Smart Factory

Accelerating the Industry 4.0 Digital Transformation Journey

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Agenda

- Introduction
- Industry Trends
- Smart Factory
- Smart Factory Case Study
- Digital Co-creation
State of the Market - Overview

Manufacturing is a concerned industry due to global demand slow growth and political and economic concerns

**Slow global demand for manufactured products**
- Output is expected to increase to 3.9% in 2018, according to the International Monetary Fund

**Pressure to adopt new technologies**
- Businesses that don’t adapt and adopt to the next generation of technology will become antiquated and be left behind

**Political and Economic uncertainties**
- Brexit is still a concern
- New nationalist governments around the world, including the US, are threatening to further weaken the free flow of goods
- The effects of attempts to reset trade agreements would be felt in the sector

**Foreign trade at low levels**
- Although oil prices have recovered a bit recently, they are not rising enough to undo the collapse in drilling and associated retraction in the rest of the energy supply chain

**Workforce concerns**
- Aging workforce, a lack of skilled employees, and training of next-generation workers are a concern
- Improve human-to-machine interaction is crucial – “Smart manufacturing must begin with people, not machines”

**Customer Experience**
- Manufacturers are expected to respond quicker and with higher quality to customers needs, and even anticipate what they want

**Security concerns**
- Industry 4.0 and IoT has increased the attack surface for cyber-threats
- Manufacturers want to evolve and innovate while ensuring the safeness, reliability and efficiency of operations

Source: 2017 Industrial Manufacturing Trends - PWC
CIO Business Priorities & Challenges

The topic of increasing efficiency and reducing costs is the #1 challenge for manufacturers globally

- **Cost reduction**: This is not surprising because the trend results from the high degree of globalization and global competition in the manufacturing industry.
  - While this is considered a major challenge among manufacturers worldwide, manufacturers from the APAC region, in particular, consider this a major topic.

- **Increased competition**: This is also not surprising because of the strong global competition in a global supply chain network.
  - The electrical engineering and high-tech industry, in particular, has rated this topic as a major challenge.

- **Reaching new customer groups** and revenue areas: Manufacturers are expected to respond quicker and with higher quality to customers needs, and even anticipate what they want.
2018 Manufacturing Predictions: Key Findings

1. **AI is in the center of manufacturers’ attentions** even though companies are planning to start using it for various purposes, the lack of necessary staff skills is and will continue to be a challenge.

2. **It is expected that manufacturers will be using IoT** to extend the integrated planning process across the entire enterprise, in real time and to automate large-scale processes and speed execution times. Also, IoT will start being included as a part of the design process.

3. **Blockchain** also seems to be calling manufacturers’ attention due to its possible benefits. With this technology, manufacturers will be able to automate large-scale processes and speed execution times, track goods in anticipation of regulatory changes, resulting in an improvement in delivered product quality and overall enhance the understanding of supplier capacities.

4. **Analytics-driven cognitive capabilities** will also be used to support the operational supply chain, monitor the operations at every step of the distribution and, ultimately, increasing cost efficiency and service performance.

5. Manufacturers that manage data-intensive production and supply chain processes will also be **leveraging cloud-based execution models**, cloud-based commerce networks, and participating in industry clouds in order to have real-time visibility and operational flexibility, to improve resiliency and reducing the impact of supply disruptions and to monetize their data contributions.
IDC: Worldwide Manufacturing Predictions

1. By 2020, 60% of G2000 manufacturers will rely on digital platforms that enhance their investments in ecosystems and experiences and support as much as 30% of overall revenue.

2. By 2021, 20% of G2000 manufacturers will depend on a secure backbone of embedded intelligence, using IoT, blockchain, and cognitive to automate large-scale processes and speed execution times by up to 25%.

3. By 2020, 75% of all manufacturers will participate in industry clouds, although only one-third of those manufacturers will be monetizing their data contributions.

4. By 2019, the need to integrate operational technology and information technology as a result of IoT will have led to more than 30% of all IT and OT technical staff having direct project experience in both fields.

