

Circular economy in the textile and beverage sector in Catalonia

Presentation of results - July 2018

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1. Context, scenario and challenge

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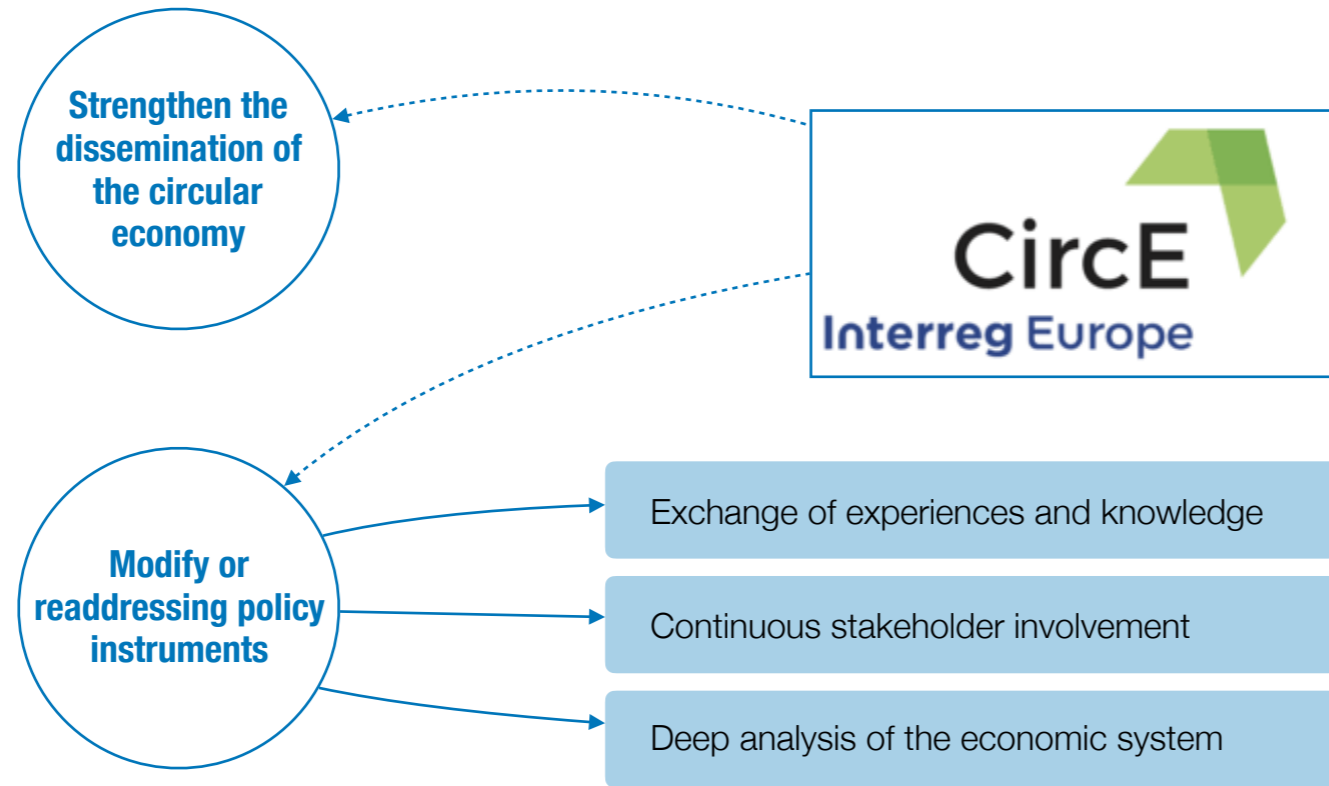


**ELLEN
MACARTHUR
FOUNDATION**

“In its research to date, the Ellen MacArthur Foundation has demonstrated that the **circular economy is a clear value creation opportunity**. As many policymakers become interested in this promising model, they envisage the important role they can play in creating **the right enabling conditions** and, as appropriate, **setting direction** to **unlock it**. This report [...] aims to provide policymakers with an actionable toolkit to help accelerate the transition towards the circular economy.”

1. Context, scenario and challenge

Context: Circular Economy Package 2015-2018



Partners of the project



"Every Partner will draft an action plan to transfer the lessons learnt in the interregional exchange into its own policy instrument, according to the prioritized opportunities and the highlighted barriers."

1. Context, scenario and challenge



Selection of strategic sectors for the development of the project in Catalonia



TEXTILE



BEVERAGES

STAGES OF THE PROJECT

Identification of good practices at national and international level

Identification of circular economy opportunities

Identification and characterization of barriers linked to their development

Prioritization of opportunities of major impact and interest for the region

Results

Identification of **spaces of opportunity** for the transformation/generation of effective policy instruments targeted to the deployment of the circular economy in the region and among the main economic sectors.



2. Methodology

2. Methodology

For each of the two sectors addressed in the project (textile and beverages) and in order to fulfill the objectives of the present stage of the Circe project, the following methodology has been applied:



Sectorial and in-depth market analysis

- Global state of the art of the circular economy in the analysed sectors
- Good practices in circular economy in each sector
- Trends and main developments in each sector
- Dimension and characterisation of the addressed economic sectors in Catalonia
- Analysis of their industry value chains
- Identification of market drivers in the development of sustainable and circular economy practices



Involvement of stakeholders of each sector

- 1st working group session: 2 working sessions (textile and beverages) on the identification of opportunities
- More than individual interviews for the detailed analysis of leverages and barriers of development for the identified opportunities (more than 10 interviews for each sector)
- 2nd working group session: 1 joint working session (textile and beverage sector) and with representatives of the digital technologies sector.
- 3rd working group session: 2 working sessions (1 textile and 1 beverage) for the inclusion and validation of criteria for the final prioritisation of opportunities

Participant stakeholders of the textile sector



Participant stakeholders of the beverage sector



Transversal players involved in digital transformation



2. Methodology

Obtained results

Circular economy good practices in Catalonia and at international level (for each sector)

Circular economy good practices in education in Catalonia

Identification of circular economy opportunities:



In-depth analysis of opportunities in circular economy for each sector and their barriers of development



