ACCELERATING THE IOT: UNLOCKING BIG DATA THROUGH CONNECTED, MANAGED SYSTEMS ON THE FACTORY FLOOR

Kevin Davenport, Intel
HOW BIG IS IoT?

>50 Billion
ERICSSON

50 Billion
CISCO

17 BU
The Linley Group

200 Billion
IDC

75 Billion
Morgan Stanley
ERP, CRM Data
Geo Location Data
Social Media Data
Machine Data
Sensor Data
Historian Data
Logs
ERP, CRM Data
Social Media Data
Geo Location Data
1.5m components tracked perfectly in Airbus supply chain
CHALLENGES IN IMPLEMENTING IOT PLATFORM

Preserve Legacy Infrastructure
Preserve existing investments and infrastructure, and varies from Small/Medium/Large requirements

Many Devices to Connect
Heterogeneous devices and middleware, and >40+ Fieldbus protocols exist

Immense Volume of Data
Increased frequency, volume and resolution. Inconsistent data, can be both structured and unstructured data

Maintain Responsiveness
Critical devices must maintain high availability and real time, deterministic response

Secure Disparate Systems
Heterogeneous IT and OT Systems
Silo’d Business organizations
Complex supply chain coordination
INTEL IOT INDUSTRIAL PLATFORM
Evolving IoT Security for Devices

**CLOSED**
- Assumed Air Gap

**DEVICE ORIENTED**
- Device level controls
- Tightly coupled connectivity

**E2E INTEGRITY ASSURANCE**
- Strong device controls
- Extensive connectivity
- Common trust model
- Support for new data usage

Cloud Services
E2E Open reference model to streamline development of IoT Solutions in Manufacturing and Energy markets

- PROVEN E2E, OPEN SCALABLE AND TRUSTED PLATFORM
- DEFINED BUILDING BLOCKS AND CONFIGURATIONS FROM EDGE TO CLOUD
- UNIQUE DIFFERENTIATION PROVIDES SUSTAINABLE COMPETITIVE ADVANTAGE
INTEL’S VISION

Internet of Things

INTELLIGENT DEVICES
Deliver Intelligence where needed to acquire and filter data securely

INTELLIGENT SYSTEM OF SYSTEMS
Billions of intelligent devices sharing data and securely, supporting legacy and new environments

END TO END ANALYTICS
Solutions from device to cloud to deliver end-to-end customer value
Influence: Partnerships are critical

- Industrial Internet Consortium: 220+
- Open Interconnect Consortium: 100+
- Just Announced: Open Fog Consortium

Standards & Consortia:
- 3GPP
- CHINA IOT NATIONAL STANDARDS GROUP
- JTC 1
- ETSI
- NIST
- IEEE
- IOT END TO END WORLDWIDE STANDARDS

* Other names and brands may be claimed as the property of others.
INTEL’S VALUE IN TRANSFORMATIONS

Delivering Innovation through validated and open horizontal building blocks
Optimize Operations with an Open Scalable Platform

Deploy Rapidly
Seamlessly connect and secure legacy or integrate new devices in infrastructure.

Scale with Open Platforms
Extend capabilities with open scalable E2E platforms.

Gain Actionable Insight
Ingest data with increased frequency, volume and resolution, for rich analytics.

Maintain Low Latencies
Meet high availability and real-time deterministic response times for critical equipment.

Make Key Decisions
Integrate IT – OT systems to seamlessly integrate silo’d business organizations.

Easily deploy and expose new services to partners, customers and suppliers with IoT for Industrial and Energy Reference model.
Technology solutions delivering an open platform to make Industrial automation **smart, predictive** and **self-optimizing**
Better Data Means Better Decisions
“Industry is on the threshold of the **fourth industrial revolution**. Driven by the Internet, the real and virtual worlds are growing closer and closer together to form the **Internet of Things**.”

German Federal Ministry of Education and Research

http://www.bmfi.de/de/19988.php

"The term **Industry 4.0** was coined by the German government to describe the intelligent factory, a vision of computerized manufacturing with processes all interconnected by the **Internet of Things (IOT)**."

IHS website, January 2014
From integration to deployment of the Industrial Internet of Things, Intel and Siemens are working together to help industrial companies harness new opportunities.

Intel and Siemens are helping companies realize the promise of this data by speeding IoT through innovative solutions that help connect, secure, manage and analyze devices and data.

Intel processors power Siemens industrial PCs (IPCs), helping Siemens continue to reliably meet the IPC needs of OEMs and industrial companies.

