Industrie 4.0 –
A challenge and a chance for the "Mittelstand"

Congress der Controller 2016

Munich, April 25, 2016
We are a European born, global top-5 strategy consulting firm with extensive experience across all industries and functional issues.

**OUR PROFILE**
- Created in 1967 in Germany by Roland Berger
- 50 offices in 36 countries with 2,400 employees
- Over 240 Partners
- ~1,000 international clients

**OUR VALUES**
- **Entrepreneurship**
  We follow an entrepreneurial approach and provide creative and pragmatic solutions
- **Excellence**
  We achieve excellent results and develop global Best-practices to ensure measurable and sustainable success
- **Empathy**
  We are insightful and responsible advisors who contribute to the greater good

**INTERNATIONAL POSITION**
- 2014 Market position in the strategy segment
  - Germany #3
  - Core markets in Western Europe #3
  - Growth regions China and Russia/CEE #2
  - World #5

**We serve...**
- The largest international companies:
  - 30% of the Global 1000
  - 40% of Europe’s leading companies
- The most dynamic and innovative mid-size companies
- Governments about to deregulate and privatize

Source: Roland Berger
We are a pioneer in Digitalization – We work for associations and companies – both large conglomerates and "Mittelstand"

Studies and client projects on Industrial Digitalization (excerpt)

RB publications

Studies (client projects)

Reference projects

Please download our THINKACT app or visit www.rolandberger.com/media for further information!

We have first-hand project experience in digitalization and data-related projects for leading companies

Source: Roland Berger
Cyber-physical systems might form the basis of the next industrial revolution – Industrie 4.0 will transform the economy

Development stages industrial manufacturing

**First industrial revolution**
1784
Mechanical weaving loom
Introduction of mechanical production assets based on water and steam power

**Second industrial revolution**
1923
Introduction of a "moving" assembly line at Ford Motors
Introduction of mass production based on division of labor and electrical energy

**Third industrial revolution**
1969
First programmable logic controller (PLC)
Introduction of electronics and IT for higher automation of production

**Fourth industrial revolution?**
2014
Cyber-physical systems

impact of each Revolution

> Introduction of new products and means of producing existing ones

> Disruption of the competitive status quo (both within and between countries and enterprises)

> New requirements to workforce and infrastructure

Source: BITKOM/Fraunhofer, DFKI, Roland Berger
The Industrie 4.0 ecosystem – A set of technologies about to interconnect and disrupt business

Industrie 4.0 ecosystem

- Cyber Security: Stronger protection for internet based manufacturing, technology products with longer life cycle
- Cloud Computing
- Big Data: Give sense to complexity, creativity, collaborative manufacturing
- Sensors: Zero default/deviation, reactivity, traceability, predictability
- Advanced Manufacturing Systems: Cyber Physical Systems (CPS), numerical command, full automation, totally interconnected systems, machine to machine communication
- Additive Manufacturing: Scrap elimination, mass customization, rapid prototyping
- Nanotechnology/Advanced Materials: Smart value added products, technical differentiation, connectivity
- Robot: Real time - autonomy - productivity, full transparency on data reporting
- Autonomous Vehicle: Flow optimization, increased security, lower costs
- Logistics 4.0: Fully integrated supply chain, interconnected systems, perfect coordination
- Internet of Things: Object tagging, internet-object communication via low power radio, real time data capture, optimized stocks, reduced wastes
- Mass Customization: Customer & marketing intimacy, flexibility, perfect match with customer's needs with production mass efficiency, on demand manufacturing
- The smart factory: German core strength
- Resources of the Future: Clean and renewable energies, energy storage, alternative raw materials
- Clients: Customer & marketing intimacy, flexibility, perfect match with customer's needs with production mass efficiency, on demand manufacturing
- Suppliers: Resource, cluster, plant of the future A
- Cluster: SUPPLIERS
- Plant of the future B: CLUSTER OF PLANTS

Source: Roland Berger
Industrie 4.0 is not only restricted to the production system – Scope extends to other value chain and business functions

Scope of Industrie 4.0

Benefits

> Faster reaction to customer requirements
> Higher flexibility in manufacturing
> Economic manufacturing of small batches
> Higher uptime /output and increased process stability
> Improved products
> More efficient use of resources

Source: Roland Berger
To fully leverage the potential of Industrie 4.0, manufacturing companies need to transform their business models.