Opportunity fact sheet for their characterisation

Fact sheet describing the set of barriers involved in each opportunity



Heat map of circular economy barriers in Catalonia for each sector



Prioritisation of opportunities in circular economy for each sector

Prioritised model of opportunities



Sectorial and market in-depth analysis

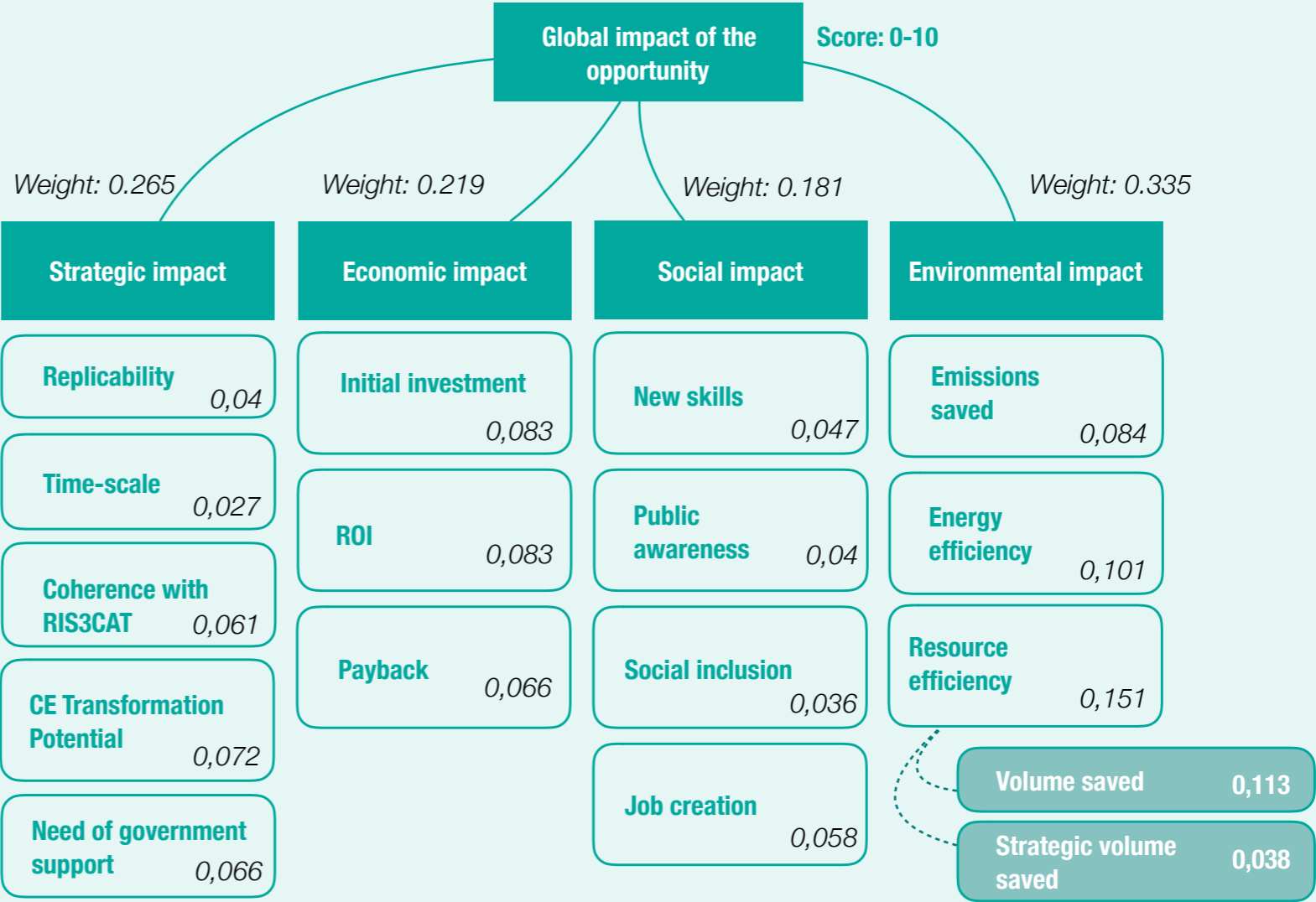


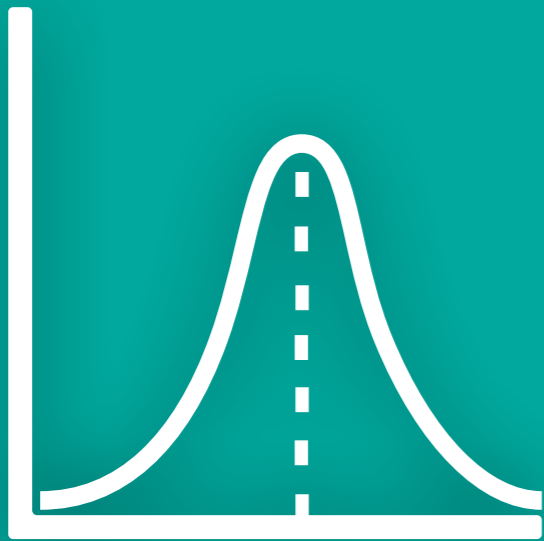
Stakeholder involvement of the sector



Methodology

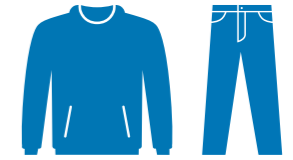
Creation of a **prioritisation model of opportunities** from a methodology based on multifactorial analysis of the Circe project **adapted to the reality in Catalonia** and the reality of its industry landscape, taking into account its market insights and the qualitative insights of the stakeholders involved.





3. Main results

3. Main results



3.1. Opportunities: textile sector



Increase the capacity of post-consumer textile collection

This opportunity focuses on the potential of increasing the **availability of materials** of post-consumer fashion and home textiles, by implementing selective collection and effective sorting systems that allow and facilitate a further retention of the value of the products in a closed loop.



Increase the recyclability, recycling and the use of recycled fibres, threads and fabrics

Beyond guaranteeing its collection, the recovery of textile waste (both pre-consumer and post-consumer) has to go with an improved **channeling** of these **material** inputs into assets that can be transformed into **new products** by other players in the value chain, with a minimum market viability.



Scale up the creation of new business models

Digital technologies facilitate the creation of **new business models** which are revolutionising the way we relate to each other whether as individuals, users or consumers, and also in the way we produce. In fact, the impact of the new digital tools is larger in those business models that move from the **product** itself to its **use** as a service.



Intensify the search of alternatives to prevent the effects of microfibre release and other substances of concern during the product lifecycle

The textile sector is an unintentional responsible for the release of **72.000 to 138.000 tonnes of microfibres annually** to the maritime environment, originated in the use and maintenance phase of clothes and synthetic fabrics, thus, in a very quotidian and massive act such is laundering clothes made of polyester, nylon and acrylic fibres, which are present in a large amount of products and represent a significant share in the textile market.



Increase savings and water and energy efficiency used during the production process

The industry needs the intensive consumption of energy and water in order to maintain its activity, and for the creation and marketing of their products. One of the textile industry's main trends is the implementation of more efficient process: **reducing** consumption, increasing **efficiency** in its use, and promoting **reuse** when possible



Explore new ways of upcycling pre consumer textile waste for industrial uses

The textile sector in Europe produces a significant amount of **textile waste from its own production process**, which has the potential to be circularised back in the system again, as by-products for other industries, or valorised by treating and integrating them in production processes of other industries of the sector, or in other value chains.



Ecodesign for durability

Taking into account the exponential increase of the consumed clothes and the dramatic reduction of the time of use of these products, the sector needs to set a future horizon which aspires to **reduce the pressure on raw materials**, **decelerating** this product rotation and betting on a consumption model that extends as much as possible the **durability** of clothes.

3. Main results



3.1. Opportunities: beverage sector



Preventing food waste along the value chain

Beverage manufacturers are able not only to implement actions to prevent food waste in their production process but also they can be **protagonists in preventing food waste** in the food value chain: redirecting resources to feed people and animals, as they have the capacity to transform and preserve a set of food products into new formats.



Minimising material use for beverage distribution

In order to develop a more circular productive model, beyond ensuring that the product and material flows do not leave the loop, the preferred option in managing waste is the one focused on practices that do not generate waste or generate waste as less as possible.



Increase the reuse of glass packaging

The **reuse of resources** has a **preferential position** in the waste hierarchy and the principles of the circular economy. Reuse allows to create strategies that move the linear industrial model towards a more efficient management of assets, minimising environmental impact, and reducing the need to maintain redundant processes.



Increase water savings and water efficiency during production

Among other aspects, the circular economy provides a new model for the management of resources and raw materials. It allows a new future scenario for the industry where waste waters cease to exist or get minimised as much as possible. It provides the possibility to **close the water loop** in the production process, maximising its use cycles (both reducing consumption and treating it for its reuse).



Scaling the creation of new valuable industry products from by-products

The large **volume of organic waste** produced by the beverage sector generate several problems in its management and treatment. On the other hand, these **by-products** and waste can be transferred to other sectors or treated to create **new valuable products**, generating new economic and social opportunities.



Use of recycled packaging materials

Recycling is a **necessary but not sufficient condition** to create a circular economy. Recycling is a minimum and essential condition to maintain material flows inside the system, and also prevents those materials to move from the technical to the natural cycle, as negative externalities to the environment.



Use of biobased and/or compostable materials for plastic packaging where beneficial

There are priority strategies such as prevention, reuse, recycling of conventional plastics. However, the Ellen MacArthur Foundation also highlights that these processes are not yet enough taking into account the future global demand levels that plastic production will not meet. In this sense, **separating plastics from its fossil base** represents an interesting case to consider in certain contexts.



Increase the implementation of smart packaging solutions

Smart applications such as Radio frequency identification (**RFID**) and the creation of new applications such as the near field communication technologies (**NFC**) transform the package into an important asset for improving market knowledge and accelerating the **transition to circular supply chains**.

3. Main results


3.2. Barriers: textile sector

BARRIERS ● Very high ● High ● Moderate ● Low ● NI/NA: Not impacted / Not assessed



Circular economy opportunities identified in the textile sector in Catalonia



Barriers	Area	Post consumer collection	Recycled materials	Business models	Microfibres and substances	Energy and water	Industrial waste	Codesign for durability
Economic 	Profit	Yellow	Yellow	Yellow	Yellow	Green	Green	Orange
	Capital	Grey	Grey	Orange	Grey	Orange	Grey	Grey
	Costs	Yellow	Yellow	Orange	Yellow	Orange	Green	Yellow
Regulatory 	Regulatory framework	Orange	Green	Grey	Yellow	Orange	Yellow	Green
	Government support	Orange	Green	Yellow	Yellow	Orange	Yellow	Green
Social 	Business culture	Red	Orange	Orange	Red	Yellow	Green	Orange
	Customers and society	Red	Orange	Orange	Orange	Grey	Grey	Orange
Market failures 	Externalities	Orange	Orange	Grey	Red	Yellow	Grey	Red
	Business competition	Orange	Red	Red	Grey	Grey	Orange	Red
	Business ecosystem	Orange	Orange	Red	Grey	Orange	Yellow	Red
Business 	Governance	Grey	Yellow	Grey	Grey	Yellow	Grey	Grey
	Additional costs	Grey	Yellow	Grey	Grey	Yellow	Grey	Grey
Technology and knowledge 	Accessibility	Grey	Orange	Grey	Yellow	Green	Yellow	Yellow
	Skills	Grey	Grey	Yellow	Grey	Yellow	Yellow	Grey

3. Main results

3.2. Barriers: beverage sector

BARRIERS ● Very high ● High ● Moderate ● Low ● NI/NA: Not impacted / Not assessed



