Progressive

Disintermediation

GLOBAL PRODUCT DATA INTEROPERABILITY SUMMIT 2018

ELYSIUM   Parker | Aerospace   NORTHROP GRUMMAN   BOEING

Disruptive Technology
Synergy

Robert Rencher - Boeing

Technology Assertions

Progressive Disintermediation

Integrated Value Opportunities

BC-IOT-AI-5G-MEC

Blockchain-Internet of Things-Artificial intelligence-5G Networks-Mobile Edge Computing

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Assertion to Synergy

- **Realizing that the technology assertions of today will find their way into tomorrows business value propositions.**
- **Business value is made on the interdependencies of evolving technology**
- **Transition from autonomous utilization (traditional) of technology to a unified technological approach**

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Core Technologies

- Blockchain   TRUST
- Internet of Things   DATA
- Artificial Intelligence   AUTONOMY
- 5G Cellular   CONNECTIVITY
- MEC   EDGE COMPUTE

Blockchain - TRUST

- **Assertions:**
  - *DISTRIBUTED LEDGER DATABASE,* **A secure network of computers**
  - *PEER-TO-PEER TRANSMISSION. Communication occurs directly between peers instead of through a central database.*
  - *TRANSPARENCY WITH PSEUDONYMITY. Every transaction and its associated value are visible to anyone with access to the system*
  - *IRREVERSIBILITY OF RECORDS. Because transactions reside on every node of the distributed network.*
  - *COMPUTATIONAL LOGIC. The digital nature of the ledger means that blockchain transactions can be tied to computational logic.*
  - *The encrypted transaction is broadcast to members of the peer network, who evaluate the transaction as being valid or invalid.*
  - *CRYPTOGRAPHY. Each digital transaction is turned into a unique string of numbers and letters called a hash, and inserted into the transaction.*
- **Push to the Edge**
- **Associative Technology Wrappers– Analytics, Time Sequencing, Decisioning…**
- **Systemic deployment within infrastructure platforms and service platforms.**
- **Accepted Truth Record**

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Cisco Blockchain Architecture (a networked perspective)
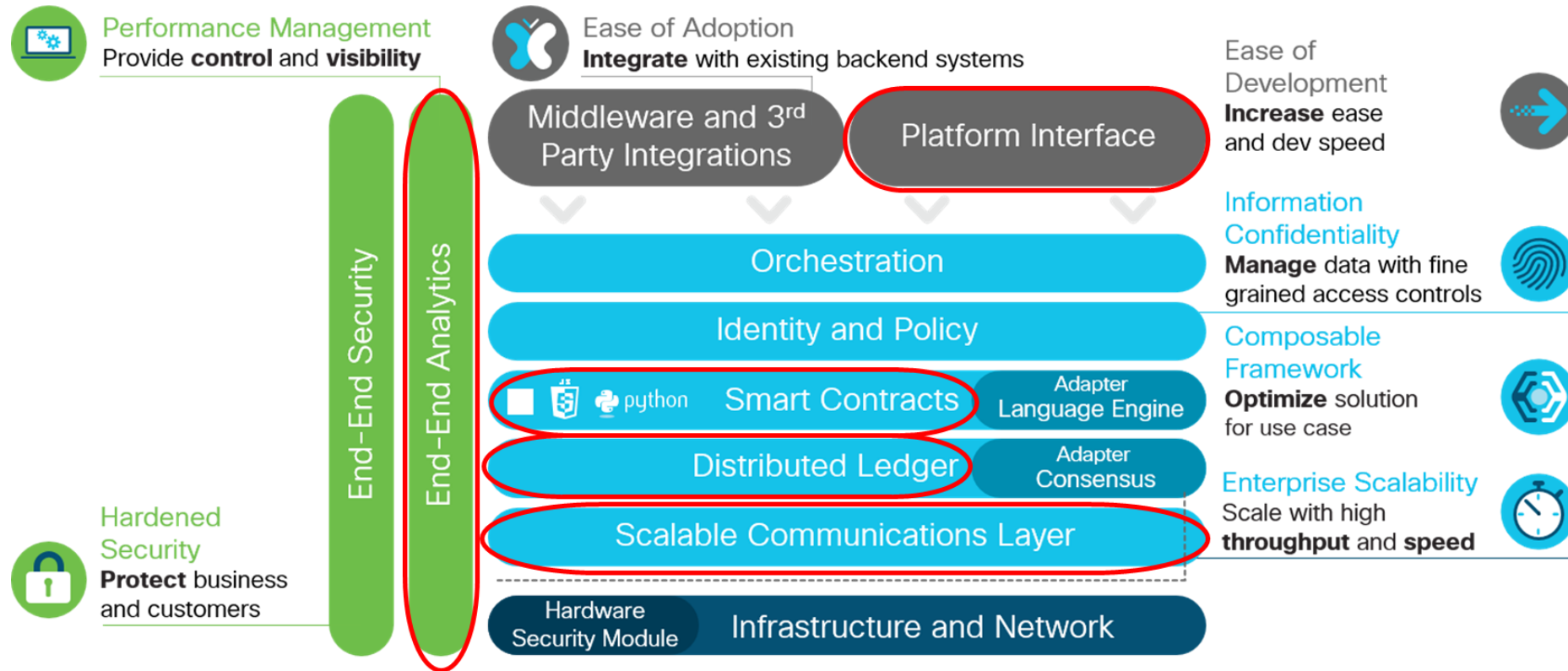
https://www.cisco.com/c/en/us/solutions/digital-transformation/blockchain/index.html

