Progressive Disintermediation

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
Assertion to Synergy

- Realizing that the technology assertions of today will find their way into tomorrow's 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.
Core Technologies

- Blockchain
- Internet of Things
- Artificial Intelligence
- 5G Cellular
- MEC
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
Cisco Blockchain Architecture (a networked perspective)

**Internet of Things - DATA**

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

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

Artificial Intelligence - **AUTONOMY**

**• 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](https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf)
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.
5G Transforms Telecommunications

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

Boeing ROOI 15-01-2953
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

People & Things

Multiple Access

Intelligent Network Fabric

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

Intelligent Edge

CSP Cloud

Public Clouds

Remote Users

HPE teamed with INTEL/CISCO

HPE teamed with INTEL/CISCO

BOEING is a trademark of Boeing Management Company
Copyright © 2018 Boeing. All rights reserved.
Copyright © 2018 Northrop Grumman Corporation. All rights reserved.
GPDIS_2018.ppt | 11
Confluence of Technology

Global Product Data Interoperability Summit | 2018

DIGITAL IS EXPONENTIALLY ACCELERATING A MASSIVE SHIFT IN INDUSTRY

Succeeding waves of disruptive technologies:

- Mainframe
- Client-server & PCs
- Web 1.0 e-commerce
- Web 2.0, cloud, mobile
- Big data, analytics, visualization
- IoT & smart machines
- Artificial intelligence
- Quantum computing

Combinatorial effect of technology will transform the industrial landscape beyond recognition.

Copyright © 2018 Accenture. All rights reserved.
## Evolution of Things as the Customer

**Global Product Data Interoperability Summit | 2018**

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

Disintermediation of...
- Networks
- Platforms
- Products
- Services

![Disintermediation Chart]

SOURCE: EVERETT ROGERS (BELL CURVE)
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
Sources

Global Product Data Interoperability Summit | 2018

• https://hbr.org/2014/06/mastering-the-intermediaries
• https://www.avinoc.com/useCase1
• https://beam.land/aviation/-blockchain-can-provide-trust-without-intermediaries-746
• 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
Questions?