Challenges for Innovation in the 21st Century – a European Perspective
Topics

- New terms – fundamental change
- Impact on economy and business
- A different society?
- Where are the markets?
- Effects on the intellectual property system
- Need for collaborations
- Conclusions
New Terms, Acronyms

- IoT
- AI
- Big Data
- 3D printing
- GMO
- Industry 4.0
- Society 5.0
Industry

1st: Mechanization, water power, steam power
2nd: Mass production, assembly line, electricity
3rd: Computer and automation
4th: Cyber Physical Systems

Source: Christoph Roser at AllAboutLean.com
Dramatically Increased Connectivity

- **2010**: 5 billion connected people
- **2020**: 26 billion connected things

Max Olofsson
Avanci, 2016
Digital India

- Today: 1 billion mobile subscribers in India
- Digital Farming („more crop per drop“)
- Health care to all
- Upgrade education continually
Disruption

By 2018, 33% of industry leaders will be disrupted by digitally enabled competitors

IDC, IoT and Digital Transformation, 2016
Profound Change

New digital business models are the principal reason why just over half of the names of companies on the Fortune 500 have disappeared since the year 2000. And yet, we are only at the beginning…

Pierre Nanterme, CEO Accenture, 2016
Complete Transformation

Big Data:
A revolution that will transform how we live, work and think

Mayer-Schönberger/Cukier, 2013
Big Data and Artificial Intelligence

- Data transform industries and professions
  - 80% of all data is invisible to today‘s computers
  - 85% of data is unstructured

- Computing is entering a new cognitive area
  - Computing to understand and learn
  - Impact of Artificial Intelligence

- Products as such become capable of learning by themselves
Hope and Challenge

It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change.

Charles Darwin
1809 - 1882
Impact on Economy and Business

- Internet of Things: connecting information technology (ICT) with operational technology (manufacturing industry)

- Relevance of services will grow exponentially
- Which services?
- New, disruptive digital business models

- Who will be the core players?
Germany’s Position in Industry 4.0

- Germany presently holds a leading position in Industry 4.0.
- Closely followed by the USA: platform economies of Silicon Valley Internet companies, innovative start-ups, risk capital.
- And by China: Government initiatives “Made in China 2025” and “Internet plus”.
- Japan: ...

Recent analysis of the German National Academy of Science and Engineering, Acatech, 2016.
Standardization

- Interoperability by means of a joint international infrastructure must be standardized
  - International means global!
- It will likely not pay off to focus on proprietary solutions instead, and certainly not alone

- When debating details of standardization, lessons learned from ICT FRAND licensing should be taken into account
- Contrary to the general perception, ICT FRAND licensing is spectacularly successful with probably 95% of agreements concluded without dispute
New Business Alliances Needed

- Already many examples
  - Bosch with SAP
  - Bosch with GE
  - Schaeffler with IBM
  - And many, many more

- Notably, many cross functional alliances and collaborations required
  - Across industries
  - Across technical fields
  - In science, across faculties
Complexity Increasing

- No single solution can handle the amount of complexity
- Combined and multifaceted approaches are needed

- Industry 4.0 requires Management 4.0
  - It is not enough to delegate responsibility to CTO
  - „Fast failure“ culture: fail often, fail better
    will be a powerful accelerator of migration to 4.0
New Paradigm for Ownership

- Clear differentiation between hardware product and services to vanish
- Opens opportunities for small and large companies but equally for start-ups
- How to identify respective opportunities?
  - Take product (virtually) apart into all its relevant functions
  - New perspective will open eyes to new possibilities of combinations of product with services
  - Change perspective from individual product towards network oriented functional perspective
Identifying Innovations Early

- Often difficult
- Examples:
  - Hybrid car
  - Hydrogen powered car
  - …
Wrong Cost Calculations to be Avoided

- When comparing technical alternatives, we must look at the overall cost impact.
- Looking only at the specific market price, while disregarding later follow-on costs, results in distorted judgment.
- Unavoidable follow-on costs will have to be paid later – perhaps not by the enterprise as such, but by society, i.e., typically, by the taxpayer.
Risks

- **Security**
  - Data as such
  - Paralyzing whole factories or, worse even, public utilities

- **Growing DDoS (distributed denial of service) attacks**, resulting in overloading and paralyzing websites
  - Connecting IoT devices into botnets, e.g., Internet routers, surveillance cameras, digital VCRs, etc.
  - Often no servicing, no software updates

- **Privacy**
Optimism

Many years of super growth lie ahead of us

Alain Madelin
Former French Minister for Economy and Finance
2016
A different Society?

