

SUBPROJECT

Innovative fiber blends and yarn spinning techniques

**“Challenge the way
we do things”**

Project partners

Albany International

FOV Fabrics

Houdini

ICA

IVL

Pure Waste

Rester

RISE

Stadium

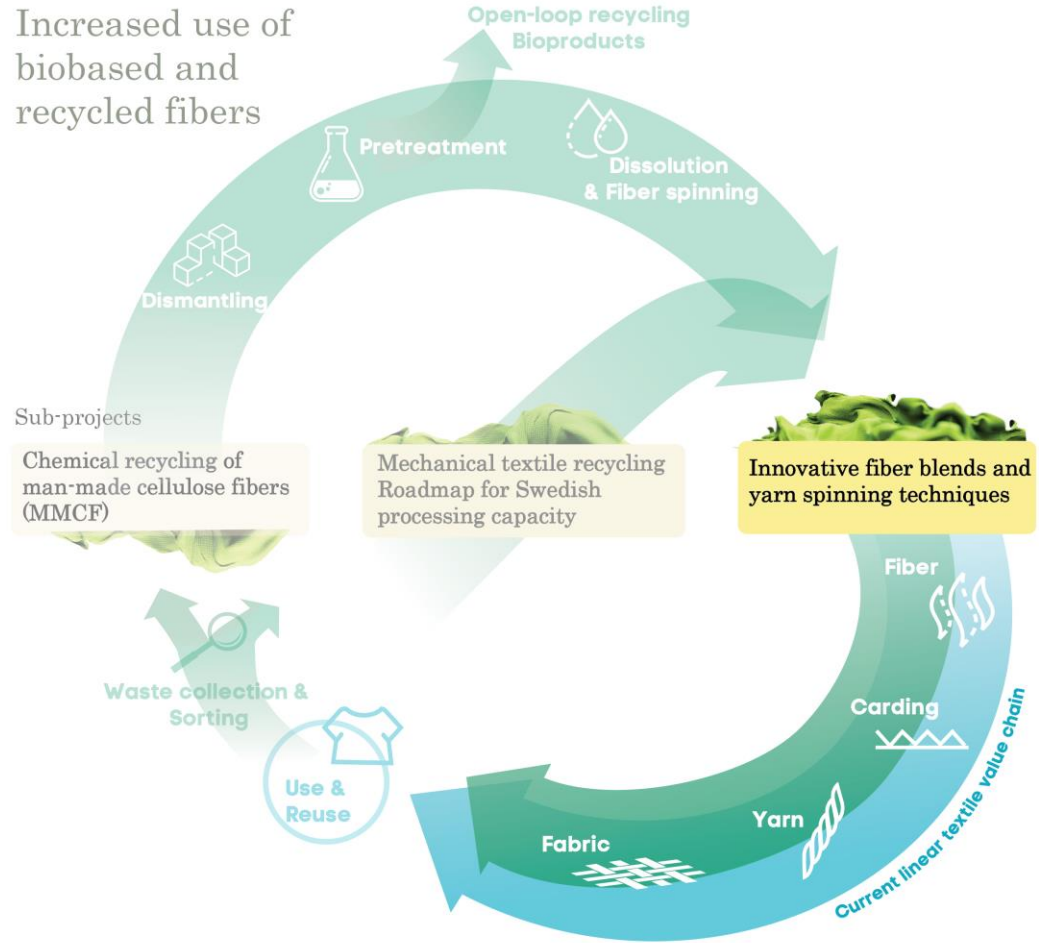
The Swedish School of Textiles

TreeToTextile

Trikåby

Ullkontoret

Increased use of
biobased and
recycled fibers



Aim of the project

Develop yarns that:

- **Increase sustainability**
- **Maintain the quality and fulfil property requirements**