Circular economy opportunities identified in the beverage sector in Catalonia

Barriers	Area	Food waste	Use of materials	Glass reuse	Water use	Valorisation	Recycled material	Bioplastics	Digital Tech
Economic 	Profit	High	NI/NA	Moderate	Moderate	Moderate	High	High	Moderate
	Capital	High	Moderate	High	Very high	NI/NA	NI/NA	NI/NA	NI/NA
	Costs	Very high	Very high	High	Very high	Moderate	High	High	Moderate
Regulatory 	Regulatory framework	NI/NA	High	Low	Very high	High	NI/NA	Moderate	High
	Government support	NI/NA	High	Low	NI/NA	High	NI/NA	Moderate	NI/NA
Social 	Business culture	High	Low	NI/NA	Low	High	Low	Moderate	High
	Customers and society	High	High	Low	NI/NA	NI/NA	Low	Moderate	Moderate
Market failures 	Externalities	NI/NA	NI/NA	NI/NA	High	NI/NA	High	High	Moderate
	Business competition	Very high	NI/NA	High	Low	NI/NA	NI/NA	High	Very high
	Business ecosystem	Moderate	High	Very high	Low	High	High	High	Very high
Business 	Governance	NI/NA	NI/NA	NI/NA	NI/NA	High	NI/NA	NI/NA	Very high
	Additional costs	NI/NA	NI/NA	NI/NA	NI/NA	High	NI/NA	NI/NA	NI/NA
Technology and knowledge 	Accessibility	Low	High	High	Low	Moderate	Very high	High	High
	Skills	NI/NA	NI/NA	NI/NA	NI/NA	High	NI/NA	NI/NA	NI/NA

