

IoT & Big Data

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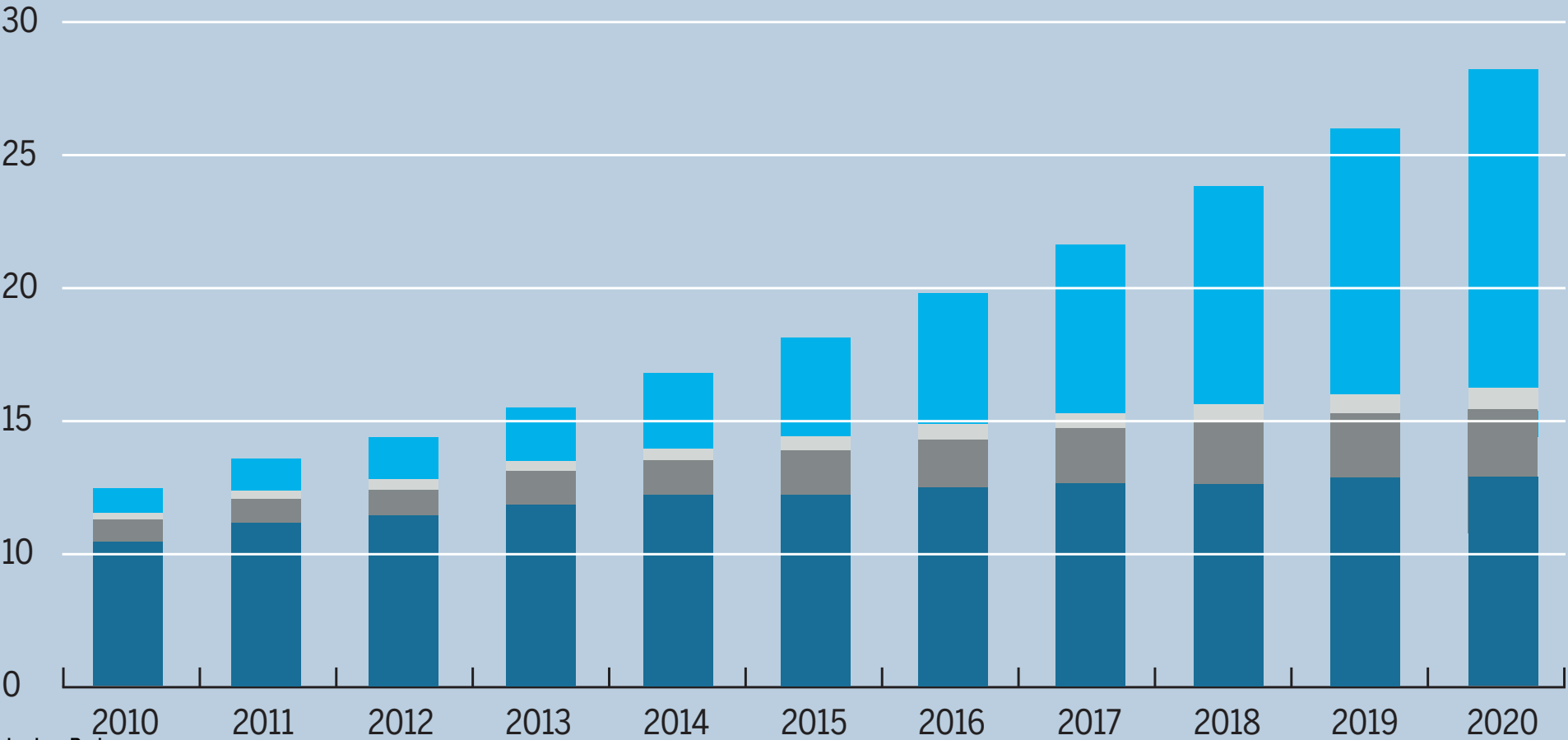


Machines Go Online

The number of everyday objects, or “things,” connecting to the Internet will exceed PCs and smartphones.

