KNIT-ORCE

VALORIZAR O CONHECIMENTO NO STV

by CITEVE

- Circular Economy and Sustainability

COMPETE 2020 | PORTUGAL 2020 | UNIÃO EUROPEIA Fundo Europeu de Desenvolvimento Regional

KNIT-FORCE
VALORIZAR O CONHECIMENTO NO STV

Starting point

circular economy and sustainability

Starting point

Global commitment with sustainability is a reality

- 2030 Agenda for Sustainable Development
- United Nations Member shared commitment for peace and prosperity for people and the planet, now and into the future

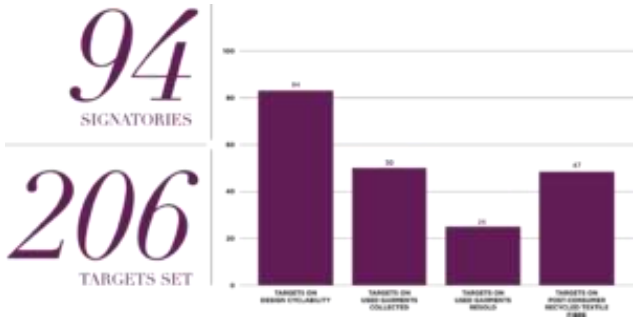
Starting point

Transition to a circular economy is unavoidable

question is no longer
whether
but how it will be done

Starting point

- **2020 Circular Fashion System Commitment**, by Global Fashion Agenda, signed by 94 companies, representing 12,5% of the global fashion market:
  - Implementing design strategies for cyclability
  - Increasing the volume of used garments and footwear collected
  - Increasing the volume of used garments and footwear resold
  - Increasing the share of garments and footwear made from recycled post-consumer textile fibres



Starting point

- **Make Fashion Circular** (Circular Fibres) initiative, by Ellen MacArthur Foundation, bring together brands, industry, cities, philanthropists, NGOs, and innovators:
  - stimulate the level of collaboration and innovation to create a new textiles economy, aligned with the principles of the circular economy.
  - radically redesign the textile operating model, transitioning to a circular system

Starting point

- **CEO Agenda 2018**, by Global Fashion Agenda – seven sustainability priorities for fashion industry leaders

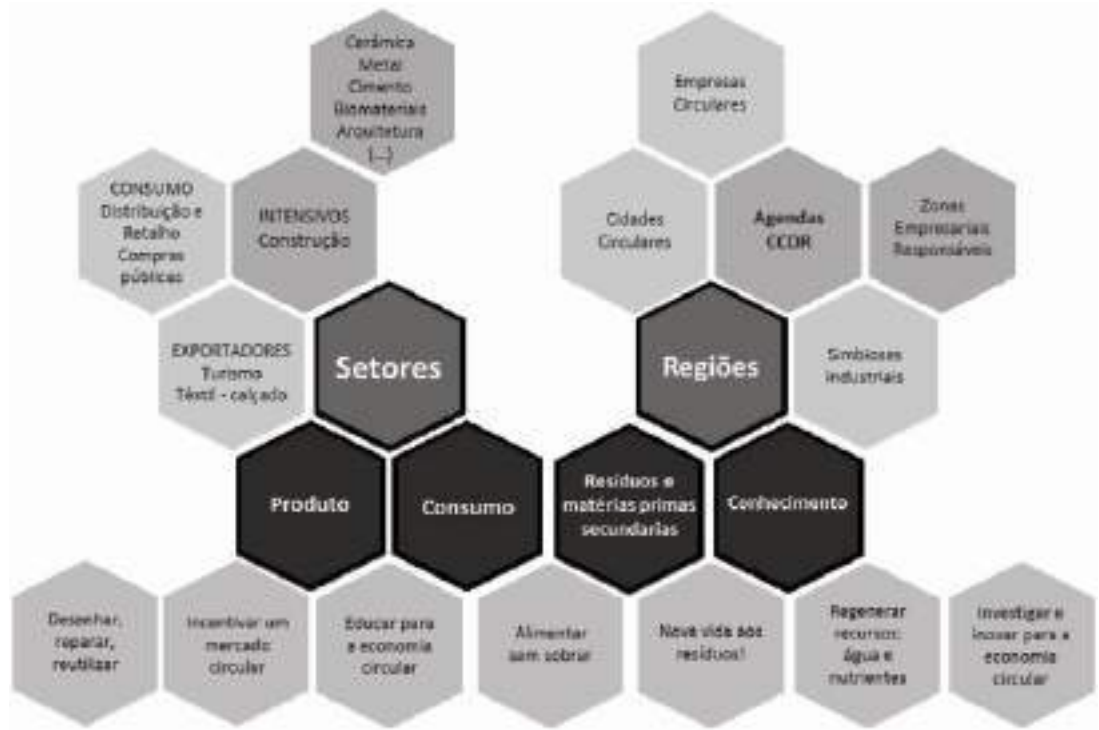
Starting point

- **Closing the loop - An EU action plan for the Circular Economy** by European Commission - established 54 measures to accelerate the transition to a circular economy,
  - the value of products, materials and resources is kept as long as possible
  - the generation of waste minimised

