IloT in the Factory and in the Field

Emergent Technologies Track
Tuesday 10:50 AM – 11:30 AM
Geronimo Meeting Room

Chris Borneman, VP & CTO
Software AG Government Solutions
Chris Borneman, VP & CTO

• 25 years as CTO recommending, designing, implementing and operating technology in industrial industries (manufacturing, aerospace, mining)
• Current focused activities around IIoT, Integration, API Management, and Enterprise EA & Portfolio Management
• Actively delivering high security cloud solutions to US Federal Government
• Former Exostar CTO & COO for 10 years
Objectives of this presentation

• IoT and Industrial IoT (IIoT) will have a significant material business impact.
• Nearly two thirds of IoT projects never get past the pilot.
• Most IoT projects focus too much on the vendor-specific IoT technology and not enough on how those technologies will be managed and integrated into an organization’s existing solutions.
• Nearly 80% of successful IoT projects relates to integration, yet most pilots focus on the remaining 20%.
• This session will discuss successful approaches to deploying IIoT by using real-world deployments of IIoT in the factory and beyond. We will discuss actual customer use cases, performance results, and lessons learned.
Example of IIoT Use Cases we are tracking in Manufacturing

- Tool tracking and utilization
- Predictive maintenance during manufacturing
- Robotic monitoring (painting, welding)
- Tracking of inventory
- Supply chain monitoring
- Quality metrics
- Predictive maintenance / monitoring post deployment
What does this mean for manufacturing / Industry 4.0?

**HYPER AWARENESS**
Gain visibility into production through real-time and historical insights

**INFORMED DECISIONS**
Analyze and use information gathered, in real-time, to drive business actions

**AUTOMATE PROCESSES**
Bi-directional communication with devices and applications

**ECOSYSTEM VISIBILITY**
Interface with vendor and supplier systems for supply chain insights

- Increase Productivity
- Reduce Downtime
- Boost Efficiency
- Deliver on Time
IoT is making a big business impact

- 63% of CEOs perceive IoT to have a significant material business impact.
- 42% of orgs have deployed at least one IoT use case.
- 80% of orgs that have implemented IoT have realized greater value than expected.

Gartner
Cisco IoT Industry Study

60% of companies substantially underestimate the complexity of building an IoT Service

75% of self-initiated IoT projects were considered a failure
IoT Platforms are distributed and complex

• 80% of IoT Architecture requires integration

IoT Endpoints  IoT Edge Platform  IoT Cloud Platform  Enterprise Applications

Local Communication  Gateway  Edge Server  Data Broker  Backend Integration

Long-range Communication

Long-term Communication

Enterprise Applications:
- MES
- ERP
- CRM
- SaaS
The Only Leading IoT and Integration Platform

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Magic Quadrant for Industrial IoT Platforms, June 2019

Strategic iPaaS And Hybrid Integration Platforms, Q1 2019
Open Stack of Related Services

all devices, all networks, all verticals, all use cases
Software AG IoT Ecosystem

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Hardware & Devices

Technology Alliances

System Integrators

Consortia & Alliances

Infrastructure & Connectivity

Value-added resellers
Comprehensive Connectivity with 300+ Adapters

Mainframe Adapters (10+)
- COBOL
- CICS
- IBM PL/I
- NATURAL
- z/OS
- IBM AS/400

Database Adapters (15+)
- SQL Server
- Oracle Database
- IBM DB2
- SAP HANA
- Java
- JDBC
- ADABAS
- Amazon Redshift
- PostgreSQL
- MySQL

Application Adapters (10+)
- Oracle Fusion Applications Financials
- Oracle PeopleSoft Enterprise
- JD Edwards Enterprise Software
- SAP
- Ariba

Big Data Adapters (10+)
- Elasticsearch
- Apache HBase
- MongoDB
- Cassandra
- Kafka
- Hive

Social Media Adapters
- Facebook
- Twitter
- LinkedIn
- Instagram
- Chatter

Content Management Adapters (5+)
- SharePoint
- OpenText
- Alfresco
- CMIS

B2B Adapters (10+)
- EDI
- ACH
- SWIFT
- HIPAA
- HL7

SaaS/PaaS Adapters (Any REST/SOAP) (70+)
- Salesforce
- ServiceNow
- DocuSign
- Marketo
- Concur
- Twilio
- Workday
- Zendesk
- NetSuite
- Google Apps
- Azure
- Amazon Web Services

IoT Connectors (150+)
- Bosch IoT Suite
- Siemens Mindsphere
- Cumulocity
- ADAMOS