The Fashion Industry



The Technical and High Performance Textiles



WP 1 & 2 & 3

Concept development
Validation & scalability
Life cycle assessment

The 5 concepts

A



Cellulose yarns from recycled cotton waste

B



Elasticity beyond elastane

C



New generation of cellulose yarns

D



Twistless yarn: recycled cotton & wool residues

E



Non-woven from textile production residues

Addressed parts of the value chain

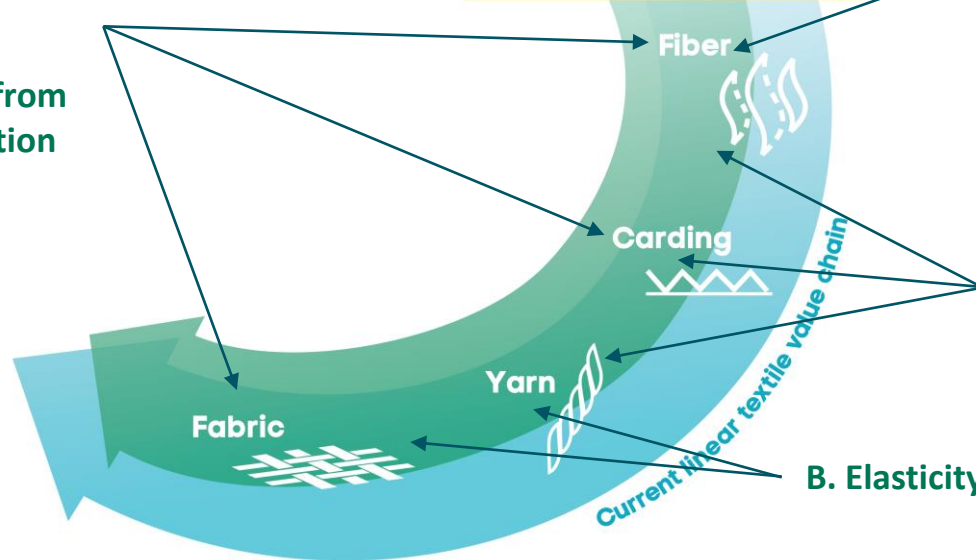
**D. Twistless yarn:
recycled cotton and
wool residues**

&

**E. Non-woven from
textile production
residues**

**Innovative fiber blends and
yarn spinning techniques**

**C. New generation
of cellulose yarns**



**A. Cellulose yarns from
recycled cotton waste**

B. Elasticity beyond elastane

CONCEPT A

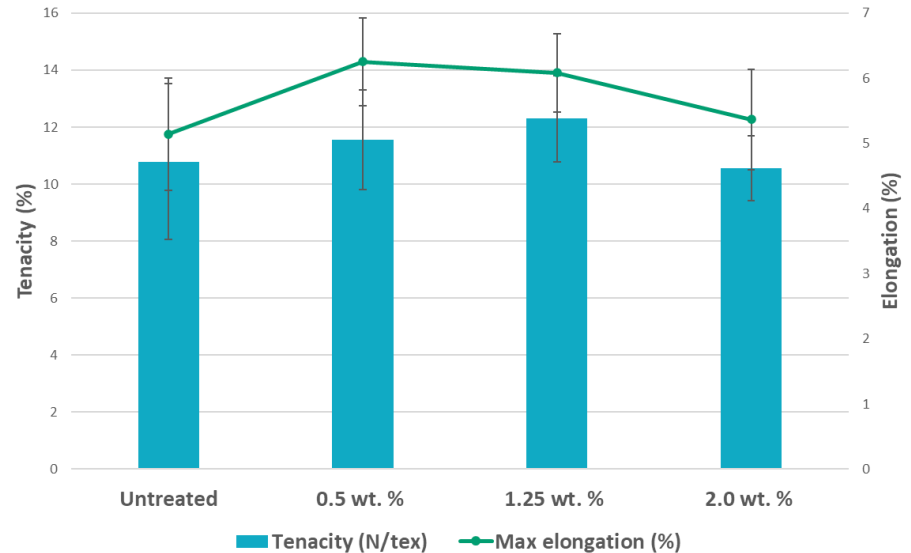
**Cellulose yarns from
recycled cotton waste**