Internet of Things - DATA

- ## **Assertions**
  - Improve Performance
  - Compliance, Privacy, Security
  - Reduce Operational Costs

- **Reality - Push to the Edge**
- **Machine to Machine**

https://www.iiconsortium.org/pdf/Introduction_to_Edge_Computing_in_IIoT_2018-06-18.pdf

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Introduction to Edge Computing in IIoT

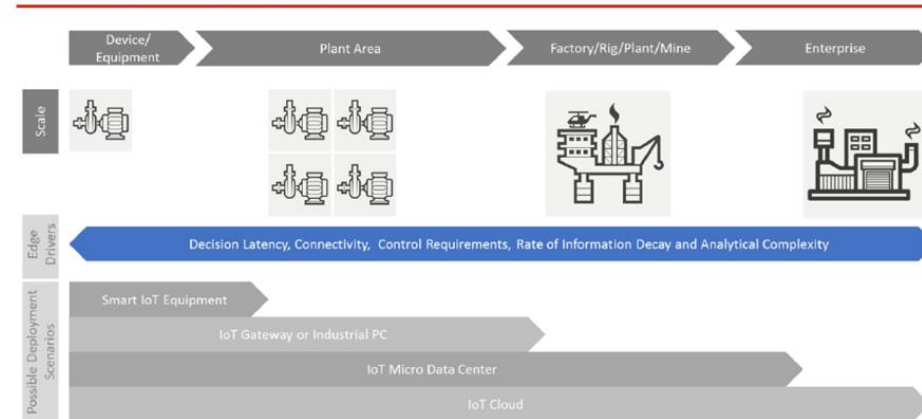Figure 2: Edge continuum for a typical industrial environment
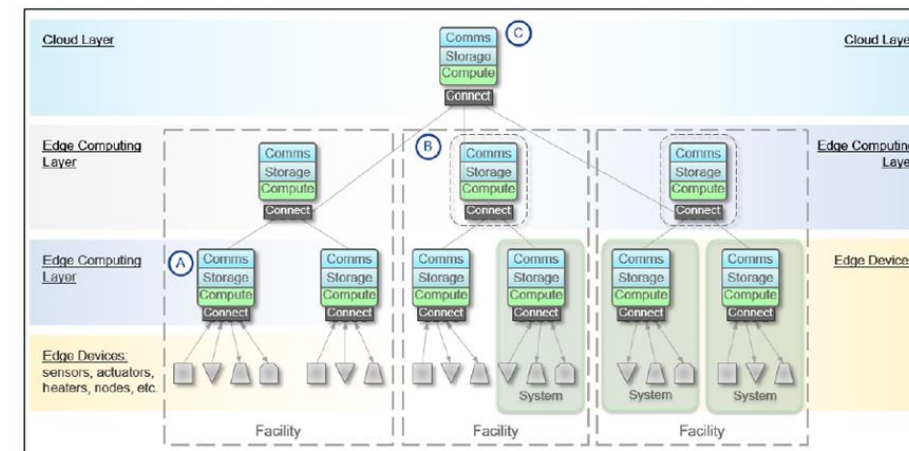
DIAGRAM OF EDGE COMPUTING EXAMPLES