product design	•Products reparability, upgradability, durability and recyclability •Extended producer responsibility schemes
production processes	•Sustainable sourcing of raw material •Best practices in sectorial BREF •Industrial symbiosis (by-products clear rules)
Consumption	•Green claims more trustworthy •Product prices better reflect environmental costs (e.g. taxation) •Innovative forms of consumption (e.g. sharing products, consuming services, digital platforms) •Emphasising circular economy in Green Public Procurement
Wastes management	•Waste legislation for increasing municipal wastes recycling •Improve wastes separate collection and recycling infrastructure •General requirements for extended producer responsibility schemes
Secondary raw materials and water reuse	•EU-wide quality standards for secondary raw materials •Harmonised rules on end-of-waste •Reuse of treated wastewater, including legislation on minimum requirements for reused water •Reduce the presence and improve the tracking of chemicals of concern in products

Starting point

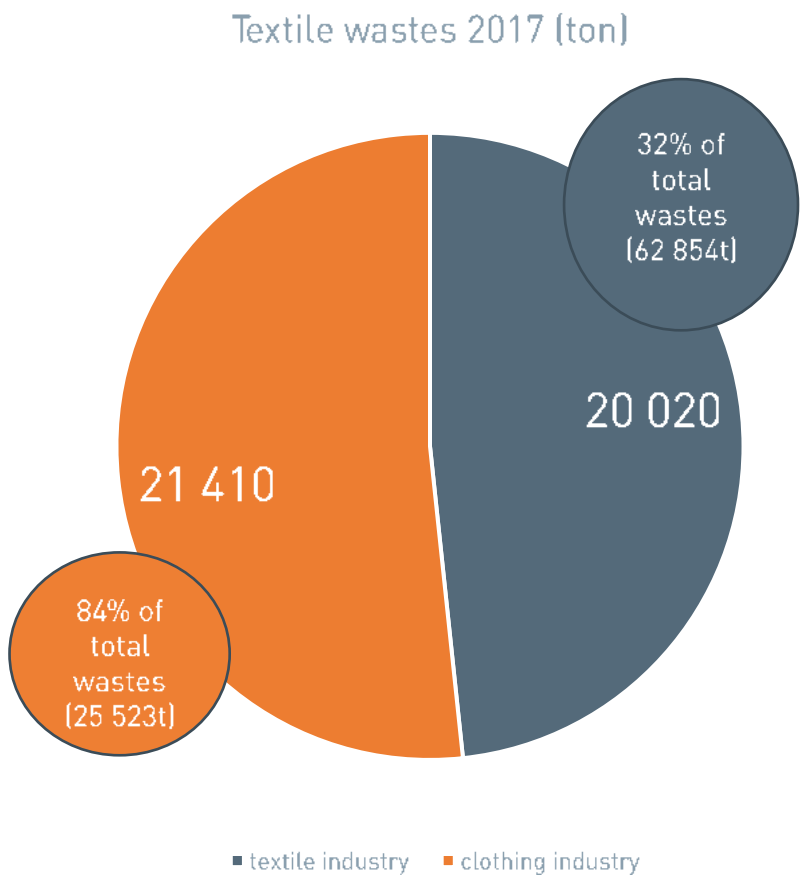
- Portuguese Action Plan to the Circular Economy:
  - three levels of operation: national, sectorial and regional, - **textile sector relevant** for being resource-intensive and export-oriented
  - and seven structural actions:
    - Design, repair and reuse;
    - Encourage a circular market;
    - Educate to circular economy;
    - Feed with food leftovers;
    - New life to wastes;
    - Regenerate resources: waster and nutrients;
    - Investigate and innovate to a circular economy



(Resolução do Conselho de Ministros 190-A/2017)

Starting point

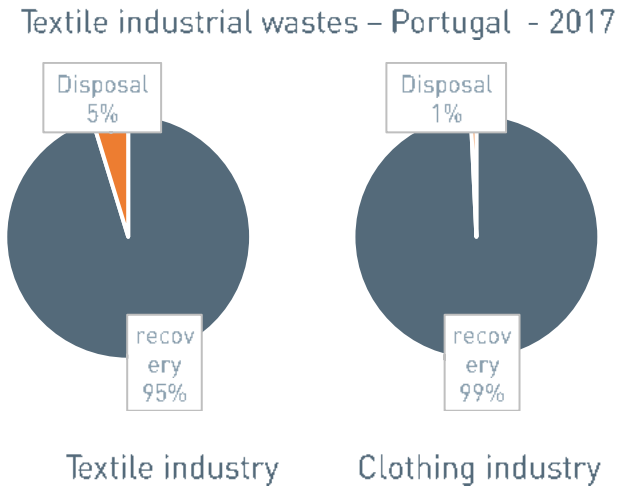
- Quantity and relevance of **textiles wastes** generate in Textile and Clothing industry in Portugal in 2017
- Based on companies data communication to Portuguese Environmental Agency