- Things
- Tablets
- PCs & laptops
- Mobile phones

Connected devices (billions)

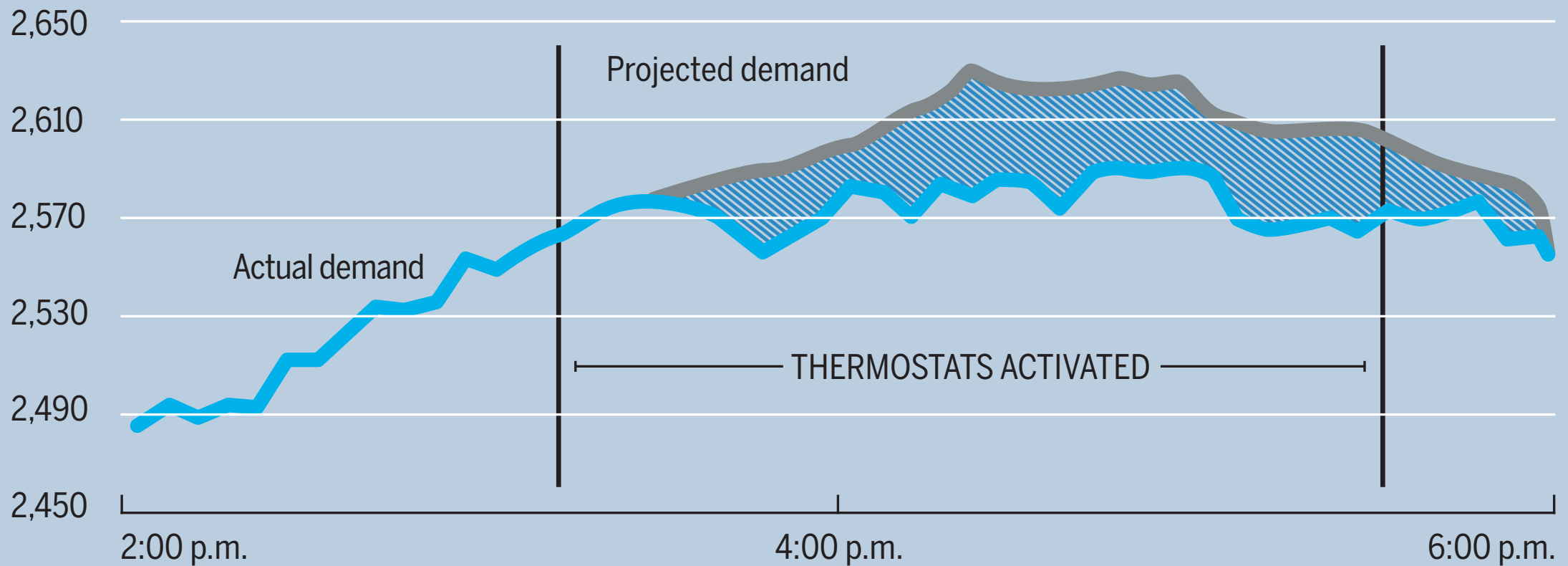


SOURCE: MIT Technology Review

Peak Power

On a 104° day in Austin, remote control of home thermostats helped cut power demand.

