Industrial Revolution 4.0
Guidance for Indonesia
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  • Specific interest in Security and Operational Excellence (CISSP, ITIL, PMP)
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Indonesia – in Summary

- Indonesia spend less on tech than it’s peers.
- Economy expected to shift towards services economy
- Needs to create more jobs, with the increase of working age population
Industry 4.0 initiative is the global trend in the manufacturing industry

**End of 18th century**
- First mechanical loom - 1784

**Beginning of 20th century**
- First production line, slaughterhouses in Cincinnati - 1870

**Beginning of the seventies**
- First programmable logic controller (PLC) Modicon 084 - 1969

**Today**
- Ubiquitous connectivity of people, machines and real time data

**Industry 4.0**
- Cyber-physical systems

**Industry 3.0**
- Use of electronics and IT to further automate the production

**Industry 2.0**
- Introduction of mass production based on the division of labor

**Industry 1.0**
- Introduction of mechanical production facilities using water and steam power
Five technologies will be the key technologies for Industry 4.0

5 Key Technologies of 4IR

1. AI (Artificial Intelligence)
2. IoT (Internet of Things)
3. Wearable (AR / VR)
4. Advanced Robotics
5. 3D Printing
What Business Needs?

- **Enhance productivity**: 32% increase in technician productivity using augmented reality\(^1\)
- **Maximize effectiveness**: Over 80% of companies that adopt IoT report efficiency improvements\(^2\)
- **Reduce costs**: Analysts predict that IoT will lead to $177 billion in reduced costs by 2020\(^3\)
- **Increase sustainability**: 20% energy savings from productivity improvements\(^4\)
The essential journey for Manufacturers

1. Connected
   - Connected equipment, plant and data systems that provides visibility into asset productivity and performance metrics
   - Operational efficiency improvement and cost benefit 1-5%; New digital service platform

2. Predictive
   - Connected equipment or plant that identifies operating patterns and trends to improve reliability and utilization to enable optimal performance
   - Reduction in maintenance costs by 20-30%. Increase in overall equipment effectiveness 7-10%

3. Cognitive
   - Intelligent equipment or plant that is capable of autonomous operation and self healing to ensure maximum business benefit and opportunities
   - % Incremental revenue (EBIT) improvement of 6-15%

Expected financial impact
5 x Maintenance Models
Value returned to the Enterprise

1. Traditional break fix
   Repair prompted by customer request

2. Scheduled maintenance (preventative maintenance)
   Repairs and service based on a fixed schedule regardless of condition or meet regulation

3. Condition based maintenance (remote monitoring)
   Condition is monitored continuously using operating parameters to assess health and indicate maintenance needs via real-time alerts.

4. Predictive maintenance planning
   Remaining Useful Life (RUL) for critical components determines asset health and pairs efficient operating range measures, usage patterns and repair history to improve maintenance planning.

5. Cognitive maintenance (intelligent operation)
   Autonomous actions are taken to ensure maximum asset utilization and efficiency. Maintenance is automatically scheduled in consideration of operating health and maintenance logistics including parts, consumables, tools and resource availability.

Increasing profitability and incident responsiveness.
Increasing asset uptime and revenue.
Intelligent Factory
The modern Manufacturer

1. Product-as-a-Service for new revenue streams
2. Connected field service to increase profitability
3. Customer centric sales and ordering
4. Agile production with Factory of the Future
5. Optimized supply chain for cost and control
6. Digital Twin to drive innovation and competitiveness

- CONFIGURATION OPTIONS
  - Low
  - Medium
  - High

- AOG Events prior 2000hrs: 15
- Maintenance scheduled: 1/10/18
- Schedule A planned

- Cruise impact: 80%
- Operating efficiency: 83%, target: 88%

- 74 orders exceeding production run rate
- Utilize excess capacity on lines 5 & 6
- OEE: 89%, target: 98%
### Intelligent Factory – common improvement projects

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<th>Building Services Management</th>
<th>Safety &amp; Security</th>
<th>Space Utilization</th>
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<td>Organizational Analytics</td>
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**Making Indonesia 4.0**
Intelligent Factory

Intelligent manufacturing operations: supply chain, production, logistics

- Increase global effectiveness and productivity
- Optimize logistics to meet demand
- Manage inventory stored and time in warehousing
- Supply chain orchestration and collaboration
- Real-time demand prediction and planning
- Integrated business planning
- Forecast weather, demand, and steel prices
- Inventory levels and recommended adjustments
- Replenish inventory to meet customer demand
Intelligent Factory

Drive continuous improvement with automated factory processes, intelligent devices, and analytics.

1. Remotely monitor production flow in near-real time with smart connected machines to get ahead of production issues.

2. Securely connect factories to share information across regions and departments, such as enabling experts to provide guidance across the business regardless of location.

3. Analyze plant data to gain production insights, respond to changes in demand, and provide cross-channel visibility into inventories to optimize the supply chain.


5. Drive quality assurance with aggregated supplier data, customer sentiment, and other product information to identify and correct quality issues.

