

Catalogue of Circularity Challenges

TABLE OF CONTENTS

ADDITIONAL REMARKS (OPTIONAL):	30
<u>1</u> BACKGROUND & TIMELINE	35
<u>2</u> METHODOLOGY	37
<u>1</u> INTRODUCTION	50
<u>2</u> CONCLUSIONS REPORT	51
<u>3</u> INSPIRATION	54

LIST OF ABBREVIATIONS AND DEFINITIONS

DoA	Description of Action
EC	European Commission
H2020	Horizon 2020
GA	Grant Agreement
CA	Consortium Agreement
KPI	Key Performance Indicator

LIST OF FIGURES

Figure 1. Photo collage of the Romanian regional camp	8
Figure 2. Circular Economy building blocks (Technical Annex pp 11-12)	41

LIST OF TABLES

Table 1. List of camps	7
Table 2. Discussion of industrial sectors	8
Table 3. Directly sector-related challenges	16
Table 4. Directly cross-sector related challenges	25
Table 5. Prioritised circularity challenges	32
Table 6. Milestones of Task 3.1 timeline	36
Table 7. Generic barriers for moving towards CE (from Ritzén and Ölundh, 2017)	38
Table 8. Overview of pre-camp tasks	38
Table 9. Overview of tasks after a camp	40
Table 10. Overview of tasks prior to a European camp	40
Table 11. Overview of tasks after a European camp	42

1. Introduction

This deliverable describes the Catalogue of Circularity Challenges identified during M1-M17 of the C-VoUCHER project. The deliverable represents a status from the analytical results of the developments in C-VoUCHER up until now and is basis for the contents of the future Open Calls in the project.

The Catalogue of Circularity Challenges contains two types of challenges

- Circularity Challenges on regional level and
- Circularity Challenges on a cross-sectoral, European level.

The catalogue was derived using three parts, which are all summarised in this deliverable:

1. The Circularity Challenges Identification Methodology (submitted in M2), described in Section 2
2. An update of the Summary report for the two rounds of Regional Camps (up until M16), described in Section 3
3. A summary of process and conclusions from the two European Camps (in M6 and M17), described in Section 4

The catalogue itself is comprised of the sum of outcomes of the Regional Camps and of the two European Camps.

1.1 About C-VoUCHER

The C-VoUCHER project aims to develop new circular value chains, disrupting traditional linear business models by means of cross-fertilization with Design Thinking and Circular Disruptors. The project helps 66 selected SMEs by offering a three-phase Circularity Program to enable them to develop circularity solutions that can be used by other SMEs who have similar challenges with circularity and sustainability. The support has a total value of €4.2 million. C-VoUCHER focuses on the following five “traditional industries/sectors”: Agro-food, Health, Maritime¹, Textile and Manufacturing.

The goal for C-VoUCHER is to develop new cross-sectoral industrial value chains across the European Union, by supporting SMEs together with innovation actors and help them move away value chains from a linear towards a circular model. For SMEs, C-VoUCHER can provide new and innovative approaches to business, business skills and technological competences, and knowledge on the innovative ways of producing and consuming that circular economy strategies can provide.

¹ In C-VoUCHER’s Open Calls this sector is widened and called Blue Growth.

2. Circularity Challenges Identification Methodology (CCIM)

During the very first weeks of the project (M1), DTU and MADE developed an individually adaptable step-by-step methodology, which was designed for partners to use, supporting them in the planning, the execution, and the documentation of Regional Camps and European Camps, so that regional Circularity Challenges could be identified during those Camps (or whichever concept or format the partner chose). Concept and structure for this so-called “Circularity Challenges Identification Methodology (CCIM)” had been introduced to all participants at the Kick-off meeting.

The CCIM document is written as a separate report covering 16 pages (see Appendix A).

The CCIM describes, what to do in the phases

- before a camp,
- during a camp and
- after a camp,

providing separate sets of instructions both for the Regional and European Camps. It also gives generic examples of circularity challenges as found in scientific literature, and it shows Circular Economy Building Blocks (CE Building Blocks) as they are outlined in the Technical Annex, pp. 11-12. The CE Building Blocks are useful as tools for both the analytical part of the project but also for the more solution-generation-oriented part of the project.

In support of practical application by actors, the CCIM includes:

- a worksheet on “Circularity Flows” (developed by the Ellen MacArthur Foundation), recommended as pre-camp self-assessment tool for camp participants
- a template for reporting camp results, so that similar aspects are reported from all camps which helps simplify the summing up process and synthesis of results
- exemplary questions for camp evaluation, in support of improving the camp process from the first round of camps to the second

Following C-Voucher’s dynamic approach, the CCIM is updated several times and is now found in a version 4, which reflects comments and suggestions from partners, e.g. on clarity of steps.

3. Updated summary report on the Regional Camps

In the Regional Camps, Regional Innovation Hubs (RIHs) – regional agencies specializing in innovation and support to SMEs and communities – identified sectoral challenges, cross-sectoral challenges plus, to some degree, relations to the Regional Smart Specialization Strategies. Details on each Regional Camp can be found in the respective camp conclusions report by the RIHs.

This report presents output from the Regional and European camps, the latter being held in September 2018 in Denmark and in September 2019 in Stockholm.

The following RIHs (plus a cluster and an RTO) were involved in the task:

- The Swedish Agency for Economic and Regional Growth (SAERG) – Sweden
- Agencja Rozwoju Mazowska S.A. (ARMSA) – Poland
- Vejle Kommune (VEJLE) – formerly Trekantsområdet (TRNGL) – Denmark
- Lifestyle and Design Cluster (LDC) – Denmark
- Systematic (SYS) – France
- Agentia de Dezvoltare Regionala Nord-Vest (ADRNV) – Romania
- Axengia Galega de Innovación (GAIN) – Spain
- Force Technology (FORCE) – Denmark, RTO involved in the European Camp

3.1 List of camps

By the end of July, in 2018 and 2019, the first and second round of the regional camps was held. Overview of all the Regional Camps is presented in Table 1.

Date	RIH/location	No. of external participants (no. of C-Voucher project members)
June 11, 2018	SAERG, Stockholm (Sweden)	6 (3)
June 12, 2018	LDC, Herning (Denmark)	25 (2)
June 14, 2018	TRNGL, Kolding (Denmark) – now VEJLE	6 (1)
June 22, 2018	ARMSA, Warsaw (Poland)	11 (5)
July 5, 2018	SYS, Paris (France)	19 (3)
July 6, 2018	ADRNV, Cluj-Napoca (Romania)	29 (3)
July 16, 2018	GAIN (Spain)	8 (3)
May 2, 2019	VEJLE, Vejle (Denmark)	14 (3)
June 12, 2019	SAERG, Stockholm (Sweden)	14 (3)
June 14, 2019	ARMSA, Warsaw (Poland)	12 (3)
July 10, 2019	SYS, Paris (France)	18 (4)
July 24, 2019	ADRNV, Cluj-Napoca (Romania)	27 (6)
Total		189 (39)

Table 1. List of camps

3.2 Identification of Circularity Challenges

Below is a matrix that shows which industrial sectors were being discussed in the different camps in both 2018 and 2019, arranged by the RIHs and LDC.