These customers rely on Siemens and its IPCs to handle growing amounts of data collection and provide mission-critical connectivity between the production floor and office environments.
Ecosystem

- As IoT grows and expands, the ecosystem plays an ever more pivotal role in driving new thinking and advancing the industry. Because in addition to open industry standards, IoT requires a robust network of trusted partners if it is to reach its full potential to transform industrial operations.
- In short, companies like Intel and Siemens must continue to work together to bring about innovations in the ecosystem able to address and support issues ranging from interoperability and security to connectivity and big data analytics.
Interoperability and Standards

- It is with that goal in mind that organizations such as the Open Interconnect Consortium (OIC) and Industrial Internet Consortium (IIC) have been established. The OIC, for example, which currently includes Intel, Samsung, Atmel, Broadcom, Dell, and Wind River, seeks to define a common communications framework based on industry standard technologies. This would enable companies to wirelessly connect and intelligently manage the flow of information among personal computing and emerging IoT devices, regardless of form factor, operating system, or service provider.
Security solutions in an industrial context must take account of all protection levels.

- **Plant security**
  - Physical access protection
  - Processes and guidelines
  - Security service protecting production plants

- **Network security**
  - Cell protection, DMZ and remote maintenance
  - Firewall and VPN

- **System integrity**
  - System hardening
  - Authentication and use administration
  - Patch management
  - Detection of attacks
  - Integrated access protection in automation

**Industrial Security**

**The Defense in Depth Concept**

Security threats demand action.
Among the challenges faced by today’s industrial companies is how to at once take advantage of emerging technological innovation while still protecting the sizable investments already made in existing systems.

Legacy technology cannot simply be abandoned, nor can companies undertake the cost of its wholesale replacement.

Connecting legacy infrastructures with new things must be streamlined so they can securely and reliably interoperate across the enterprise.

Intelligent gateways that aggregate and filter data near the edge offer one way to effectively capitalize on new and emerging technologies, while also extending the value of existing systems. This is especially critical for manufacturing enterprises as approximately 85 percent of their equipment is not connected. These systems must be converted to connected systems to make them share data.
# The Siemens Digital Factory

<table>
<thead>
<tr>
<th>Enterprise Level</th>
<th>Management Level</th>
<th>Operations Level</th>
<th>Control Level</th>
<th>Field Level</th>
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<tbody>
<tr>
<td>ERP</td>
<td>MES</td>
<td>DCS</td>
<td>SPS</td>
<td>SIMATIC NET</td>
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<td>PLM</td>
<td>Plant Engineering</td>
<td>SCADA</td>
<td>HMI</td>
<td>Industrial Communication</td>
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<td>SIRIUS</td>
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<td>Industrial Controls</td>
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### NX & Solid Edge
Product Development

### TEAMCENTER
Shared PDM

### TECNOMATIX
Digital Manufacturing

- SIMATIC WinCC SCADA System
- SIMATIC Motion Control
- TIA PORTAL
  Engineering Framework
  Automation Tasks
Why Industrial Computers?

PC-Based Automation combines the features of PLC-Control and open PC-Architecture on one industrial device!

- Visualization
  - Open & closed-loop control
- Office applications
- Data processing
- Networks

One engineering software: TIA Portal
- re-use of existing software, increased flexibility

System-wide communications & diagnostics
## SIMATIC IPC – extensive options and expansion possibilities

<table>
<thead>
<tr>
<th>SIMATIC IPCs</th>
<th>Embedded industrial PCs</th>
<th>High-end industrial PCs</th>
<th>Industrial PCs</th>
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<tbody>
<tr>
<td>Remote operator panels</td>
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<tr>
<td>Industrial Flat Panel</td>
<td>DVI / VGA</td>
<td>Industrial Ethernet</td>
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<tr>
<td>Up to 30m</td>
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<td>&quot;unlimited&quot;</td>
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<td>Industry Thin Clients</td>
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<tr>
<td>Software</td>
<td>Detection of faults, and</td>
<td>Remote maintenance and</td>
<td>Data backup and</td>
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<tr>
<td>for minimizing standstill times</td>
<td>preventive maintenance</td>
<td>administration</td>
<td>partition</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>management</td>
</tr>
<tr>
<td>Industry-specific and</td>
<td>Customer-specific design</td>
<td>IP65 all-round, stainless steel</td>
<td>Intrinsically-safe (EX area)</td>
</tr>
<tr>
<td>customer-specific</td>
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<td>versions</td>
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Diverse application options for many tasks

Data collector & converter
- Data recording directly at the machine
- Interface between machine and IT level
- Link to corporate information systems

Automation tasks
- Control and visualization with one device
- Complex SCADA applications
- Flexible integration of PC hardware and software

Industrial servers and workstations
- PC applications in production
- Machine-level server applications
- Data management in control rooms
Customer challenges:
- The customer wanted to implement a new system that could be standardized for global use,
- achieve openness for the later expansion, address throughput efficiency, and minimize
- installation costs.
- The basic task of the IPC in the field is to collect available data as well as to control the
- I/O in the production line.
- With the integrated Ethernet interface as well as the optional interfaces for the fieldbus and
- serial buses, the IPC is able to communicate to the shop floor and the MES level.

Benefits for the customer:
- The proof of quality, the serialization of charges for further traceability, and logistics up to the shipment
- Long-term available basic components
- Data acquisition, visual inspection, and server capabilities for storage of required data
Thank you for your attention!