Manufacturing: Microsoft’s Vision For IIoT & Successful Customer Story

Virendra Chaudhari, Azure IoT, Global Black Belt, India Sales Lead
“In the next five years, all of you are going to have to deal with an existential threat: the fundamental business model is under direct attack.”

Geoffrey Moore
Managing Director, Geoffrey Moore Consulting
“Industry after industry is being transformed as we speak, and that’s the real opportunity for us collectively. This is perhaps more so than ever in our history where technology is not just adding capability but it’s changing business models.”

Satya Nadella
CEO, Microsoft
GDP components impacted by digital technologies in India:

- **TODAY**: 8%
- **BY 2021**: 60%

Source: IDC
Devices

60 M 1.9B

TODAY BY 2020

India IoT Market Size

Source: NASSCOM and Deloitte
India IoT Market Size

$15 B by 2020

5% of global market

Source: NASSCOM and Deloitte
India IoT Market Size

Utilities: 25%
Manufacturing: 18%
Trans. & Logistics: 13%
Automotive: 11%

BY 2020

India IoT Market Size

Healthcare: 10%
Retail: 9%
Agriculture: 8%
BFSI: 3%
Others: 3%

Source: NASSCOM and Deloitte
Digital Disruption and the 4th Industrial Revolution

- **Mechanized production** (1780s)
- **Mass production** (1870s)
- **Automated production** (1970s)
- **Digitized production** (2015+)

- 1780s
- 1870s
- 1970s
- 2015+
Vision for Industrie 4.0

Product to be manufactured contains all necessary information on its production requirements

Flexible configuration of production steps

Flexible decision making on the basis of current situation

Human beings as essential decision-makers, creative planners and controllers
Design Principles Of I-4.0

- **Interoperability**: the ability of cyber-physical systems (i.e. work piece carriers, assembly stations and products), humans and Smart Factories to connect and communicate with each other via the Internet of Things and the Internet of Services
- **Virtualization**: a virtual copy of the Smart Factory which is created by linking sensor data (from monitoring physical processes) with virtual plant models and simulation models
- **Decentralization**: the ability of cyber-physical systems within Smart Factories to make decisions on their own
- **Real-Time Capability**: the capability to collect and analyze data and provide the insights immediately
- **Service Orientation**: offering of services (of cyber-physical systems, humans and Smart Factories) via the Internet of Services
- **Modularity**: flexible adaptation of Smart Factories for changing requirements of individual modules
Potential Implications I-4.0

- Robot Assisted production
- Predictive Maintenance
- Additive manufacturing of complex parts
- Machines as a service / Digital Twins
- Big data drive quality control
- Production line simulation
- Smart supply network
## The Third Wave of IT-Driven Transformation

### First Wave
- **Automation of individual activities in the value chain**
- 1960’s and 70’s
  - Order Processing, billing paying, CAD, MRP, etc.
  - **“Standardization”**

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<th>Productivity Gains</th>
<th>Product Improvements</th>
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<td><strong>Big</strong></td>
<td><strong>No</strong></td>
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### Second Wave
- **Internet coordinates activities across the value chain**
- 1980’s and 90’s
  - Coordination across individual activities with suppliers, channels, and customers, and across geography
  - **“Integration”**

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### Third Wave
- **IoT enables value chain + product improvements**
- Today
  - Changes in product design, marketing, manufacturing, post-sale service enabled by huge amounts of data
  - **“Optimization”**

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### IoT in Action

> “...the **biggest** yet, triggering even more **innovation, productivity gains**, and economic **growth** than the previous two.”

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[Image: Microsoft logo]
IoT Connects to the Heart of the Business

IoT is... a business revolution, enabled by technology.
Companies rarely die from moving too fast, and they frequently die from moving too slowly.

— Reed Hastings
Azure IoT Offerings

**SaaS**
- Managed Solutions
  - IoT Central
  - Connected Field Service

**Solution Accelerators**
- Remote monitoring
- Predictive maintenance
- Connected factory

**Device Support**
- Azure IoT Hub

**Data & Analytics**
- Azure Time Series Insights

**Visualization & Integration**
- Azure Logic Apps

**IoT Edge**

**Build your own | Platform**

**Use | Solutions**

**Partner Solutions**
Industrial IoT and Value Chain

Intelligent Supply Chain
- Improve Visibility
- Reduce Inventory
- Increase Collaboration
- Increase Quality
- Reduce Energy Costs
- Reduce Scrap

Product-as-a-Service
- New Business Models
- Increase Customer Connection
- Predict and Schedule Service

Factory of the Future

Supply chain
- Design and engineering
- Planning
- Sales and service

Manufacturing

Connected services
- IoT in Action

Microsoft
Enabling Intelligent Supply Chain

**Planning**
- Demand Forecasting
- Integrated Business Planning
- Inventory Optimization
- Supply Chain Visibility and Orchestration

**Sourcing & Procurement**
- Strategic Sourcing
- Spend Analytics
- Contract lifecycle management
- Pricing optimization

**Smart Logistics**
- Product Tracking
- Transportation Management
- Warehouse Execution
- Supply Chain Visibility and Orchestration

- Power BI—Analytics—Insights
- Data Platform
- 3D Printing
- HoloLens / Mixed Reality
- Advanced Analytics
- Blockchain
- Hybrid Cloud Integration
- AI & Cognitive Capabilities
- Graph technology
- IoT and Edge
- Digital Workplace
- Security & Compliance

IoT in Action
Enabling Product as a Service

- Connected Product
  - Digital field service
  - Remote assist
  - Customer asset insights

- Smart Provisioning
  - Smart sparing
  - Initial provisioning
  - Inventory Optimization

- Connected Field Service
  - Improved asset availability
  - Optimized technician routing
  - Improved Productivity