Industrial sector		REGIONAL INNOVATION HUBS (RIHs) and 1 cluster						
		SAERG	VEJLE	ARMSA	SYS	LDC	ADRVN	GAIN
2018	Textile	X				X		
	Agro-Food	X	X	X	X		X	X
	Manufacturing	X	(X)	X	X		X	X
	Health*	(X)						
	Maritime/Water	(X)					X	X
	IT**				X			
2019	Textile	X	X		X		X	
	Agro-Food	X	X	X	X		X	
	Manufacturing	X	X		X		X	
	Health*						X	
	Blue Growth						X	
	IT**				(X)			

Table 2. Discussion of industrial sectors

*None of the camps dealt specifically with health-related sectoral challenges but some of the mentioned challenges could also be related to these sectors or participants had mentioned a relation (See in Section A).

** Some IT companies were present at the camp at SYS, where related challenges were captured.

Sectors in parentheses (X) are mentioned in a camp but in lower depth than other sectors.

The below picture gives an impression of a Regional Camp arranged by ADRVN in Romania.



Figure 1. Photo collage of the Romanian regional camp in 2018.

A. Sectoral Challenges

This section introduces the different sectoral challenges that were brought up during the regional camps in 2018 (●) and 2019 (●) and provides further explanations to some challenges as captured from the regional camps. If a challenge during a camp was given a cross-sectoral character, this was indicated. Cross-sectoral challenges are further structured in the subsequent Section B.

Abbreviations used in the brackets are:

Regulatory barriers = r, Technological barriers = t, Cultural barriers = c, Market failure = m.

Also, as a final introductory remark, it was decided during the 2019 European Camp to rephrase challenges in the format “how to...” to make the challenges more specific and increase applicability.

Textile

The following circularity challenges in the textile sector were gathered in the regional camps by SAERG and LDC in 2018 (●), and complemented with input from regional camps by SAERG, SYS, ADRNV, VEJLE and the European camp in 2019 (●):

- Non-harmonized regulations regarding collection, storage and transport of used textiles (r)
- Lacking automated sorting solutions (with adequate capacity) (t)
- Lack of recycling solutions for fibres (t)
- Difficult to estimate quality of collected used textiles (t)
- Collection volumes of used textiles not sufficient (m)
- CEO’s resistance against reusing uniforms (c)
- Lack of knowledge about recycling textiles besides clothes-to-clothes (t)
- Lack of general policy that underlines who wants to take products back after use (r)
- Certain discourses within the sector/community might work against the initiative to turn linear models into circular ones (c)
- Lack of transparency in the source of recycled fibres, e.g. in regard to unwanted chemicals and assurance of the recycled content (r)
- How to mobilise great brands to evolve their economic models and reuse/recycle clothes (m)
- How to introduce regulations at product design phase (r)
- How to improve and scale up recycling technology (t)
- How to promote economic incentives for extended life span, reusage and repairs of textile products (m)
- How to improve consumer knowledge and better convey information regarding circular products to consumers (c)
- How to regulate better regarding ownership of waste, collection, reuse and recycling of textiles (m)
- How to improve textile waste collection and recycling into other products (t)
- How to develop design optimisation tools, used from tailor step (t)
- How to increase transparency regarding processing techniques of textile fibres (r)

- How to avoid non-transparent and harmful for skin chemicals, used in treatments of textiles (r, m)
- How to limit fast and low-quality fabric fashion – and thereby enhance reuse and quality of recycled materials (c, m)
- How to improve clothes so they fit women and men better – cheaper clothes are often a poor fit according to body typology (m)
- How can companies work together and strategically handle waste problems (m, r)
- How can more clothes be produced from recycled textiles/materials (m)
- How can work clothes to a higher extent be repaired and used again (m)

Agro-Food

The following circularity challenges in the agro-food sector were gathered in the regional camps by SAERG, TRNGL, ARMSA, GAIN and SYS in 2018 (●), and complemented with input from regional camps by SAERG, SYS, ARMSA, ADRNV, VEJLE and the European camp in 2019 (●):

- Differences in regulations between countries constitute a barrier for greater resource efficiency (r)
- Lack of trust and transparency in food chain (c)
- Lack of system perspective (c)
- Food prices too low (m)
- Problems with legislation not allowing implementation of CE solutions (r)
- Lack of in-house expertise about strategic innovation processes
- Lack of collaboration throughout the value chain
- Validating the business case (m)
- Storage and maintenance of quality (and of biological activity) for bi products (e.g.: spent grain) (t)
- Lack of awareness for the consumers, to buy and consume products obtained from agro-food residues (m)
- Energy consumption for agro-food products manufacturing (t)
- Need for waste decomposition technologies (t)
- Valuation of organic wastes from seafood industry (m)
- Algae waste generation in European coastal areas (t)
- Agro-food wastes generation (t, m)
- Conversion of agricultural residue to bio-products and biomaterials is challenged by high energy consumption, degrading processes, complexity and variability in chemical composition of the feedstock.
- How to control biological risk, e.g. in grain fields, and get needed R&D funding (t, r)
- How to obtain better knowledge in revalorisation of “uncommon” waste, e.g. in use of brewing grain in furniture production (t)
- How to overcome resistance to change in the sector, e.g. in terms of food packaging (c)
- How to set up a “just-in-time” supply chain for food packaging, especially in relation to start-ups (m)

- How to introduce standardisation in food/drink packaging (with size, form etc.) to improve washing in a deposit system (r)
- How to apply digital technologies to decrease the use of pesticides (by monitoring and modelling) (t)
- How to model disease assessment in order to monitor health of crops and prevent risks (t)
- How to develop a crop management system that promotes efficient, effective and sustainable decisions (management practices of natural resources, inputs, planting, seeding, harvesting and other scheduling) (t)
- How to develop a platform that provides valuable information in efficient, effective and sustainable decisions regarding vineyard management (e.g. use of natural resources, pest prevention, irrigation, harvesting) (t)
- How to combine monitoring of protection of plants and nutrition (t)
- How to introduce bio-packaging and opportunities for synergies inside the agro-sector (t, r)
- How to develop R&D bio-plastics that can be used in cross-sectorial value chains (r, t)
- How to improve extraction and formulation of bio-sourced chemistry (t)
- How to increase consumer awareness of circular chains and purchased products (e.g. with digital technologies) (t, c)
- How to improve information of toxic substances in recycled materials (r)
- How to change legislation, in certain countries, that hinder or disallow implementation of certain circular economy solutions (r)
- How to improve challenging and non-compliant packaging design and materials (r, m)
- How to introduce new and improved waste decomposition technologies (t)
- How to map food consumption better, in order to reduce food waste (e.g. canteens) (t, c)
- How to reduce consumer food waste, e.g. by having manufacturers pack food in smaller portions (m, c)
- How to limit unnecessary use of packaging for food and beverages (r)
- How to increase valorisation of side streams from production (e.g. skin, bones, shells) (t)
- How to create safe and closed loops for food packaging (track material properties) (r, t)
- How to control packaging in export markets (e.g. consumer behavior/recycling possibilities) (m, r)
- How to enable packaging reuse, to a higher extent (t, r)

