Hyvää päivää Laba diena Labdien Tere päevast Dzień dobry

Smart and Safe Work Wear

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www.centria.fi/sww

Program

9.00 – 9.30 **Welcome and Opening – Smart and Safe Work Wear**, *Egidija Rainosalo, Centria UAS, Finland*

9.30 – 9.50 **3D Body Scanning, New Measurements Tables**, *Inga Dobolina, Riga Technical University, Latvia*

9.50 – 10.10 **New Prototype of Work Wear**, *Elzbieta Mielicka, IW Textile Research Institute, Poland*

10.10 – 10.30 **Virtual Garment Design and Fitting for Chemical Protective Costume,** *Eugenija Strazdiene, Vilnius UAS, Lithuania*

10.30 – 11.00 Coffee Break

11.00 – 11.20 **Electronics Integrated into Textiles**, *Inga Dobolina, Riga Technical University, Latvia*

11.20 – 11.40 **Location Tracking Inside the Building**, *Ari Lamberg, Centria UAS, Henri Hakunti, Ruuvi Innovations Ltd, Finland*

11.40 – 12.00 **Permethrin Treated Clothes – Material with Anti-insect Treatment,** *Teele Peets, TTK UAS, Estonia*

12.00 – 12.20 **Supply Chain Management**, *Heikki Mattila, Centria UAS, Finland*

12:20 – 12:30 **Closing and discussion**

12.30 – 12.50 **Arctic Fashion and Design**, *Ana Nuutinen, University of Lapland, Finland*

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Smart and Safe Work Wear

2,438,870.00 €

03/2016 - 02/2019

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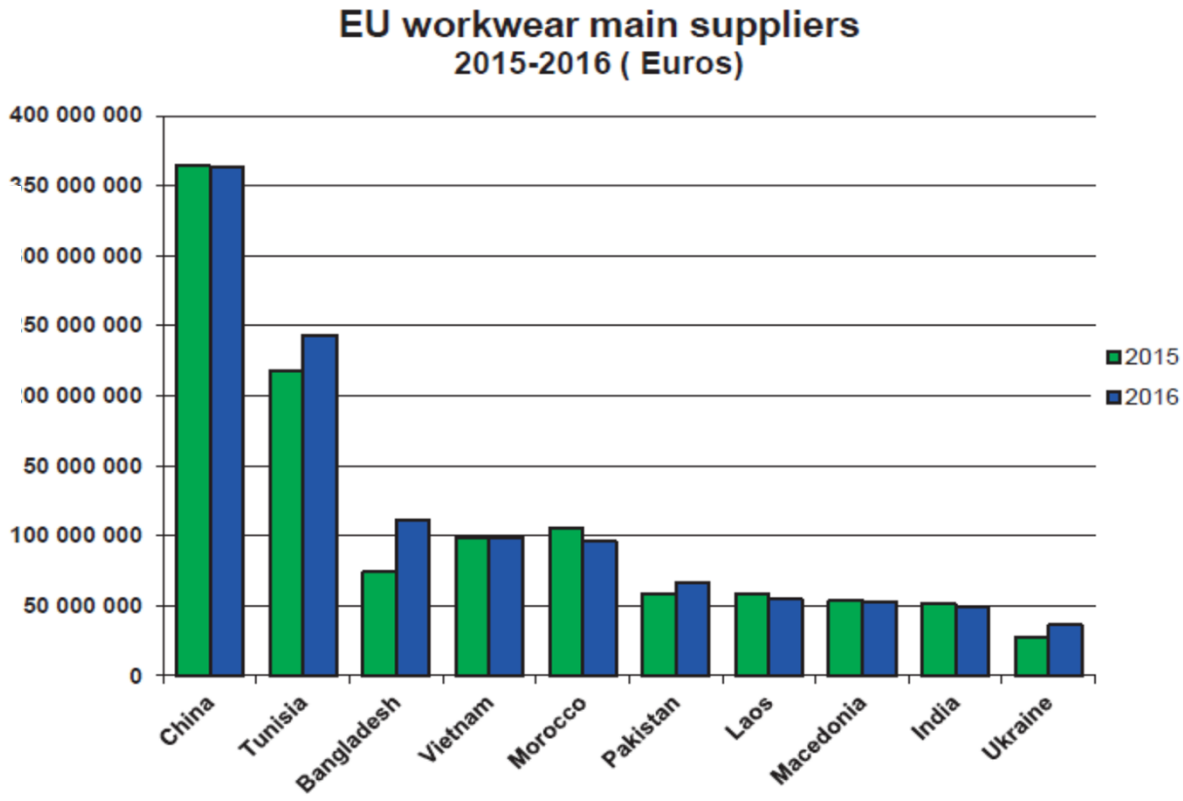
Work wear market and manufacturing in EU ~2,75 mlrd €