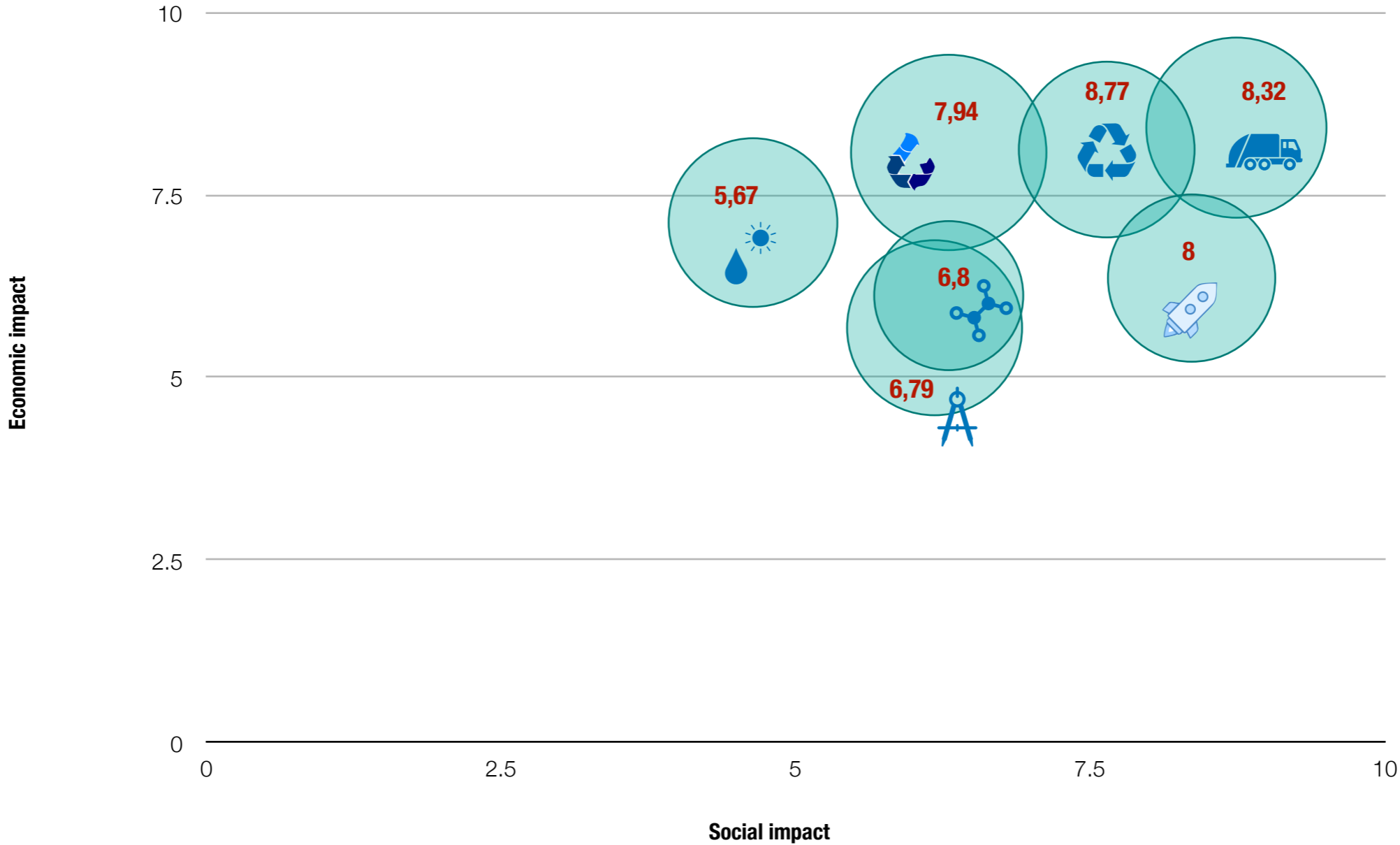
3. Main results

3.3. Prioritisation

TEXTILE SECTOR

0-10 Strategic impact

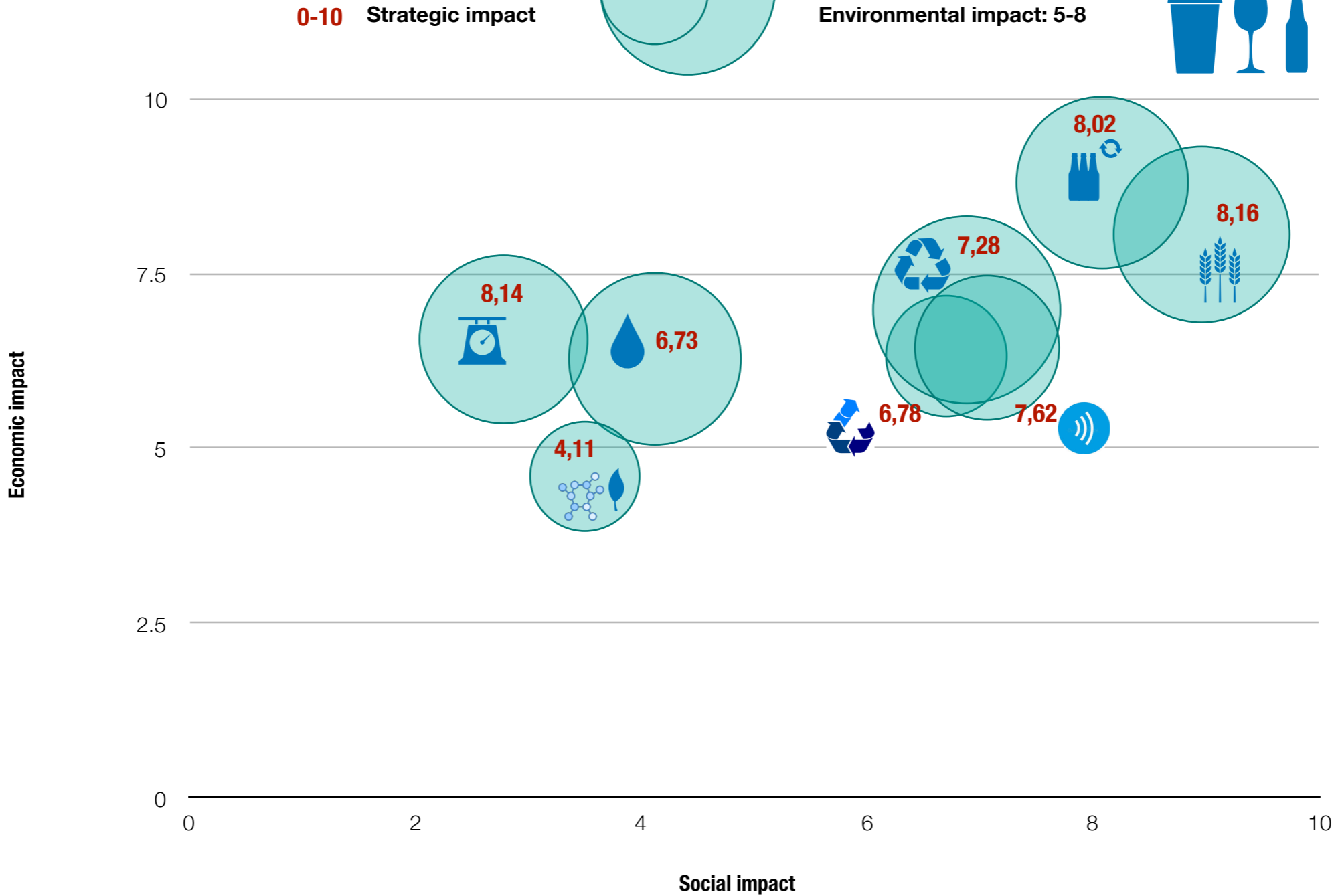
Environmental impact: 6,5 - 8,5



3. Main results

3.3. Prioritisation

BEVERAGE SECTOR



3. Main results

3.3. Prioritisation

Opportunities - Textile sector	Strategic impact	Economic impact	Social impact	Environmental impact	Score
Increase the capacity of post-consumer textile collection	8.32	8.42	8.74	7.78	8.237
Increase the recyclability, recycling and the use of recycled fibres, threads and fabrics	8.77	8.08	6.3	8.43	8.059
Explore new ways of upcycling pre consumer textile waste for industrial uses	7.94	8.12	7.64	7.59	7.809
Scale up the creation of new business models	8	6.36	8.36	7.23	7.450
Ecodesign for durability	6.79	5.68	6.18	7.56	6.698
Intensify the search of alternatives to prevent the effects of microfibre release and other substances of concern during the product lifecycle	6.8	6.12	6.3	6.45	6.445
Increase savings and water and energy efficiency used during the production process	5.67	7.12	4.64	7.29	6.344
Opportunities - Beverage sector	Strategic impact	Economic impact	Social impact	Environmental impact	Score
Preventing foodwaste along the value chain	8.16	8.06	8.96	7.91	8.204
Increase the reuse of glass packaging	8.02	8.8	8.08	7.73	8.107
Use of recycled packaging materials	7.28	6.98	6.88	8.41	7.525
Increase the implementation of smart packaging solutions	7.62	6.44	7.06	6.50	6.889
Minimising material use for beverage distribution	8.14	6.56	2.78	7.56	6.635
Increase water savings and water efficiency during production	6.73	6.28	4.12	7.74	6.500
Scaling the creation of new valuable industry products from by-products	6.78	6.32	6.7	5.45	6.223
Use of biobased and/or compostable materials for plastic packaging where beneficial	4.11	4.6	3.5	4.95	4.391



4. Conclusions

Sectorial Insights

4. Conclusions - sectorial insights

1. Implementation: the great circular economy challenge

During the last few years, the knowledge on the fundamental principles which articulate the circular economy have become exponentially popular in many fields: environmental, political and industrial.

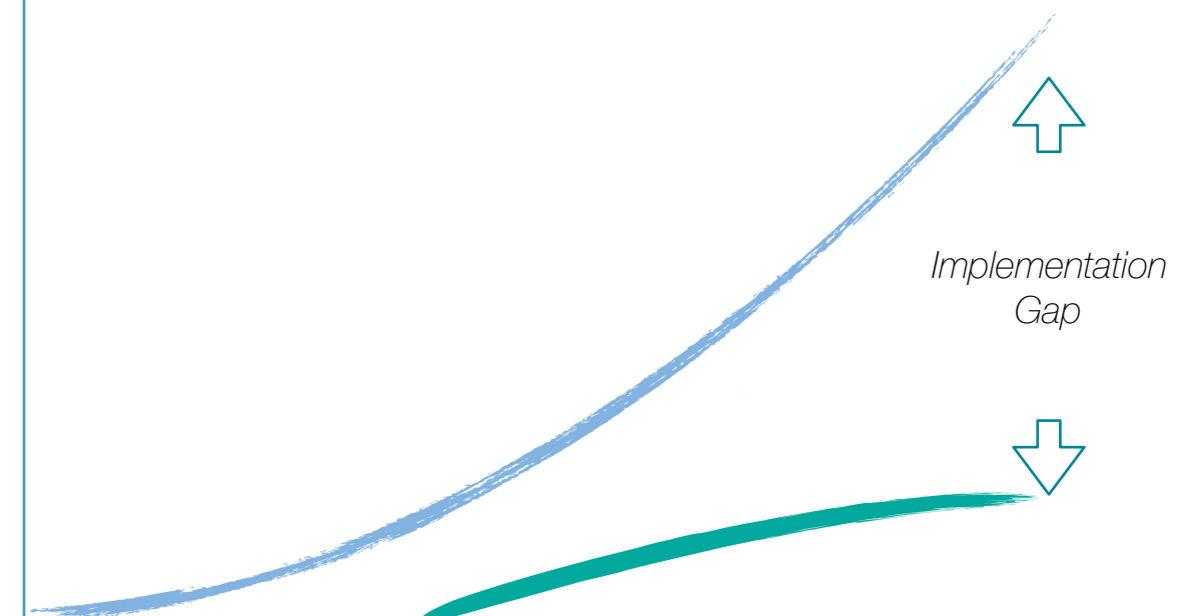
Since 2015, the EU has carried the banner for the chance of creating a regulatory framework to develop this productive and waste management model as a strategic challenge of the region in the globe (see Directives EU 2018/849-852). Similarly, both almost all the productive and industrial network and public administration bodies at different level have undersigned several commitments and strategic plans to develop those principles into practice.

However, the perfection and knowledge of this model by the many involved stakeholders has not developed in parallel with a process of generalised implementation that answers its challenges.

“There is a lot of talk on the circular economy, recently. Before that was the fight against pollution, sustainability etc. and now is the topical subject. But we don’t know how this is going to be translated into reality”

 Knowledge
 Implementation

Development of the circular economy



The circular economy is in a moment of transition towards an scenario of implementation to truly transform its environment in order to become an institutional, industrial and social reality of public interest.

4. Conclusions - sectorial insights

2. Early adopters & optimisers: the entry-door of the circular economy into the industrial landscape

The ReSOLVE framework: six intervention areas for companies and countries to move towards the circular economy



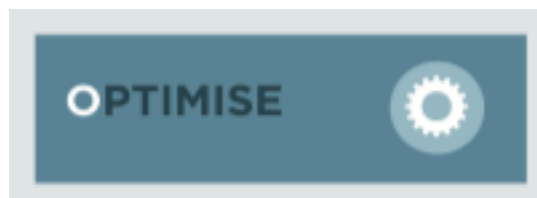
Source: Ellen MacArthur Foundation, Toolkit for policymakers

The circular economy has had a first momentum of adoption and implementation among those *early adopters* and emerging companies which have created *ex novo* a new business model or a value proposition linked to the principles and practice of the circular economy

“A circular economy has benefits that are operational as well as strategic, on both micro and macroeconomic level. This is a trillion-dollar opportunity, with huge potential for innovation, job creation and economic growth”

(EMF, Towards the Circular Economy, 2014)

Beyond those strategic positioning and roadmaps for the development of the concept, most of the current circular economy projects are founded on the own industry logic of each sector and on making their processes more efficient.



“We couldn’t understand our survival as a company if we hadn’t implemented efficiency improvement processes on our water and energy consumption, for instance”

The transformations on the industrial process since the 19th Century are based, at least, in one of the six intervention areas of the circular economy: all industries, in order to ensure its survival, have **constantly optimised their processes**. Thus, at least, the minimisation in the use of resources for generating the same outputs is an inherent factor in the productive network of the region. So, there are two important questions to highlight:

1. On the one hand, there are a lot of companies that are developing practices that respond to the circular economy model without being aware of that;
2. On the other hand, optimisation is the main mobilising factor to introduce the circular economy into the industrial context, because optimisation is a substantial element of their functioning.

4. Conclusions - sectorial insights

3. Circular economy and industry value chains

Nowadays, the majority of the projects that try to implement a circular economy approach face the challenge of transforming a linear mode of production exclusively from the point of view of their own company: how they supply themselves more efficiently or in a more sustainable way; or how they manage the waste they generate internally (reintroducing them into their production process) as well as externally with other partners usually in 1 to 1 relationships. The most relevant cases are those which articulate practices following an approach based on industrial symbiosis among organisations that, despite being real circular economy in practice, they do not get to transform the productive model or scale up this system to other productive spaces.

Closed Loop circular economy model

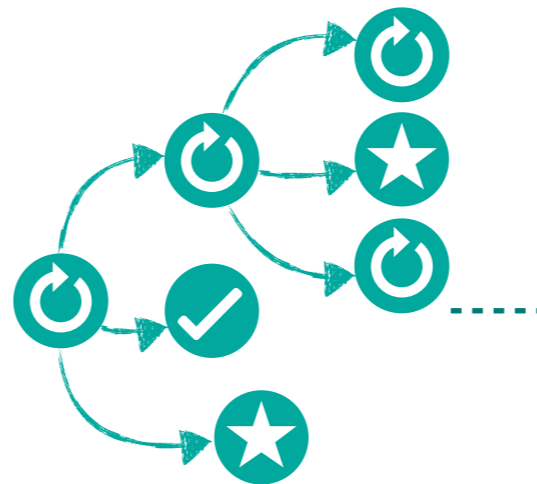


The three main principles of the circular economy are applied inside the limits of one of the players in a value chain, where:

1. The use of resources and limited raw materials is minimised and the use of renewable sources is strengthened.
2. Companies seek to close the loop maximising the recirculation of assets inside their production process
3. Negative externalities generated by the company are minimised when they escape from this recirculation streams.

Necessary but not sufficient condition

Open Loop circular economy model



Beyond companies adopt a closed loop approach in some of their practices or in their overall activity, circular economy models in a region are only possible when there is an important cohesion of needs, expectations, resources and information amongst the different players integrating one or several value chains, creating value streams far beyond the walls of individual companies.