Manufacturing

The following circularity challenges in the manufacturing sector were gathered in the regional camps by SAERG, TRNGL, GAIN, ADRNV and SYS in 2018 (●), and complemented with input from regional camps by SAERG, SYS, ADRNV, VEJLE and the European camp in 2019 (●):

- Quality of recycled materials, esp. from mixed materials (t)
- Lack of collaboration partners/suppliers
- Lack of data from Life Cycle Assessments (LCAs), hindering design process (e.g. materials selection) (t)
- Regulations limiting the possibility to take back and refurbish materials and components for the production process (r)

- Lack of Design Thinking (c)
- Need to produce reusable products, not only recyclable products (c)
- Need to shift focus to see waste as a resource (c)
- Need for concrete examples showing the business opportunity (c, m)
- Need for selective disposal/ sorting and need for technology and lab analysis at the level of components – high costs and limited use in the injection/ extrusion processes and currently limited reuse of plastic materials (t, m)
- Need for high volumes when reusing plastic, in order to be economically viable (m)
- Need for financial support in optimisation of recycling and reutilisation of plastic products and need for collaboration between plastic products processors (m)
- Finding suitable bioplastics (t)
- Recycling of aquaculture nets (t, m)

- How to identify revalorization possibilities earlier, before materials become waste (c, t)
- How to reduce logistical expenses for products with low value (e.g. paper) (m)
- How to reduce the need for large investments for machines/logistics (e.g. for plastics) (t)
- How to increase eco-conception upstream from manufacturer (e.g. for plastics) (r, m)
- How to recycle better and easier with less energy, and have enough volumes to set up a supply chain (m, t, r)
- How to nurture more options for recyclers and increase efficiency (e.g. recycling facilities being closer to production plants, being mobile) (r, t)
- How to increase recycling volumes – should we look at dismantling or supply chain (e.g. towards thermoplastics) (r, t)
- How to orient short fibres, produce long fibres from short fibres, and improve segregation of waste materials (r, t)
- How to develop markets to valorise recyclers' production and thereby increase value of recycled materials (m, r)
- How to harmonise national and EU legislation for use of waste and understand the potential of waste as a resource (r)
- How to improve infrastructure and return logistics (t)
- How to improve knowledge and information to consumers regarding circular products (c, t)
- How to improve and introduce economic incentives for circular use of waste (r)
- How to progressively remove and replace plastics and other materials leading to pollution (t, r)
- How to overcome norms that prohibit buy-back or reuse in some industries (r)
- How to limit linear and increasing use of products with short lifetime ("fast fashion") (c, m, r)
- How to easier implement circular economy solutions in businesses (c)
- How to avoid that companies support less sustainable initiatives that are driven by customer requirements (m, c)
- How to easier evaluate environmental performance and design for end-of-life disassembly (t, m)
- How to enforce regulatory framework so low cost of waste removal does not inhibit circular solutions development (e.g. in electronics sector) (r)

- How to improve “circularity” instruments at national and regional level (e.g. by manufacturing clusters) (r)

Health

The following circularity challenges in the health sector were gathered in the regional camp by SAERG in 2018 (●), and complemented with input from regional camp by ADRNV and the European camp in 2019 (●):

- Regulations on material contents and composites (r)
- Conflict of interests (e.g. health vs. environment)
- High risk health-focused procedures indicate strict regulations that are environmentally inefficient (r)
- Most medical assortment in hospitals and clinics needs to be utilize but not medical equipment (r)
- Sharing and /or leasing in the medical sector is very limited (r)
- Development of new technology is very expensive and medical start-ups look for private investors (t)
- New technologies are not supported by public health care in Poland and other countries (t, m)
- Lack of education on e.g. finding environmentally friendly ways of utilizing drugs for pharmacy customer (c)
- Lack of public and commercial health prevention initiatives (c)
- Lack of cooperation between medical companies (sharing, exchanging, supporting) (c)
- Food and water quality affects the health condition of society
- How to make companies/hospitals in a better way deal with pharma waste – instead of specialised companies (m)
- How can circular economy solutions and national price barriers for pharmaceuticals be more related (production cost often not competitive) (m, r)
- How can pharma legislation be more harmonised across EU states (r)
- How to decrease the single-use of materials/devices/accessories in e.g. hospitals (r, t)
- How to improve “circularity” regulated procurement agreements that public actors have (regions, hospitals) (r)

Maritime/Water (Blue Growth)

Despite the fact that only the Camp organized by Spanish GAIN attracted some participants from the maritime sector, the 2018 (●) circularity challenges presented below were identified on this and other regional camps, such as the one at ADRNV. Also in 2018, general circularity challenges in the sector had been communicated by C-VoUCHER partner GSF. It was decided to merge the sectors Maritime and Water (as well as related logistics) and call it Blue Growth for the purpose of the Open Call. This group of challenges developed in 2018 was complemented with challenges from regional camps by ADRNV, SYS and the European camp in 2019 (●):

- Low agility due to the rather conservative business
- Need for thorough in vivo tests to verify product claims
- Lack of pilot plant facilities (c, t)

- Need to understand link to product marketing (c)
- Lack of certified laboratories for wastewater analysis in the region/ country (r)
- Lack of an alternative to batteries for energy storage in buoys (around 150mA) (t)
- Buoy design improvement for reducing plastic production (t)
- Find a solution to ensure buoy traceability (t)
- Reduce waste from sand blasting of boats (t)
- Lack of knowledge on how maritime transportation can support the development of circular flows
- Low level of circular use of resources on vessels in operation
- Need for a more responsible recycling of ship parts
- Low growth rates, over-capacity and low freight rates (m)
- Increasingly restrictive environmental regulation to reduce emissions by 2050 (r)
- Need for new scalable technologies and platforms in order to reach the goal for reduction of CO2-emissions (t)
- Need for mindset change in the industry regarding the accommodation of business development beyond the vessel (c)
- How to implement eco-concepts in ship and harbour construction, e.g. implying the use of bio-materials or materials e.g. more suitable for recycling (r)
- How to identify new ways of revalorisation of maritime waste products, e.g. ships, sails, fishing equipment (reuse/recycle) (t, r)
- How to include circular economy thinking in R&D, as most ship waste is not revalorized due to composite materials are extremely difficult to process and separate (e.g. polyester reinforced with carbon and glass fibres) (t, r)
- How to deal with out of order ships in a cost effective and environmentally sound way (current logistics are very expensive and/or not environmentally sound) (r, t)
- How to further develop the use of renewables in ship operation, as dependency on fossil fuels is still high (t)
- How to reach consensus in the ship industry, among the various actors, on the use of energy sources (r, m)
- How to design a hydrodynamic hull that would decrease the energy need to power a ship (t)
- How to implement industrial symbiosis approach in harbour areas (t, m)
- How can start-ups/SMEs, with limited financial resources, use life-cycle assessment (LCA) in design of new products, new services and new business models (new and less costly tools) (t)
- How to lower the resistance by public authorities (water sector) towards change and adaptation of new private water solutions (c)
- How to reuse water, consumables in water treatment processes (e.g. polymers, powders), and save and separate valuable nutrients to be used in different sectors (e.g. agro) (t, r)
- How to implement sharing, renting or leasing of expensive water treatment equipment (m, r)
- How to develop norms and regulations for ships in a global/international perspective (r)
- How to optimise ship routes (data management) and develop smart capacity management (t)

Information Technology - IT

The camp at SYS had dedicated participants from the IT sector. The challenges identified by the representatives of this sector are mentioned below even though IT was never a prioritized domain in C-VoUCHER. The challenges from 2018 (●) are complemented with regional camp challenge identified by SYS in 2019 (●):

- Leasing of hardware
- Lack of standards for components in mobile phones/computers (makes it difficult to replace, recycle) (r, t)
- Some e-waste from recycling plants is illegally exported to other (developing) countries (r)
- Lack of consideration of users' willingness to pay more for environmentally friendlier products (c, m)
- How to increase cultural awareness of key actors (c)

The subsequent table summarizes directly sector-related challenges captured in the Regional Camps. They are to a certain extent selected from the comprehensive number of above bullet points.