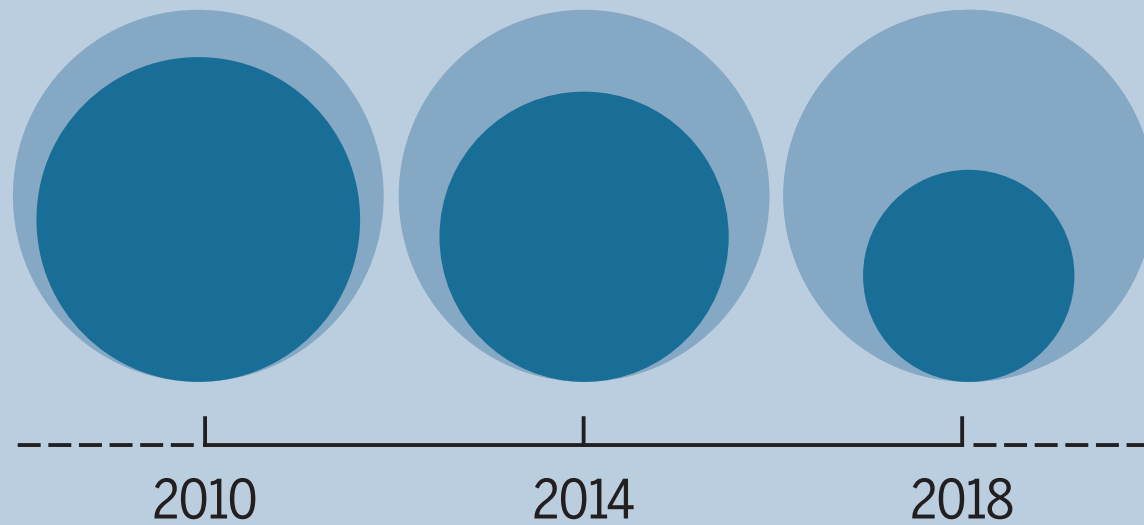
Megawatts



Wired Home

TVs, heaters, and other appliances will account for more of the Internet-connected devices in the average U.S. home.

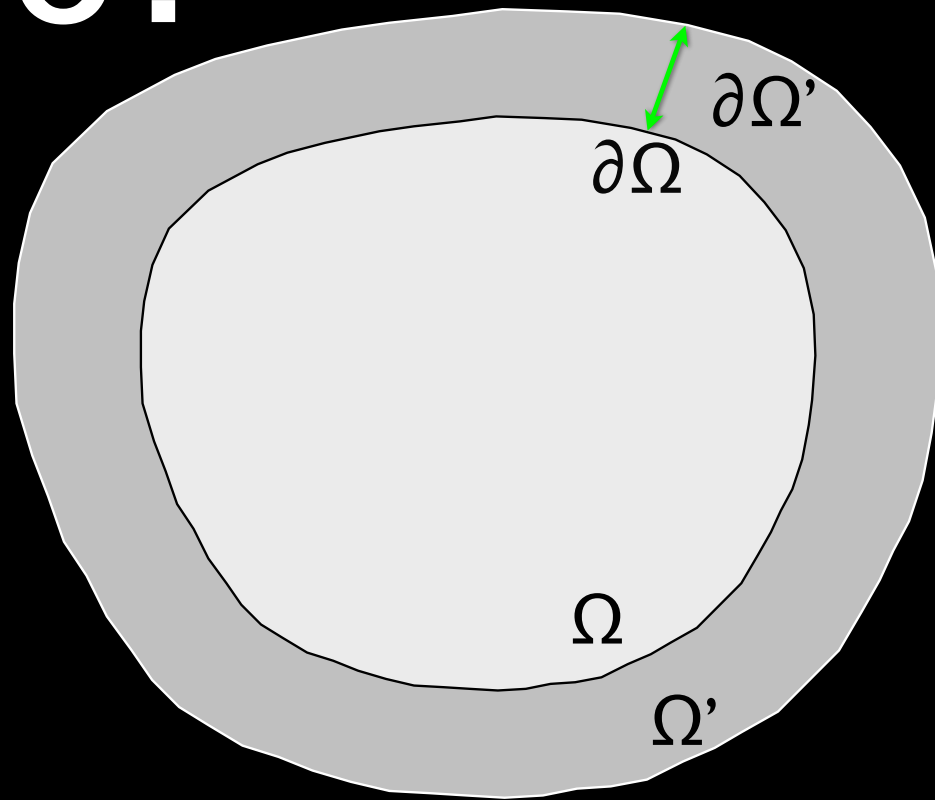
- Home appliances
- Home computers and routers





HOW TO EXTRACT
VALUE
FROM DATA ???

