Miten valmistavan teollisuuden kilpailukykyä rakennetaan?

TEM YRITYSTUKISEMINAARI
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Main points

- Digitalization is the driver of productivity
- Industry renewal – how VTT technology strategy answers the challenge
- Example of a technology solution for competitiveness: “World's most energy efficient grocery store”

The presentation slides are in English, talk in Finnish.
Trends and buzzwords

We have seen trends, hypes and buzzwords during last 10 years:
- Automation
- Mobile work (3G, 4G…)
- Cloud
- Big data and data analytics
- IoT, Industrial internet
- Industrie 4.0
- Platform economy
- Block chain
- AI
- …

Common nominator is digitalization.
Industry Believes in Digitalization

A study with 235 major German companies concluded that “the digital transition will lead to a significant transformation ... that will require considerable investment” and more than 50% of their capital investments between 2015 – 2019 was going to digitalization (“Industry 4.0”, German). [PwC 2015]. This will increase productivity by 18% in five years and add revenues 2 – 3% per year. Drivers:

1) integration of value chain,
2) digital connected products (IoT)
3) emergence of new business models

Global investment in digitalization B$ 900 [PwC] 4800 business executives, managers and analysts around the world were interviewed about digitalization. 76% of respondents said that digital technologies are important to their organisation’s today, and 92% saw that they will be important in three years from now. (MIT Sloan, Deloitte 2015)

Manufacturing (B$ 178), transport (78) and utilities (69) are the biggest investors in 2016. [IDC]. Respectively the biggest investment go to operations, freight monitoring and metering of electricity. Devices and hw largest now, services grow faster.
Digitalization and increased productivity usually go hand-in-hand

• Five top digitalized sectors have increased productivity by 2.4% every year on average during past 10 years 2005 – 2014

• Respectively, five least digitalized sectors have had no increase in productivity. *(McKinsey Global Institute, 2015)*

• During next five years companies expect to increase annual revenues by an average of 2.9% and reduce costs by an average of 3.6% p.a. *(PwC 2016 Global Industry 4.0 Survey, 2000 interviewed)*
Industrial renewal: OPPORTUNITIES

DESIGN FOR FUTURE
- Customer as a designer
- Artificial Intelligence as a designer
- Design for life-cycle excellence

RE-BIRTH OF PRODUCTION
- Manufacturing for need
- Real-time supply-chain
- Future production strategies

DISRUPTIVE BUSINESSES
- Operational excellence as a service
- Data economy
Re-birth of production

**DRIVERS**
- Globalization
- Voice of customers: need for adaptability and speed
- Price and availability of raw materials and energy, costs of logistics
- Political preferences (fear for losing manufacturing jobs; trade wars)
- Regulations (e.g. Paris climate agreement and land use)
- Transition from fossil-based to renewables
- Towards B2C, B4B
- Geographical imbalance of market, resources and skills

**OPPORTUNITY PATHWAYS**
- Modular, low capex production
- Manufacturing for need
- Real-time supply-chain
- Future production strategies

**ENABLERS**
- Excellence in manufacturing and production systems, advanced in-line metrology
- Adaptive and interoperable IIoT Platforms
- Innovations in manufacturing, additive & hybrid
- Digital platforms for e.g. exchange of data, bargain (potentially block-chain), superb connectivity solutions, 5G
- Automation as a Service
- Electrification of industry
- Value circles in CE ecosystems

**MUST WINS:**
Cognitive production systems with advanced automation, human-robot collaboration, cyber security, interoperability of systems for production and supply chain management, human-robot solutions for short series production, business models for production ecosystems

**TIME - AMBITION - VALUE ADDED**
Real-time supply-chain

DESCRIPTION
Currently automation has focused on machine and production cells. The productivity increase is however, a more holistic challenge including the end-to-end supply chain. Already now one can produce solution without own factory by effective management of production services, related design, data and logistics. The next step is real-time factory where operations are integrated with the inbound and outbound logistic.

IMPACT ON CUSTOMERS
- The key driver for production excellence as it creates transparency for identification of development areas across supply network and enables system level optimization and value creation.
- Management and optimization of global production networks creating agility for production optimization (resources, market, skills, etc.)
- There are a great potential for new XaaS production businesses and business models

NEEDED INNOVATION CAPABILITIES AND LEARNING
- Quality-assured production tools & machines, advanced robotics
- Adaptive interoperable IIoT Platforms, Edge / fog computing
- New production business models
- Cognitive production systems with adaptive robotics and automation
- Availability of reliable real time data (interoperable and secure platforms for connected factories/mills, next generation connectivity solutions with 5G)

IMPACT ON SOCIETY
- Capability to get high valued jobs to high income countries, but the increased agility over the supply chain makes the work more volatile which challenge the current work legislation.
- More sustainable industry due to 1) lower lost of products and thus less wasted energy and resources and 2) saving in e.g. logistics
- Raise of employment, but the future work will be different that the current one.
- New business models with x-border value sharing challenge the taxation.

REQUIRED SCIENTIFIC EXCELLENCE
- Cognitive production systems with adaptive robotics and automation, AI
- IIoT platforms and connectivity solutions (5G) for factory/mill and supply chain management,
- Cyber security, Interoperability & standards
- Block-chain technology

Finally, the end-to-end transparency of the supply chain enables extreme efficiency but the complexity requires cognitive and autonomous solutions and superb quality assurance before the optimization can be done real-time.
Example of technology solution for competitiveness
Renewing electricity delivery
“World's most energy efficient grocery store” (1/2)

NEED

• Solutions for lower electricity consumption and more efficient use of local resources
• Flexible control of the consumption profile
• Ability to communicate with other stores in the grid

The pilot store is Tuira S Market, Oulu.
Co-operation project supported by Tekes.
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Renewing electricity delivery
“World's most energy efficient grocery store” (2/2)

APPROACH
- A novel combination of renewable energy supply and heat pump technology provides a flexible energy resource
- This backbone is completed by advanced control system which is able to learn from data coming from the system and from the rule base.

BENEFIT
- Smooth and peak free consumption profile reduces the energy cost for the customer – and producer.
- Energy consumption data for the following 3 hours is available for energy market operations leading to predictability
- Peak and load transfer service also possible for local balancing
In conclusion

- Digitalization is the key for productivity and competitiveness
  - Recent trends and buzzwords are about digitalization
  - Leading firms invest heavily in digitalization because of productivity and new business
  - Investments in digitalization increase productivity, data shows
- VTT Strategy addresses the Industrial Renewal
  - Design for Future
  - Re-Birth of Production
  - Disruptive businesses
- Example shows: Advanced technology brings competitiveness
TECHNOLOGY FOR BUSINESS