- Power BI—Analytics—Insights
- Trusted Data Platform
- 3D Printing
- HoloLens / Mixed Reality
- Context from ERP, CRM, MES, etc.
- Blockchain
- Hybrid Cloud Integration
- AI & Cognitive Capabilities
- LinkedIn & Graphs
- Robotics
- Quantum Computing
- Security & Compliance

IoT in Action

Microsoft
Enabling Factory of the Future

- Research Development
  - Connected Product
  - Machine Design
  - Infrastructure Design
  - Generative Design

- Connected Operations
  - Operational Insights
  - Process Simulation (Digital Twin/Thread)
  - In-Process Quality
  - Human Centric Manufacturing / Robotics
  - Additive Manufacturing
  - Worker Health and Safety
  - Product Traceability

- Maintenance Service
  - Improved asset availability
  - Optimized technician routing
  - Improved Productivity

- Trusted Data Platform
- Blockchain
- Hybrid Cloud Integration
- AI & Cognitive Capabilities
- Power BI—Analytics—Insights
- Security & Compliance

IoT in Action
Successful Customer Story – L&T Construction

Balaji Kasiram S,
Head-Digital (L&T Construction)
Mr. Balaji Kasiram S  
Head-Digital (L&T Construction)

20 + years of leadership experience in EPC, Manufacturing, and Power industries spanning Digital Transformation, Large program management, Consulting, Plant automation solution development, Construction and Commissioning.

- Bachelor of Engineering - Instrumentation and Control Systems
- MBA, IIM Bangalore
Digital @ L&T Construction

Accelerating Project Progress

Enhancing Operational efficiency

Driving Organizational Change

Journey started ~ 3 years ago

Solutions across the Value chain

Implementation at Scale
Coverage across all businesses

IoT, Cloud Computing, Mobility, Computer vision, Machine learning, Drones, Lidar, AR, VR, RFID, LoRa, BLE, Robotics
Asset Insight
Industrial IoT for Heavy Equipment
Our Equipment Fleet

35000+ Equipment
100+ Major types
400+ Makes & Models

350+ Projects
Operational Visibility
Utilization
Productivity
Sizing & Allocation
Buying / Hiring
Fuel efficiency
Solution Components

10,000 + Connected Equipment

IoT Platform

Role based dashboards
Analysis and Insights
Storage
Data Ingestion
Device management

Gateways

Sensors

Equipment
**Solution Components**

**Data Acquisition**

- **Level** (DLC Capacitive, Ultrasonic, Radar, Float)
- **Pressure** (Strain gauge, Capacitive, Pirani)
- **Temperature** (Thermocouple, RTD, Thermistor, IR)
- **Flow** (DLC Magnetic, Ultrasonic, PD, Coriolis, Thermal)
- **Vibration** (Accel, Laser, MEMS)
- **Displacement** (Laser, Ultrasonic, LVDT)
- **Proximity** (Inductive, Capacitive, Magnetic, Optical, Ultrasonic)
- **Tilt** (MEMS)
- **Location** (GPS, Indoor - iTLS)
- **Weight** (Load cells)
- **Angular Velocity** (Tachometers)
- **Energy** (Instrument transformers & Energy meters)

**Edge Device** (IoT Gateway)
- **Direct Sensor Data**
  - Raw data from sensors
  - Processing and computation in Edge
- **Derived Measurements**
  - Proxy data from sensors
  - Computation and derived measurements in Edge
- **Data from PLC, SCADA systems**
  - Directly usable data

**Edge**

- Analog Inputs
- Digital Inputs
- Field Protocols (Modbus, CANBUS, OPC-UA)
- GPS

**Processed data to IoT platform**

**Platform**

- **Ingestion**: IoT Hub, Stream analytics, Spark streaming
- **Storage**: Blob storage, Hive, SQL DB
- **Analysis**: HD Insight
- **Visualization**: App services, Power BI
Equipment connected and streaming data

Technologies used - From Sensors to Analytics

Partners across geographies including OEMs

Retro fitment at Site

10000+

12+

33

87%
Key Challenges

Change Management
Data Acquisition
Niche skills
Field Retro fitment
Data Quality
Network coverage
Business Value

- Increase in utilization of equipment
- Reduction in idling
- Reduction in material pilferage
- Increase in Productivity
- De-specking / Release of oversized assets
- Reduction in fuel consumption
- Enhanced capacity utilization by sharing of assets across sites
- Reduction in hiring of equipment
- Reduction in Buying / Capex
Steps to get started...

Virendra Chaudhari, Azure IoT, Global Black Belt, India Sales Lead
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<td><strong>1</strong></td>
<td>Determine your digitization objectives and use cases</td>
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<td><strong>2</strong></td>
<td>Experiment with simulated data</td>
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<td><strong>3</strong></td>
<td>Connect equipment without disruption</td>
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<td><strong>4</strong></td>
<td>Contextualize and visualize manufacturing performance</td>
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<td><strong>5</strong></td>
<td>Make operational changes based on data</td>
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<td><strong>6</strong></td>
<td>Enable new scenarios and scale</td>
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Microsoft is the first hyperscale cloud solution provider to deliver

IoT solution accelerators | SaaS and PaaS for IoT | AA/AI at the edge
Solve device provisioning at scale | Support OPC UA for manufacturing

Forrester®
Microsoft is a leader in the Forrester Wave for IoT Software Platforms

IDC
Microsoft is a Leader in the IDC MarketScape for IoT platforms across various use cases

Navigant
Microsoft is a leader in the Research Leaderboard assessment of strategy and execution for 15 IoT platform providers

PAC
Azure IoT is the only cloud platform that was determined as best in class in every category
Some people want it to happen, some wish it would happen, others make it happen.

- Michael Jordan
Thank you