What to Do?



Ω = known technology

Ω' = known knowledge

\longleftrightarrow = “There’s plenty of gratification in between”



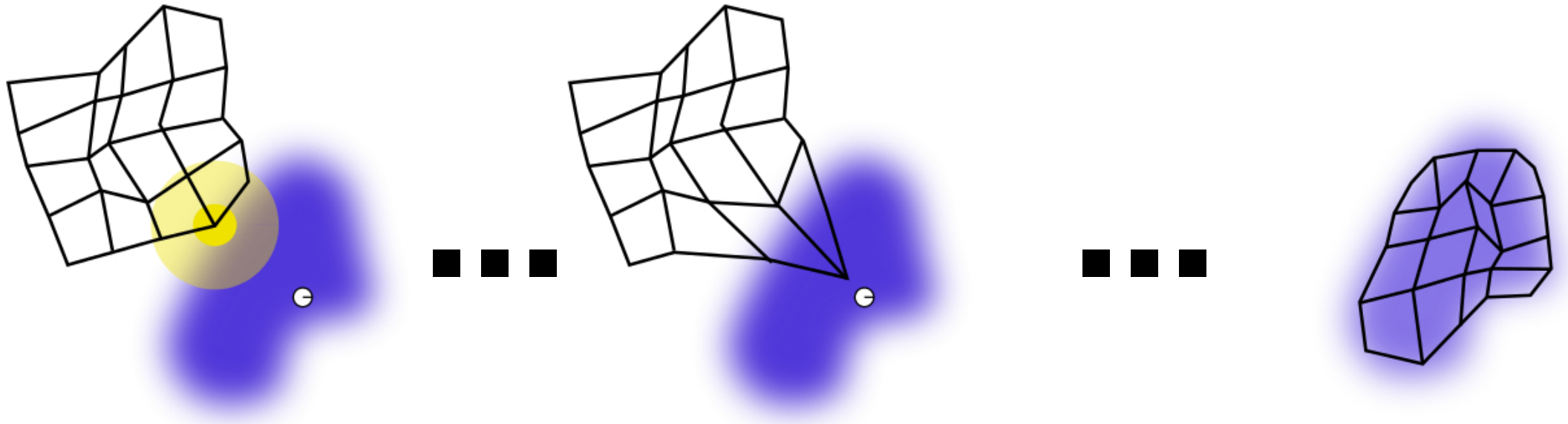




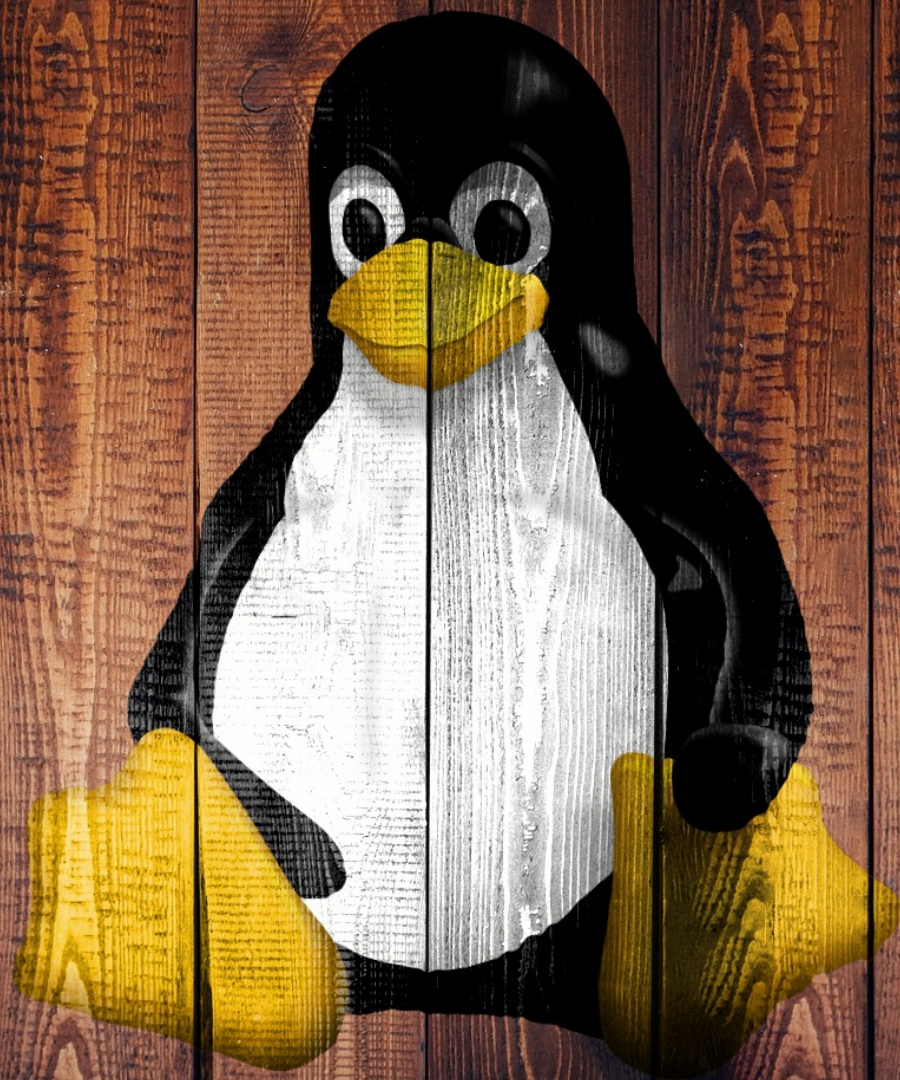
Cloud
Routers
Factory
Field



Machine Learning!