Import 2016 ~1,423 mlrd €

Manufacturing in EU ~ 1,482 mlrd €

Export ~0,15 mlrd €



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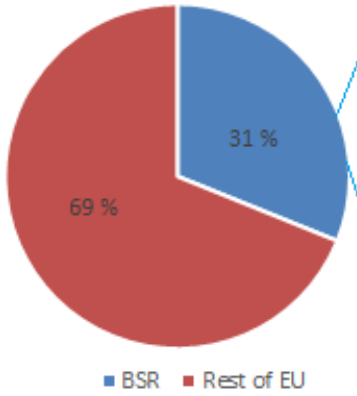
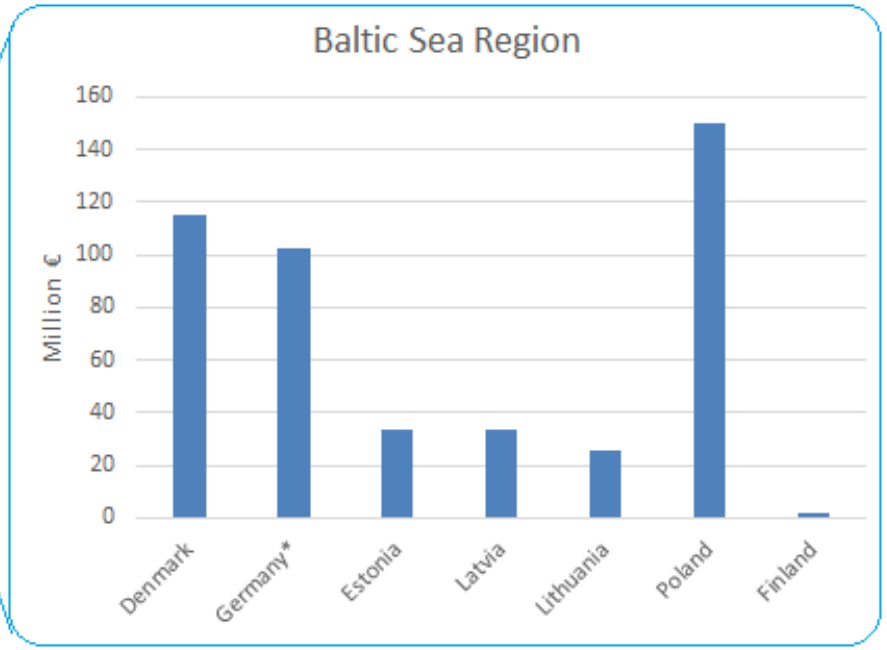
Work Wear Manufacturing in EU