Circular economy model for the region

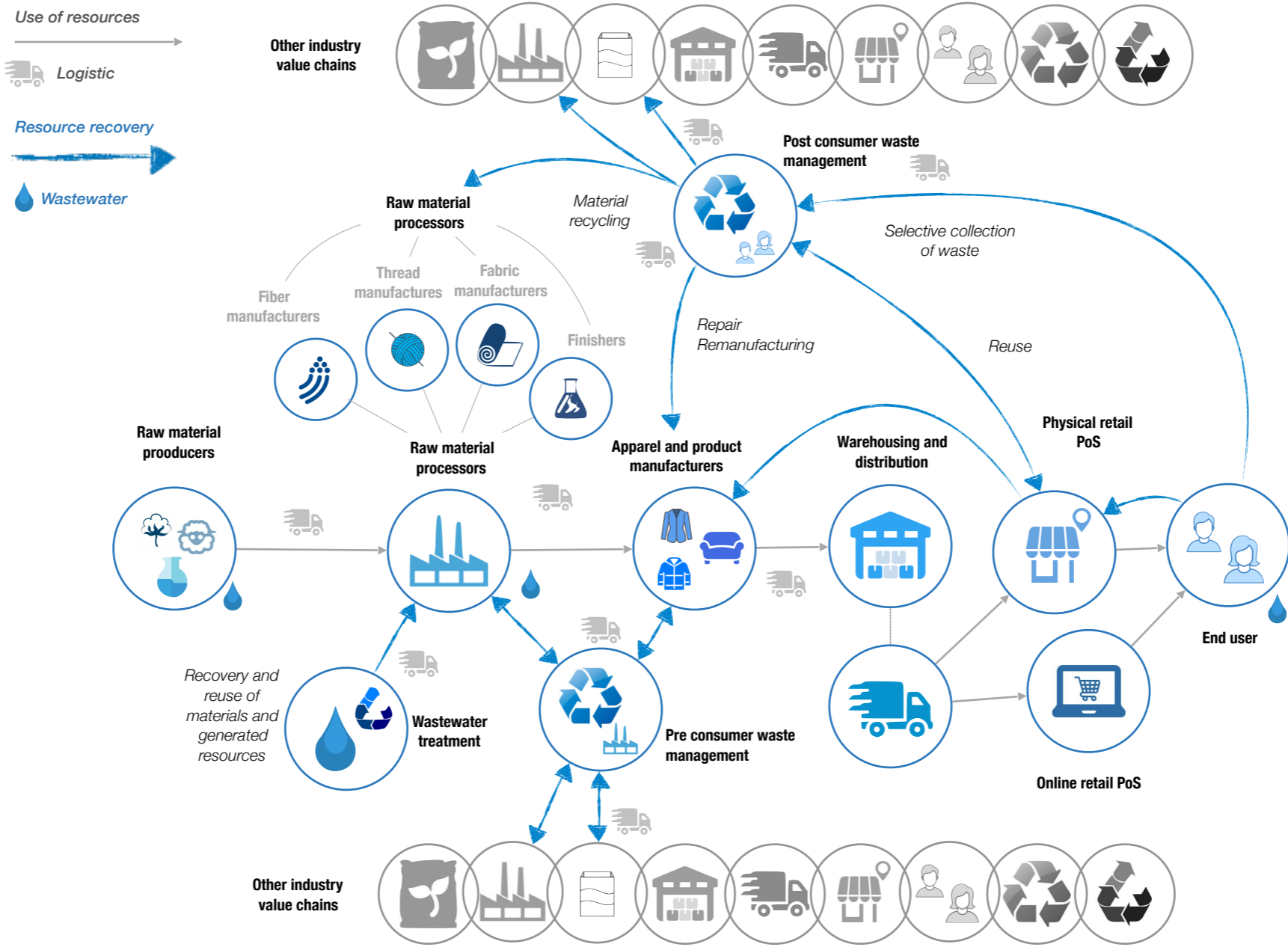
“We have to build gathering spaces for the sector and spaces for relationship between our sector and other sectors. The circular economy will only be a reality if we are able to understand who makes what and how this can be useful to me. Only by understanding all the lifecycle we can create new circular solutions”

Only by holding an holistic and systemic approach based on inter-sectorial knowledge in a region (i.e. knowing each sector and contrasting them among others) we can develop a true model that takes into account all the stakeholders of the value chain.

4. Conclusions - sectorial insights

3. Circular economy and industry value chains

The circular economy and the textile value chain



4. Conclusions - sectorial insights

3. Circular economy and industry value chains

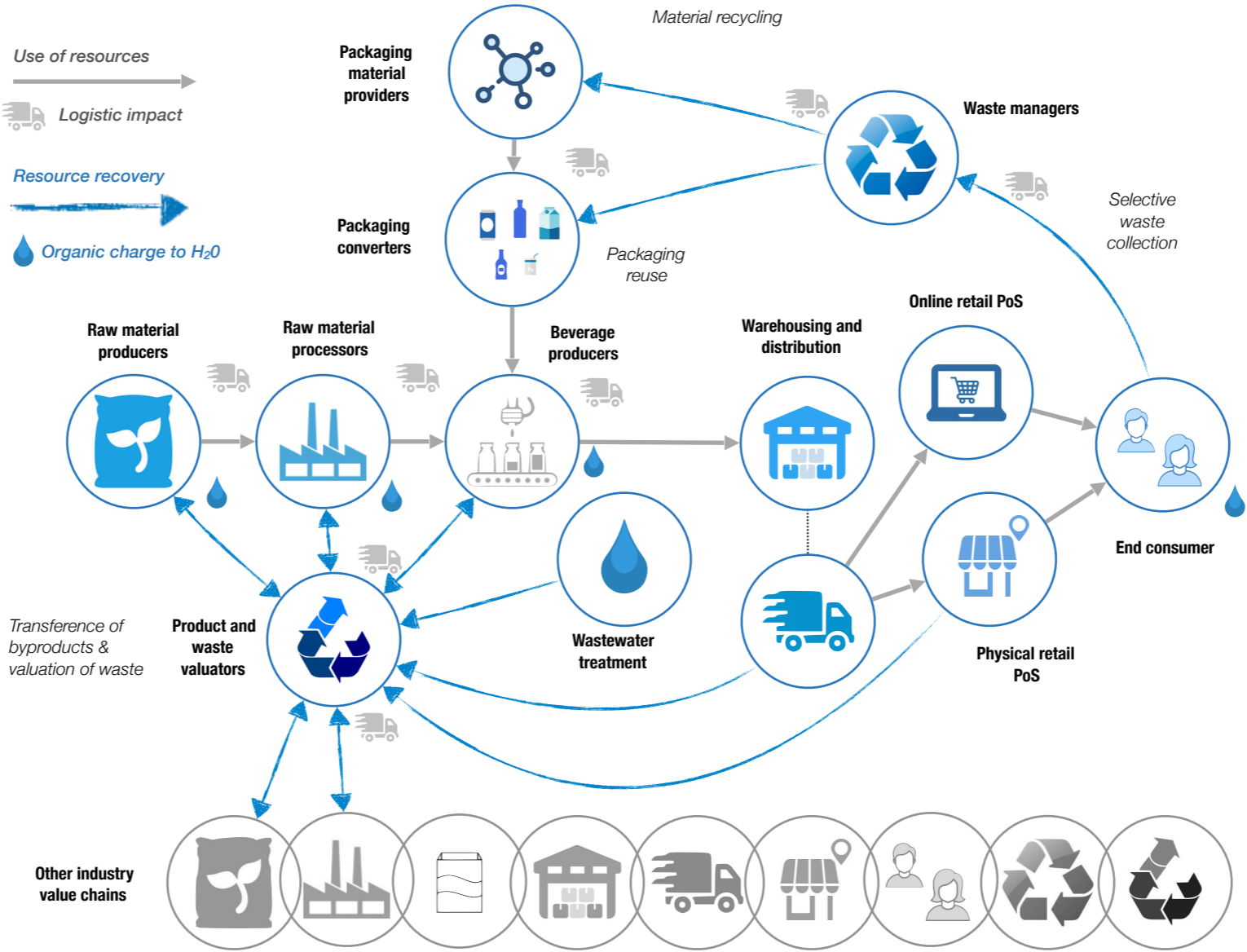
Textile sector characterisation

- ✓ Context of end of century crisis, and of strong decline during the central years of the last decade. Currently, thread, fabric and apparel/textile manufacturers stand out for the improvement of their competitiveness, driven by pure survival. They try to go for products and processes that provide more value but they are completely immersed in the dynamics and global logic of mass consumption (huge volumes, fast rotation, low durability and low costs).
- ✓ The economic structure of the companies dedicated to the production and commercialisation of technical textiles escape from this dynamic and operate in a different context. The product characteristics allow further efforts in material innovation, improve the performance of fabrics and their finishing, providing more value to the products.
- ✓ Players of the textile sector in Catalonia are subjected to the logic of optimisation of costs, strongly set by big distribution brands and wholesale intermediaries. They have also made their productive model more flexible in order to respond better to shorter orders, with a more demanding time-to-market performance, and thus competing in some circumstances with manufacturing centres in other parts of the globe.
- ✓ Lack of progress in the introduction of more sustainable or circular practices is not due to a lack of confidence in the model. The sector thinks that this an opportunity to make a difference, providing more quality and a competitive value proposition in the global market. Resistances appear due to the current linear market logic:
 1. Need to increase the consumer demand of this type of products. A lot of pedagogy is still needed (even to reeducate in values that are today abandoned, on the “true cost” of a product) so as the consumer wants to pay more for something that has been paying less during the last 10 or 20 years.
 2. Need to encourage major retailers to introduce product lines that respond to the needs of a model based on the circular economy (certified product, recycled origin, responsibly sourced, traceable etc).
 3. Generalised resistance to changing the consumption model. Companies are largely dependent on the volume of the demand. Business model fundamentally based on low margins and large volumes. The decision to reduce consumption would necessarily imply that the demand accepts to pay the difference in value in order to maintain these companies functioning.
- ✓ **This sector states the need to face the challenge of putting in common the needs of each of the players in the value chain in order to articulate innovative initiatives (also on the circular economy) in a transversal manner impacting in the overall functioning of the value chain. Despite the fact that closed loop models have still room for development, the sector demands the creation of platforms and systemic approaches (open loop) to solve sectorial problems.**