5. By 2019, 50% of manufacturers will be collaborating with customers and consumers on product designs through crowdsourcing, VR, and product virtualization, with up to 25% improvement in product success rates.

3. By the end of 2018, half of manufacturers will be using analytics, IoT, and social collaboration tools to extend the integrated planning process across the entire enterprise, in real time.

4. By 2021, 60% of manufacturers will be leveraging an advanced analytics-driven data aggregation platform for supply chain operational data to improve speed & accuracy of the fulfillment process.

6. By 2021, one-third of manufacturers & retailers will be tracking goods using blockchain in anticipation of regulatory changes, resulting in an improvement in delivered product quality of up to 20%.

7. By the end of 2018, the use of industry clouds, blockchain, and cognitive will have dramatically enhanced the understanding of supplier capacities for one-third of manufacturers, enabling the iterative rebalancing of critical supply based on capabilities rather than units and quantity.

Note: The remaining 3 predictions (1, 2 and 5) were already captured in the manufacturing predictions.

Source: IDC FutureScape: Worldwide Supply Chain 2018 Predictions
Obstacles

- Reluctant investment behavior - There is a large backlog of demand with regard to the modernization of IT landscapes.
- LoBs involvement - Lines of Business will be increasingly involved in the direct purchase of IT services.
- Silos - Investment decisions that are made on horizontal solutions are difficult to make because various stakeholders from different company areas need to be involved.
- Hampered Investments in IT due to “old” machines that cannot be easily connected.
- Resistance from workers - Implementing IT solutions is of major interest from a management perspective, but there is often resistance from workers on the shop floor.
- Regulations - The regulations that affect some sub-sectors of the manufacturing industry (aerospace, automotive, nuclear, life sciences, etc.) may slow down the adoption of new technologies such as IoT, because they need to be certified.
- Security of data is significant concern.

Sources: PAC
Fujitsu Manufacturing GTM

- Quantum Computing
- AR
- VR
- IoT
- Computer Vision
- Natural Language Processing
- Digital Twin
- Optimization
- Prediction
- Robot
- Autonomy
- FAST
- Service Innovation
- Smart Factory
- H2M
- Enabler
North America Manufacturing Focus

- **Smart Factory** - Providing real time operational **Insight** and **Intelligence** across the Manufacturing Estate to improve tactical and strategic operations gaining competitive advantage.

- **Service Innovation** - Enabling manufacturer to provide products “as a service”, delivering outcomes to customers and changing the customer experience based on extensive usage and customer feedback.

- **Human 2 Machine Optimization** - Enabling the rich data being created in the digital era of manufacturing to be presented to current and future workers in a **human centric point of view** that enables decision making.

- **FAST Enablement** - Modernization of IT environments and practices leveraging modern platforms and methodologies to enable the **rapid response to business demands**, provided in a cost efficient manner that frees core IT resource to better align with business.
“Smart Factory”

Manufacturing 4.0. – Accelerating Your Digital Transformation Journey
Fujitsu Smart Factory Framework

... is a journey to gain actionable intelligence and optimize operational effectiveness continuously in an interconnected value chain.
“Smart” = Real Time + Connected + Intelligent

**Real Time**
Actual time during which a process or event occurs. Within the Connected System, the input data & intelligent data is processed near real time (milliseconds) so it is available for immediate use.

**Connected**
Enterprise is horizontally and vertically integrated to facilitate in real time the flow of intelligent data between people, process, technology, physical (Manufacturing) and virtual assets.