Production of industrial and occupational workwear, 2016

EU28 1,486 mlrd €





*All Germany, missing data for Sweden

http://ec.europa.eu/eurostat/web/prodcom/data/database/

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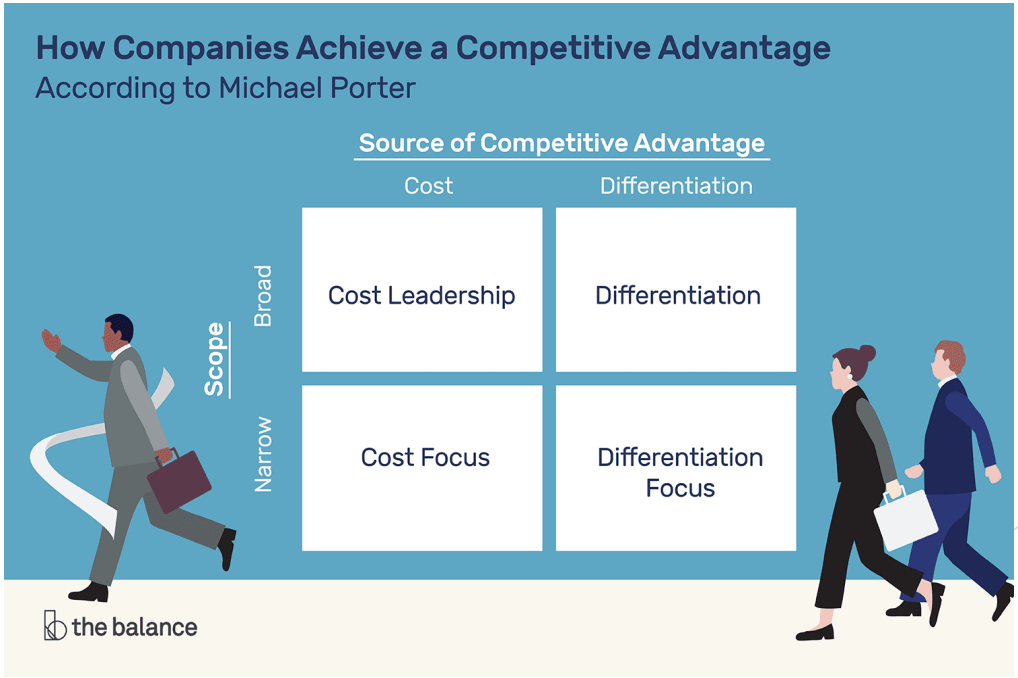
Objective

To develop the work wear clothing business process in the Baltic Sea Region and make the area more competitive against imports.



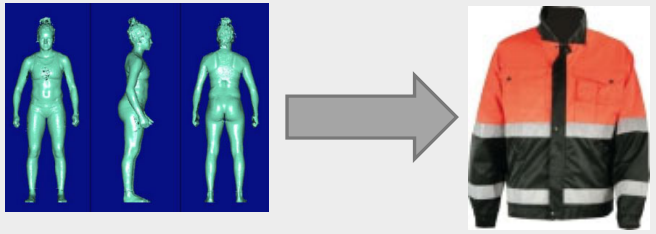
Main garment properties to win the competition

◊ Comfortable ◊ Customised ◊ Durable ◊ Smart ◊ Connected ◊ Safe

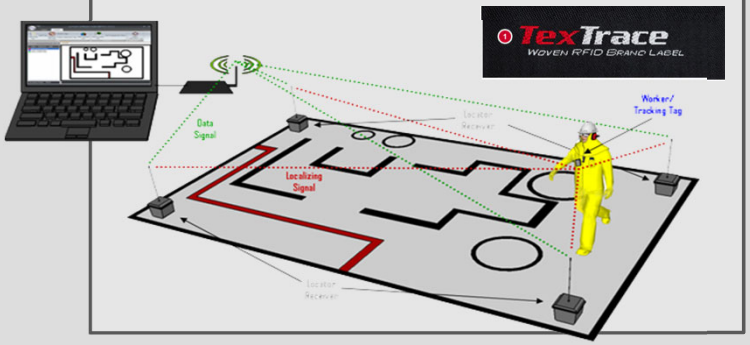
Structure of the implementation

WP1 Management

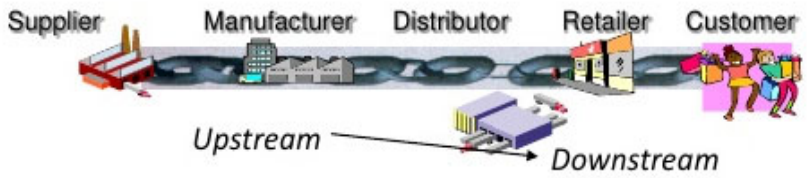
WP2 3D Body scanning



WP3 Smart clothing



WP4 Supply Chain Management



WP5 Dissemination (communication, outreach)

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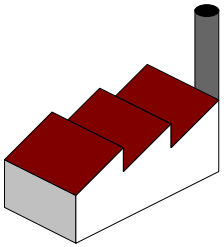
Partners