		Sectoral circularity challenges, separated into areas				
		Year	Regulatory	Technological	Cultural/ Societal	Market failure
INDUSTRIAL SECTORS	Textile	2018	<ul style="list-style-type: none"> • Non-harmonized regulations regarding collection, storage and transport of used textiles 	<ul style="list-style-type: none"> • Lacking sorting and fibre recycling solutions 	<ul style="list-style-type: none"> • Lack of collaboration and exchange of knowledge between different actors 	<ul style="list-style-type: none"> • Collection volumes of used textiles not sufficient
		2019	<ul style="list-style-type: none"> • How to introduce regulations for circular product design. Also concerning waste ownership, collection, reuse and recycling, and processing transparency of textiles • How to avoid use of harmful for skin chemicals (non-transparency) 	<ul style="list-style-type: none"> • How to derive proper solutions for collection, recycling (upscaleable recycling technology), and design optimization tools for tailor step 	<ul style="list-style-type: none"> • How to diminish lack of circular economy knowledge and difficulty to convey needed information to customers • How to limit fast and low-quality fabric fashion (to improve reuse/recycling) 	<ul style="list-style-type: none"> • How to avoid lack of economic incentives for extended life span of textile products (e.g. reuse-/repairability) – thus, difficult to mobilize great brands • How to improve transparency and information to consumers (process, chemicals etc.) • How to improve fit of clothes (cheaper clothes are often a poor fit) • How can companies work together and strategically handle waste problems
	Agro-Food	2018	<ul style="list-style-type: none"> • Different regulation in countries hinders resource efficiency 	<ul style="list-style-type: none"> • (none mentioned/ captured) 	<ul style="list-style-type: none"> • Lack of trust and transparency in food chain • Lack of system perspective 	<ul style="list-style-type: none"> • Food prices too low • Valuation of organic wastes from seafood industry
		2019	<ul style="list-style-type: none"> • How to standardise packaging forms/ type, as many different solutions make it difficult to wash in a deposit system • How to improve information regarding toxic substances in recycled materials 	<ul style="list-style-type: none"> • How to develop waste decomposition technologies and ability to control biological risk • How to better revalorise “uncommon” waste fractions • How to develop a crop management system that 	<ul style="list-style-type: none"> • How to overcome resistance to change in packaging and supply chain 	<ul style="list-style-type: none"> • How to improve logistic solutions for transport of waste products to biogas plants • How to setup “just in time” supply chains for food packaging

			promotes efficient, effective and sustainable decisions (e.g. decreased use of pesticides)		
Manu- facturing	2018	<ul style="list-style-type: none"> Regulations limiting the possibility to take back and refurbish materials and components for the production process 	<ul style="list-style-type: none"> Quality of recycled materials, esp. from mixed materials 	<ul style="list-style-type: none"> Lack of collaboration partners/suppliers 	<ul style="list-style-type: none"> Need for concrete examples showing the business opportunity
	2019	<ul style="list-style-type: none"> How to have a harmonised national and EU legislation for use of waste and better design phase thinking (some national legislations can hinder specific circular solutions) How to improve and introduce economic incentives for circular use of waste (avoid that low cost waste solutions inhibit circularity) How to overcome norms that prohibit buy-back or reuse in some industries 	<ul style="list-style-type: none"> How to improve infrastructure and return logistics, alongside having better recycling (e.g. decomposition technology) and replacement of e.g. plastics How to reduce the need for large investments for machines/logistics How to introduce better and more bio-packaging solutions How to increase valorisation of side streams from production (e.g. skin, bones, shells) How to enable packaging reuse 	<ul style="list-style-type: none"> How to improve circular design thinking and communication of circular product information to consumers How to easier implement circular economy solutions How to map food consumption better and limit unnecessary food waste alongside use of packaging 	<ul style="list-style-type: none"> How to have economic incentives for circular use of waste (e.g. for paper). For paper the logistical expense is large for such a low value product How to improve reuse/recycling in terms of volumes, waste segregation, processing (e.g. long fibres from short fibres), efficiency, energy use etc. How to avoid that companies support less sustainable customer driven requirements How to control packaging waste in export markets
Health	2018	<ul style="list-style-type: none"> Regulations on material contents 	<ul style="list-style-type: none"> (none mentioned/ captured) 	<ul style="list-style-type: none"> Conflict of interests (e.g. health vs. environment) 	<ul style="list-style-type: none"> (none mentioned/ captured)
	2019	<ul style="list-style-type: none"> How can pharma legislation be more harmonised across EU states How to improve “circularity” regulated procurement agreements that public actors have 	<ul style="list-style-type: none"> How to decrease the single-use of materials /devices /accessories 	<ul style="list-style-type: none"> (none mentioned/ captured) 	<ul style="list-style-type: none"> How to improve company/hospital approach to pharma waste – instead of just shifting burden to specialized waste companies How can circular economy solutions and national price barriers for pharmaceuticals be

					more related (production cost often not competitive)
Blue Growth	2018	<ul style="list-style-type: none"> • Low agility due to the rather conservative business 	<ul style="list-style-type: none"> • Lack of pilot plant facilities • Buoy design improvement for reducing plastic production • Lack of certified laboratories for wastewater analysis in the region/ country 	<ul style="list-style-type: none"> • Need to understand link to product marketing 	<ul style="list-style-type: none"> • Low agility due to the rather conservative business
	2019	<ul style="list-style-type: none"> • How to directly reuse water, and save and separate valuable nutrients to be used in different sectors • How to apply eco concepts in ship and harbour design – include circular economy in R&D 	<ul style="list-style-type: none"> • How to reuse/recirculate the consumables used in water treatment processes (e.g. polymers, powders) • How to environmentally friendly deal with, and revalorise, maritime waste products, including ships (e.g. industrial symbiosis) 	<ul style="list-style-type: none"> • How to alter resistance to adopt innovative private solutions by public authorities in cities and municipalities 	<ul style="list-style-type: none"> • How to overcome issue with expensive water treatment equipment – e.g. sharing, renting or leasing (especially for unexpected water related problems) • How to develop use of renewables in ship operation, and have consensus on energy sources in ship industry
IT	2018	<ul style="list-style-type: none"> • Lack of standards for components in mobile phones/ computers (makes it difficult to replace, recycle) 	<ul style="list-style-type: none"> • (ditto as under Regulatory, 2018) 	<ul style="list-style-type: none"> • (none mentioned/ captured) 	<ul style="list-style-type: none"> • (none mentioned/ captured)
	2019	<ul style="list-style-type: none"> • (none mentioned/captured) 	<ul style="list-style-type: none"> • (none mentioned/captured) 	<ul style="list-style-type: none"> • How to improve lack of cultural awareness from key actors 	<ul style="list-style-type: none"> • (none mentioned/captured)

Table 3. Directly sector-related challenges

B. Cross-sectoral Challenges

The below table shows cross-sectoral circularity challenges structured according to areas, which they are rooted in, as identified in the regional camps. They are roughly ranked, so that the first ones are the ones mentioned most often (e.g. during several camps) or stated most relevant by participants of camps.