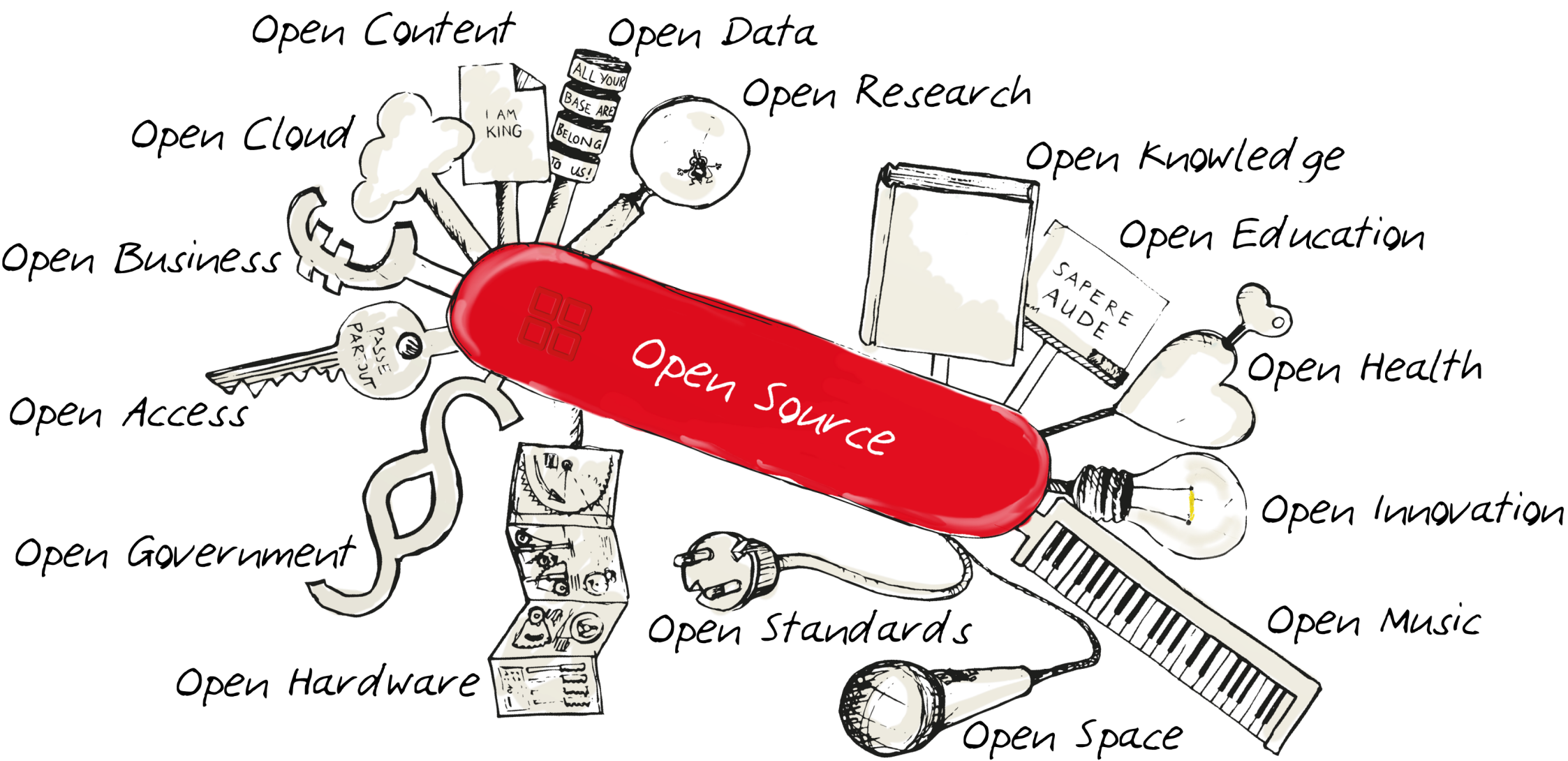


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Crowdsourcing



Principles for IoT Architectures



Open & Interoperable

Based on open source and open industry standards
Accelerates innovation with no lock-in, enables eco-systems