Starting point

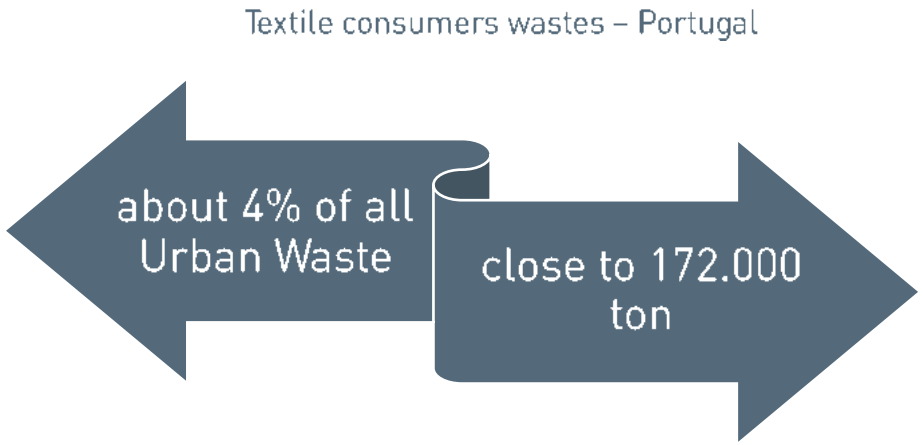
Textile pre consumer wastes

- Usually recovered to be reused or recycled (R12 and R13)
- But mostly to downclycing processes



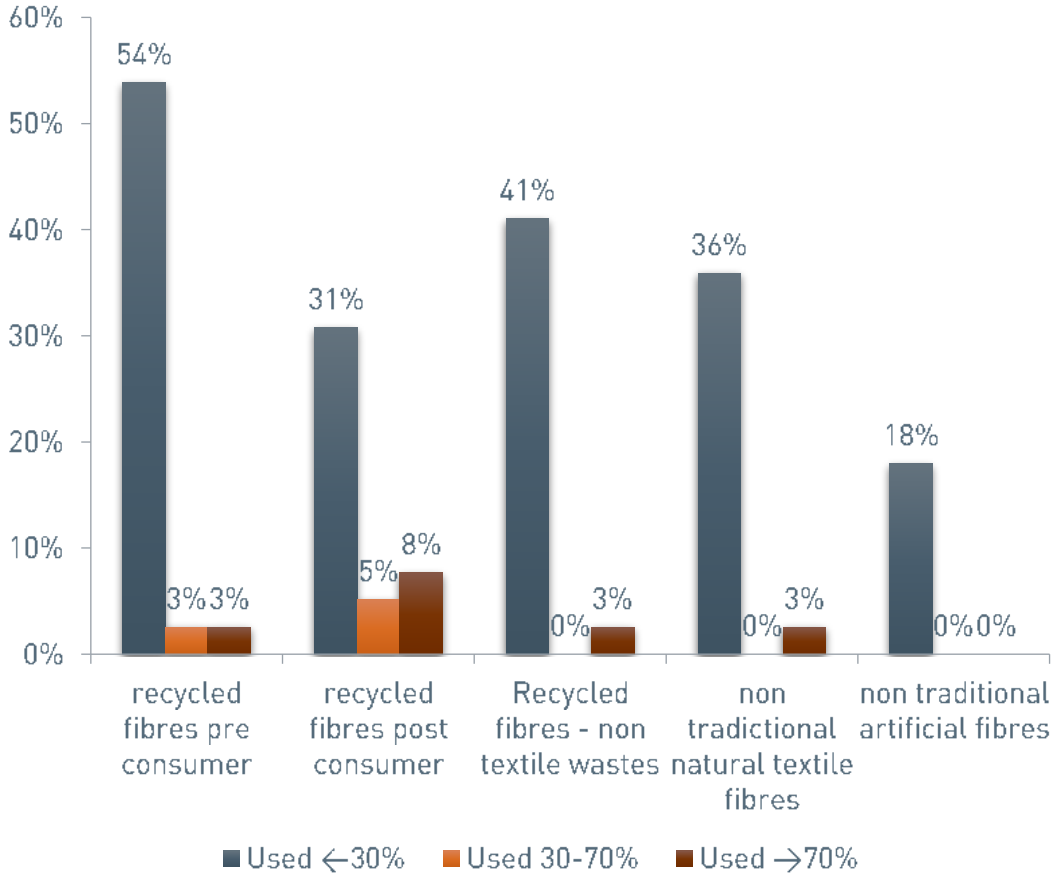
Textile post consumer wastes

- Most of them are kept in consumers closet
- or sent to social solidarity circuits



