Digital Transformation
Challenges for the Manufacturing Industry

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Challenges
Digital will be highly disruptive to most industries, affecting not only revenue and cost structures but also shaking up the core business and operating models.

Digital Disruption will be cheaper, stronger and faster.
Level of maturity of digital business models

Source: Accenture
70% of the companies in manufacturing are in the first three stages of the Service Continuum.
Moving from single, siloed systems and organizations to an industrial network of capabilities

**PAST**

While today's production is linearly organized and optimized within the boundaries of organizational and system siloes...

**FUTURE**

... manufacturing of the future will fulfill individual customer needs by a collaborative and agile network of capabilities

- Interoperability
- Virtualization
- Decentralization
- Real-Time Capability/Responsiveness
- Service Orientation
- Modularity

Are you ready?
## Internet of Things – Atos Industrie 4.0

**Atos on the Forefront**

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<th>Research</th>
<th>Atos’ scientific community</th>
<th>Gemini Project</th>
<th>Industrial Data Space</th>
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<td><strong>GEMINI 4.0</strong></td>
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<td>Thought Leaders</td>
<td>Development of sustainable business models for Industrie 4.0 / smart factory BMWi Program</td>
<td>Creating a virtual data room to enable secure exchange and usage of data.</td>
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<tr>
<td></td>
<td>Focus on technological challenges, new trends &amp; standards. + I4.0 solutions ... With customers</td>
<td></td>
<td>Security, standards, data governance, conectors</td>
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<td><strong>Solutions for Smart Analytics, Big Data, I-, P-, SaaS, Augmented Reality, Security, etc.</strong></td>
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<td>IPT (IEM) → Augmented Reality</td>
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<td>IML → Industrial Data Space</td>
<td><strong>IOTW</strong></td>
<td><strong>FACTORIES OF THE FUTURE</strong></td>
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**European open Platform for future Internet & Smart Factory**

**BMWi Program**

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**GEMINI 4.0**

**Geschäftsmodelle für Industrie 4.0**

**Thought Leaders**

Focus on technological challenges, new trends & standards. + I4.0 solutions ... With customers

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INDUSTRIAL DATA SPACE

SOFTWARE

CYBER PHYSICAL SYSTEMS

ROBOTIK  RFID  TELEMATIK  SERVICES  DIENSTE

AUTONOMIK  ASSISTENZSYSTEME
The Industrial Data Space aims at a »Network of Trusted Data«

- **Trustworthiness**: Certified Members
- **Decentralization**: Federated Architecture
- **Sovereignty**: Data and Services
- **Openness**: Neutral and User-Driven
- **Security**: Data Exchange
- **Governance**: Common Rules of the Game
- **Scalability**: Network Effects
- **Ecosystem**: Platform and Services

Source: Fraunhofer / IDS
Industrial Data Space is complimentary to the platform Industrie 4.0

Industrial Data Space
Focus on Data

Industrie 4.0
Focus on manufacturing industry

Insurance 4.0
Retail 4.0
Banking 4.0
...

Smart Services
Data
Networks
Real Time Systems
...

Source: Fraunhofer / IDS
Ecosystem of the Industrial Data Space
Members of the Board of Industrial Data Space e.V.

left to right:

Markus Vehlow, PwC
Dr. Ralf-Peter Simon, KOMSA AG
Dr. Robert Bauer, SICK
Heike Niederau-Buck, Salzgitter
Dr. Ralf Brunken, Volkswagen
Prof. Dr. Boris Otto, Fraunhofer IML
Prof. Dr. Reimund Neugebauer, Fraunhofer-Gesellschaft
Dr. Reinhold Achatz, thyssenkrupp
Ulrich Ahle, Atos
With Siemens, a unique technological Proposition
Atos & Siemens a Strategic Partnership

JOE KAESER
President and CEO of Siemens AG

"This partnership forms one of the largest strategic relationships ever between a global engineering company and a global IT provider. The value of our combined strength enables our customers to take full advantage of the next wave of industrial IT in order to maintain competitiveness and deliver outstanding services."

150 m€
Joint Investments to shape the future & shared value creation

Smart City
Smart Energy

Industrial IoT / M2M

Cloud Computing

Security

Industrie 4.0

Industrial Big Data Analytics
Strategic joint investment projects with Siemens
Defining the future of IoT Services