The following circularity challenges in the textile sector were gathered in the regional camps by SAERG and LDC in 2018 (●), and complemented with input from regional camps by SYS, ARMSA, ADRNV, Vejle and the European camp in 2019 (●):

Regulatory barriers

- High focus on safety and hygiene, limiting ability to use taken-back waste and refurbished components as input into production. Some waste types are not allowed to be recycled at all.
- Lack of norms for utilisation of nutritive components recovered from e.g. wastewater plants as fertilisers in the agriculture
- Lack of norms e.g. for utilisation of reused water (improved with Oxygen and CO₂) in the irrigation sector for agriculture
- National legislation can be formed in a way that does not generate a need for new business models
- Problem of possession/responsibility with the ownership/sharing
- How to create incentives and support for implementation of circular economy solutions
- How to prevent frameworks and regulations on regional level to counteract sustainable development
- How to avoid obstacles to deposit-systems by standardization and mutualization of needs
- How to involve municipalities in needed environmental supervision, waste handling and reuse and purchasing
- How to enforce incentives or regulations to avoid inertia of the economic actors (e.g. in textile/shoe sector where there is a need for regulations to prevent brands to burn/destroy unsold or flawed stocks)

Technological barriers

- Quality of recycled materials, esp. from mixed materials, due to difficulties in separating the materials during the recycling process
- Companies lack sufficient technological skills and knowledge about circular economy and its potential role in the company
- Sufficient amounts of renewable energy
- Difficulty to match the many existing solutions to the right one for a company
- Techno-geographical problem: sending back to the producer can mean huge carbon impact depending on transport means and –distance

- The race to miniaturizing of IT components (in order to maximize performance) means extra difficulties to recycling
- Problem with sustainable materials (e.g. leather) which are less resistant than some artificial ones
- How to create more incentives that promote “positive environmental impact” solutions
- How to create the needed technological competence basis (e.g. in how to improve current linear business models)
- How to cope with high cost of new technologies, needed for a circular economy solution
- How to create a mobile R&D lab for specific start-up/SME needs
- How to develop IT solutions that can ease adoption of circular economy solutions
- How to individualise circular economy solutions, as solutions may not be replicable

Cultural/societal barriers

- Collaboration across sectors needed, and in networks, several arenas and meeting spaces
- Lack of understanding of the business opportunities, esp. at SME’s
- Business oriented notion where short-term gains are often in focus
- Circularity generally not included in the product development phase, as Circularity has not been recognized as strategic matter
- A change of attitude in management/corporate boards needed (via e.g. good business [model] examples). Difficulty to manage such change
- Existing habits and behavioural patterns of linear economy, incl. overproduction of consumer goods
- Circular solutions are seen as being high-cost and high-risk which decreases the interest in implementing them
- Green products are considered more expensive than traditional products which makes entrepreneurs worry about their ability to have a competitive product
- Low level of cross-sectoral cooperation and cooperation with science regarding circular solutions – essentially, there’s no environment for circular economy and known eco-system
- Current lobbying: very big companies influence people towards specific states of mind
- Educating people in general to the benefits of circular economy, as well as employees.
- Lack of punishment on some wasteful value chains (This situation does not incentivise e.g. SMEs to change their habits)
- How to increase circular economy awareness at consumer level – communicate consequences of choosing a “circular product” versus a “linear product”
- How to alter consumer mindset – so they are not only looking for the cheaper option
- How to create an indicator of “circularity of a product” (such as what currently exists for bio-products or healthy products) in order to incentivize the consumer
- How to improve company knowledge of circular economy and sustainable development goals
- How to improve cross-sectoral cooperation/synergy
- How to better disseminate best practice circular economy solutions – to company & public decision makers

- How to change cultural habits of actors (suppliers, transport, buyers, producers, users)
- How to improve eco-conception upstream, as entrepreneurs can spend much time and effort to make linear business models more circular. Instead it is easier to design a circular model to begin with
- How to alter company prejudice that costs are higher than incomes when dealing with circular economy (incl. considering sustainable development goals)
- How to change design thinking that cheap equals low quality (e.g. for plastics)

Market failures

- Lack of value networks, rather than value chains
 - Non-integration of environmental costs (leading to virgin materials being cheaper than recycled ones. Some products are too cheap to be recycled)
 - Asymmetric information and transaction costs in recycling & re-use markets vs. in classic markets
 - Lack or low level of transparency towards customers
 - Conflicting interests (e.g. health vs. environmental interests regarding recycled materials)
 - Non-sufficient infrastructure solutions for collection, sorting and recycling of materials, thus lack of recycled materials available
 - More refund systems (private and public), small- and large-scale -> specific in each sector
 - Funding and investments in R&D, start-ups and business development
 - More dedicated models of financial instruments (e.g. Green bonds) & public procurement
 - The consumer is not enough environmentally aware and there is a lack of education and information on the subject
-
- How to lower the financial prerequisites of setting up a circular solution – investments can be >€100k for machines and to setup a supply chain
 - How to improve focus on reuse and revalorisation of waste, instead of recycling
 - How to associate various circular-economy actors to mutualise their needs – e.g. create a “syndicate” for circular economy actors to integrate and have more weight to negotiate with great brands, governments etc.
 - How to engage the great brands in circular economy, as it is difficult even with a cost saving model
 - How to improve commercial and organisational support of start-ups/SMEs (tools, consultancy, case collection for inspiration, R&D cost, loans etc.)
 - How to best test and implement “good on paper” circular economy solutions

One camp in 2018 suggested five (partially other) cross-sectoral challenge areas and made a ranking of those areas themselves. This ranking was:

1. Perception/Lack of overview over (or awareness of) cross-sectoral eco-systems & players and their offerings, at various scales: The problem according to the participants was that they might have an idea/solution, but they lack the awareness of the players that could help them or benefit from the solution they propose.
2. Legal environment & competitiveness: Although regulation can currently be deterrent to some activities, it should be an accelerator to circular economy in order to allow competitiveness.

Indeed, the financial issue has been appointed as crucial for the development of new economic models. Having an incentive regulation could render circular economy more competitive and motivate other SMEs to join the club.

3. Geographic proximity: Participants from SMEs argued that there is a lack of partners, recycling facilities and recollection points in the areas surrounding the SME, and a resulting lack of available synergies at the local level. This is hindering their capacity to develop new circular value chains.
4. Mind-set: Even if some solutions are developed to promote circular economy, one major problem is the mentality of the players/ users/ consumers, which can hinder the adoption of circular value chains. There is also a lack of long-term visions from the linear SME which jeopardizes the capacity to build long-term relationships based on the circular economy. There is indeed a need to educate people towards circular economy.
5. Communication: At the scale of the whole value chain with suppliers, clients, consumers, users, transports, etc. This communication is crucial in order to improve the design of products with a circular concept. Some barriers can remain between players who do not use the same vocabulary (for instance between various industrial sectors). It is necessary to establish a better communication to implement efficient solutions.