Figure 5: Edge Computing Topology

- **Assertions**
  - Assisted Intelligence – assisting human decisioning
  - Automation of cognitive tasks (existing)
  - Augmented Intelligence – augment human decisioning
  - Autonomous Intelligence – Autonomous independent decisioning
- **Machine Intelligence**
- **Enabled on the Edge**

https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf

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5G Cellular - CONNECTIVITY

Fundamentals of wireless networks have remained essentially static. Evolution of radio from 2G to 3G to 4G, provided connectivity for (geographically dispersed) human communications.

However…

5G era networks are expected to serve a user environment that is significantly more complex than that of today:
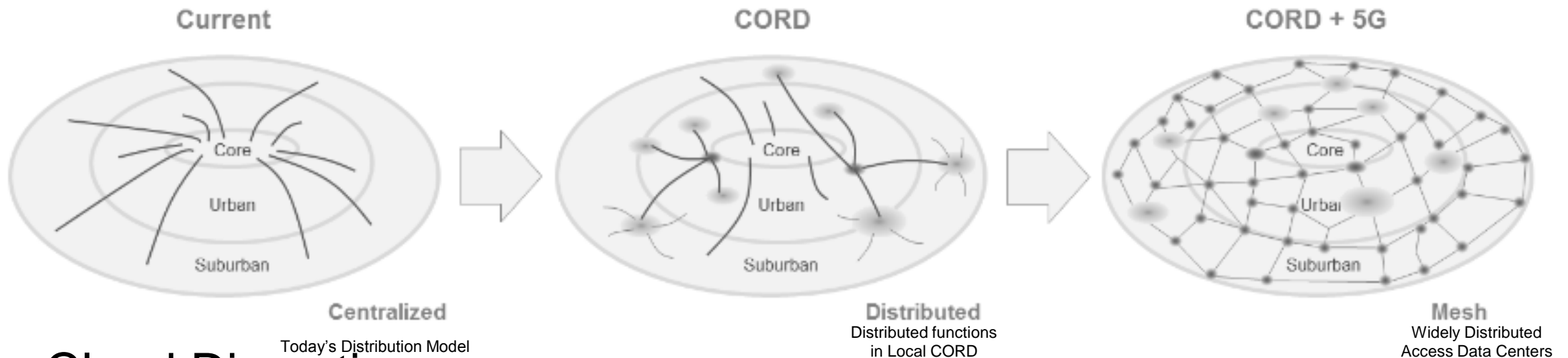
>   Software Defined Networks, Network Function Virtualization, M2M communications, Robotics, Artificial Intelligence and Machine Learning.

5G Service groupings:

- Extreme Mobile Broadband (xMBB): high data rates, low latency communications, with extreme coverage.
- Massive Machine Type Communications (mMTC): scalable connectivity for a large number of devices (tens of billions), efficient transmission of small payloads, with wide area coverage.
- Ultra-reliable Low Latency Communications (urLLC): ultra-reliable, low latency connectivity for services with stringent requirements on up-time and latency.