Research and Development



Companies

Finland	Centria University of Applied Sciences	Ruuvi Technologies Ltd
Estonia	TTK University of Applied Sciences	AS Profline
Latvia	Riga Technical University	SRC BRASA Ltd
Lithuania	Vilnius University of Applied Sciences	Ansell Protective Solutions Lithuania Ltd
Poland	IW Textile Research Institute, Lodz	PW Krystian Sp. Zo.o

Chemical Industry

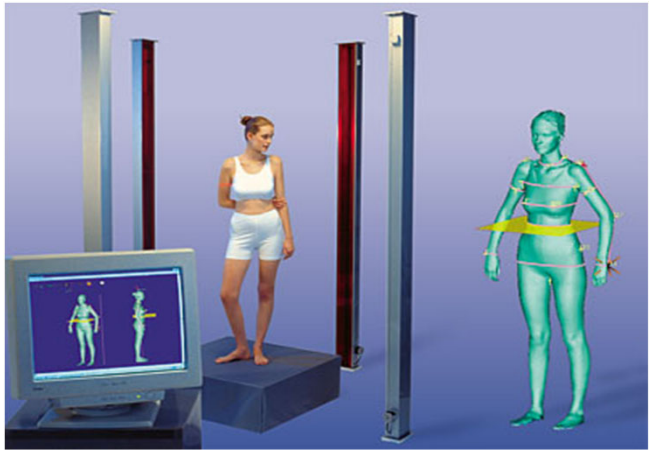
Military forces

Construction Industry

Firerfighters

Enabling technologies – 3D body scanning

Hand held

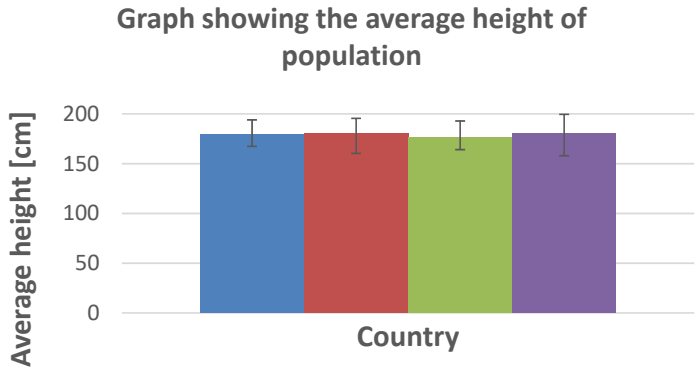


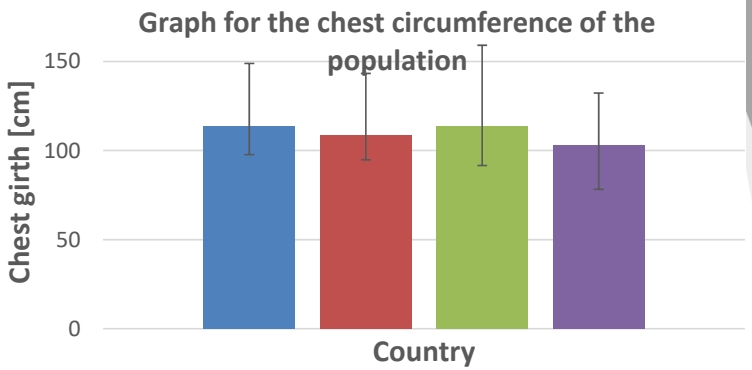
Automatic: in about 30 seconds over 130 different measurements

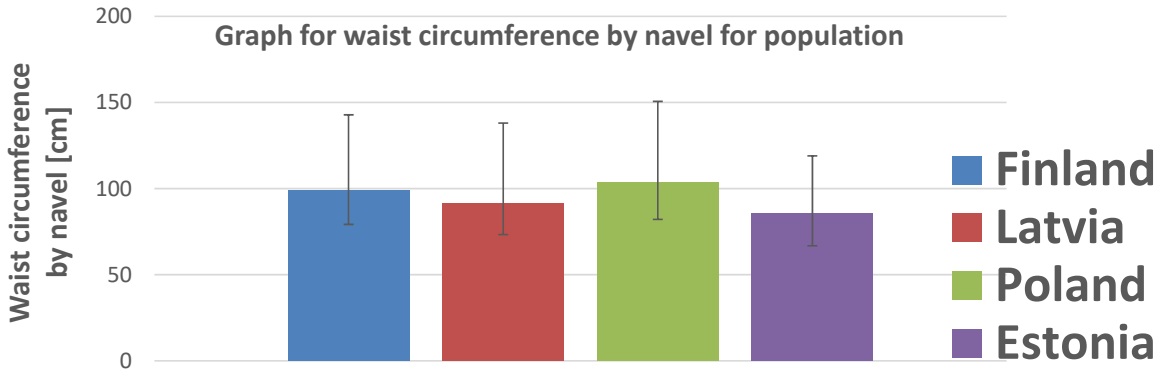
SWW has scanned 547 workers of different professions