Technology Adapters (30+)
- Java
- .NET Framework
- Java EE
- MQTT
- WebSocket
- RESTful
- SOAP
- XML
- JSON
- FTP
- LDAP
- IMAP
- SMTP
- JMS
SOFTWARE AG AND SIEMENS

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EASILY ANALYZE RAW IoT DATA

PROVIDE OPTIMUM SUPPORT FOR MANUFACTURING CUSTOMERS

CREATING A GLOBAL ECOSYSTEM

ENABLING POWERFUL INDUSTRY APPLICATIONS
**IoT Key Differentiators**

**Open & Independent**
- Flexibility to grow without vendor lock-in
- Freedom to choose own infrastructure, devices, enterprise apps and 3rd party extensions
- Supports open standards and any device

**Rapid Self Service**
- Prove value in minutes, not months
- Get immediate value from your IoT strategy
- Empower subject matter experts with self-service accessibility (no coding required)

**Distributed Architecture**
- Flexible deployment options:
  - in the cloud
  - at the edge
  - on premises
- Common APIs throughout uniform underlying technology
- Write once, deploy anywhere

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After evaluating 26+ IoT Platforms in the market, we selected Software AG to be our IoT partner because of their comprehensive offering, modularity and GTM model to partner with customers.”

- IoT Platform and Digital Architecture team at Stanley Black and Decker
Monitoring of Paint Systems

Applied Intelligence in Real-time

• Real-time signals from paint shop robots
• Anomaly detection score (IO / NIO)
• Detect anomalies in real-time at the edge (Industry PC)
• Closed-loop analytics (real-time execution and re-training of machine learning models)
Predictive Maintenance (Plant)

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Major Global Chemical Company
23GW Power across 5,500 Wind Turbines

- Autonomous operation at the edge
- Optimized efficiency of assets & data
- Simplified development, single architecture
Bosch Asset Monitoring for Railway Applications (AMRA)

Data transfer to AMRA-portal via mobile communication

Bluetooth connection between sensors and AMRA-device

Payload monitoring

Sensors

Closed door detection
Temperature
Shunting impacts
Wheelset diagnosis
Brake monitoring
## Online Motion & Vibration Analysis

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### Bosch

**Invented for life**

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<th>Route to</th>
<th>Goods Category</th>
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www.softwareag.com/IoT

Connect your things and innovate your business

Cumulocity is the leading independent Device and Application Management Internet of Things (IoT) Platform since 2010. Our Internet of Things Platform connects and manages your machines effortlessly, so you can focus on your business's value adding activities.

Connect
Connect your things over any network in minutes with a 'plug and play' approach

Manage
Condition monitoring, real-time analytics and fully configurable dashboards

Extend
Extend your service with easy workflow integration to your business applications

Our IoT Platform is open, application centric and free-to-try which allows you to prove your end-to-end business concept quickly with a handful of things and rapidly scale your deployment to over 20 global data centres as you connect millions with telco grade reliability.

TRY CUMULOCITY FREE
Thank You

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Backup Material for Offline Review
Device Connectivity

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Plug & Play with existing integrations

- 100+ devices and gateways
- 300+ protocols (BACnet, KNX, Siemens...)

Cloud Fieldbus

- Central, web based end-to-end integration

LPWAN Agents

- Modbus
- OPC UA
- Can
- SIGFOX
- NB-IoT

Connect over any IP network without VPN

Integrate new device types

Protocols supported:
- MQTT, REST, LWM2M, Tracker, SNMP
- SmartREST payload compression

Device SDK’s for:

- C++
- Lua
- Java

Use any environment with:

- MQTT
- REST

Model-less integration

- Use 1000’s of device types/versions
- Device originated data model extension

all devices, all networks, all verticals, all use cases
Device Management

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**Device Lifecycle**
- Device Inventory & Runtime Statistics
- Device Identity Management
- Credentials per individual device
- Provisioning for small & large deployment
- Auto-registration
- Asset management (network, location, …)
- Gateway hierarchy and command routing
- Device Twin

**Connection Management**
- Connection availability monitoring
- Connection metrics (RSSI, Signal strength)
- Switching between IP and SMS

**Device Operations**
- Firmware & software management
- Fault & alarm management
- Configuration management
- Remote command execution
- Bulk operations with scheduling
- Troubleshooting: Remote shell, logs, ….
- Real-time alarms with integrated workflow

**Cloud Remote Access**
- Access screen of remote machine / HMI
- Single sign-on, per user access rights
- No shared password, VPN, or client SW
- VNC, SSH, Web

all devices, all networks, all verticals, all use cases
Analytics
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Streaming & Predictive Analytics
- In-memory filtering, correlation, aggregation and pattern detection with time and location constraints
- Operationalization and model management of predictive models
- For condition monitoring, predictive maintenance, anomaly detection, etc.