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Current

Core
Urban
Suburban

Centralized
Today's Distribution Model

CORD

Core
Urban
Suburban

Distributed
Distributed functions
in Local CORD

CORD + 5G

Core
Urban
Suburban

Mesh
Widely Distributed
Access Data Centers

- Cloud Disruption
- Platform Disruption
- Ultra Low Latency
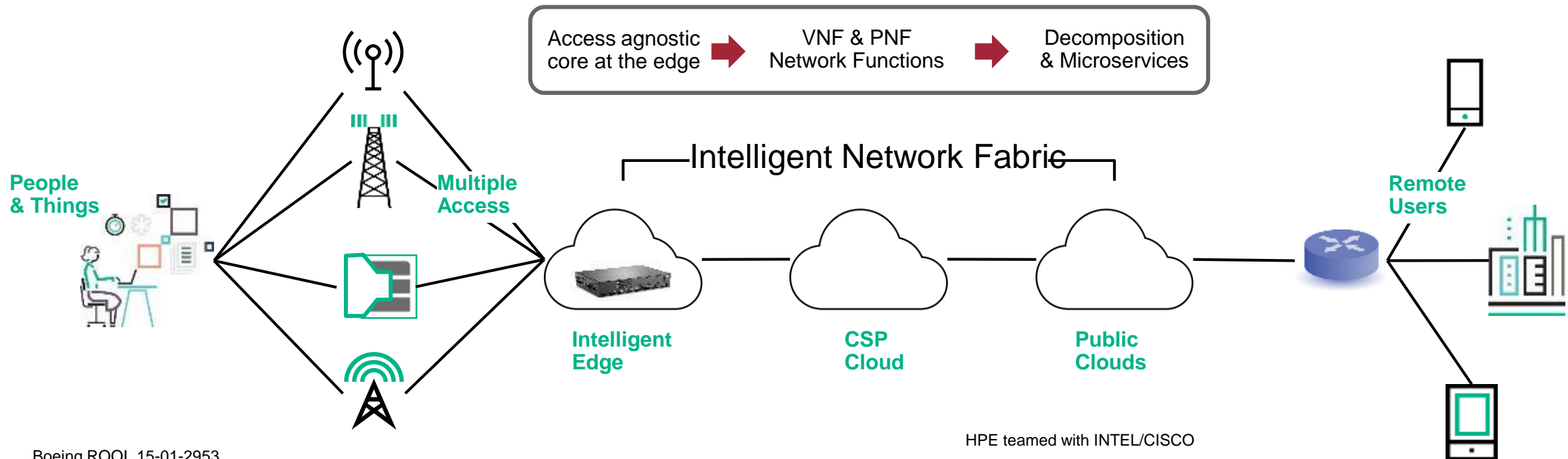- Mobile Edge Computing – Active validation with HPE

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What is Multi-access edge compute?

- **- consistent service experiences, flexible deployment across different access methods**
  - Consistent & unified services across any access
    - fixed & mobile, licensed & unlicensed
  - Cornerstone for building converged 5G services
  - Architecture meeting demands of near real-time applications

Core becomes adaptive to service a connected world

Access agnostic core at the edge ➡ VNF & PNF Network Functions ➡ Decomposition & Microservices