4. Conclusions - sectorial insights

3. Circular economy and industry value chains

The circular economy and the beverage value chain



4. Conclusions - sectorial insights

3. Circular economy and industry value chains

Beverage sector characterisation

- ✓ The dynamics of the beverage sector (water, wine, beer, juice) is very much attached to the territory and the availability of natural resources for production.
- ✓ Water availability and its consumption are a key factor for the manufacturing of the product (beverage).
- ✓ The identification and design of circular economy practices are linked to the distribution and presence of several players in the same territory.
- ✓ There is a direct link in beverage manufacturing with organic matter. So, the overall functioning beverage sector needs to be considered accordance to the logic of the agri-food sector, because the behavior of both value chains and processes are very similar:
 1. A good deal of circular economy practices can be generated from the utilisation of (organic) waste from their own productive process.
 2. There is a large room for improvement in farming practices and food production (use of natural resources, chemical products etc) under the principles of the circular economy (the industry processes are generally more optimised).
 3. Beyond the innovation process of new products of value (impacting R&D such as polyphenol extraction and their use in cosmetic products, food preservation; or biopolymers extraction), most of the waste generated has a high return rate into the agrarian sector (fertilisers, use in animal food for farming, fish farming etc).
 4. This organic matter and the food nature of the final product pose higher hygienic-sanitary barriers than in other sectors, making the recirculation or reuse of resources more difficult (such as the reuse of process water).
 5. Food waste is a phenomenon where the beverage sector stands as one of the protagonists to lighten the problem, as it is able to capture and preserve the value of some food products (vegetables and fruit) transforming them into juices and extending their shelf life.
- ✓ In the same way than other food sectors, but specially in this case, the beverage sector is particularly sensitive in the developments and innovations produced in food packaging solutions. Fruits can be partially dematerialized (at a primary packaging level, sometimes even secondary packaging as well), beverages need a container to be transported all along the value chain and also to preserve its properties until its consumption. A good deal of the circular economy transformation in this sectors can be facilitated by more sustainable packaging solutions
- ✓ This sector is particularly impacted by the new directives of the circular economy package. Its players are interested in anticipating the next regulatory moves of the next two years (with the transposition of the directive into the regulation of each member state).
- ✓ **The beverage (and agrifood) sector needs also solutions that address challenges of the whole value chain, from primary production centres, product manufacturers and packaging fillers (that also decide on packaging solutions), retailers in charge of the final distribution of beverages, and the end consumer that participates as responsible form the final disposal of the package.**

4. Conclusions - sectorial insights

4. The next step in the circular economy: users (and citizens) at the centre of the model

- ✓ The challenge and the main achievement of the model created and disseminated by the Ellen MacArthur Foundation has been to translate this environmentally and economically sound model -against the current of the linear model in force- among the main public bodies and leading corporations of many sectors in the globe (see the members of the Project Mainstream led by Ellen MacArthur Foundation, the World Economic Forum and McKinsey & Company).
- ✓ Its main ideas count with the support, collaboration and involvement of reference companies from several sectors, innovation hubs, global corporations and public administration bodies of several levels.

Example: Partners de la New Plastics Economy: Rethinking the Future of Plastics and Catalysing Action (desembre 2017)



The user-citizen: the key stakeholder of the circular economy

Once this integration of the circular economy is ensured among the knowledge framework of companies and public bodies, we can identify a **large intervention area**, that has not been incorporated in the stakeholder involvement process, in almost all cases, neither from a private nor private perspective:: **the user and citizen.**

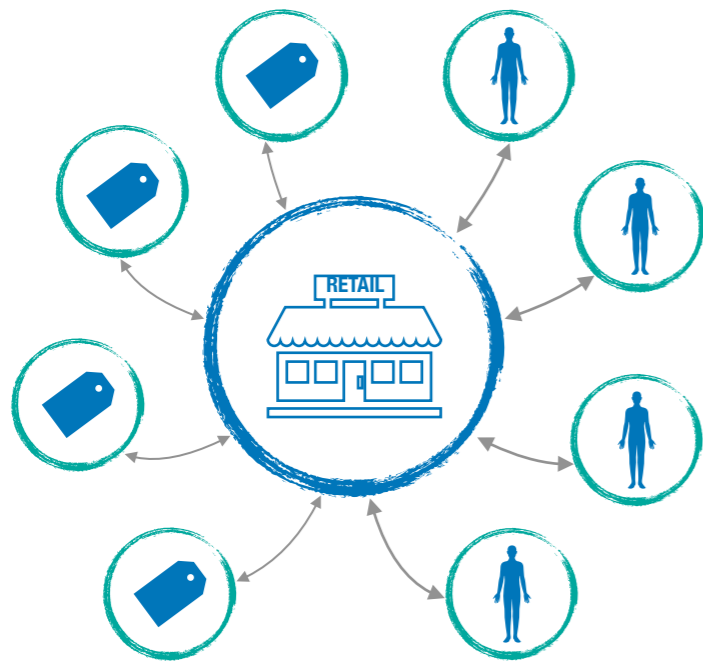
Any policy intervention tool operating into reality or any sectorial initiative on the market has to take into account the rol of the user-citizen, not as a recipient of this initiative but as a **participating stakeholder in this change of model.**

The big step in the circular economy will be when this knowledge framework, which is so extended in the business and political field, becomes part of the **quotidian mental map of individuals**, and when these individuals define and integrate, by themselves and in their own terms, the role that they want to develop in this new paradigm.

Without developing phenomenon, all industrial initiatives promoted suffer from a structural weakness. In the case of public policy actions, without an in-depth knowledge of this stakeholder, the instruments developed will not maximize their true potential.

4. Conclusions - sectorial insights

5. Integration of retail as a link between production and consumption



- ✓ One of the main **underrepresented agents** in the analysis of industry value chains for the development of the circular economy is the retailer.
- ✓ This player has carried the **burden** of being the **symbol and maximum representative of the linear model** and the current society of consumption (in the collective imaginary of public bodies, companies and individuals).
- ✓ This segment of the value chain is not necessarily more linear than other players, which in the majority of cases also try to downstream the maximum amount of products with an efficient and simplified structure of costs.
- ✓ However, studies and projects on circular economy **miss the potential of retailers** as the contact point between products of different nature and consumers or end users of these final products.
- ✓ Without understanding their current role in the distribution model of FMCG products we will not be able to develop seamless circular economy strategies.

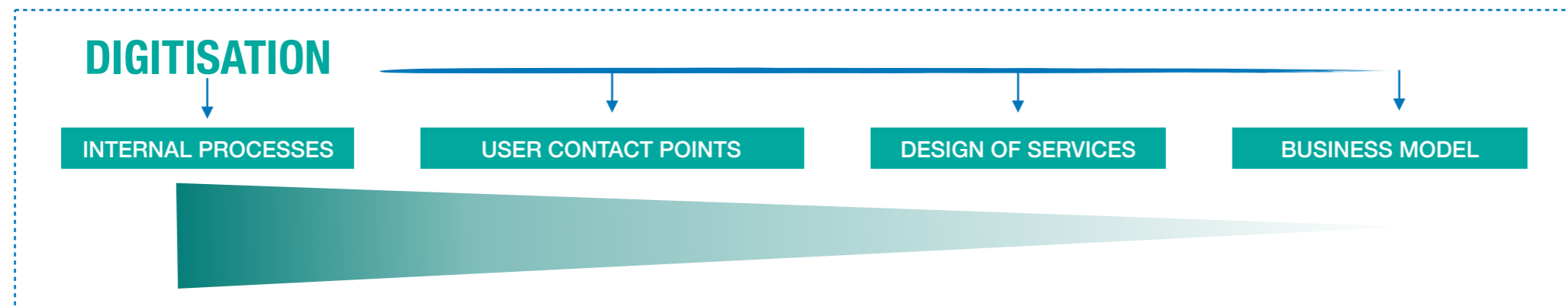
The retailer role in current supply chains

1. **Quotidian contact point with individuals:** as individuals, we buy to a greater or lesser extent; but in the context and nature of our labour specialised society we cannot meet our basic needs without going through a physical or virtual Point of Sale (PoS). The PoS is an essential element for our daily lives, beyond those unnecessary or superfluous transactions we also do.
2. The retailer acts as a connection between **brands and consumers:** it sells both its own brand and also products from other brands to potential consumers. It also makes available information and context of those products and has the capacity to communicate value.
3. Multibrand retailers also have the **capacity to influence in the decisions that brands do** on their products, if they want to operate in one retailer's specific channel (retailers can forbid the distribution of a specific material, product or package, they also decide in logistic and warehouse operations etc).

