Telaketju
Business from Circular Economy of Textiles

Pirjo Heikkilä
VTT
VTT in brief: We create sustainable growth by tackling global challenges
VTT is a visionary research, development and innovation partner. We help society and businesses grow through technological innovations – we think beyond the obvious.
We make an impact through science and technology

Our vision
A brighter future is created through science-based innovations.

Our mission
We help our customers and society to grow and renew through applied research.

Our strategy
We make an impact through scientific and technological excellence.
VTT brings businesses and the public sector together with cutting-edge international research – cooperation creates solutions that go beyond the obvious.
We turn science into practical innovations through applied research

The sweet spot where innovations are born
VTT research infrastructures support piloting in basic research

- Bioruukki piloting centre
- Biotechnology & food research piloting
- MIKES Centre for Metrology and Accreditation
- Micronova clean room
- SMACC Machinery and vehicle research facilities
- PrintoCent Printed intelligence research environment
- ROViR Remote control and virtual technology centre
- New fibre products piloting environment
- Centre for Nuclear Safety
VTT today

- **2,049 employees**
- **44% of turnover from abroad** *
- **36% of Finnish innovations have links with VTT’s competences**
- **363 patent families**

**Turnover (parent 160 M€)**
- **171 M€**
- **26 M€** Other operating income
- **71 M€** Government grant

**VTT**

is under the state ownership steering of the Ministry of Economic Affairs and Employment

*VTT Group 2018*
Innovations emerge from collaboration

- Tailored partnership
- Joint projects
- Innovation ecosystems
First phase

2017-2019

16.3.2020
Telaketju action & network

Focus of the first phase was mainly on textile recycling and business related to that – building circular ecosystem
Telaketju action & network

First phase composed of multiple projects and funding tools

Telaketju YM 2017-2018
Jointly funded project, total budget 205 k€
Topics: Collecting, sorting and pre-processing
Coordinator Lounais-Suomen Jätehuolto (municipal waste management organization in Southwest Finland)
Participants: Municipalities, recycling organizations, public participants, as well as charities.

Telaketju Tekes, 2017-2019
Jointly funded project, total budget 2.67 M€
Topics: R&D for processes, products, services aiming for business and export markets
Coordinator VTT
Participants: Turku and Lahti Universities of Applied Sciences and Companies

Telaketju TEM & AIKO 2018-2019
Topics: Investments and markets & business planning
Beneficiary: Lounais-Suomen Jätehuolto
Telaketju YM and Tekes projects
Examples of results of jointly funded Telaketju YM and Tekes projects

Identification and sorting: Manual and NIR studies

Textile collecting trials: reusable and textile waste

Heikkilä P. et al., Telaketju - Towards Circularity of Textiles, VTT Research Report, VTT-R-00062-19
Examples of results of jointly funded Telaketju YM and Tekes projects

Risk management of textile recycling

<table>
<thead>
<tr>
<th>Risk (potential)</th>
<th>Severity of consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likelihood</td>
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</tr>
<tr>
<td>unlikely</td>
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<td>3</td>
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<tr>
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<td>4</td>
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</table>

Heikkinen P. et al., Telaketju - Towards Circularity of Textiles, VTT Research Report, VTT-R-00062-19
Examples of results of jointly funded Telaketju YM and Tekes projects

- Ring-spun yarn and knitted material, VTT (TUT)
- Foam laid nonwovens, VTT
- Composite materials, VTT
- Composite materials, Turku UAS

Heikillä P. et al., Telaketju - Towards Circularity of Textiles, VTT Research Report, VTT-R-00062-19
Examples of results of jointly funded Telaketju YM and Tekes projects

- Regenerated cellulose fibres, Infinited Fibre Company
- Towels, Finlayson
- T-shirt, Pure Waste Textiles
- ‘Heal’ work clothing line, Touchpoint

Heikkilä P. et al., Telaketju - Towards Circularity of Textiles, VTT Research Report, VTT-R-00062-19
Examples of results of jointly funded Telaketju YM and Tekes projects

Nonwovens, Suominen

Acoustic panels, Soften

Packaging materials, Paptic

Composite furniture, Touchpoint

Heikkinen P. et al., Telaketju - Towards Circularity of Textiles, VTT Research Report, VTT-R-00062-19
Telaketju YM and Tekes projects

- Focused on building ecosystem for textile recycling and circular economy
- More information about projects [www.telaketju.fi](http://www.telaketju.fi)
Second phase
2019-2021

Public Telaketju 2 Business Finland project
Coordinated by VTT

Activities related to Refinement plant
Lounais-Suomen Jätehuolto Oy (LSJH)

16.3.2020
Telaketju 2 BF project

Title: Business from circular economy of textiles”

• Coordinator: VTT Pirjo Heikkilä (pirjo.heikkila@vtt.fi, +358 40 6891443)
• Co-Innovation project of Business Finland (BF)
• Duration two years: 1.5.2019 - 31.4.2021

Targets to build business from circular economy of textiles

Scope of the project includes:

• novel circular economy business models aiming for better material efficiency and increase material and product life
• business related to textile recycling
Telaketju 2 BF project