Intelligent Network Fabric

People & Things

Multiple Access

Intelligent Edge

CSP Cloud

Public Clouds

Remote Users

HPE teamed with INTEL/CISCO

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HPE teamed with INTEL/CISCO

DIGITAL IS EXPONENTIALLY ACCELERATING A MASSIVE SHIFT IN INDUSTRY
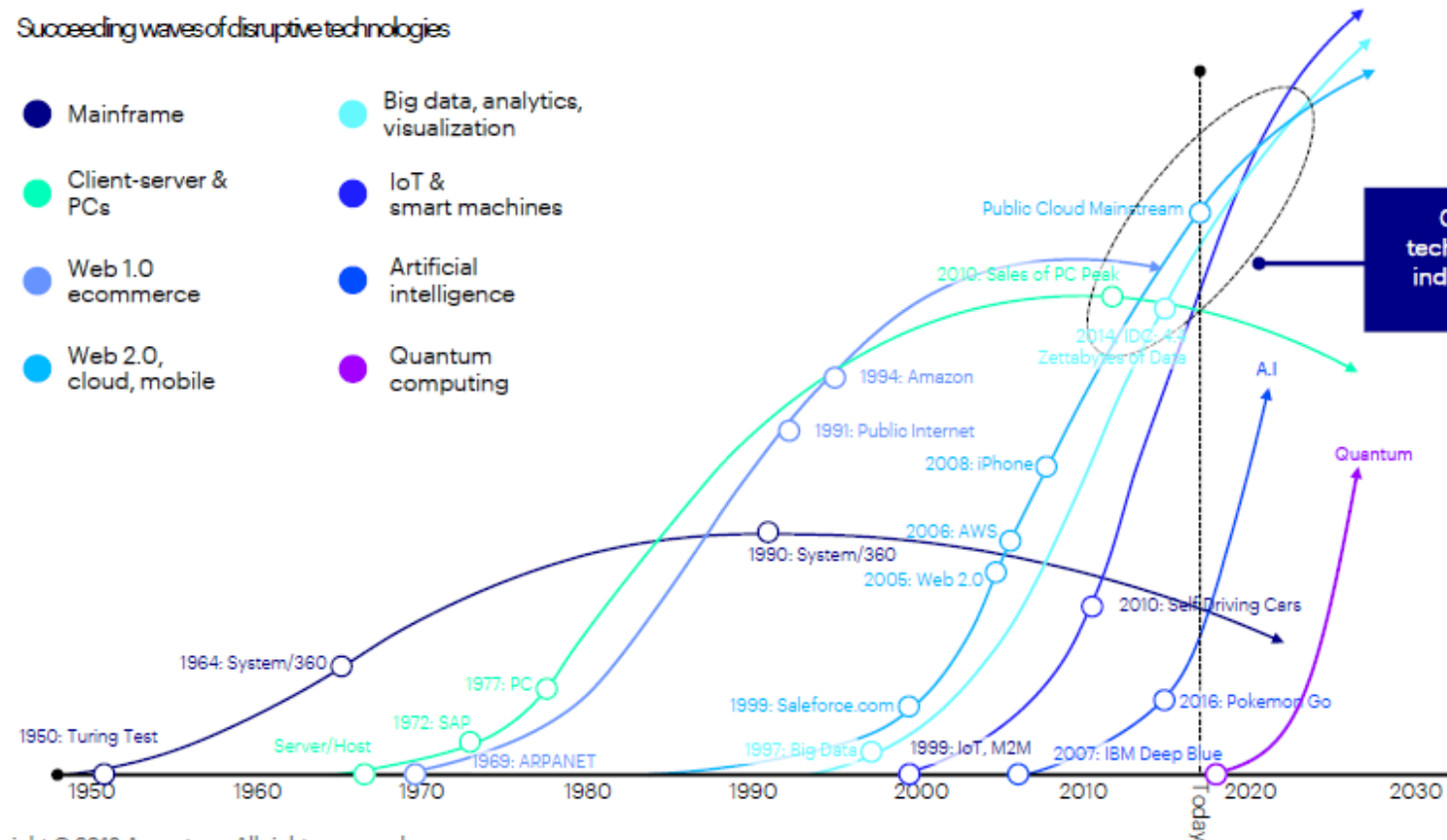
Evolution of Things as the Customer

Stage	Announcer	Fixed Purchaser	Adaptable Purchaser	Autonomous Purchaser
What Things Do	Provide information and make basic recommendations	Take action on behalf of parameters set by a human	Choose among multiple options, with outcomes set by humans	Decide and take action independent of human
What Humans Do	Make decisions	Set parameters for decisions and make decisions	Set parameters for outcomes; allow thing to make decision	Delegate authority to the thing
Impact on People	Better decisions	Faster decisions	Focus time on higher-impact decisions	Focus time on higher-impact activities
Hierarchy of Needs for Things	Power; bandwidth; connectivity	Security; process/rules capabilities	Decisioning capabilities	Digital identity
Context	Feedback from surrounding environment	Feedback from surrounding environment; parameters set by humans	Feedback from humans, surrounding environment, and other sources of context	Feedback from humans, surrounding environment, other machines/systems

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What's at Risk?