<table>
<thead>
<tr>
<th>Universal Tolling Solution</th>
<th>Low Emission Zones</th>
<th>Energy Trading &amp; Risk Management</th>
<th>Data Center Infrastructure Management</th>
<th>Industrial Data Analytics</th>
</tr>
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<tbody>
<tr>
<td>Satellite and Microwave tolling integrated with back-office and central system to provide end to end system</td>
<td>A end to end cloud-based LEZ solution with integrated ANPR and roadside technology, and Atos back-office services</td>
<td>Integration Siemens JROS and Atos PTRS allows integrated view of production scheduling and energy market trading</td>
<td>A new joint solution to enable end to end Data Center wide (Facilities &amp; IT-Infrastructure) reporting, analysis and optimization.</td>
<td>A comprehensive program to build both the analytics platform and 9 use cases in preventive, predictive and prescriptive analysis for Industry &amp; Manufacturing, Energy, Mobility and Healthcare</td>
</tr>
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**MES Just In Time, Just In Sequence**

- Seamless integration between OEMs and their first tier suppliers at production and assembly time

**PLM Supplier Connect**

- Seamless integration between OEMs and their first tier suppliers at the design phase

**Data Analytics for Smart Grid**

- A comprehensive program with 5 use cases for Data Analytics in Smart Grid management.

**Industrial IoT Platform**

- An elaborate scalable and cost effective communications platform to facilitate connecting millions of devices and support the remote management services.

**Innovation PoC’s**

- Running: Spare Part Identification, Additive Manufacturing, Security Incident & Event Management
- In preparation: Internet of Systems, Future Networking
2 Architecture
Building blocks and use cases

- **Security**
- Additive Manufacturing
- Data Analytics / Atos Codex
- Industrial IoT Platform
Internet of Things – Atos Industrie 4.0
Road to Security

1. Security Maturity Assessment
2. Penetration Test
3. Security Concept
4. Security Monitoring
5. Auditing

- Target: Reaching a security level sufficient for Industrie 4.0
- As-is analysis: Security maturity assessment
- Technical assessments via penetration tests performed by Certified Ethical Hackers
- Security concept with proof of implementation for BSI (esp. required for KRITIS)
- Security Monitoring and alerting / notification
- IS audit performed by a certified IS service provider
Building blocks and use cases

- Security
- Additive Manufacturing
- Data Analytics / Atos Codex
- Industrial IoT Platform
Additive Manufacturing in Atos

Design and Analysis of AM manufacturable parts
Reverse Engineering, Parts Integration
Topological Optimization Studies
Test Programs: Development of material data and allowables
Microstructure and Thermo-Mechanical Modeling

Business Integration | Technological Platform | Industrialization

Distributed Production environment
Reverse Traceability: Tracking & Tracing
SW Adaptation and Integration (MES, PLM, SCM)
Analytics to predict component properties
Intellectual Property Rights and Cybersecurity
Additive Manufacturing (3D Printing)
“RepAIR” – Focused in a Predictive Maintenance System

Onsite Maintenance and Repair of Aircraft by integrated Additive Manufacturing

The main objective of RepAIR is to shift the “make” or “buy” decision towards the “make” decision by cost reduction in the remake and rework of spare parts and therefore improve cost efficiency for maintenance repair in aeronautics and air transport.

RepAIR Members (Extract):
Building blocks and use cases

- Security
- Additive Manufacturing
- Data Analytics / Atos Codex
- Industrial IoT Platform
## Atos Codex Framework Architecture

<table>
<thead>
<tr>
<th>Access to Ext. Systems</th>
<th>Data Integration</th>
<th>Data Management</th>
<th>Data Modeling &amp; Analysis</th>
<th>Data Presentation</th>
</tr>
</thead>
</table>

### Real-Time: latency < 100 milliseconds

- **OMQ**
  - High-speed messaging
  - Java
  - Scala
  - Binaries
- **Spring**
- **Gemfire XD**

### Near-Real-Time: latency < 1 minute

- **RabbitMQ**
- **Spark Streaming**
- **Drools**
- **Cassandra**

### Batch Layer: latency > 1 minute

- **DB Access**
- **File Transfer**
- **Talend**
- **ETL**
- **Data Quality**

### Serving Layer

- **In-Memory Data Store**
- **Spark**
- **R**
  - R for biostatistics
- **KNIME**
  - IDL
- **Python**
  - Drools Expert

### Integration of analytical layers

- **Tez**
- **MapReduce**
- **Solr**
- **Qlik**

### Data Scientist Workbench

- **TIBCO Spotfire**
- **Tableau**

### Visual Analytics Reporting

- **BIRT**
- **Jaspersoft**
- **Drools**
- **TIBCO Spotfire**
Building blocks and use cases

- Security
- Additive Manufacturing
- Data Analytics / Atos Codex
- Industrial IoT Platform
Atos’s Industrial Internet of Things Platform

**Industrial IoT Platform**
- Authentication & Authorization
- Remote Access
- Collaboration
- Secure Data Transmission
- Logging
- Reporting / Analysis

**Service Center**
- Service Techn. EU
- Service Techn. US

**Service Partner**
- External Specialist

**Customer**
- Technician

**Industrial Data Analytics Applications**
- Data Scientists

**Machines and Devices**
- Condition & Usage Data Monitoring
- Alarming & Alerting
- Asset Management
- Intelligent File Transfer