4. Conclusions - sectorial insights

6. The digitization phenomenon

Processes of digitisation have burst into the production network and all its processes, on a large and transversal scale. Until today, the challenge of the digital transformation has usually been undertaken as the internal digitisation of the majority of companies. In the meantime, the organizations that have also digitised its contact points with users and customers start being a majority. The current context places us in a moment where the design of new services is also fully digital, while digital business models are still a tiny minority.



In a similar way, **the circular economy has to go through three different phases** in order to develop circular solutions which are designed and thought to operate in a completely digital (but not virtual) world, where technologies serve processes and not the other way round.

The digital process of the circular economy

Conceptual linking

Nano-electronics, biotechnology or Advanced manufacturing have been categorised as Key enabling Technologies (KET) of the industrial transformation.

The current digital technologies (IoT, cyber-physical systems, Big Data, Blockchain etc) have an inextricably enabling and accelerating character of the circular economy. They are the **Circular Enabling Technologies**.

Translation of offer to demand

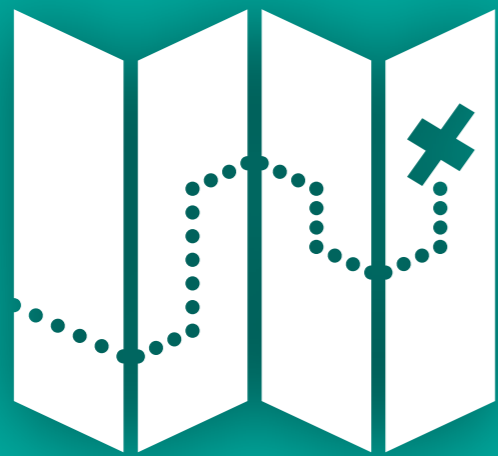
The most urgent and important challenge to solve in order to develop a fully operational circular economy for the digital world is the need to **translate the language and technological performance provided by offer-side companies into the industrial process and needs of the demand**.

Only by doing so, we can identify which areas of intervention already have a viable technical development.

Design of processes and digital circular models

Digitisation and digital technologies are no longer an external and unrelated element to the circular economy, and they do not only speak from the needs of the demand-side companies.

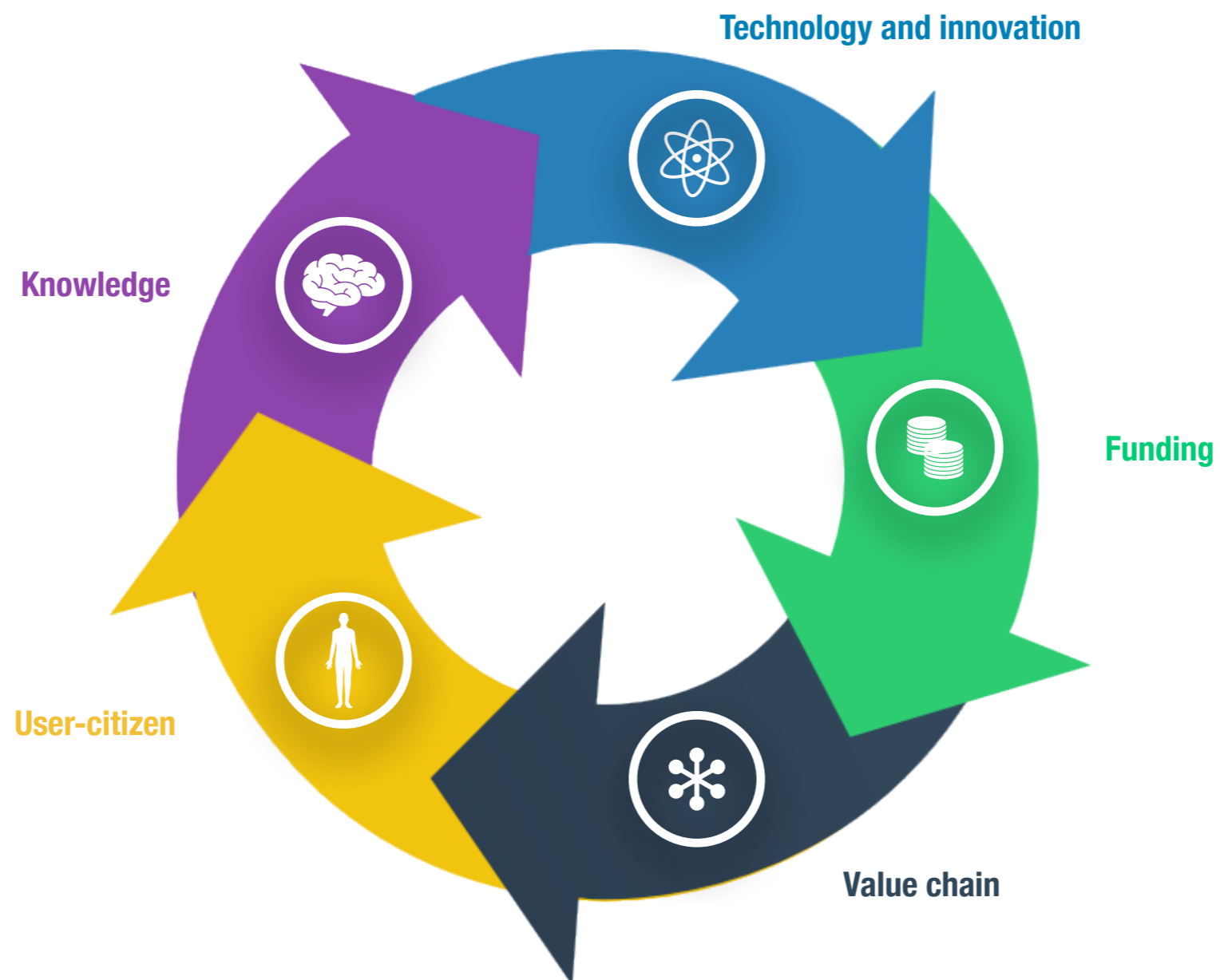
The last step in digitising the circular economy is the design of solutions and models, from a circular perspective, taking into account from the beginning the transformative potential of the digital technologies. **Digital technology suppliers integrate the core circular stakeholders and are involved in the design of the solution.**



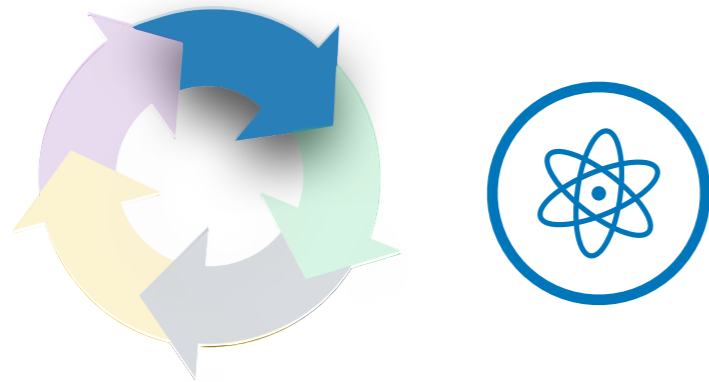
5. Intervention strategies

5. Intervention strategies

After the whole working process on these two industry sectors in Catalonia, and after generating the main conclusions of the project, all this know how allows a further general overview and analysis on the global state of the art of the circular economy in the region, its development in the recent years, its potential and room for improvement. Thus, we can set a **systematic intervention model to transform the present reality:**



5. Intervention strategies



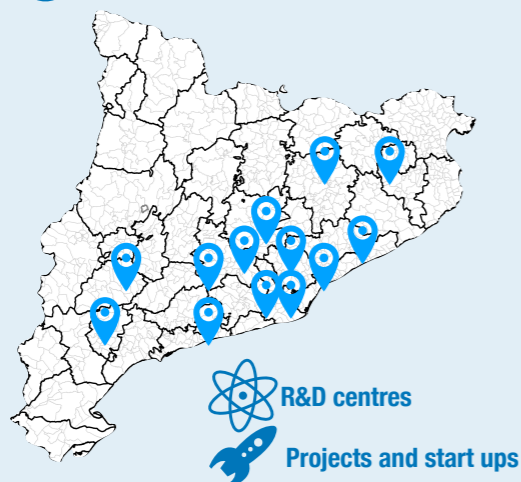
Mapping on innovation technologies for the circular economy

One of the main unresolved challenges is the **connection** between developing **technologies** in the region and **projects** which are implementing new technologies with **industry needs** to be solved in each sector of activity in the region, in order to boost a true circular transformation.

This priority action consists on **mapping the main technological hotspots focused on research, development and innovation**: derived both from the main research centres in the region (such as the TECNIO network among others) and the network of start up companies which are implementing in an innovative way these solutions into the market.

The aim is the **characterisation of the main technologies and innovations** identified, **link them to processes** corresponding to the main vertical industries of the region and **translate into their potential to develop circular economy actions and strategies**, from the needs of the demand.