Concept A - Cellulose yarns from recycled cotton waste

Increase the spinnability of mechanically recycled cotton

A1

60% Recycled post-consumer cotton, with Spin lubricant Afilan CFA100 + 40% virgin cotton



K. Lindström et al. (2023) 'Increasing The Spinnability Of Recycled Denim Fibres With Spin Finish Treatment'

Concept A - Cellulose yarns from recycled cotton waste

Increase the spinnability of mechanically recycled cotton

A2

30% Recycled pre-consumer cotton + 20% Cottonized hemp + 50% lyocell

- Chemically cottonized
- Mechanically cottonized
- Cottonized Finola hemp at Swedish School of Textiles - residue from Swedish food hemp



Finola hemp



Treated hemp



Knitted samples

Kahoush, M. and Kadi, N. (2023) 'Finola hemp: Fibre extraction from crops intended for grain-production'

Concept A - Cellulose yarns from recycled cotton waste

Increase the spinnability of mechanically recycled cotton

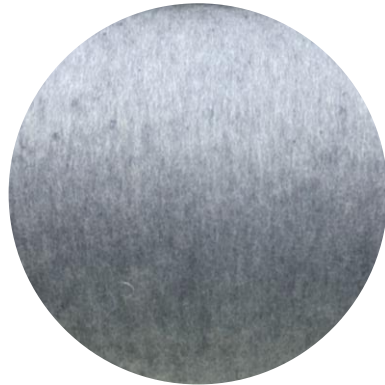
A3

Recycled cotton with MMCF-fibers:

- 50% recycled pre-consumer cotton + 50% lyocell
- 50% recycled pre-consumer cotton + 50% viscose