Country	Group of end users	No of scanned people
Finland	Chemical industry	50
Estonia	Soldiers	300
Latvia	Soldiers	150
Lithuania	Fire fighters	7
Poland	Construction	40

Comparison







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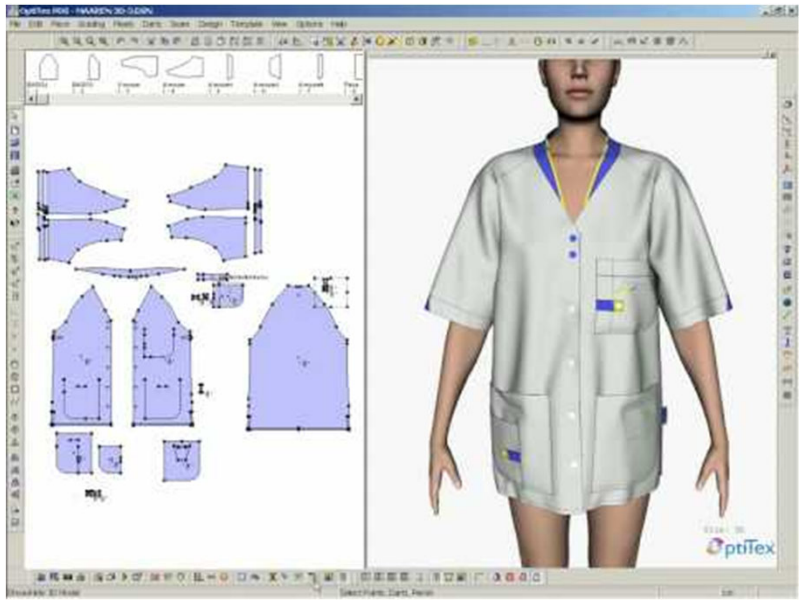
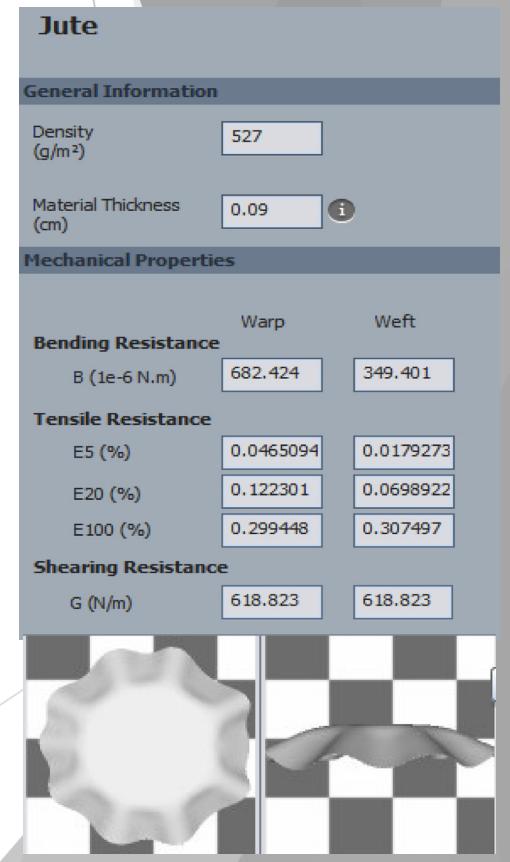
Enabling Technologies - Virtual Garment Design and Fitting

- Made-to-fit and truly tailor-made clothing
- Better fitting and more secure than regular mass made clothing
- New possibilities to special textile and tailor-made mass production
- Less material waste for prototyping
- Marketing without physical examples





