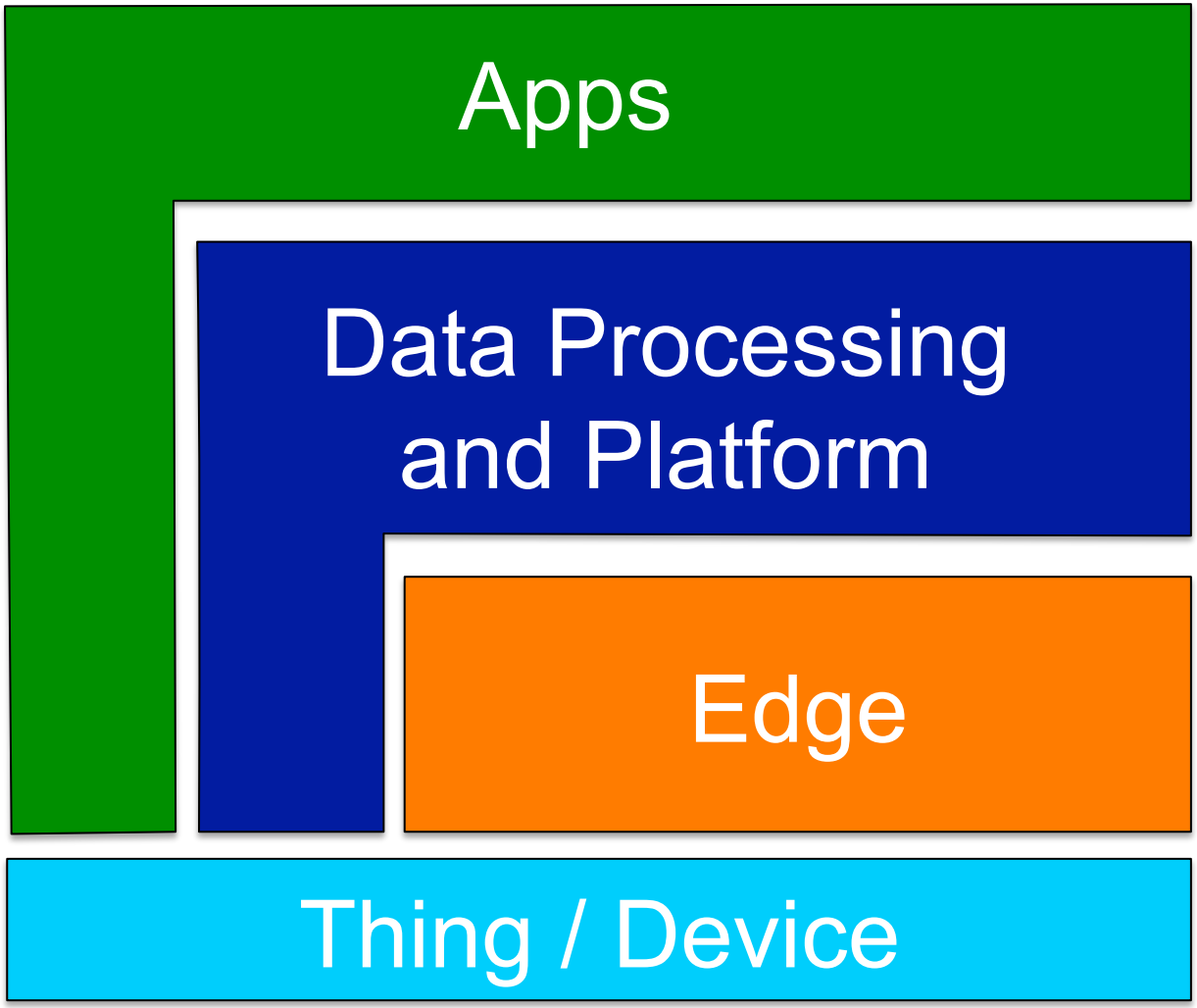
One final thought: the stack as it exists today is also converging…



Scenarios where the middleware and edge have converged (i.e., MuleSoft Anypoint Edge)



And there are also scenarios where the app layer is directly connected to the Thing/Device layer (i.e., embedded Android, Java, Javascript etc.)



Thank you!

Questions?

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