Prerequisite and impact of Industrie 4.0

**Prerequisite**
Comprehensive review and further development of the business model

1. Flexibility / Mass customization
2. Direct client relationship
3. De-laborization
4. Asset rotation
5. Decentralization / Regionalization
6. Fast-product launch
7. Shift of skillset

**Value creation**

**Business area**

**Business model**

**Revenue model**

**Productivity**

**Quality**

**Customer value**

Source: Roland Berger
This transformation involves several challenges for Controlling that need to be tackled

Major challenges for Controlling

A. **Complexity** – Increased complexity in e.g. planning processes due to higher variety in products and smaller lot sizes

B. **Data** – High amount of data to be managed and analyzed, transformation from "Big Data" to "Smart Data"

C. **Integration** – Complete integration along the value chain from supplier until customer requiring to oversee issues in a much broader sense

D. **Methodologies** – Limited applicability of current methodologies such as product cost calculation due to integration and small lot sizes

E. **Role** – Change of role from historic data driven "deviation analyst" to real-time data driven "data scientist" focusing more on evaluating new business models, etc.

Source: Roland Berger
Deutlich mehr Unternehmen nehmen Industrie 4.0/Digitalisierung als Chance wahr – 2015 waren es noch weniger als 50%.

Veränderungen durch Industrie 4.0


Chancen und Risiken

Industrie 4.0 als Chance

<table>
<thead>
<tr>
<th>1-3 = mittel bis sicher nicht</th>
<th>4 = sicher</th>
<th>5 = sehr sicher</th>
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</thead>
<tbody>
<tr>
<td>57%</td>
<td></td>
<td></td>
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<tr>
<td>Trend im Vergleich zu 2015</td>
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</table>

Industrie 4.0 als Risiko

<table>
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<tr>
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<td>31%</td>
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</table>

Source: Roland Berger
Deutlich mehr Unternehmen werden das Thema I4.0/Digitalisierung 2016 systematisch angehen – Politische Unterstützung wird vermisst

Reifegrad der Unternehmen

Reifegrad der Unternehmen:
Zustimmung zu den Aussagen …

Wir gehen das Thema Industrie 4.0 in 2016 systematisch an

Wir sind gut aufgestellt, um "unsere" Transformation bzgl. Industrie 4.0 erfolgreich zu meistern

Wir sehen ein ausreichendes Maß an politischer Initiative für Industrie 4.0, wie z.B. durch Reformen und Infrastruktur-Investitionen

Source: Roland Berger
Das Potential für Industrie 4.0/Digitalisierung im Einkauf ist erkannt, das Thema wird trotzdem in 2016 noch nicht energisch angegangen.

Funktionale Betrachtung Industrie 4.0/Digitalisierung – Einkauf

Das Thema "Industrie 4.0"/Digitalisierung birgt Potential für die Ziele

- Kosten: \(\sum 41\%\)
- Qualität: \(\sum 39\%\)
- Zeit: \(\sum 58\%\)
- Innovation: \(\sum 39\%\)

Im Einkauf gehen wir das Thema "Industrie 4.0"/Digitalisierung in 2016 systematisch an.

\[\begin{align*}
\text{Einkauf} & \quad \sum 18\% \\
\text{45\%} & \quad \sum 45\% \\
\text{41\%} & \quad \sum 41\% \\
\text{39\%} & \quad \sum 39\% \\
\text{58\%} & \quad \sum 58\% \\
\text{39\%} & \quad \sum 39\% \\
\end{align*}\]

Source: Roland Berger
In Innovation und Entwicklung wird das Thema Industrie 4.0 systematischer, aber noch nicht hinreichend angegangen.

Funktionale Betrachtung Industrie 4.0/Digitalisierung – Innovation und Entwicklung

Das Thema "Industrie 4.0"/Digitalisierung birgt Potential für Innovation und Entwicklung in Innovation und Entwicklung gehen wir das Thema "Industrie 4.0"/Digitalisierung in 2016 systematisch an.

Das Thema "Industrie 4.0"/Digitalisierung birgt Potential für die Ziele:

- Kosten: \(\sum 48\%\)
- Qualität: \(\sum 50\%\)
- Zeit: \(\sum 55\%\)
- Innovation: \(\sum 44\%\)

Source: Roland Berger
Action required on three levels – Industry must lead the way, policymakers create the basis, associations act as the "drive belt"
Each company must individually review its own business model in the digital world

**a. Within companies – Develop a digital strategy**

<table>
<thead>
<tr>
<th>Key questions to be answered…</th>
<th>…from four perspectives</th>
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</thead>
<tbody>
<tr>
<td>? Spot how the digital economy is <strong>evolving</strong> and what influence that is going to have</td>
<td></td>
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<tr>
<td>? Identify possible <strong>disruptive changes</strong> in your own business model, e.g. product-as-a-service</td>
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<tr>
<td>? Assess and decide on the necessary options for <strong>developing new business models</strong></td>
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<tr>
<td>? Examine how <strong>efficiency potential</strong> can be <strong>realized</strong> through digital technologies</td>
<td></td>
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<tr>
<td>? Review the organization’s <strong>digital competency</strong>, e.g. cyber-security, collaboration tools</td>
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</table>