**Customer spec. Services**
- ...
Atos manages the communication platform for more than 1,5 million devices
Today, more than 300,000 systems are serviced with our platform at Siemens

<table>
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<tr>
<th>Industry</th>
<th>Energy</th>
<th>Healthcare</th>
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<tr>
<td>Paper machines</td>
<td>Gas turbines</td>
<td>X-ray systems</td>
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<tr>
<td>Ships</td>
<td>Steam turbines</td>
<td>Ultrasound systems</td>
</tr>
<tr>
<td>Cranes</td>
<td>Power plant control systems</td>
<td>Magnet resonance tomography</td>
</tr>
<tr>
<td>SIPLACE mounting machines</td>
<td>Wind power plants</td>
<td>systems</td>
</tr>
<tr>
<td>Building technology</td>
<td></td>
<td>Hospital information systems</td>
</tr>
<tr>
<td>(e.g. building automation systems,</td>
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<td>Diagnostic systems</td>
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<tr>
<td>fire detectors, cameras)</td>
<td></td>
<td>Particle Therapy</td>
</tr>
<tr>
<td>Traffic systems</td>
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<tr>
<td>(e.g. traffic computers, traffic</td>
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<tr>
<td>light systems, traffic management</td>
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<td>systems)</td>
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<td>GAS Analysis</td>
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<td>Train Rail Automation</td>
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Our business impact: we deliver Business Reinvention

Providing enhanced functionality and increased comfort to the consumer
Creating valuable customer and product insight through data collection
Providing a multi-sided-marketplace for the smart home ecosystem

What we have realized for B/S/H/:

Create a risk- and revenue-sharing business partnership for the “Home Connect” program
Support B/S/H/ from vision to requirements to realization, including end-to-end system test
Design, develop and operate the central communication platform, capable to support millions of devices

The mission: Monetizing the data
Our business impact: we ensure Business Reinvention

Transforming Manufacturer into the Digital Mobile World

What we have realized for our client Michelin:

- New Michelin Service
- 30 countries availability
- 10-15% after market business boost
- For Michelin’s clients:
  - 10% Fuel savings
  - Improved Fleet Uptime up to 5%
Our business impact:
we ensure Customer Experience

Renault granted its Innovation Award to Atos in 2013 for the R-Link project

What we have realized for our client Renault:

Renault R-Link solution, awarded as most innovative solution, with seamless integration of multimedia connectivity and infotainment services

Global Roll-out in more than 35 countries

E-Commerce for onboard, & off-board functionalities

The in-dash R-Link Multimedia Tablet (7 inch Android based) allows a seamless smartphone OS integration
Methodology
The Connected Enterprise in the Digital Age
New business and collaboration models within the manufacturing industry

Connectivity within the Enterprise
- Vertical integration
- Horizontal integration

Connected Suppliers

Connected Designers

Connected Machines

Connected Products

Connected Consumers

Connected Customers

Connected Boardroom

Connectivity to the outside world
- Consumers providing direct feedback to products designers
- Products providing online customer/product profile data
- Individual customized products & services
- Smart Products generating usage data
- Suppliers becoming Co-designers
- Customers designing (part of) their own products

Connected Customers

Connected Machines

Connected Suppliers

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Connected Boardroom
Industrie 4.0 Opportunity Discovery workshop

Workshop approach

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<th>DISCOVER</th>
<th>IDENTIFY</th>
<th>QUALIFY</th>
<th>RESULTS</th>
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<td>SUPPLY CHAIN</td>
<td>ENTERPRISE</td>
<td>CUSTOMER EXPERIENCE</td>
<td>OPERATIONAL EXCELLENCE</td>
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<tr>
<td>Scoping</td>
<td>Principles &amp; Technologies</td>
<td>Business use cases &amp; Use case Fit/Gap</td>
<td>Prioritize use cases</td>
<td>ROADMAP</td>
</tr>
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</table>

**Roadmap**:

1. Top 3 – 5 Business Use Cases
Topics

Conclusion
Experton Industrie 4.0 / IoT Vendor Benchmark 2016

Experton Market Insight
14.0/IoT Vendor Benchmark 2016 - Germany
Consulting & System Integration - Machine & Plant Engineering

Experton Market Insight
14.0/IoT Vendor Benchmark 2016 - Germany
Consulting & System Integration - Automotive Industry

Source: Experton Group 2015
Atos at a glance

Revenue 2015 (M EUR) *

12.000

Employees 2015 (Global)

100.000

Employees 2016 (Germany)

12.000

Countries

72

Revenue distribution (in %)
per Business Unit

51% Managed Services

35% Consulting & Systems Integration

12% Worldline

3% Big Data & Security

* Partially pro forma Revenue 2015
Thank You

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