6. Implement proactive maintenance practices to eliminate accidental production issues, machine down-time, and increase throughput.

THIRD-PARTY LOGISTICS
Tetra Pak

Transforming maintenance with predictive analytics and mixed reality

**Challenge**
Tetra Pak wanted to avert costly breakdowns, while being able to make repairs quickly at remote factories.

**Solution**
Tetra Pak transformed production lines with cloud-connected predictive analytics and powerful mixed reality (MR) headsets to prevent breakdowns and fix equipment with remote experts.

**Benefits**
Analysis of data patterns saved Tetra Pak more than $30,000 by predicting and preventing future breakdowns. Remote guidance via MR headsets reduced repair times.

“This is how we take the global expertise that we have available somewhere in Tetra Pak and bring it to the fingertips of the engineer in the countryside in Chile or Pakistan.”

— Johan Nilsson
Vice President, Tetra Pak Services
Volvo

Car manufacturer explores the future of car buying with hologram technology

Challenge  
Volvo wanted to reimagine the car buying experience for better customer interactions.

Solution  
Partnered with Microsoft to develop new experiences using HoloLens holographic technology.

Benefits  
Volvo provided immersive views of cars, from inspecting internal systems to configuring options for colors and features, demonstrating safety features in action, and building trust in their cars.

“HoloLens helps us to push the envelope of innovation for our customers.”

— Björn Annvall  
SVP Marketing of Sales and Services, Volvo Cars

Watch
Digital Twin
Asset Data Model for Digital Twin

- Asset ID
- Design data
- Build configuration
- Sales history
- Operational data
- Maintenance records
- Disposal data

360° view of asset history

Real-time asset performance and lifecycle data

Enable insights and actions

Work process specific device interface

- Security
- Data Lake
- Machine Learning
- Cognitive Services
- Stream Analytics
- Time Series

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Digital Twin System Architecture

Device Connectivity
- IP capable devices
- Existing IoT devices
- Resource constrained devices

Data Processing, Compute, Analytics and Management
- Cloud Gateway
- Stream Processing and Analytics
- Device Provisioning and Management
- Application Business Logic
- Simulation & Visualization Compute

Business Connectivity, Presentation & Interaction
- Solution UX
- Business Integration Connectors and Gateway(s)

- Common Data Services
- Customer Service
- Field Service
- Analytics

- Mixed Reality
- Mobility
- Productivity

- Computer Aided Design, Engineering & Visualization
- Software Development
- 3D Printing

- ISO 10303-239 (PLCS)
- Product Lifecycle & Data Management
- Supply Chain Management
- Manufacturing Execution

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Chillers account for about 50% of the energy consumption in a building. It’s higher than transportation or any other industry, so being able to run chillers efficiently makes a big difference.

— Sudhi Sinha
Vice President, Product Development, Johnson Controls
3D and Engineering
Accelerate innovation with Big Compute from Microsoft

Engineer anywhere
Virtual Machine
Laptop
Tablet
Mobile
Big Compute
Deep Learning
Mixed Reality
Industrial IoT
Additive Manufacturing
Transform products

Design
Cloud Workstation

Render
Cloud Rendering
Rendering in Progress
Time remaining: 3:29

Validate
HPC Simulation & Analysis

Train
Deep Learning & AI Training

Road Lanes
Building
Traffic Sign
Pedestrian
Bicycle
Other Vehicles

Validate
Running Simulation
520 of 1263

Running Simulation
522.700
475.050
438.300
391.513
344.627
307.740
260.853
214.956
168.059
122.162
76.265
30.368
0.000

Status
56%
Cloud Workstations: Engineer from anywhere securely

- **Engineer from anywhere** with any device by engaging high-performance computing resources on demand to get the results you need.

- **Innovate more efficiently** by sharing and exploring designs with distributed teams in multiple sites across the globe.

- **Improve product quality** by enabling efficient collaboration with complex supply chains in a secure environment.

AEROSPACE WING COMPANY

WHEELS INCORPORATED

SEATING VARIANT

Jet Engine no. BE9-172035
Transform the prototype process with Cloud Rendering

**Control project costs** by scaling up or down at the pace of changing business requirements and paying for only what you use.

**Compare design concepts faster** by running on high-powered VMs that manage, schedule and scale jobs when and where you need them.

**Improve speed-to-market** by running jobs in parallel and generating high-quality prototypes with minimal wait time.
Optimize product validation with Simulation and Analysis

Remove on-premises constraints by bursting to the cloud on demand to run large jobs in order to meet business goals.

Run more compute-intensive simulations by managing, scheduling and scaling jobs to secure a better performance yield.

Iterate and optimize product design by running rapid simulations in parallel to validate all product variants and versions with greater speed.
Train on billions of miles with Deep Learning & AI

Enable asset training on demand by empowering engineers to tag, process and simulate jobs for training from anywhere and paying only for what you use.

Improve operational efficiency by accelerating training at scale using your existing open source framework, or running it as a managed service.

