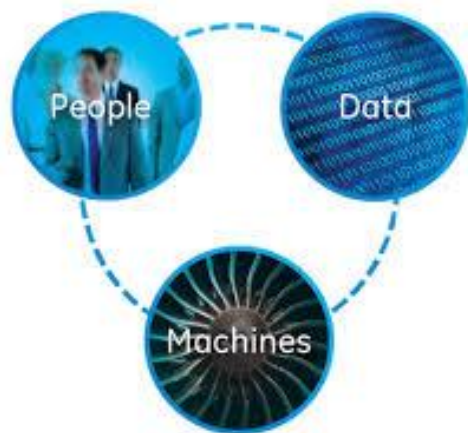




Miten valmistavan teollisuuden kilpailukykyä rakennetaan?



TEM YRITYSTUKISEMINAARI

11.10.2017

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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*)

VTT Strategy: Lighthouses and Opportunities 2030





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

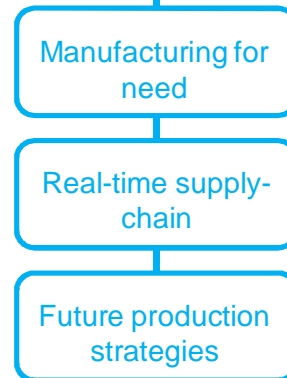
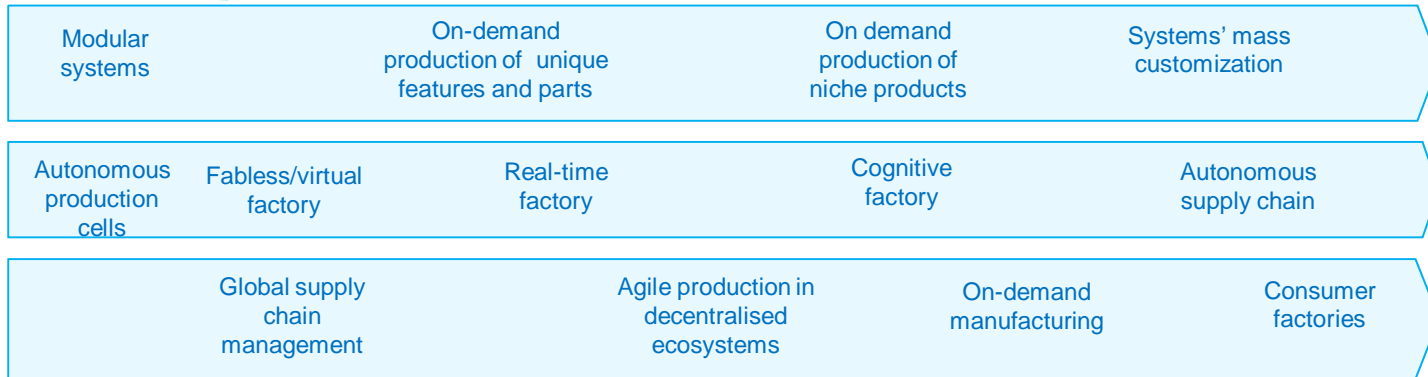


Re-birth of production

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
- **Modular, low capex production**

OPPORTUNITY PATHWAYS



ENABLERS

TIME - AMBITION - VALUE ADDED

- 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



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)



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.

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



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.
For more information: Klaus.Kansala@vtt.fi



Renewing electricity delivery

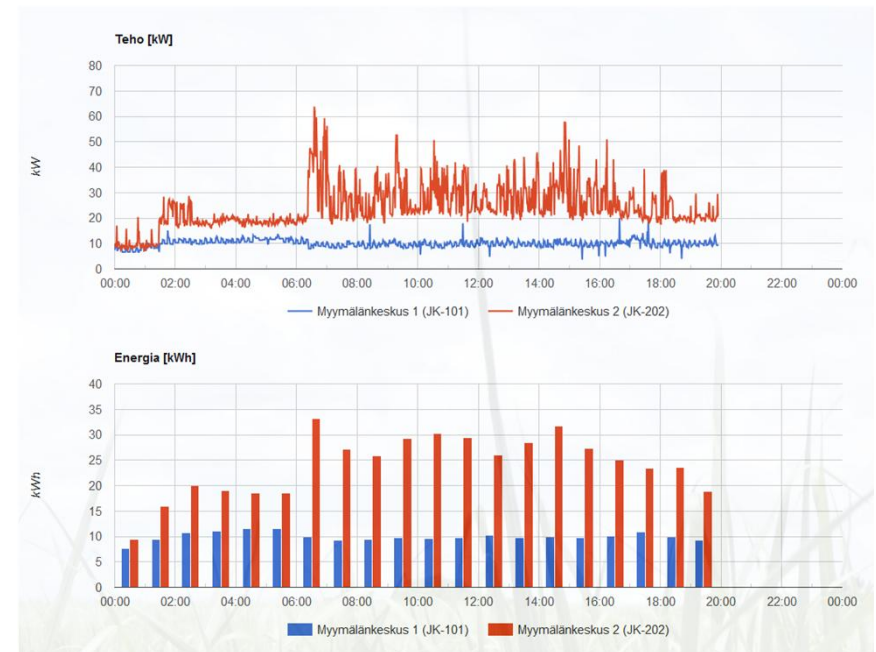
“World's most energy efficient grocery store” (2/2)

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