In your own opinion

In dialog with customers & suppliers

In dialog with competing firms

By simulating the market entry of digital intermediaries

Source: Roland Berger
Management responsibility – Implement a digital strategy and institute change

a. Within companies – Implement a digital strategy and institute change

**Organizational embeddedness**
- Definition of roles and responsibilities
- Creation of dedicated organizational entities

**Cyber-security**
- (Regular) Updates of cyber-security measures
- Establishing cyber-security as part of the corporate DNA

**Financial perspective**
- Rigorous revenue management – reinvesting in innovation
- Extensive communications with the capital market

**Setting standards**
- Coordinated approach within the industry sector for efficient standard setting

**Digital change**
- Reinforcing experimentation and a tolerance of mistakes
- Increasing the use of digital tools

**Available skills**
- Checking what skills are required
- Training within the company
- Recruiting specialists

Source: Roland Berger
Industrial companies should examine selective cooperations – Global digital competition calls for a joint approach

b. Across companies – Cooperate with partners and competitors

**Objectives**

- Establish/defend competitive edge in global digital competition
- Set standards based on market success not by policymakers/committees
- Spread the investments to spread the risk
- Protect investment in the installed base

**Cooperation in digital testing grounds**

**Logic**
- Industrial companies cooperate to pilot new approaches and/or operate digital platforms/processes

**Content**
- Focus on an industry segment or functional domain

**Format**
- Project companies/joint ventures financed by shareholders; requires a construct safe from an antitrust perspective

**Philosophy**
- Fast piloting, tolerance of mistakes, shareholders share the intellectual property

**Specific, joint projects**

**Speed**

**Results focus**

**Practical innovation**

Source: Roland Berger
Industrie 4.0 requires preparation for new tasks which will allow Controlling to gain a central position within companies.

New tasks for Controlling

1. **Transparency**
   - Automatized and data driven process allow to gather information in real-time

2. **Details**
   - Every step, every part in the production is creating information which can be analyzed

3. **Prediction**
   - Change from historic data analysis towards predictive analytics and model based forecasts

4. **Optimization**
   - Concrete recommendations possible, based on completely data driven process

Source: Roland Berger
It is crucial for Controlling to develop new skills and acquire new tools in order to be able to leverage Industrie 4.0 properly

Requirements on Controlling (non-exhaustive)

New skills

> **Development** of data handling know how and advanced analytics towards a data scientist

> **Evolution from** (mainly) pure analyst to a more strategic advisor for the management – Owner of most important data and analysis that needs to be understood

> **Higher flexibility** due to rolling cycle of controlling (vs yearly based planning) and immediate decisions

> **Integration** of engineering and information technology competencies in order to further understand the ever more complex and automatized processes

New tools

> **Change in methodology** regarding cost calculation, profitability, etc. to re-focus on new business models

> **Development of new KPI sets** to cover real-time analysis, new business models and new analyses

> **Creation of quantified driver models** for planning and controlling purposes

> **Introduction of new controlling systems** which are interactive and linked with all partners in the value chain

Source: Roland Berger
Controlling needs to take responsibility and actively support this transformation!

Ideas for actions

Be open for the **cultural change** and the **new role** that is required from Controlling in the Industrie 4.0 environment

Participate in all **relevant activities** in your company regarding the transformation and demonstrate the importance of controlling in its future role

Take on the challenge of developing **new skills** which are necessary to tackle the new tasks ahead (analytics, data models,…)

Start thinking about the required **tools & methods** and how to integrate them in your existing systems

Actively support **new business models** by bringing in your own ideas and by conducting analyses regarding potential profitably

Create a **roadmap** combining all activities on how to develop your controlling alongside and in alignment with the rest of the company during this transformation

Source: Roland Berger
I am happy to answer any further questions – Please feel free to contact me

> 18 years of consulting experience with Roland Berger

> Responsible for Roland Berger’s global EPHT and Operations Strategy competence center

> Industry focus on engineered products, functional focus on operations strategy

> Many projects in strategy, operational excellence, performance improvement and M&A support

> Leading the Industrie 4.0 task force at Roland Berger

> Grown-up in midsized family business, long term head of supervisory board

thomas.rinn@rolandberger.com