Recreate the physical world by running large-scale integrated logical control model simulations to ensure performance and safety.
Industrial Safety
Safety Capabilities
Image matching and object detection

- Machine unsafe
- Zone violation
- Emotional response
- Video evidence
- Safety gear absent
- Unauthorized access
Safety Capabilities
Machine & sensor intelligence

Safety gate open, partial actuation, or fault
Machine distress or malfunction probable
Fire, excess heat
Explosion, flash
Machine telemetry evidence and root cause
Real time recognition and post event analysis
User experiences

Dashboards

Mixed Reality

Interactive speech

Gestures

Preconfigured Azure IoT Suite and SaaS applications

Remote monitoring

Predictive maintenance

Connected factory

Microsoft IoT Central

Analytics and artificial intelligence

HDInsight

Machine Learning

Data Lake Analytics

Azure Time Series Insights

Cognitive Services

Bot Framework

Operations Technology

Enterprise business processes

 MES & Enterprise IT

 Business integration

 Logic Apps

 API integration

 BizTalk Services

 Analytics and artificial intelligence

 Hot path analytics and application platform

 Stream Analytics

 Event Hubs

 Service Fabric (Actors)

 Functions

 Cold path analytics and storage

 Data Factory

 DocumentDB

 SQL Database

 Data Lake Storage

 Enterprise business processes

 CRM

 PLM

 ERP

 SCM

 Operations Technology

 L3: Mfg Ops, Mgmt, MES, CAD, PLM

 L2: Supervisory Control, SCADA, HMI

 L1: Plant Control PLC, DCS, IPC

 L0: Physical Equipment, I/O, Devices, Sensors

 MES & Enterprise IT

 SQL Server

 Azure Stack

 Business integration

 Logic Apps

 API integration

 BizTalk Services

 Analytics and artificial intelligence

 HDInsight

 Machine Learning

 Data Lake Analytics

 Azure Time Series Insights

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AI and IoT

Learning Materials
Al School

Whether you’re completely new to AI or a seasoned professional looking for new learning materials and topics to explore, Al School is here to help. Whether you're looking for AI general knowledge, professional looking at AI or a seasoned professional looking for new learning materials and topics to explore, Al School is here to help.

**CONVERSATIONAL AI**
- AI SERVICES
- MACHINE LEARNING
- INTELLIGENT EDGE AI

**Conversational AI**

Intelligent bots have become an intuitive way to enable interactions between people and apps. The learning paths in this house will guide you through how to build these intelligent bots, and incorporate features like natural language processing and intent recognition, as well as other features to create delightful bot interactions in your apps and other channels.

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Path Builder

Not sure where to start? I can help you tailor a learning pathway.

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Get started
Face and Emotion Recognition
Microsoft Cognitive Services Face API can quickly analyze and compare to determine if two photos contain the same person or not. Test it out with your own photos or with a friend.

Speech Authentication
Microsoft Cognitive Services Speech API decipher voices and determine if it's the same person speaking or not. Try it today by using different voices or use pre-recorded voices.

Text Analytics
Microsoft Cognitive Services Text Analytics API determines the sentiment of your message, typed or spoken. Try it out and see if the message is positive, negative, or neutral.

Language Understanding
Microsoft Cognitive Services Language Understanding interprets human language and understands the intent. Type in a custom intent or try one of the predefined ones to affect the house.

Video Indexer
Video Indexer creates intelligent insights automatically after indexing a video, including people, keywords, sentiment, and more. Upload your own video today and gain new insights.

AI Route Planner
Bing Maps Distance Matrix API calculates travel time and distances for multi-stop routes and optimizes based on traffic patterns and other inputs. Try it to plan a sight-seeing trip.
Microsoft for Startups

More ways Microsoft supports startups

Microsoft Reactor
Microsoft Reactors are spaces designed to foster learning, networking, and resource sharing within your local startup and developer communities.

LEARN MORE

Microsoft ScaleUp
Built to accelerate the success of enterprise-ready companies, you'll be granted access to top Microsoft partners and customers, make valuable business connections, and access a strong network of technical knowledge.

LEARN MORE

M12
As the corporate venture arm for the company, M12 (formerly Microsoft Ventures) typically invests in enterprise software companies in the Series A through C funding stage. As part of its value-add to portfolio companies, M12 offers unique access to strategic go-to-market resources and relationships globally.

LEARN MORE

Ready to scale your business?
Microsoft works with select accelerators and incubators to offer these exclusive benefits. Contact your local program director to learn if you qualify.

Explore benefits

Just getting started with Azure?
Get up and running in the cloud. Bring your favorite open source software tools and technologies to Azure and explore the possibilities using the tools and platforms you know.

Get $200 in Azure credits
What about regulated Data?

Microsoft Azure Stack

Indonesia ready partners:
- TelkomTelstra
- VIBICloud
- CBN
- Visionet
- Datacomm
- dll
How To Start?

• Contact: Yosv@Microsoft.com for:
  • more guidance, reference, partner introduction and PoC or Pilot.
• Explore IOT: https://iotschool.microsoft.com/learning-paths
• Explore AI: https://aischool.microsoft.com/en-us/home
• Free Azure Credit: https://azure.microsoft.com/en-us/