Disintermediation of…

- Networks
- Platforms
- Products
- Services
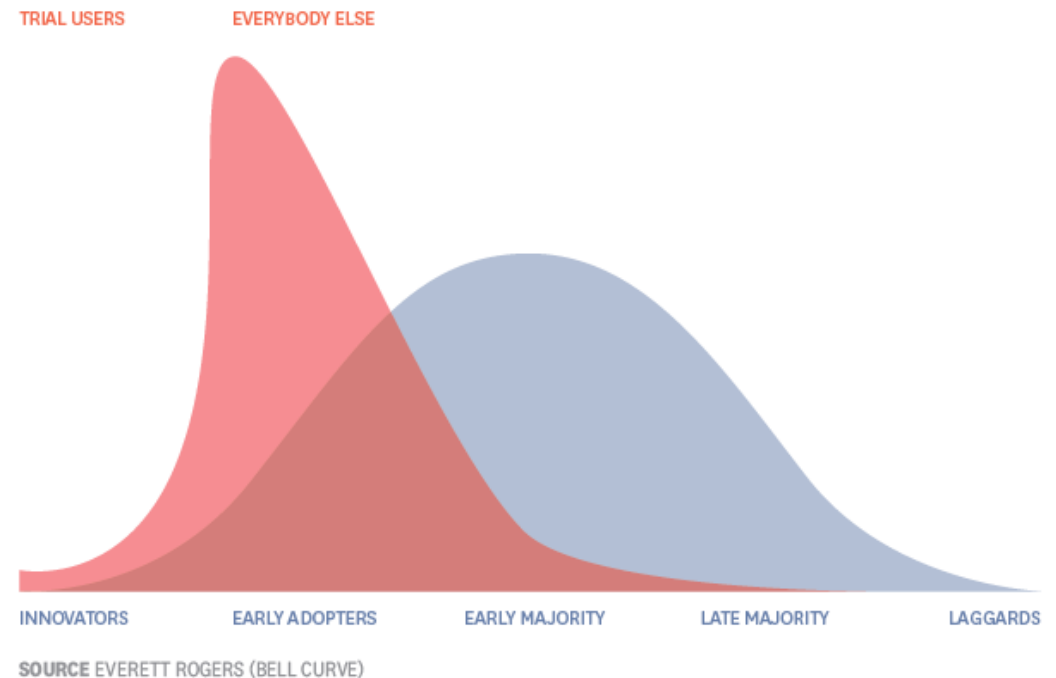
Aviation Industry Disintermediation

- Purchase of an Aircraft – Reduce the transfer cost – Blockchain/IoT
- Maintenance of an Aircraft – Trusted Configuration – Blockchain/IoT/5G
- Operating an Aircraft – Autonomous Flight – AI/Blockchain/IoT
- Designing an Aircraft – Collaborative Design - Blockchain/AI
- Manufacturing an Aircraft – Integrated control and Awareness - 5G/Blockchain/AI/MEC
- Supply Chain Services – Optimized Track/Trace - IoT/Blockchain/AI/5G
- Passenger Experience – Travel Assist - 5G/IoT/AI/Blockchain/MEC

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Sources

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- https://centreforaviation.com/analysis/reports/lufthansa--sap-aviation-blockchain-challenge-for-entrepreneurs-431594
- https://anticorruptiondigest.com/anti-corruption-news/2018/08/16/why-is-chinas-aviation-industry-so-ridden-with-corruption/#axzz5OrMBeCEw
- https://www.iata.org/events/Documents/ads17-program.pdf

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Questions?

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