Modular yet Integrated

Integration at the edge and in the data center
Ready-to-use building blocks for a faster time to market



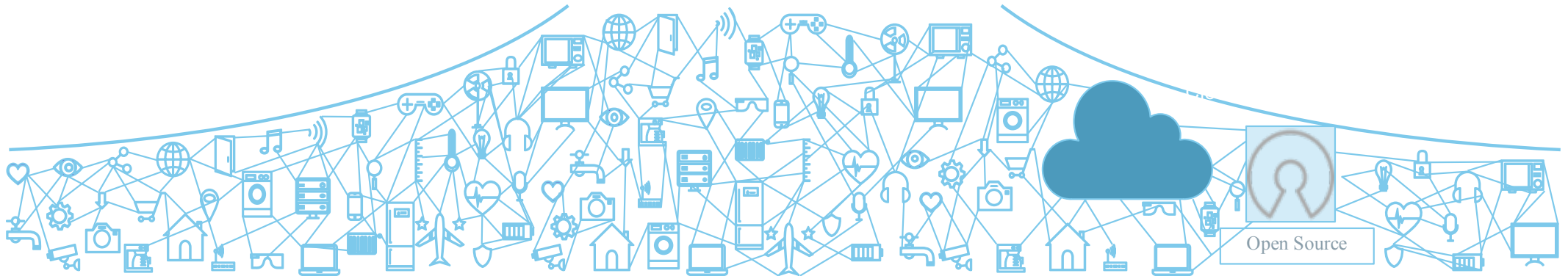
IT / OT Management

Manage field devices and the data center
Improved operational efficiency with flexible deployments