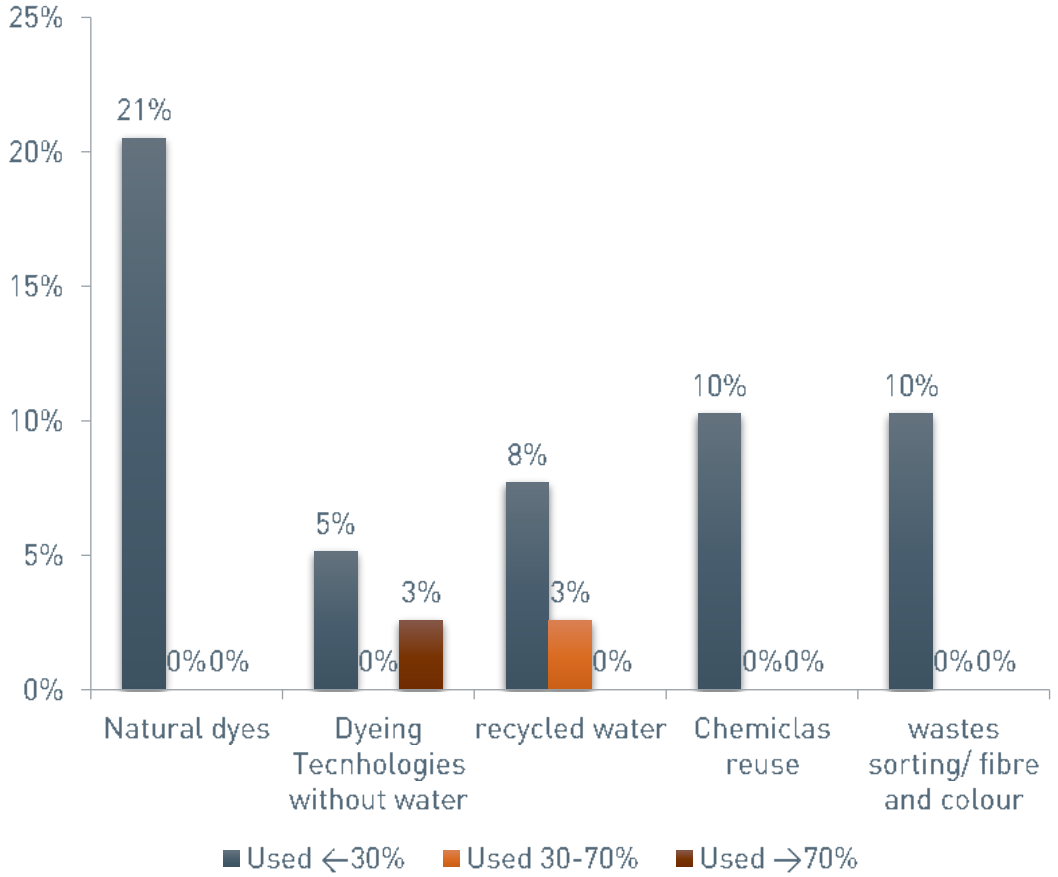
Starting point

- Knit Force project survey – scoping the 30% most innovative companies
- Although most of them use recycled or bio based fibres they represent less than 30% of the total production



Starting point

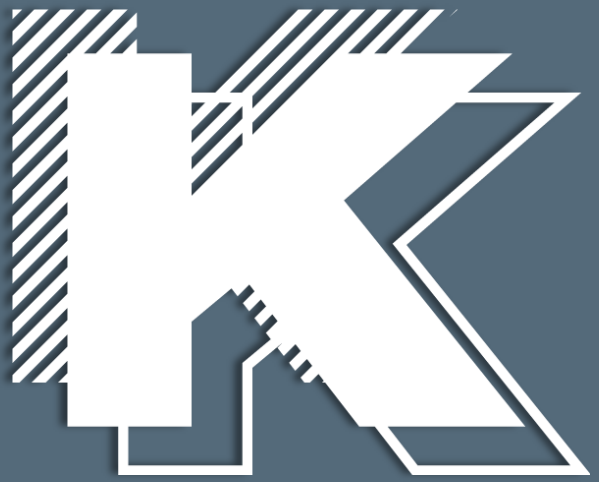
- In terms of circular processes the implementation rate is low, but the companies are interested in have processes more sustainable and circular