**Intelligent**
Capable of analyzing, in real time, states and/or actions, in response to varying situations, requirements and past experiences, and updating data accordingly.
“Smart Factory” Technology Enablers (Examples)

- Technology (Agnostic)
  - Recognized as one of the “Enablers” in the journey to a “Smart Factory”
  - Dependent on the organization, business, processes and products.
  - Must be relevant, provide value, and support the business and be accepted by the users
Business Driven Outcomes

Assess

Results Chain™
Setting the correct agenda for change

Fujitsu Fact Sheet
Map to target architecture
Present decision options

Map

Decide

Decision Tree
Automated decisions based upon objective data

Execute

Smart Factory Waves
Industrialized transformation

Success starts with clear goals and a targeted Business outcome

Assessment Repository
Data for objective decisions and action

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Fujitsu Smart Factory Framework

Smart Factory
- Pragmatic approach to “Factory of the Future”
- Business Value
  - Start with business outcome
  - Map and validate business benefits
- Technology agnostic
  - Builds on existing and future technology and applications

- Artificial Intelligence
- IoT Platform
- Human-Machine Interface
- Smart Devices
- Supply Chain Optimization
- Real Time
- Manufacturing Operations
- Enterprise Application
- Green Manufacturing
- 3D Printing
- People
- Video / Image Analytics
- Cyber Security
- Robotics
- Augmented Reality / Wearables
- Cloud
- Quality Management
- Maintenance
- Engineering
- Big Data Analytics
- 3D Printing
- Enterprise Application
- Green Manufacturing
- People
- Video / Image Analytics
- Cyber Security
- Robotics
- Augmented Reality / Wearables
- Cloud
- Quality Management
- Maintenance
- Engineering
- Big Data Analytics

Attributes
Domains
Enablers
Fujitsu Smart Factory Use Case

$2B Global IMC Manufacturer
Case Study
International Manufacturer of Industrial Components

Productivity
Quality
Return on Assets

More Speed, Less Labor
Less waste, More utilization
Fujitsu Smart Factory Approach & Methodology
SFOF Roadmap Overview

Wave 0

0 Enterprise Initiatives:
  - High Level Blueprint
  - Program Management
  - Mobility & User Experience Strategy
  - Cyber Security

Wave 1

1 Optimize Prod Operator Dashboards
26 Org Design for Enterprise Asset Management (EAM)
28 Enable SAP EH&S
11 Enable EAM
8 Integrate Setup database into SAP(including ECM)
9 Utilize PRT for Cutting tools
10 Utilize PRT for Equipment
27 Activate Calibration in SAP

2 Enable Machine Integration & Monitoring
37 Implement Master Data Management Strategy
36 Enhance VC Functionality
34 Support holistic VC Concept

3 Implement Systematic Error Proofing
6 Enable Machine Integration & Monitoring
102 Specification Database
47 Redesign Change Process

44 DMS Collaboration

“LOW HANGING FRUIT” INITIATIVES

20 Optimize Prod Operator Dashboards
5 Implement Systematic Error Proofing
37 Implement Master Data Management Strategy
102 Specification Database
47 Redesign Change Process

Wave 2

14 Integrate SAP PLM/QM/CAD - Quality Planning Processes
13 Implement WIP Tracking & Product Genealogy
46 Product Structure Management & visibility (Digital Twin)

48 Implement Enterprise Workflow
46 Product Structure Management & visibility (Digital Twin)
13 Implement WIP Tracking & Product Genealogy

Wave 3

18 Optimize Inspection Processes
7 Integrated WIP Non-conf w/QM
21 Build New QN Process

19 Implement Quality Collaboration with Suppliers
20 Implement Product Certifications Inspection
33 Enable SAP Predictive Maintenance & Service (PdMS) on HANA

102 Specification Database
47 Redesign Change Process

Wave 1

Wave 2

Wave 3

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# Customer Validated Benefits