- Growing unemployment
  - 47% of total US employment at risk
    Frey/Osborne, 2013
  - Probably less dramatic in countries with better educational systems, e.g., dual educational/professional training system in Germany

- Protectionist measures will not help

- Demographic change: problem in Europe and Japan, not in the USA
Further Challenges

- Decision-making: regulate or not?
- Society transformation: how to employ the unemployed?
Advantages of Autonomous Driving

- 90% of traffic accidents are rooted in human causes (German Federal Statistical Office for 2014)
- Improvement of traffic flow expected
- Substantial increase of traffic security
Ethical Questions

- **Laws of Robotics (2058):**
  - A robot may not injure a human or, through inaction, allow a human to come to harm
    
    Isaac Asimov, 1942

- **2016:** First meeting of Ethical Commission on Automatic Driving, instituted by the German Federal Ministry of Transport and Digital Infrastructure
  - Material damage before damage to humans
  - No classification of persons (regarding age, etc.)
Confront Erosion of the Middle Class

Measures to be taken

- Education and professional training
- Social Security systems, coupled with corresponding commitment by enterprises for their employees
- Modernization of infrastructure
- More justice and fairness in the tax system
- Access to capital to be facilitated and entrepreneurship to be incentivized

Jo Biden
Former US Vice President
2016, World Economic Forum, Davos/Switzerland
Where are the Markets of the Future?

- Developed countries, of course
- Developing countries in an increasing manner
- Africa in particular
  - Promising: Japanese focus on Africa
- Leapfrogging technology generations
  - Mobile communication without passing via fixed networks
  - Mobile payment
Intellectual Property
Any Effects on the IP System?

- Ownership of data?

- Who is allowed to use the data and for what purpose?
E Class Mercedes  2016 Model
Economic Relevance of the IP System

In the USA, 38 % of the economy are IP intensive industries, where 45 million people work.

Robert Slifer,
USPTO Deputy Commissioner
2016
Sufficient IP Protection?

- Many new, additional business opportunities

- Successful new business models are often only loosely covered by, e.g., copyrights but not easily by patents

- Business model protection to be revisited?
- Or deliberately not, in the interest of more competition?
Challenges: Need for Collaborations

- Mankind, world have existential problems: climate change
  - All brilliant brains needed from all parts of the world
Buildings Alone Consume…

- 40% of global energy
- 25% of water
Demographic Development

World Population

<table>
<thead>
<tr>
<th>Year</th>
<th>Population (billion)</th>
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<tbody>
<tr>
<td>1600</td>
<td>1</td>
</tr>
<tr>
<td>1700</td>
<td>1</td>
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<tr>
<td>1800</td>
<td>1.5</td>
</tr>
<tr>
<td>1900</td>
<td>2</td>
</tr>
<tr>
<td>2000</td>
<td>7 billion</td>
</tr>
</tbody>
</table>

Today: 7 billion
Open Innovation

- Often misunderstood
  - Open Innovation is not equal to Open Source
  - Open Innovation aims at eliminating the ubiquitous „not invented here“ syndrome
  - Cognizant of the fact that, as good as a company may be, there will always be a higher number of brilliant experts in the relevant technical field outside than inside the company

- Access to jointly or severally generated results must accommodate the specific interests of the parties

- As in technical collaborations generally, all types of arrangements are possible
Conclusions

- Fundamental change will impact all of us
- Companies to consider now areas of necessary change in their business
  - Organizational
  - Mindset, company culture
  - New business opportunities
  - Collaborations and alliances
- Profound debate in society about imminent changes, involving all groups of society, necessary
- Intellectual property and competition law, as well as other regulatory fields, need attention
- It is all GLOBAL – with challenges and unprecedented opportunities
Act Now!

A man who dares to waste one hour of time has not discovered the value of life

Charles Darwin
1809 - 1882
Thank you very much for your attention!

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