End-to-End Security

Enterprise-grade data security and compliance - from the edge, all the way through to storage and access



Desirable Features



Device Management & Connectivity

Securely connect, authenticate and manage disparate connected devices that speak different protocols



Intelligent Edge Processing & Analytics

Apply analytics at the edge with machine learning and business rules to enable local, low-latency decision making



Advanced Analytics & Machine Learning

Centralize IoT data processing, analytics and machine learning to enable deep business insights and actionable intelligence



Business & Application Integration

Enable integration with enterprise and business applications to bridge the gap between OT and IT and reduce complexity



End-to-End Security & Compliance

Tools to enable end-to-end data security, compliance, authorization and authentication



SECURITY



ONTOLOGIES



TOOLS & SDKs



Communication



Field protocols

IoT protocols

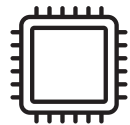
Hardware
Abstraction Layer (HAL)



OS / RTOS



Remote
Management



CONSTRAINED DEVICES



Data Management
& Messaging



Connectivity



Field protocols

IoT protocols

Network Management



Application Runtime



OS / RTOS



Remote
Management



GATEWAYS AND SMART DEVICES



Connectivity



Message
Routing

Application
Enablement



Event Management,
Analytics & UI



Data
Management



Device
Management



Device
Registry

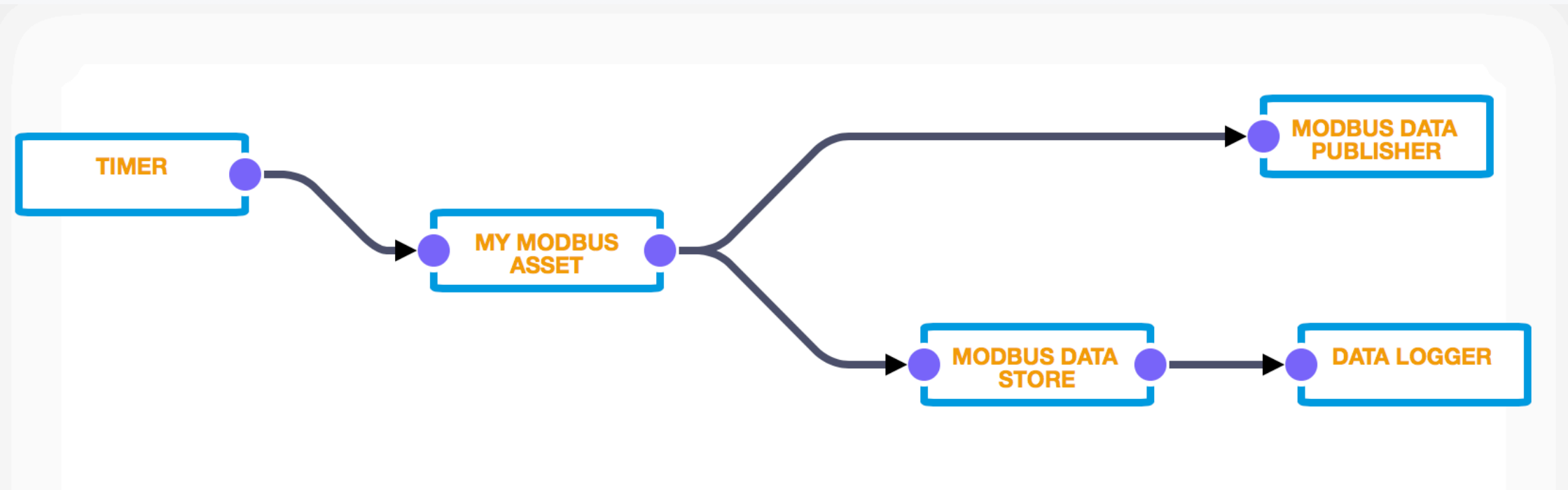


OS / PaaS

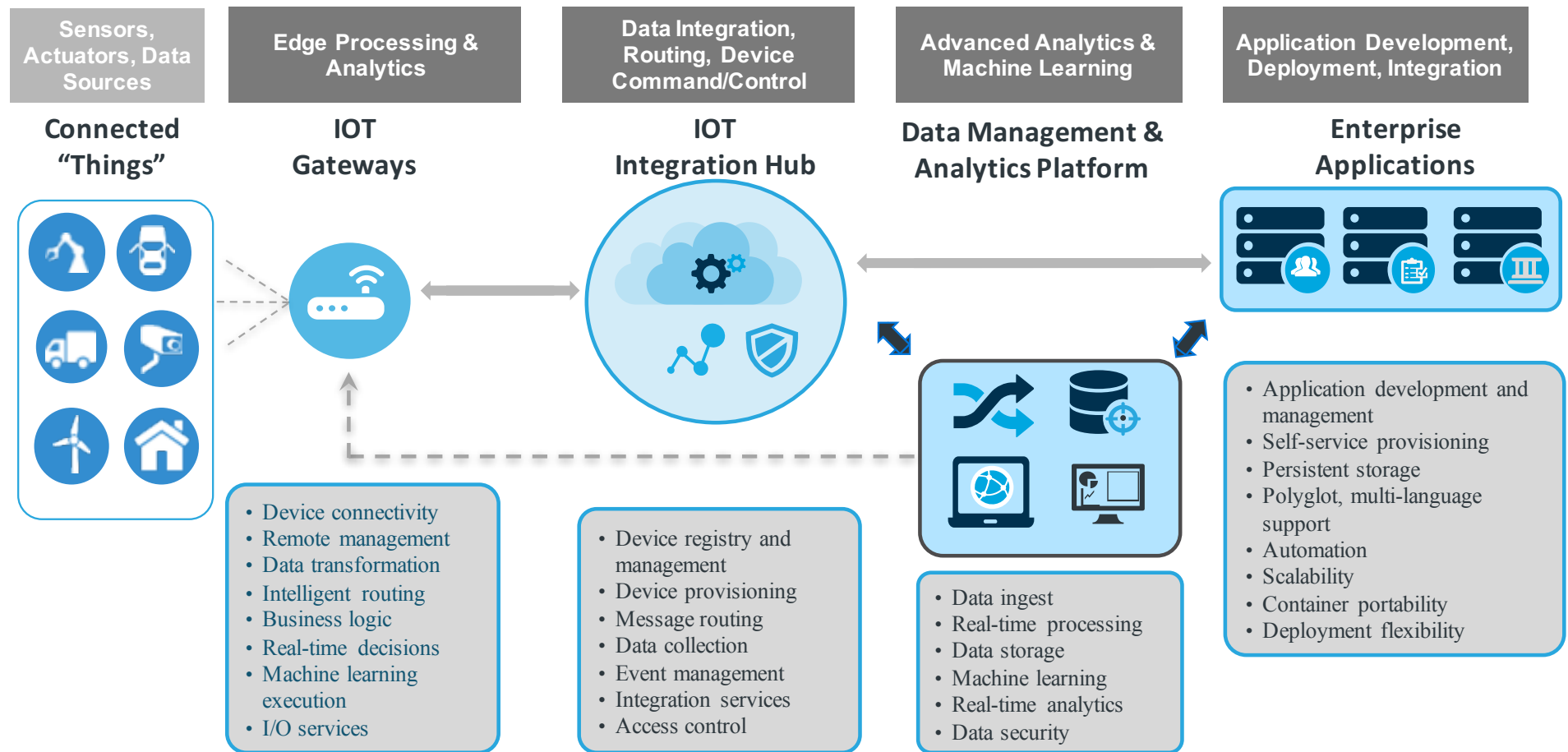


IOT CLOUD PLATFORM

Symbolic Elaboration



Open end-to-end Architecture



Open end-to-end Architecture