1st carding



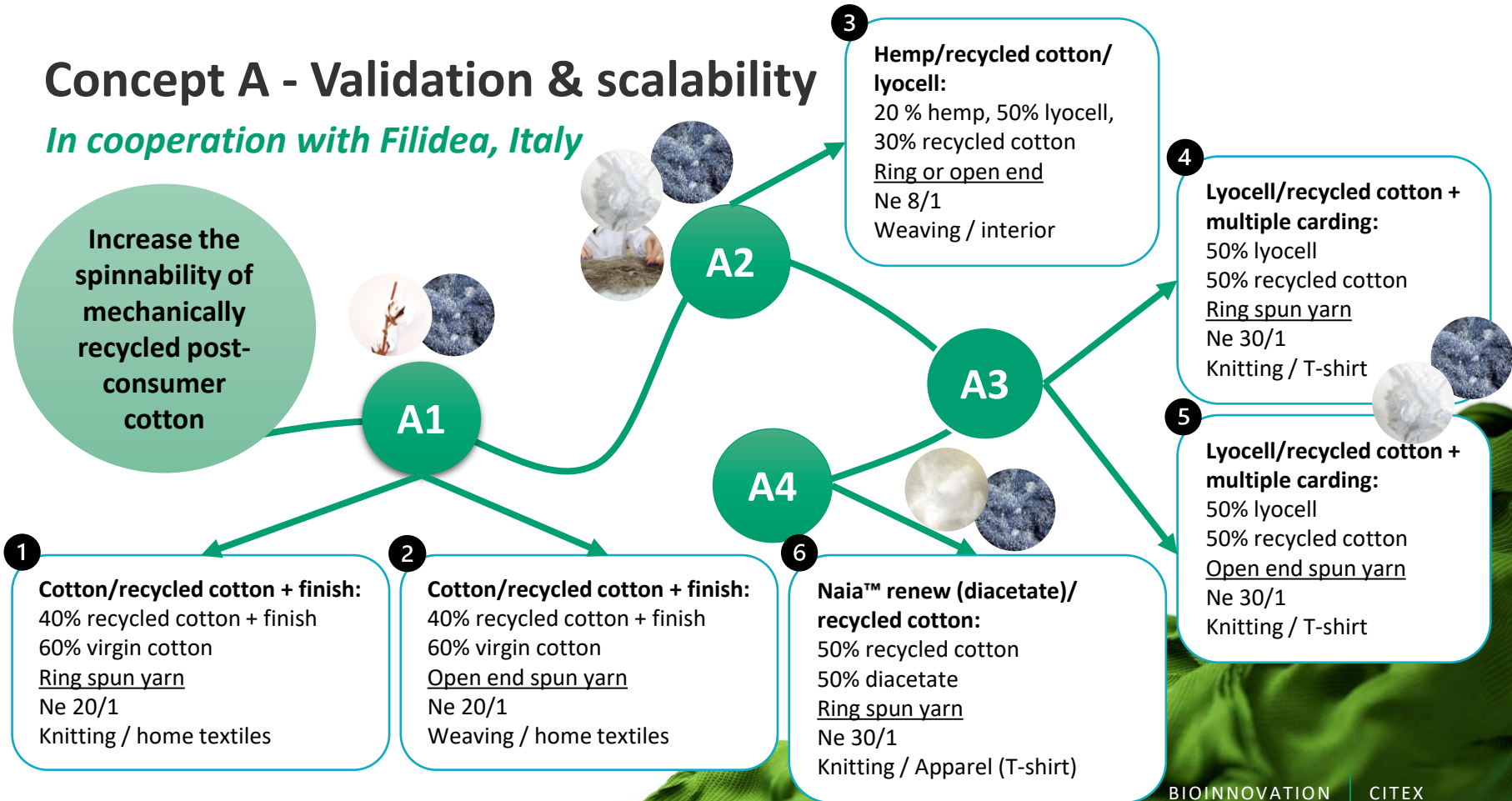
2nd carding



Blended yarn

Concept A - Validation & scalability

In cooperation with Filidea, Italy



Concept A – Life cycle assessment



Conclusions about concept A1

- This contributes most to its climate impact:
 - Electricity use in yarn production
 - Input of primary cotton
- Yarn production in Sweden reduces impact with 50%
- Transports are not very important
- Climate impact similar to 100% primary cotton yarn – but other benefits:
 - Reduced eutrophication
 - Reduced use of arable land
 - Reduced water scarcity



CONCEPT B

Elasticity beyond elastane

Concept B – Elasticity beyond elastane

Investigation to add stretch to cellulose yarns and weaves

Key findings:

- Complex to have fixed properties over time
- Ph.D student started and will continue to investigate this technique



Knit-de-Knit
texturing technique



After texturing



Measuring the
elasticity in the yarn



Woven
Fabric sample

CONCEPT C

New generation of cellulose yarns

Concept C - New generation of cellulose yarns

Innovative regeneration process of cellulose

Key findings:

- New cellulose fiber with unique properties:
 - Cotton/natural like hand feel
 - Semi dull luster
 - High moist and color absorption and high color resistance
 - High pilling resistance
 - Low environmental impact
- Blending with existing natural or man-made cellulose fibers results in yarns with appreciated properties