Another Regional camp, also held in 2018, derived additional areas, they refer to as follows, incl. examples:

- Environmental culture, Lack of green education of customers. Low environmental culture of buyers.
- Attitudinal, e.g. Perception of circular business model as high business risk. SMEs do not have time for looking for new business model/ innovation. Concentration on today's business/ lack of strategic planning.
- Operational, Lack of infrastructure for CE solution. Lack of virtual platforms for information/knowledge exchange between partners / cross-sector co-operations.

In continuation of this, a camp in 2019 had another take on areas, however, these contained some of the previously mentioned areas:

Financial barrier:

- High cost of „green” innovation (investment cost)
- Lack of financial resources for R&D (high cost of R&D)
- High upfront costs of investment and the anticipated pay-back period
- Lack of financial resources to test and implement new technologies and business models
- Lack of financial resources to establish and manage a recycling scheme

Legislation and government support:

- Lack of effective legal solutions
- Existing law in Poland does not allow implementation of certain circular economy solutions in enterprises
- Lack of the administration support – the principle of green public procurement is not used
- Legal ecosystem - does not generate needs for change of business model
- CE support system do not exist/lack of financial support

Environmental culture:

- Low environmental awareness culture of consumers (lack of “green” education)

Structural:

- Low level of cross-sectoral cooperation/synergy
- Low level of cooperation between businesses and scientific environments
- CE ecosystem cannot work
- Access to finance and suitable sources of funding

Technological:

- Lack of technological skills
- Low level of competences/lack of design process knowledge
- Lack of information on how to change manufacturing processes/rebuild & redesign product
- Lack of knowledge/skills on how to add value to an existing product thanks to CE solutions (e.g. use unsold food product as raw material for another product, increasing its added value)
- High cost of new technologies

Market:

- Market is not ready for new green solution
- High price sensitivity of customers - looking for cheaper products rather than „greener” ones
- „Green” products are perceived as more expensive
- High competition on retail market – price not quality (e.g. „green”) of products
- Market pressure from raw material suppliers

Attitudinal:

- Perception of circular business model as high business risk
- Concentration of today business/ lack of strategic planning
- SMEs do not necessarily have time to look for new business model/ innovation
- SMEs do not necessarily see business opportunities in circular economy – CE as solution for big player / lack of knowledge about the benefits of the circular economy
- Lack of information sources which will help build new business opportunities

Operational:

- Lack of infrastructure for CE solutions
- Lack of virtual platforms for information/knowledge exchange between partners / cross-sector cooperation

All the above areas can be categorized under the previously mentioned four areas – Regulatory, Technological, Cultural/Societal, Market failure – and thus these are used for the following overview of cross-sectoral challenges shown below in sum-up table 4.

A third camp, both in 2018 (●) and 2019 (●), identified the below generic challenges encountered in all industrial sectors:

- Financial challenges – financial effort needed to adopt and implement circular economy solutions; low profitability, need of fiscal incentives for companies that put materials back into circulation or that use biodegradable materials, which develop and assimilate RDI solutions (to be introduced by national legislation, such as deductible VAT)

- Human resources – experts needed to assist the technology change, lack of skills in Circular Product Design and product fabrication (to be attracted internally or externally) – need for investment and support programs in eco-design and eco-innovation
 - Technical difficulties in adopting CE technologies, issued from transposing national legislation
 - Resistance to change – mentalities and old habits that hardly change – need for incentives or subsidies to determine the change and to support it financially
 - Need for ICT solutions to ease the adoption of EC solutions
 - Lack of visibility in the region/country for EC Adopters – lack of best practices dissemination (SMEs implementing CE solutions) across companies and public decision making
-
- Financial challenges – financial effort needed to adopt and implement circular economy solutions; low profitability, need of fiscal incentives for companies that put materials back into circulation or that use biodegradable materials, which develop and assimilate RDI solutions (to be introduced by national legislation, such as deductible VAT)
 - Human resources – experts needed to assist the technology change, lack of skills in Circular Product Design and product fabrication (to be attracted internally or externally) – need for investment and support programs in eco-design and eco-innovation
 - Technical difficulties in adopting CE technologies, issued from transposing national legislation
 - Resistance to change – mentalities and old habits that hardly change – need for incentives or subsidies to determine the change and to support it financially
 - Need for ITC solutions to ease the adoption of EC solutions
 - Lack of visibility in the region/country for EC Adopters - lack of best practices dissemination (SMEs implementing CE solutions) across companies and public decision making
 - Need for educating the population and the final consumer – responsibility both in action and as buyers, in choosing environmentally friendly solutions

It can be noted that the above-mentioned generic cross-sectoral challenges of “mind-set”, “attitudinal”, and “resistance to change” seem to be of the same character and are mentioned particularly in several Regional Camps.

The subsequent table summarizes the cross-sector related challenges captured in the Regional Camps in 2018 and 2019. They are to a certain extent selected from the comprehensive number of above bullet points.

Cross-sectoral circularity challenges, separated into areas				
Year	Regulatory	Technological	Cultural/Societal	Market failure
2018	<ul style="list-style-type: none"> • High focus on hygiene limit use, e.g. for take-back and refurbished components • Lack of norms, e.g. for utilisation of reused water and wastewater nutrients in agriculture • National legislation can limit the need for new business models • Problem of possession/responsibility with ownership/sharing 	<ul style="list-style-type: none"> • Lack of quality of recycled materials, especially from mixed materials due to separation issues • Companies lack enough tech. skills and circular economy knowledge (e.g. as it can be difficult to match existing solutions to be the right one for a company) • More miniaturising of IT components makes more difficulty to recycle (incl. waste transport) • Sufficient amounts of renewable energy • Sustainable materials may be less durable than artificial ones 	<ul style="list-style-type: none"> • How to include circularity in product development phase, collaborate across sectors and understand business opportunities better (especially long-term gains) • Issue with existing habits and linear economy thinking – circular economy and green products are often considered high cost/risk • Low level of cross-sectoral cooperation (incl. with scientific field) • Need of education and incentives for circular economy benefits – also to alter big company lobbying 	<ul style="list-style-type: none"> • No integration of environmental costs in products, meaning that virgin materials are cheaper than recyclables • Lack of transparency toward customers and of value networks • Conflicting interests in impacts, e.g. health vs. environment of recycled materials • Not sufficient infrastructure for collection, sorting and recycling of materials – not enough recycled material. • Not enough deposit systems (private and public) • Not enough funding and investments in R&D • Lack of models for financial instruments and public procurement