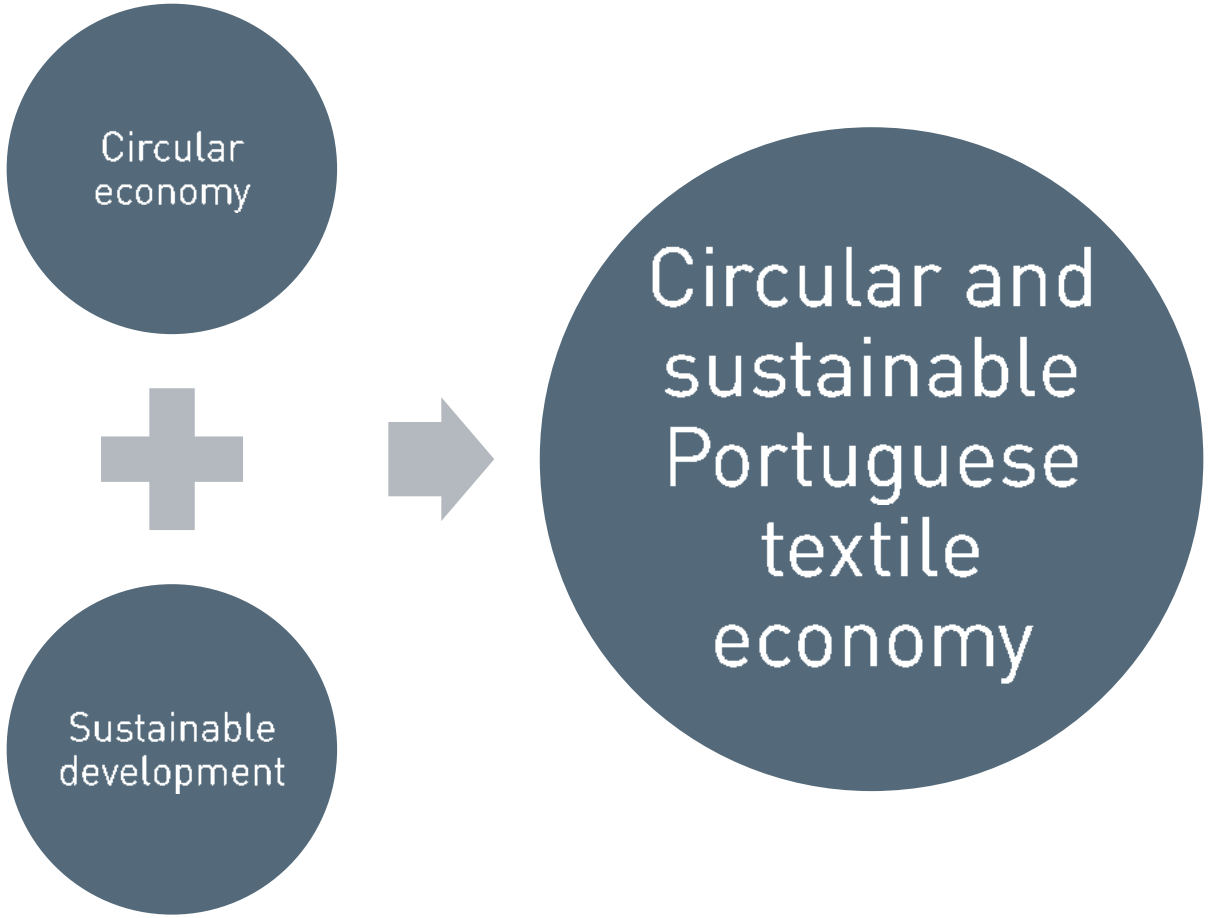
KNIT-FORCE
VALORIZAR O CONHECIMENTO NO STV

Challenges

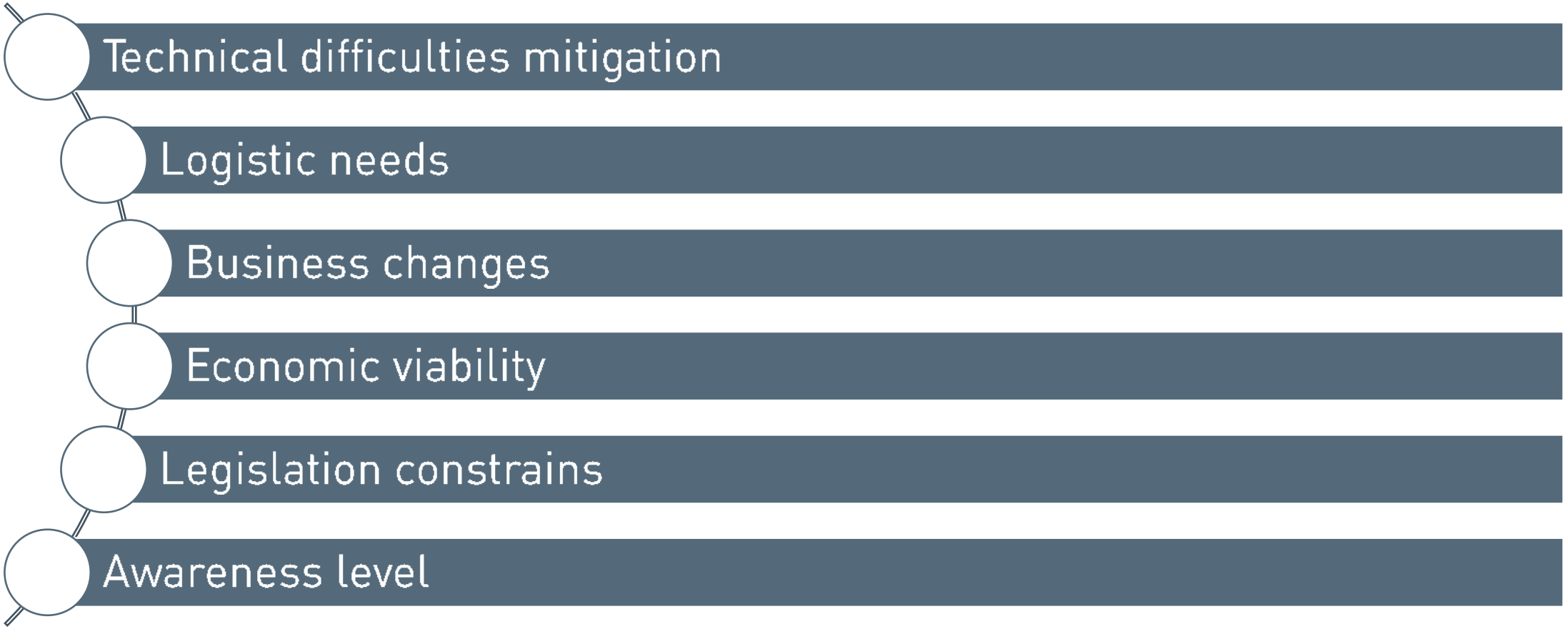
circular economy and sustainability



Challenges


Circular economy
Sustainable development
Circular and sustainable Portuguese textile economy