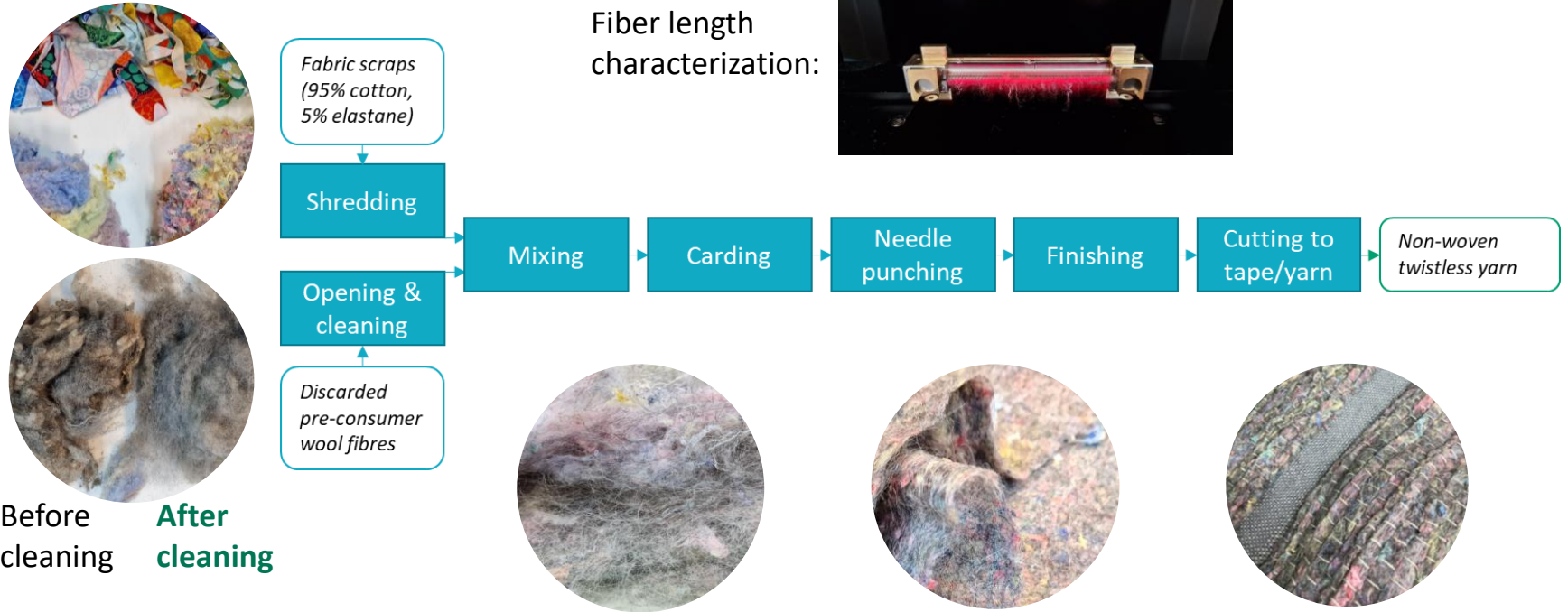
The image shows two sheep in a field. The sheep in the foreground is black with a white blaze on its face. The sheep in the background is white. The entire image has a yellow-green tint. The text is overlaid on the left side of the image.

CONCEPT D

**Mixed yarn:
recycled cotton & wool residues**

Concept D - Twistless yarn: recycled cotton & wool residues

Eco. cotton/elastane fabric scraps & wool residues processed to a tape yarn



Concept D – Validation & scalability

In cooperation with Boma Väveri, Sweden



Key findings:

- Different batches of residue wool
- Increased strength by adding 25% new Swedish wool
- Different kind of finishing methods
- Entire value chain possible in Nordic countries
- Small scale validation

Concept D – Life cycle assessment



Conclusions about concept D

- Electricity use in yarn production contributes most to its climate impact
- Transports are not very important
- Clear benefits compared to 100% primary wool yarn, in most impact categories
 - This is because the high impact of wool in the studied impact categories
 - Note: global average wool dataset used
- This is based on pre-consumer wool being waste, if instead a valuable co-product: the impact of concept D increases dramatically
 - Still beneficial compared to primary wool

CONCEPT E

**Non-woven from textile
production residues**

Concept E - Nonwoven from textile production residues

High-tenacity production waste refined to nonwovens and twistless yarn

Key findings:

- Working on procedures such as carding and needle punching for different production waste
- Clean material - cut-offs from weaving or waste from nonwoven industry



Cut-offs from weaving



Shredded fibers



Woven sample

“Challenge the way we do things”

Quick panel talk



Thanks!

Priser av:



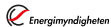
IKEM
INNOVATIONEN I KEMISKA INDUSTRIER

TEKO | SVERIGES TEXTIL
& MODEFÖRETAG

Bioinnovation

Med stöd från:

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innovations-
program