	Regulatory	Technological	Cultural/Societal	Market failure
2019	<ul style="list-style-type: none"> • How to avoid inertia from economic actors (e.g. to prevent destruction of unsold or flawed stock) • How to avoid obstacles to deposit systems, e.g. by standardisation • How to avoid that regional level regulations counteract sustainable development • How to involve municipalities in needed environmental supervision, waste handling and reuse, and purchasing • How to create incentives and support implementation of circular economy solutions 	<ul style="list-style-type: none"> • How to create a mobile R&D lab for specific SMEs • How to make circular economy solutions fit companies (easier with help of IT solutions) • How to create the needed technological competence (e.g. on how to improve linear business models) • How to cope with high cost of new technologies needed for circular solutions 	<ul style="list-style-type: none"> • How to improve circular economy awareness at consumer and company level, e.g. a circularity indicator can be introduced • How to change habits of actors (suppliers, transport, producers, buyers, users) • How to avoid that focus is only placed on making linear business models more circular – instead it's easier to design a circular model from scratch • How to make companies understand that circular models are good business • How to better disseminate best practice solutions – to company & public decision makers 	<ul style="list-style-type: none"> • How to lower financial prerequisites of setting up a circular solution (e.g. machines and setup of solution can cost >€100k) • How to mutualise circular economy actors, e.g. create a syndicate and negotiate with big brands, governments etc.) • How to engage big companies in circular economy, it can be difficult even when cost savings are evident • How to improve status of funding in R&D and business development, e.g. as better tools are needed • How to improve focus on reuse and revalorisation of waste, instead of recycling



Table 4. Directly cross-sector related challenges

C. Relation to the Region's Smart Specialization Strategy (S3) – 2018 camps only

Overall, there was a diverse degree of information on this in the analysed Regional Camp reports. One of the RIHs, SYS from Paris, reported on this by explaining that their region, Ile-de-France, focuses on health and well-being, transports and mobility and last environment and energetic efficiency in their smart specialization strategy. These focal points have then been the starting point for their selection of domains for strategic innovation in cross-sectorial development, where the region ended up with the following five domains:

- Engineering of complex systems and software
- Digital creation
- Smart and decarbonized vehicles
- Eco-construction high environmental value
- Medical devices

Another RIH, ARMSA, reports their Mazovia/Warsaw region's focus areas are:

- Safe food – i.e. measures to increase availability and development of high quality, sustainable food products that are safe for both the final consumer and the environment throughout the production and distribution chain
- Quality of life – i.e. technological and organisational solutions used to provide social services, in particular in the field of education, health, safety, work and leisure time and increase attractiveness of the region as a place to live.
- Diversification – understood as an extension of the offer of creating services synergistic relationships with various sectors of economic activity

For ADRNV, Circular Economy is considered one of the transversal/horizontal priorities of the region within the S3 strategy, together with

- energy efficiency,
 - climate change and
 - key enabling technologies.
- Moreover, the C-Voucher targeted sectors are included in the Regional S3

GAIN's Circularity Challenges (CCs) are directly linked with Challenge 1 "The innovative management of natural and cultural resources" and Challenge 2 "The future industrial model of Galicia" of the Galician RIS3, and a solution to the identified CCs would contribute directly to the future industrial model of the region.

3.3 Reflection points after the camp

This section summarizes the reflections made by the camp organizers about the execution of the regional camps in 2018 (●) and 2019 (●).

Aspects of camp preparation and execution that went well, in 2018 (●) and 2019 (●):

- The group workshops went especially well with cross-sectorial groups that have been able to list all of the challenges, from the more specific to the most cross sectorial.

- The organisation with a number of 12 SME with various players (designers, consultants) has allowed to study each case individually, allowing in depth analysis of the specific problems of each SME.
 - Presentations were dynamic and opened to questions from the audience, allowing dialogue all along the camp.
 - The fact that some SME that came are current partners allowed facilitating the dialogue and the assessment of the challenges.
 - Allowing time after the workshop for the participants for “networking” activities at the end of the workshop in order to let them meet and discuss about potential collaboration.
 - Good organization of camp
 - Good cooperation with regional partners
 - Clusters’ involvement
 - Research organisations’ involvement, mixed with business representatives
 - CE expert presentation & dialogue
-
- Relevant number of SMEs from different industrial areas, this allowed debates at sectoral and cross-sectoral level
 - Participants were not divided into specific groups at the beginning of the camp, which allowed them to create groups that were from the start cross-sectoral
 - Enough time for participant networking was used, this made it possible to have 1-on-1 talks with C-Voucher partners
 - Participation of Niki Bey, although on videoconference, made the event European with participant discussions in English
 - Good ratio between camp registrations and actual participants
 - The offices of Systematic, where the French camp was held, allowed to have a plenary session with all participants; then to divide them into 3 groups in 3 different rooms
 - Participants were interested in participating in the event, especially in terms of meeting other entrepreneurs and to exchange circular economy ideas/advice
 - Most of the SMEs that attended the regional camp were interested to apply the next call for proposals, and desired information on when the C-Voucher call would open
 - Representatives of different sectors involved (Clusters, Ministry, SMEs, Research organization)
 - Clusters involvement – following the collaboration contracts signed with 5 of the clusters in the North-West Region, which act in the C-Voucher targeted sectors, the promotion for the Regional Camp was more targeted and the needs of the cluster members, SMEs and R&D, were better mirrored in the circular challenges inventory. Both cluster management representatives and SMEs were well represented at the Regional Camp 2nd edition 2019, some of them attracting also member universities and research institutes (RTOs), which could potentially act as Disruptors for the next Circularity Programme and which contributed to the discussions and to the interaction with the SMEs in need for circular solutions.
 - Sectoral representation: 4 out of the 5 sectors were represented and debated at the meeting: agri-food, manufacturing, water and textile. The representative of the health sector could not be present but individual meeting with the only Romanian EIT Health representative took place two days later, health challenges being also included

- Circular Economy expert – the only Romanian institute for circular economy was also present with two members representative, the president being the only Romanian representative to the EU Circular Economy Coordination Group set by the European Commission, being currently the coordinator of the national initiative targeting the elaboration of the National Strategy for Circular Economy 2030. She had valuable inputs at the challenges debate and also interactions with the SMEs present at the Camp
- Local administration – Cluj County Council structure dealing with agri-food logistic was represented at the meeting by the development director, which was interested in circular solutions and also contributed with useful inputs for the participant SMEs regarding the relation with local administration in various issues dealing with water and agri-food
- The 6 Circular Solutions served as best practices and inspiration for ideas to be eligible and to be prepared in view of the 2 kind of C-Voucher calls to be followed this year: Adopters (I0 and Circular (II)); nonetheless, some of the ideas raised controversy (such as ethics and safety regarding ImseVimse, 3D tool for textile waste as solution that already exists on the market, price and effectiveness of the PYXO dishes)
- DiR presence – the presentation of the 6 circular solution was made by the Designer in Residence hired by ADRNV, who was able to provide extended details based on the constant interaction with the other DiR who provide assistance and coaching to each one of the 6 circular SMEs

Aspects of camp preparation and execution that may be improved for the second round of camps:

