Unlocking the potential with digitalization

Dr. Roland Busch, CTO and Member of the Managing Board of Siemens AG
Digitalization opens up enormous potential for India...
Investing in our digital future – R&D spending

€1.2 bn R&D in digital business in FY 2017
20% R&D intensity for digital business
Currently 24,500 software engineers

*in billions of euros
Atellica: ultrafast and flexible diagnostics platform
Mireo: innovative platform for premium-class mass transit
1,100 kV: record-breaking HVDC
3-D printing of gas turbine blades
NX for additive manufacturing
Innovation with a clear focus
Siemens Company Core Technologies

<table>
<thead>
<tr>
<th>Additive Manufacturing</th>
<th>Autonomous Robotics</th>
<th>Blockchain Applications</th>
<th>Connected (e)Mobility</th>
<th>Connectivity and Edge Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cybersecurity</td>
<td>Data Analytics, Artificial Intelligence</td>
<td>Distributed Energy Systems</td>
<td>Energy Storage</td>
<td>Future of Automation</td>
</tr>
<tr>
<td>Materials</td>
<td>Power Electronics</td>
<td>Simulation and Digital Twin</td>
<td>Software Systems and Processes</td>
<td></td>
</tr>
</tbody>
</table>
Improving innovation speed and capital allocation with Siemens Company Core Technologies

Full innovation cycle:
university collaboration – applied research – advanced applications and prototyping
Covering technological as well as business model innovations
Output-driven and market-oriented
Tapping outside innovations with partners/ecosystem and next47
~€500 million focused investments
The key to success in the digital age

Speed
and scale
Digitalization is a key driver of innovation and growth

Revenue FY 2017

<table>
<thead>
<tr>
<th>Digitalization</th>
<th>Siemens software</th>
<th>~€4.0 bn</th>
<th>Digital services</th>
<th>~€1.2 bn</th>
<th>MindSphere</th>
<th>+8%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation</td>
<td>Enhanced automation</td>
<td>~€19 bn</td>
<td>Classic services</td>
<td>~€17 bn</td>
<td>~+3%</td>
<td></td>
</tr>
<tr>
<td>Electrification</td>
<td>Enhanced electrification</td>
<td>~€43 bn</td>
<td></td>
<td></td>
<td>+1-3%</td>
<td></td>
</tr>
</tbody>
</table>

Revenue digital businesses: €5.2 bn

1) Total growth: +20% (+20% in software, +20% in digital services)
Growth excluding Mentor Graphics acquisition: +11% (+9% in software, +20% in digital services)
How we drive the digital transformation and create value for our customers

• Deep domain know-how in a broad range of markets and industries
• Strong installed base/connected fleet
• Powerful ecosystem
• Unmatched digital portfolio: MindSphere, Software, Services, Security
• Strong partnership and co-creation with customers
Siemens is among the top 10 of the biggest software companies worldwide.

We’ve invested more than US$10 billion in software acquisitions since 2007.

*minority equity investment
Closed loop innovation – the digital twin improves development, production and operation

MindSphere connects the virtual with the real world – from factories to infrastructure
Holistic approach to meet the needs of our customers

MindSphere - The cloud-based, open IoT operating system
Platform as a Service

Enabler: Infrastructure as a Service (storage, processing power, provider agnostic)

Digitally enhanced Electrification and Automation

Holistic IT security concept
Developments of our digital offerings over a year

+25% connected assets: 1 million devices and systems

Doubled number of customers: plus 2,900

4x increase of digital offerings: more than 250
Infrastructure upgrade with **Advanced Metering** (65,000 meters deployed\(^1\))

**EnergyIP**: collects and validates data and outage events; automated workflow

**Customer value:**
- Improved timeliness and reliability of electricity usage data
- New prepaid offerings for customers
- Less maintenance thanks to remote connect-disconnect functionality: **130,000 truck rolls** avoided
  \(\rightarrow\) **US$1.6 million** saved in 1 ½ years
Use of artificial intelligence for maintenance of gas turbines

Algorithms analyze operation data, environmental conditions and component attributes better than human experts

Customer value:
- 30% longer maintenance intervals
- 16% lower costs
Residential and commercial buildings account for 40% of total U.S. energy consumption

**Navigator**: Bank company Capital One monitors >20 office buildings to improve energy efficiency

**Customer value:**
- 10% energy savings
- based on 14 million data records per week
Amtrak, USA

Availability of locomotives

Maximum availability of 70 Vectron locomotives for the North-East Corridor high-speed passenger service.