Challenges


Technical difficulties mitigation
Logistic needs
Business changes
Economic viability
Legislation constrains
Awareness level

Challenges – Technical difficulties

- Lack of maturity of wastes sorting technologies for mixed compositions - type of fibres, type of structures and colours
- Limitation in percentage and yarn thickness for recycled fibres- specially in cellulosic fibres
- Damaged fibres in post consumer textile wastes limiting its upclying
- Research related with new materials from renewable sources (considering the available materials in proximity)
- Ensuring product safety, in particular SVHC, while keeping the materials in use

Challenges – Logistic needs

- No mapping of textile wastes flow during the entire life cycle (pre and post consumer)
- Difficulty in connections between industries and with other sectors (as farming) – circuits, materials (wastes/ by-products) and quantities
- No traceability and transparency covering the entire supply chain

Challenges – Business changes

- Extension of product life cycle – durability, reparability, reuse, etc.
- Services for textiles repair or maintenance
- Industrial symbioses
- Certification / validation of the products circularity
- Textiles as a service not a product (user instead of owner)

No more business as usual…

Challenges – economic viability

- Higher production costs for circular materials compared with linear materials
- New technologies investments to produce new materials/ products
- Market willingness to pay more for circular products

Challenges - legislation constrains

- Wastes legislation limits the implementation of circular systems – in particular in industrial symbioses
- High cost and time necessary to wastes declassification
- Potential application of the extended producer responsibility to textile products (national or European level)
- Directive UE 2018/851 amending Directive 2008/98/EC on waste:
  - Encourage the re-use of products and the setting up of systems promoting repair and re-use activities, including textiles
  - Set up separate collection in urban wastes for textiles, by 1 January 2025

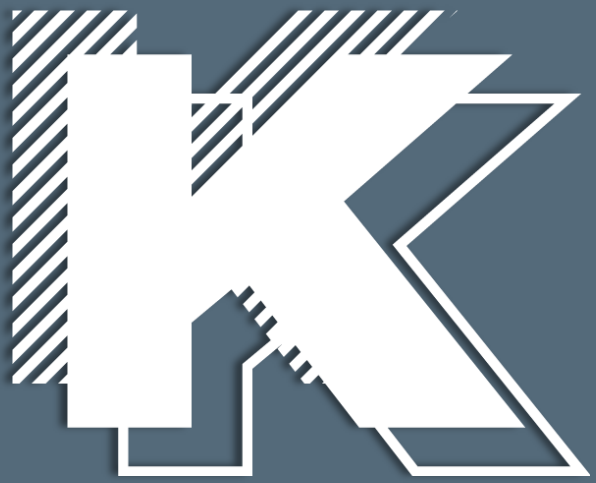
Challenges - Awareness level

- Consumers awareness influencing their behaviour for circular purchases
- Textile and clothing industries awareness to circular and sustainability in their business
- New training needs – textile design for circularity; sustainable expert, etc.
- Dissemination of success stories – good circular/ sustainable performance, research results, final products with circular concepts, etc.

KNIT-FORCE
VALORIZAR O CONHECIMENTO NO STV

Strategic fields

circular economy and sustainability



Strategic fields

KNIT-FORCE
VALORIZAR O CONHECIMENTO NO STV

Recycled textile materials

Renewable textile materials

Circular textile processes

Design for circularity

New business models

Circularity validation

Strategic fields

Recycled textile materials

Incorporation of industrial textile wastes / by-products / leftovers (samples, stocks, non-conforms, ...) in new textile materials

Incorporation of non textile wastes / by-products (food industry, agro-forestry, metallurgical, paper, ...) in textile materials

Incorporation of post consumer textile wastes in new textile materials

Strategic fields

Renewable textile materials

New non conventional natural textile fibres (fibres from nature – banana fibre, pineapple fibres, etc.) – preferably in our geographic proximity

Textile fibres produced from biobased materials (forest biomass, agricultural wastes, food wastes, etc.) – in our geographic proximity

Strategic fields

Circular textile processes

Technical processes to closed loop of resources – recover and reuse (water, dyes, chemicals, materials, energy)

New techniques for a more efficient use of raw material, water, energy and/or chemicals

Sustainable solutions for elimination/ replacement of hazardous chemicals and materials (textiles, accessories,...)