<table>
<thead>
<tr>
<th>Outcome Impacted</th>
<th>Estimated Benefits (Annual)</th>
<th>Wave 0 (Low - High)</th>
<th>Wave 1 (Low - High)</th>
<th>Wave 2 (Low - High)</th>
<th>Wave 3 (Low - High)</th>
<th>Total (Low - High)</th>
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<tbody>
<tr>
<td>IDL/DL</td>
<td>• IDL Reduction (Hrs.)</td>
<td>2000 - 3000</td>
<td>113,000 - 224,000</td>
<td>63,000 - 100,000</td>
<td>57,000 - 84,000</td>
<td>235,000 – 411,000</td>
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<tr>
<td></td>
<td>• DL Reduction (Hrs.)</td>
<td>-</td>
<td>162,000 - 245,000</td>
<td>113,000 - 255,000</td>
<td>-</td>
<td>275,000 – 500,000</td>
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<tr>
<td></td>
<td>• W/C Utilization Improvement (Hrs.)</td>
<td>-</td>
<td>8,000 - 17,000</td>
<td>-</td>
<td>8,000 – 13,000</td>
<td>16,000 – 30,000</td>
</tr>
<tr>
<td>ZCD</td>
<td>• QN Decrease (%)</td>
<td>-</td>
<td>10% - 15%</td>
<td>20% - 25%</td>
<td>-</td>
<td>30% - 40%</td>
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<tr>
<td>NPD Cycle</td>
<td>• NPD Cycle Time Reduction (Hrs.)*</td>
<td>-</td>
<td>600 - 900</td>
<td>-</td>
<td>50 - 150</td>
<td>650 - 1,050</td>
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<tr>
<td>EoU</td>
<td>• Ease of Use</td>
<td>-</td>
<td>50% - Min. Improvement over the baseline</td>
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<tr>
<td>Financials (Annual Savings)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$20.4M - $36.2M</td>
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Fujitsu Smart Factory Journey

Adaptive Testing
- Event assistance
- Dynamic test control
- Problem visualization
- Multiple operation / less invest

Quality Improvement
- Online problem solver
- Process instruction
- Escalation assessment
- Trigger on event

Shopfloor Management
- Worker’s place control
- Real time data
- Mobile App

Power / Energy Management
- Peak reduction
- Energy cost saving
- Consumption supervision

Predictive Maintenance
- Improve OEE
- Production stabilization
- Resource allocation
- Avoid unnecessary waste

Operation Support
- Context based instruction
- Quality increase
- Agility and fast reaction

Digital Supply Chain
- Paperless Kitting: eink eKanban
- Transparency along supply chain
- "Pull" control

Client interface
- Cloud based App
- Seamless DataFlow towards customer
- Data value for clients
- Desk view load
Operation instruction with AR

- Integrated with FNC’s MES System (QDC)
- SFP configuration is loaded onto the HoloLens.
- After scanning the SFP barcode the Hololens application will indicate the installation position.

The indicator overlays and locks on to physical unit regardless of where the operator is looking.
Fujitsu Digital Co-creation
The Journey with the Fujitsu Smart Factory

- Vision & Strategy
- Maturity Model
- Business Case

Co-Define Target State

- Co-Define Roadmap

Co-Develop Roadmap

- Outcome-based roadmap
- ID pilot opportunities

Co-Creation Proof of Value

- Packaged Solution
- Digital Co-creation

Managed Implementation

- Solution Accelerator
- Implementation

Managed Services

- Transformational Managed Services
- Dev Ops
- Apps Modernization

Plan - Think Big

Build - Start Small

Run - Grow Fast
Getting Started – Explore Workshop

**Explore**
- **1 day**
  - Vision and Scope Definition
- **Fujitsu Investment**
  - Explore workshop with business stakeholders
  - Understand challenges, barriers and wishes
  - Align with business strategy and outcomes

**Discover and Design**
- **2 weeks**
  - Design Thinking and Prototype
- **Shared Investment**
  - Observation and participatory Design Workshop
  - Confirmation of technical feasibility
  - Development of interactive low fidelity prototype
  - Development of HL business case

**Deliver**
- **6-8 weeks**
  - Proof of Value or Pilot
- **Commercial agreement**
  - Development of a functional PoV or Pilot
  - Development of a proposal for full implementation
  - Monitor and evaluate the value realization

- **Heat Map of use cases**
- **Transformation Game plan**
- **Value Assessment report**
- **Decision to Packaged Solution or Co-creation**

- **Interactive prototype and customer validation**
- **High level business case**
- **Proposal for pilot implementation**

- **Functional pilot of accelerator or Co-creation**
- **Detail business case**
- **Governance model for ongoing engagement**
- **Proposal for full implementation**
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