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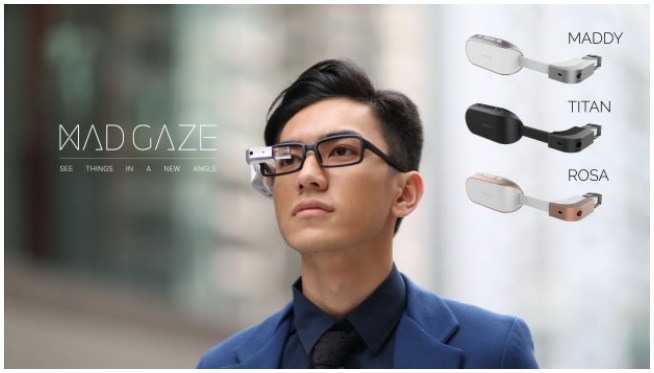
Smart wearables

- smart watches and wristbands
- smart glasses
- smart clothing
- fitness trackers
- body sensors
- wearable cameras
- jewelry
- headsets
- other



ECG cardiac monitoring with lung function and activity monitoring , HexoskinLtd

EMG, electromyography for monitoring activity of muscles, Myontec Oy

Polar Oy

Electric heated west, ORORO

Ansell Protective Solutions AB

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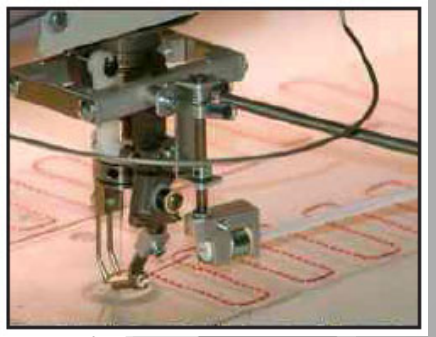
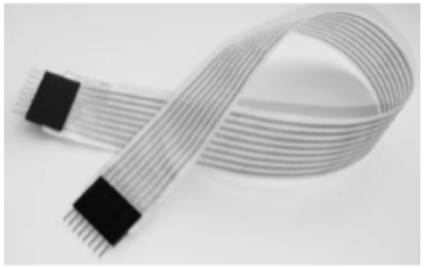
Technologies for integration of electronic components into garments

- Screen-printing on textile
- Screen-printing on flexible substrate and laminating onto textile
- Direct-write printing using conductive resins
- Embedding RFID chips and sensors into filament which then is integrated during sewing
- Embroidering and sewing
- Weaving
- 3D printing





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HS and wellbeing solutions for work wear

Health and Safety

- **Work wear gathering information on wearer's location:** indoor and outdoor
- **Distance form the danger sources,** e.g. moving vehicles, chemicals, heat sources, etc.
- **Hazards in the environment**: chemicals, dust, noise
- **Electromagnetic hazards in the environment**
- **Workload hazards:** weight of load being lifted, knee impact, vibration level, torque
- **Illumination** for lighting, warning, better visibility

Other

- Timecard properties
- Speech recognition/notebook

Comfort and personal wellbeing

- **Information on wearers activity**
- **Physiological data** including the wearer's body temperature, pulse, blood oxygen level, breathing rate, heart condition, sugar level, etc.
- **Body temperature control**

Requirements: carefree, no additional pieces, easy to use

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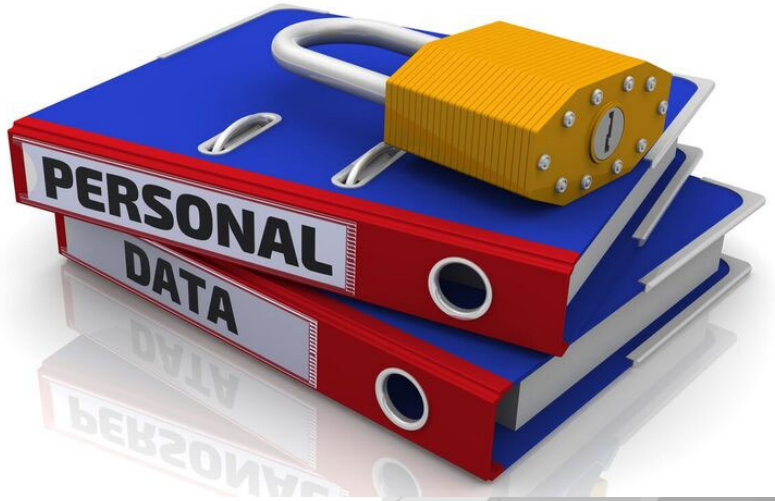
Meeting needs of end-users