Strategic fields

Design for circularity

- Methodologies and criteria to implement design for circularity (durability, reparability, recyclability, biodegradability, compostability, etc.)
- Products redesign (new cloths from the ones out of fashion - outlets, collection remains, samples; new products using materials from the ones out of use, etc.)
- Textile fibres database considering their level of sustainability and circularity (helping the selection of the most suitable fibres during the design process)
- Digitalization of prototypes/ samples - virtual conception of materials and final products reducing the number of physical prototypes / samples

Strategic fields

New business models

- Sharing of resources and technologies
- Industrial symbioses
- Collaborative platforms (wastes and by-products marketplace, material leftovers market, textiles rental, etc.)
- Traceability and transparency in the supply chain (blockchain approach) – where and how is produced + product ID (fibres, processes, chemicals used, etc.)
- Textiles repair and maintenance services

Strategic fields

Circularity validation

- Recycled content certification by traceability and by laboratory test
- Determination of textiles biodegradability and compostability - industrial + domestic
- Determination of a textile circularity level by objective metrics
- Validation of non-presence of prohibited chemicals in recycled material
- Analyses of GMO in natural and artificial fibres
- Adaptation to circularity of the textiles labelling (fibres composition and care)

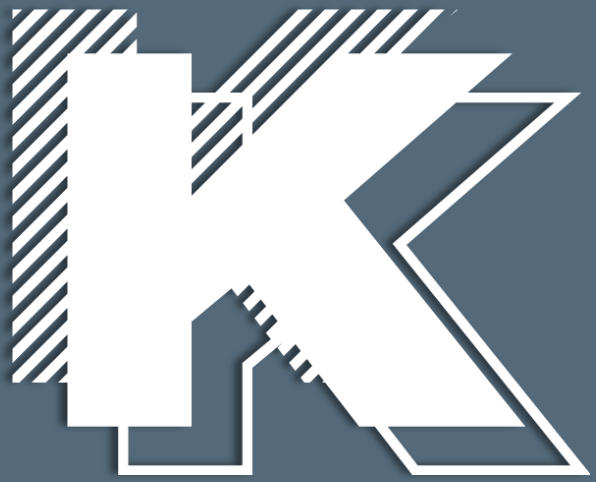
Strategic fields – type of technologies

Recycled textile materials	• Mechanical recycling • Chemical recycling • Coating, spray application and others
Renewable textile materials	• Mechanical extraction of fibre from natural products • Chemical regeneration
Circular textile processes	• Emerging Best Available Techniques • Membranes treatments (Nanofiltration, ultrafiltration inverse osmose) • Zero wastes /water techniques
Design for circularity	• Industry 4.0 technologies
New business models	• Industry 4.0 technologies
Circularity validation	• Biodegradability/ compostability simulators • Chemical and ecotoxicological harmlessness analysers • Industry 4.0 technologies

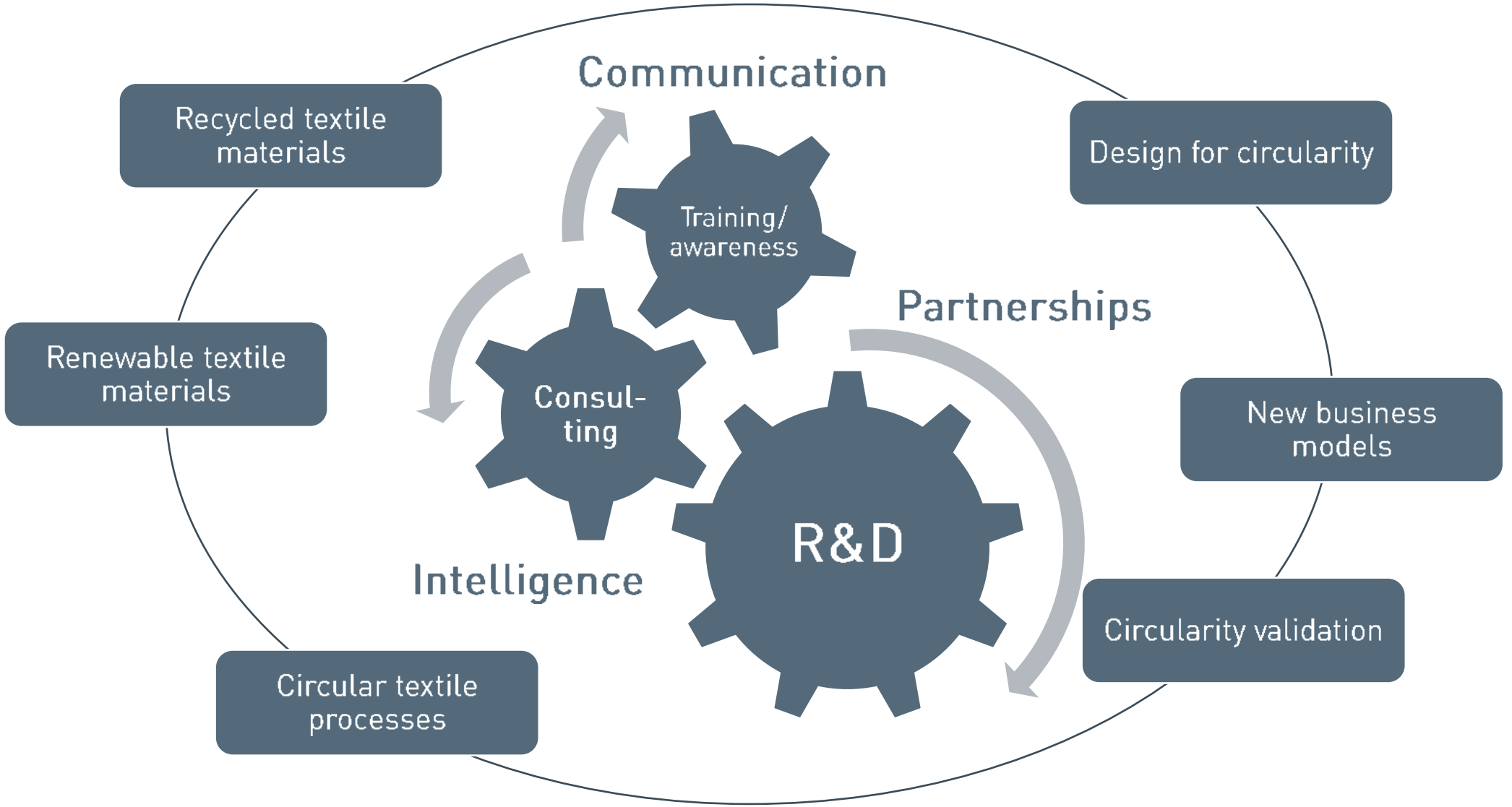
KNIT-FORCE
VALORIZAR O CONHECIMENTO NO STV