Optimized maintenance, smart monitoring and obsolescence management

Customer value:
– 33% fewer delays thanks to predictive maintenance
Management platform **Desigo CC**
Demand-oriented cooling regulation
Digital services for continuous optimization of building performance with **Navigator**

**Customer value:**
– Reduction of operating costs by **32%**
– CO₂ emissions lowered by **35%**
– Return of investment after **7 years** with **Energy Performance Contract**
The digitalization of industries requires a different approach

How to turn data into value?
How to create digital offerings?
How to turn data into value?
MindSphere Application Centers for Siemens digital offerings

- Domain know-how/vertical expertise
- MindSphere and software portfolio
- Data analytics capabilities
- IoT integration competence

Co-location
Customer

Digital offerings → Industrial apps → Digitally enhanced services → Integrated digital solutions
MindSphere Application Centers for Siemens digital offerings

20
MindSphere Application Centers

50
Locations in 17 countries across the globe

~900
software developers, data specialists and engineers

Speed and scale
MindSphere Application Centers – Locations around the globe

- Dubai
- Singapore
- Hong Kong
- Riyadh
- Erlangen
- Karlsruhe
- Munich
- Abu Dhabi
- Frankfurt
- Nuremberg
- Newcastle upon Tyne
- Nottingham
- London
- Oslo
- Frankfurt
- Renningen
- Karlsruhe
- Berlin
- Budapest
- Vienna
- Moscow
- Istanbul
- Dubai
- Gurgaon
- Noida
- Pune
- Shanghai
- Perth
- Hong Kong
- Seattle
- Atlanta
- Austin
- Foster City
- Berkeley
- Pittsburgh
- Orlando
- Sao Paulo
- Seville
- London
- Oslo
- Bad Neustadt
- Erlangen
- Nuremberg
- Munich
- Vienna
- Budapest
- Istanbul
- Abu Dhabi
- Dubai
- Gurgaon
- Noida
- Pune
- Shanghai
- Perth
- Hong Kong
• **Gurgaon**: one center focusing on steam turbines and one on process industries

• **Noida**: focus on digital grid, municipalities and distribution system operators (DSOs)

• **Pune**: focus on power generation services
MindSphere – Operating system of a city
Sector management and coupling

Vertical use cases and horizontal enabling

- **Power Utilities**
  - Digital services, e.g. dynamic outage planning
  - Meter data mgmt.
  - Micro grid
  - CHP solutions
  - Storage integration

- **Rail System Operators**
  - Digital services, e.g. predictive maintenance
  - Interlocking Management
  - Energy Efficiency
  - End-to-end trip planning
  - Be-in-be-out ticketing

- **Gov./ Public Buildings**
  - Energy efficiency
  - Building performance optimization
  - Energy efficiency
  - Meter data mgmt.
  - Digital enhanced fault detection

Platforms

- FlexLTP
- EnergyIP
- DES
- Railigent
- Navigator
- Hacon (SW)
- Navigator
- EnergyIP

Assets

- Power generation
- Grid
- Pro-sumer
- Rolling Stock
- Signaling/Rail Infrastructure
- Stations
- End customers
- Airports
- Council buildings
- Campus
- Logistics

MindSphere – The cloud-based, open IoT operating system
Platform as a Service

3rd Party Apps
Siemens supports India in unlocking the potential with digitalization

Clear and focused R&D capital allocation to drive differentiation

Leverage domain know-how, digital portfolio and customer relationship

Focus on co-creation with four MindSphere Application Centers in India

Speed and scale