Chemical industry, boat building, construction industry

Needs and Challenges	
Corporate	**Employees**
▶ Increase productivity	▶ **Safety at work**
▶ To monitor wellbeing to improve safety, reduce injuries and health care costs	▶ Own wellbeing
▶ Better planning of factory operations	▶ **"Big brother watching me"**
▶ Improve quality	
▶ **Improve safety**	



- Enough knowledge about the technology and benefits
- Data protection

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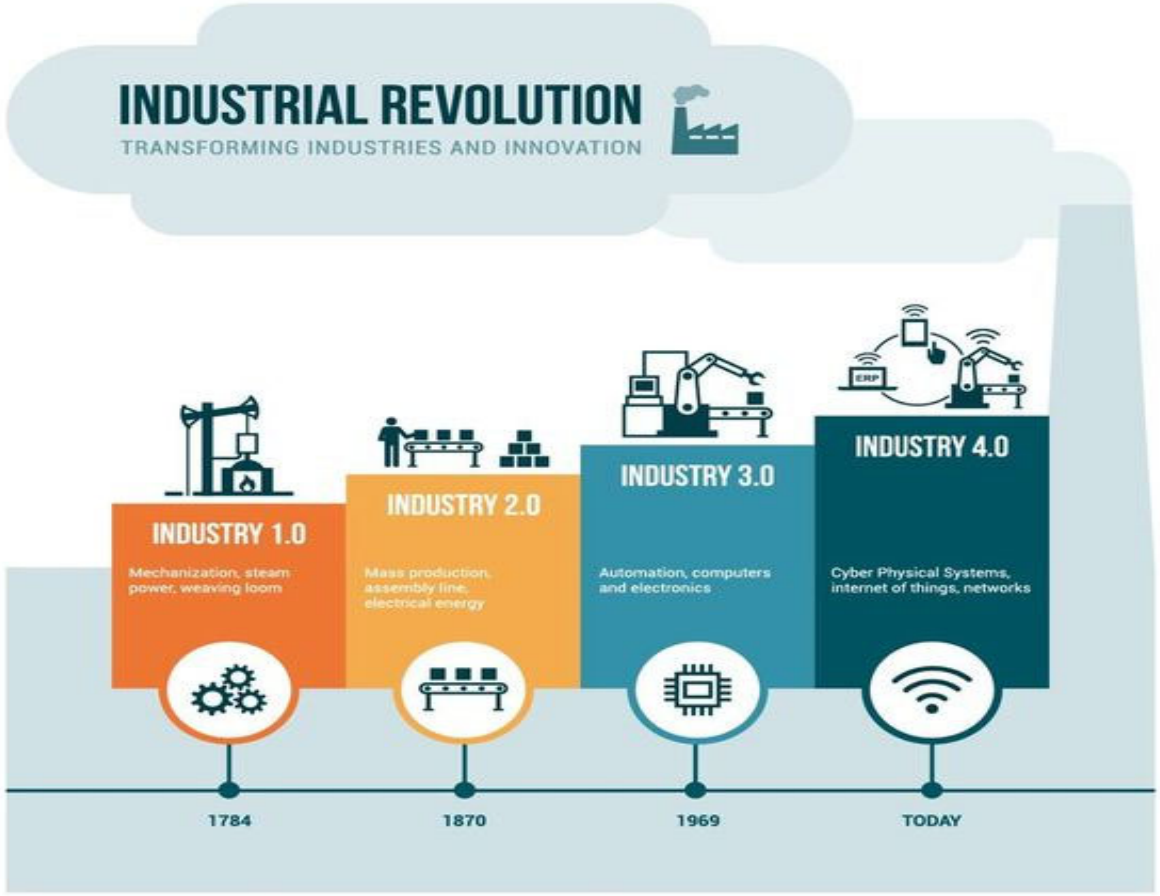
INTEROPERABILITY