CITEVE agenda

circular economy and sustainability



CITEVE agenda



CITEVE agenda

KNIT-FORCE
VALORIZAR O CONHECIMENTO NO STV

Circular textiles R&D and innovation projects

Consulting/ tests in circular economy and sustainability

CITEVE agenda

KNIT-FORCE
VALORIZAR O CONHECIMENTO NO STV

- Wastes recovery and recycling pilot
- Spinning to finishing pilot plan
- Development of laboratorial analyses/ certification
- Development of methodologies to circularity

CITEVE agenda

Partnerships – share knowledge an technologies

Intrinsic connection with industry 4.0 developments

Systematic monitoring of brands commitment and world policies

CITEVE agenda

Training /awareness in circular and sustainability issues

Promoting Portuguese circular and sustainable products

Participation in working groups dedicated to the sustainability and circular economy

CITEVE agenda in each strategic fields

KNIT-FORCE
VALORIZAR O CONHECIMENTO NO STV

CITEVE Agenda	Strategic Fields					
	Recycled textile materials	Renewable textile materials	Circular textile processes	Design for circularity	New business models	Circularity validation
Circular textiles R&D and innovation projects	→←	→←	→←	→←	→←	→←
Consulting/ tests in circular economy and sustainability	→←	→←	→←	→←		→←
Wastes recovery and recycling pilot	→←		→←			
Spinning to finishing pilot plan	→←	→←	→←			
Development of laboratorial analyses/ certification						→←
Development of methodologies to circularity				→←	→←	
Partnerships – share knowledge an technologies	→←	→←	→←	→←	→←	→←
Intrinsic connection with industry 4.0 developments				→←	→←	→←
Systematic monitoring of brands commitment and world policies	→←	→←	→←	→←	→←	→←
Training /awareness in circular and sustainability issues	→←	→←	→←	→←	→←	→←
Promoting Portuguese circular and sustainable products	→←	→←	→←	→←	→←	→←
Participation in working groups dedicated to the sustainability and circular economy	→←	→←	→←	→←	→←	→←

CITEVE agenda - timeline

	2019	2020	2021	2022	2023	2024	2025
Circular textiles R&D and innovation projects		Recycled textile material					
			Renewable textile material				
			Circular textile processes				
		Design for circularity					
			New business models				
			Circularity validation				
Consulting/ tests in circular economy and sustainability				Recycled textile material			
					Renewable textile material		
				Textile circular processes			
			Design for circularity				
		Circularity validation					
Wastes recovery and recycling pilot		Recycled textile material					
			Circular textile processes				
Spinning to finishing pilot plan		Recycled textile material					
			Renewable textile material				
			Circular textile processes				
Development of laboratorial analyses/ certification		Circularity validation					

CITEVE agenda - timeline

	2019	2020	2021	2022	2023	2024	2025
Development of methodologies to circularity			Design for circularity				
				New business models			
Partnerships – share knowledge an technologies	All strategic fields						
Intrinsic connection with industry 4.0 developments		Design for circularity					
			New business models				
			Circularity validation				
Systematic monitoring of brands commitment and world policies	All strategic fields						
Training /awareness in circular and sustainability issues	All strategic fields						
Promoting Portuguese circular and sustainable products	All strategic fields						
Participation in working groups dedicated to the sustainability and circular economy	All strategic fields						

CITEVE agenda – what CITEVE has already started

KNIT-FORCE
VALORIZAR O CONHECIMENTO NO STV

- Technical consulting in virtual hub to industrial symbioses (KORTEX Industrial Hub)
- R&D projects (at national level) related with recycling of textile wastes and accessories – ongoing and new applications
- R&D projects application (at European level) related with a platform to recycling post consumer textile cloths
- Methods development for biodegradability/ compostability of textiles

CITEVE agenda – what CITEVE has already started

- Qualification profiles development for sustainability and circular economy technician (ECOTEX and Skills4Smart)
- Active participation in Regiotex Initiative @ sustainability working group
- Promotion of Portuguese circular and sustainable products by iTechStyle Green Circle