Edge Analytics
- Full support for distributed architectures: deploy all types of analytics in the cloud, on-premises and at the edge
- Local analytics to streamline traffic flow and increase autonomous operation

Industrial Self-Service Analytics
- Non-code, graphical streaming analytics environment for domain experts
- Self-service analytics for time series data to analyze, monitor and predict performance of manufacturing processes
- IIoT Cockpit & SCADA visualization
- Digital Twins & Augmented Reality
- Interactive business-focused mashup dashboards with responsive design

Batch Analytics
- Rich data manipulation and discovery through simple and concise interface
- Combine and easily query complicated source data with nested structures and mixed types
- Connect with any BI tool, Python, R, or SQL (no data replication)

DATA & ANALYTICS

DEVICE CONNECTIVITY & MANAGEMENT

all devices, all networks, all verticals, all use cases
Data Management

Proven IoT Data Model
- Built-in extensible IoT data model refined and proven over the last 7 years
- Pre-defined hierarchical data models purpose-built for IIoT use cases

Plug & Play Device Integration
- Native device model mapping for multiple protocols
- Support for (brownfield) fieldbus connectivity through Cloud Fieldbus
- Data normalization support to simplify application and model development

Operational Data Store
- Elastically scalable data store based on MongoDB
- Full data isolation on tenant level and configurable data retention policies

Analytical Data Store
- Batch analytics service to efficiently store and compress raw data in Parquet files
- Long-term archiving of raw data for the entire platform in data lake of your choice and enrichment with other data sources
- Out-of-the-box integration with Business Intelligence tools and machine learning frameworks to visualize/analyze the data
- In-memory data platform for caching and storage

API Gateway
- Secure data access, enforce security policy, and data transformations for data trust (available cloud & on-premises)
- Secure device endpoints for device trust (identity, integrity) at edge (roadmap)

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Integration & API

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Hybrid Integration

- Easily integrate *device data* with Enterprise Apps, Cloud Apps, Big Data Apps, Data Lakes and 3rd Party Ecosystems

- **170+ adapters:** SAP, Oracle, Siebel, Salesforce, MS Dynamics, AWS S3, ...

- Start *automated actions based on IoT events* (e.g. remedy actions, kick off smart contracts, send technician out)

- Manipulate data with *graphical mapping* & convert it into other formats

- Pre-built connectors and recipes to accelerate common integration tasks

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API Management

- Full lifecycle API Management for delivering higher-value data via REST, SOAP, etc.

- **API Portal** for API design, development, promotion and 3rd party access

- **API Gateway** for security, authorization, monitoring, governance & monetization

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**Integration & API**

**DATA & ANALYTICS**

**DEVICE CONNECTIVITY & MANAGEMENT**

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all devices, all networks, all verticals, all use cases
Process Automation & Application Enablement

High-Productivity App Development

- **Low Code Apps:** New drag & drop web designer provides assembly capabilities for applications by leveraging task, process, case and UI logic
- Templates for IoT and workflow apps like incident management use cases
- Pre-built integration with Cumulocity IoT

High-Control App Development

- **Dynamic Processes:** Insert & change processes “on the fly” including in-flight tasks, steps and sub-processes
- **Microservice SDK & Hosting:** Add and run self-developed functionality easily

**APPLICATION ENABLEMENT**

**INTEGRATION & API**

**DATA & ANALYTICS**

**DEVICE CONNECTIVITY & MANAGEMENT**

all devices, all networks, all verticals, all use cases
Solution Accelerators

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Pre-packed features, plugins and configurations

- **Industrial IoT Accelerator:**
  - Cloud Fieldbus secure connection
  - Support for over 300 protocols
  - Full featured SCADA-like visualizations

- **Telematics Accelerator:**
  - Connect industrial vehicles
  - Optimize vehicle operations
  - Analyze environmental conditions

- **Tracking Accelerator:**
  - Connection to locator devices
  - Geofencing and localization techniques
  - Condition monitoring

Simplifies, speeds & secures time to value:

SOLUTION ACCELERATORS

APPLICATION ENABLEMENT

INTEGRATION & API

DATA & ANALYTICS

DEVICE CONNECTIVITY & MANAGEMENT

Starter kits for various use cases & industries

all devices, all networks, all verticals, all use cases