Projects including total budgets (k€) and share (%)

- VTT; 699; 14%
- Turku UAS; 218; 5%
- Lahti UAS; 217; 4%
- Public R&D project
  Total 1134 k€; 22%

Company projects; 3808; 77%

Lounais-Suomen Jätehuolto
Touchpoint
Pure Waste textiles
Image Wear
Telaketju 2 BF project

Funding (public part) including total (k€) and share (%)

- Business Finland; 681; 60%
- VTT; 182; 16%
- Turku UAS; 57; 5%
- Lahti UAS; 57; 5%
- Companies and other organizations; 158.5; 14%

- Aijuu
- Black Moda
- Freudenberg
- Globe Hope
- Infinited Fibre Company
- Kangaskapina
- Kehräämö Mustalammas
- Kuumeri
- Mirka
- Lounais-Suomen Jätehuolto
- Nosh Company
- Paptic
- Porin Villa ja Peite
- Reima
- Sideflow
- Topper
- Vaatepuu
- Valmet

- Fida
- Nextiili
- Painovoimapaja
- PK-seudun kierrätyskeskus
- Suomen Tekstiili & Muoti
- Työn Vuoksi ry
- Verstas 247
Telaketju 2 BF project
Telaketju 2 BF project

Research work packages are focused on circular economy
WP1 Management and networking
We aim to build and strengthen circular ecosystem of textiles by networking both nationally and internationally.
Led by VTT

WP2 Business models
Novel circular business models will be studied and developed, and companies are provided with tools communicating about circular solutions within their value chain.
Led by Turku UAS
Telaketju 2 BF project

**WP3 Products and materials**
We will review effect of product design on material and products life span and recyclability, integrated product information in circular economy, as well as bio-based solutions for textiles.
Led by Lahti UAS

**WP4 Recycling**
We develop concept for textile collecting and pre-sorting, textile identifying and sorting systems, and draft a classification system of recycled textile materials.
Led by VTT
Telaketju 2 BF project

**WP5 Sustainability**
Environmental, social and economical sustainability are promoted in our project. We will review different tools for LCA and social costs calculation, make modeling of costs of textile recycling and study market potential of different solutions.
Led by Turku AMK

**WP6 Quick trials and demonstrations**
Participants of project represent various stakeholders in circular economy, which enables us to make fast experiments with novel business models, as well as demonstrate processes and products thus modelling future recycling value chains.
Led by VTT, company involvement strong
Telaketju 2 BF project

**WP7 Consumers**
Consumers need to be involved in circular economy of textiles and therefore we study consumer attitudes and direct our communication activities also to common public.
Led by Turku UAS

**WP8 Ecosystem**
We aim to increase business opportunities also by supporting ecosystem building, and review scalability and export potential of results as well as further development and research needs.
Led by VTT
Refinement plant for end-of-life textiles

Lounais-Suomen Jätehuolto Oy (LSJH)
Municipal waste management

- LSJH is responsible for household waste management in South-West Finland
  - Co-owned by 17 municipalities, approx 420,000 residents
  - Separate collection for textiles since 2016
- Collection in cooperation with other municipal waste management companies
  - First phase expansion started 2/2020
    → 5 companies covering 57 municipalities (2.3M residents)
- Aim to implement nationwide textile collection by 2023
Added value through high quality recycling

- Mechanical recycling of fibers is the missing link in Nordic circularity of textiles
- Sorting systems developed to ensure added value
  - Strong emphasis on waste hierarchy
  - Sorting for structural recyclability
  - Fiber content and purity assured by NIR technology
- Refinement plant
  - Produces high quality recycled raw materials according to industry requirements
  - Enables varied partnerships (collection, sorting, utilisation)
  - Provides new business opportunities
  - Helps forming strong value chains across the textile industry
**Plant & Process**

- Pilot plant to be located in Paimio
  - Shared facilities with Rester Oy
  - Construction during 2020
- Textiles are refined mechanically into fibers
  - Sorting by fiber composition prior to processing
  - Finished product pressed as fiber bales
- Process is developed according to needs and requirements from the textile industry
- Full scale refinement plant will include multiple recycling lines optimized for specified materials
Schedule

• 2019 – 2020 (Preparation for Pilot phase)
  • Expansion of municipal collection area
  • KaMU-collection pilot 2020, including
    • Second hand markets
    • Clothing stores (Fashion Finland members)
  • Capacity 170 - 700 t/a
    -> Buffer stock collected before recycling line start-up

• 2021 (Pilot facility)
  • Commissioning of the mechanical recycling line
  • Collection expansion to involve more municipalities
  • Value chain pilots, processing demos, PCT waste stream screenings within the Baltic area, financial evaluation for large scale refinement plant
  • Capacity 700 ➞ 5 000 t/a

• 2022 ➞
  • Preparations for facility expansion to be located at Topinpuisto Circular Economy Hub in Turku
  • Nationwide collection of end-of-life textiles by 2023
  • Recycling services offered for the Baltic sea region?
  • Capacity 5 000 ➞ 100 000 t/a ? (to be determined during Pilot phase)
Thank you! Questions!