The ability to connect and communicate with each other

- ✓ machines
- ✓ devices
- ✓ sensors
- ✓ people



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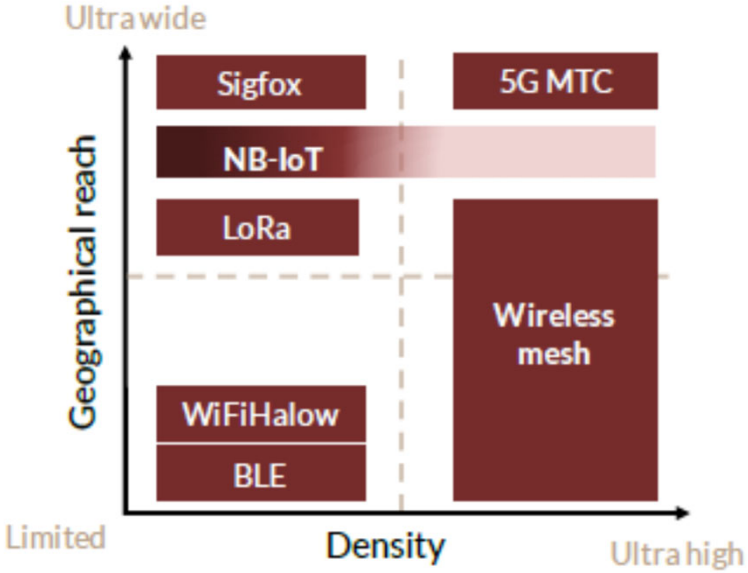
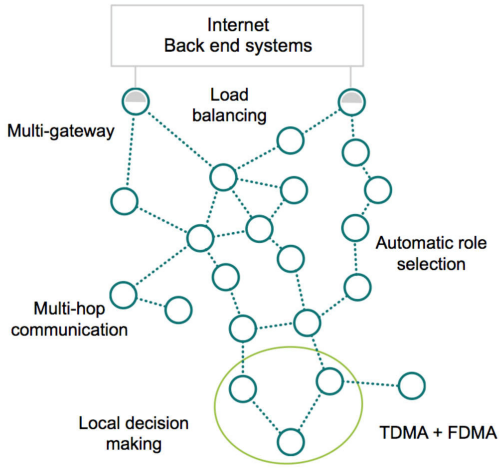
Connectivity solutions

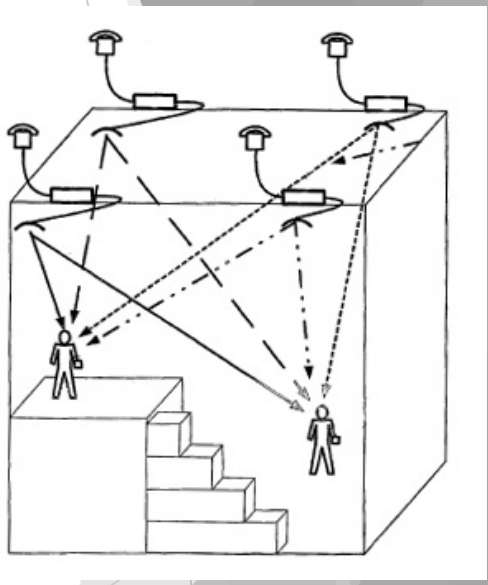


Geographical reach vs density for massive IoT technologies
(Nordstream whitepaper 2017)

Wide area mesh



RFID



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Ecosystem for development of smart work wear as a part of IoT

- Work wear producers with traditional supply chain
- End user

- Smart solution technology providers/manufacturers
- Software developers – analytics and system integration
- IoT connectivity technology providers
- Others: manufacturing tool producers

No one size fits all solution existing anymore!

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Summary - challenges

Technical	Commercial	Social
• Integration of electronic components • Elasticity • Connections • Microsize electronics • Power management • Washable, flexible and user friendly • Mass production • Agile manufacturing	• What is the problem end-user wants to solve • How to commercially utilize available technologies • How to communicate technology to customers • Are the solutions worth the money • Complexity of ecosystems • Distribution channels • Branding	• What are culturally accepted products • Comfort issues • Personal data protection • Sustainability and environment protection

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Have a fruitful seminar with SWW team!