1 Identification of innovation poles



2 Technology/innovation characterisation

Benefits
Traits

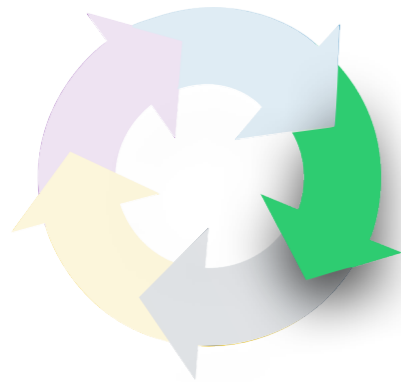
3 Vertical industry characterisation

Experience

4 Circular Economy potential impact (CE²) of this technology

Potential impact CE ²

5. Intervention strategies



Identification of funding mechanisms for the circular economy

The **circular economy** has demonstrated not only its responsible, sustainable and efficient character as a model, but also its strategic and market, both for **public instruments** and for private agents of the **financing markets**.

1

During the last 3 years, many public funding instruments have been appearing in order to commence with the creation of circular economy projects and strategies. At the EU level, H2020 calls (Challenge V), LIFE projects (DG Environment and Climate Action) or the funds provided by regional administrations such as the Catalan Waste Agency seek to carry out the circular economy through funding R&D&I projects.

A **benchmarking of the type of grants and circular economy funding instruments** from an international perspective, and specially at EU level, would allow to identify the best ways to optimise the activation model of the circular economy in the region: type of funding/instrument; volume of mobilised capital, areas or strategic sectors impacted, ROI model, business plan etc.



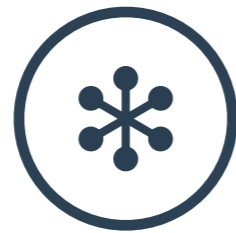
2

Catalonia is well positioned in concentrating, attracting and accelerating the network of start up companies and innovative initiatives in the current business ecosystem in Europe and the world. The different existing acceleration programs in the region (such as the Barcelona & Catalonia Start Up Hub), not only represent an attractive ecosystem among the main national and international investment funds, but also position Catalonia in its capacity to **attract investments in sustainability and circular economy**.

The current dynamics of the investment markets are developing funding mechanisms that take specifically into account the sustainable character of the project. From its strong potential to attract venture capital funds, Catalonia has the opportunity to develop a **Venture Capital program to boost the circular economy in the region**.



5. Intervention strategies



Building value networks

In order to create systematic solutions, industry sectors need of **platforms** or **sectorial/intersectorial** that enable the chance of identifying opportunities for collaboration, harmonising processes or adapting them into an optimal functioning along the existing value chains in order to create **more circular solutions**.

- 1 One of the main aspects for the construction of a truly circular economy in a region is articulating a system which is able to **identify the waste streams and secondary raw materials moving around**, or in real time.

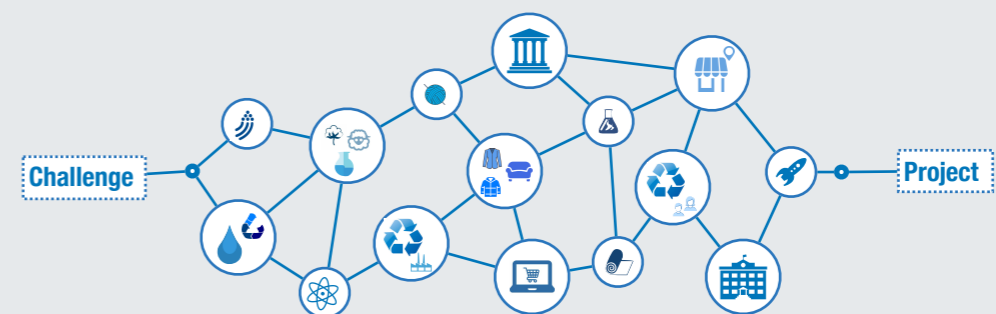
This living functioning of the economy, the industry and the production system enables to identify exactly when and where new waste is being produced or will be produced, characterise its typology and its route until its final destination.

An **exchange platform of data** between administration and companies of different sectors can identify the “black spots” in the production cycle, and providing a more circular, sustainable and efficient response/solution.



- 2 This knowledge generated by identifying waste and secondary raw material streams can maximise its potential with sectorial and inter sectorial meeting platforms.

By launching **strategic industry challenges**, many players of the value chain can interact with other profiles and poles of knowledge (such as research centres administrations, public bodies, investors, and technology integration services, to finally building projects and circular economy value networks the region.



5. Intervention strategies



Activation of the user-citizen stakeholder

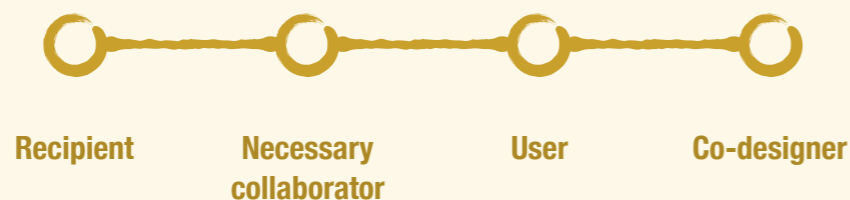
All interventions that want to transform reality towards a circular logic need the **active participation** and permanent interaction of the individuals: both as **citizens** and as **users**, and consumers of products and services.

1 Bringing the citizen into the solution model

In circular economy models, citizens are whether absent or treated as a passive receiver of the new promoted initiatives (in an “awareness-raising” manner).

A truly effective model should make this subject to move from its current state into an **empowered and active user-citizen** involved in the co-design of the solution, through a roadmap of participation that enable the inclusion of his or her concerns and making the subject to participate from the beginning in articulating those solutions.

PARTICIPATORY ROADMAP



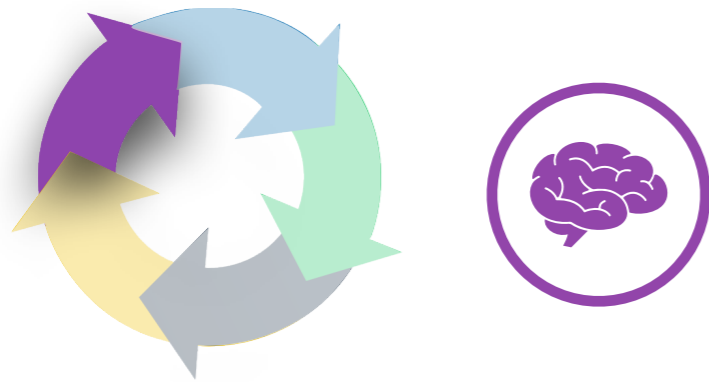
2 Implicació de l'usuari en el canvi de pautes de compra

Beyond their public role, individuals and their purchasing behaviors are one of the main stoppers or leverages to make the circular economy a market reality, a new consumption model in the region and with a business sense for those players operating in the industry field.

In order to include both retailers and consumers in the circular economy logic in the region, the retail sector is technically prepared for building up a **reward system for responsible consumption patterns**, when buying environmentally friendly products.

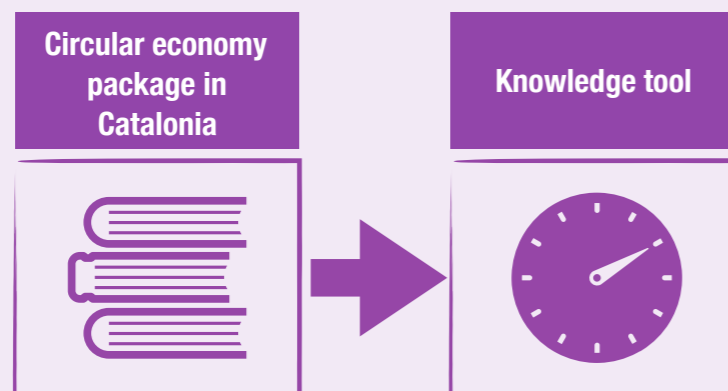
This system can stimulate consumers to look for and demand this type of products, position (big and small retailers) in the encouragement of this system, and help brands to finally move towards putting more sustainable products in the market. The implication of the administration in the design of the reward system can maximise this transformation of the demand.

5. Intervention strategies



Monitoring of knowledge

The circular economy model needs of a **tool that monitors its progress** amongst the territory, both its knowledge and the adoption of new circular economy practices and strategies. This tool would identify elements to be improved and capture the pace of adoption of this paradigm as well as future intervention opportunities



Any systematic circular economy action needs the creation of an ad hoc knowledge instrument able to monitor and assess the transference of this model into practice. Catalonia has recently launched the platform *Catalunya Circular*, an observatory for the circular economy in the region. In its framework of actions a further element such as this could be included in order to gauge the pulse of the circular economy progress among the different economic sectors and organisations in the region, in the form of a **Circular Economy Barometer**.

Both from the current situation and when new circular economy actions and instruments start to be implemented, the launching of a **barometer of the circular economy in Catalonia** would enable:

- the identification of the degree of internalisation, knowledge and understanding of the model among different typology of stakeholders and industry sectors;
- the assessment of the degree of evolution and implementation of the promoted initiatives
- the barriers and resistances for its adoption among players in the region
- the control and evolution of the barometer over time, the progress of its indicators during new barometer waves



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