- Better coaching at the beginning of the workshop to explain to the SMEs what kind of challenges they need to list (for example with followed-up preparatory work before the workshop).
- Using pre-filled worksheets about needs and challenges, collected from SMEs before the camp and analysed and debated at the Camp (as preparatory work)
- Pre-established listing of challenges in order to list them more efficiently.
- Regarding the presentations: it was unclear what exactly means the C-VoUCHER “replication programme”: is-it scaling-up, copying, reusing a proven concept, resuming the development of an idea, ... ?
- Short recruitment time
- Low level of interest in the subject among entrepreneurs despite the recruitment action conducted directly or by our partners, such as clusters, we were able to gather a small number of entrepreneurs. The attempt to organize the second round of the camp in cooperation with the Foundation of Small and Medium-sized Enterprises resulted in even smaller number of applications. Our main challenge is to work with entrepreneurs to get them interested in the CE concept and the development of new forms of doing business.
- The manufacturers didn't show up for the camp/discussion, so the input above is from actors from the rest of the value chain. Right from designers, through textile collectors, to national NGO's.
- Bring more best practices examples which fit into Circular Economy
- Attracting also public representatives to the camp
- Lack of time to go deeper into the value chain of each participants
- No SME coming from the Blue Growth sector (in one camp)

- Organisation in July implied difficulty for some SMEs to attend (holiday season)
- Not satisfactory involvement of Mazovian clusters (not all are equally involved)
- Low level of interest in the subject among entrepreneurs despite the recruitment action conducted directly or by Mazovian clusters and personal contacts of ARMSA team
- Due to the specificity of Circular Economy only the “tailor-made” activities may be successful (thoroughly selected info channels, direct contacts and selection with potential proposers should be more fruitful than the popular internet “wide-spread” information (e.g. by Facebook) – it may be helpful only if the dissemination of the general information on CE is concerned. Concrete CE solutions dedicated to SMEs require to a large extent personal involvement of the partner organizations (ARMSA) and local DIR supported by regional clusters delivering contacts to relevant SMEs. Only such collaboration between ARMSA and clusters may be fruitful

Additional remarks (optional):

- Cost of experimentation was mentioned at one camp as a general challenge of SMEs
- Increased stress on energy systems calling for sufficient renewable energy can be considered a systemic background challenge, relevant for any circularity solution
- Circular Economy concept is rather new to the participants, but fits into the environment protection rules and concepts, the discussions become more familiar
- Circular Economy concept was rather new to some participants
- The 6 circular solutions already included in the Circular Programme presented in detail was considered useful and inspiring. The presentation of the conditions of the Adopters Call to be launched soon made the meeting more focused, the needs of the participants SMEs being analysed in relation with solution to be prepared / solved in the future using C-Voucher vouchers
- The dialogue was fluent and natural, participants were active, both in the plenary session and when analysing the potential challenges and adding new ones
- The participants stressed that it is important to elaborate on good proposals of CE solutions and on the related knowledge/experience. Therefore, ARMSA team decided to combine several complementary thematic blocks within one event (Challenges elaboration, info on calls, good CE examples and practices workshop)

4. Process and conclusions from the first European Camp

4.1 First camp summary

The European Camp was held on September 6th 2018 in Denmark (arranged by MADE, at the Technical University of Denmark, DTU). All partners were present, including target companies and clusters, in total 26 participants. A pre-recorded presentation from ARLA FOODS AMBA representative was played as well.

Overall aim of the European Camp was to specify the challenging areas in the pre-selected industries, in order to structure the scope of the SMEs Open Call. Just as for the Regional Camps, the Circularity Challenges Identification Methodology (CCIM) offered elements and procedure of the day.

Main elements of the camp were:

- Participants were grouped together after the C-VoUCHER sectors: Textile, Manufacturing, Maritime (Blue Growth), Health, Agro-Food
- All Regional Innovation Hubs gave a template-based status from their Regional Camps held prior to the European-level meeting
- In the first part of the workshop, groups determined main sector-specific CCs relevant on the EU level and presented the outcomes of the discussions
- After lunch, the second part of the workshop was introduced by explaining the eight Strategic Circularity Building Blocks (CEBBs) described in the Technical Annex and in the Methodology document (CCIM). Using a provided A3 format worksheet (see photo attached), groups then established links between their Circularity Challenges and the CEBBs.
- In the third part of the workshop, each group made and presented a prioritized list of Circularity Challenges (linked with CE Building Blocks) relevant in their sector at EU level.
- Parallel to the five group presentations, main challenges were collected as a table on a white board and discussed in plenary

This sector-divided essence of prioritised Circularity Challenges on European level is the key outcome of the European Camp and is given in below table.

Since the delivery of the first version of this deliverable (D3.1.), it was mentioned that the identified challenges were very general, and it was suggested that for future camps, the project partners and task leader(s) should focus on identifying more specific challenges. More specific challenge identification will help provide better solutions and identify the most relevant SMEs for Open Calls (both Circularity and Adopters).

Maritime (Blue Growth)	Health	Textile	Agrofood	Manufacturing
Lack of interdisciplinary action	Lack of medical staff	Collected volume not sufficient for economic viability	Avoid food waste along value chain	Integration of end-users
Lack of technological overview	Unused/unusable pharmaceuticals, product life cycle	Increase in times clothes are being reused	Enable cascading strategies	Quality of recycled materials
Impact of drinking water production	Medical equipment	Lack of cooperation and exchange of knowledge	Create transparency and trust throughout value chain	Include all environment/economy/social, define the value for all beneficiaries
Water quality monitoring	Sports-related	Lack of knowledge about how textile could be used across sectors	Avoid packaging	Map of who and how to collaborate
Marine pollution	Social impact	Resources used to make clothes + resource efficiency	Primary producers	Recycling of process
Fossil fuel → safe marine energy	Lack of knowledge			Return on investment, show business opportunity examples
Reverse logistics	Lack of awareness			
New and multipurpose services				
Reduce emissions				
Uptake of energy efficient digital technology				
Design for CE (feasibility)				

Table 5. Prioritised circularity challenges

During the discussion, a list of additional “higher-level” points to remember was collected. These were

- Waste hierarchy
- Life cycle assessments
- A label for Circular Economy

4.2 Second Camp Summary

The second European Camp was held on September 11th 2019 in Stockholm, Sweden (arranged by MADE and FORCE, at the premises of SAERG). Present were project officer from EASME, Virginie Perron, along with all partners except for NEUCA, in total 22 participants.

Main elements of the camp were similar to the ones in the first camp:

- Arla gave a presentation on “Circularity perspectives and barriers for continuing the recycling journey”
- Participants were divided into groups by C-VoUCHER sectors: Textile, Manufacturing, Blue Growth, Health, Agro-Food
- The RIHs that had executed regional camps during the summer of 2019 presented their findings from those camps
- In the first part of the workshop, groups determined main sector-specific CCs relevant on the EU level and presented the outcomes of the discussions
- After lunch, the second part of the workshop was introduced by explaining the eight Strategic Circularity Building Blocks (CEBBs) described in the Technical Annex and in the Methodology document (CCIM). Using a provided A3 format worksheet (see photo attached), groups then established links between their Circularity Challenges and the CEBBs.
- In the third part of the workshop, each group made and presented a prioritized list of Circularity Challenges (linked with CE Building Blocks) relevant in their sector at EU level.
- Parallel to the five group presentations, main challenges were collected as a table on a white board and discussed in plenary

Appendix A – CCIM report

H2020 project C-VoUCHER

Circularity Challenges Identification Methodology

A part of Deliverable D3.1 “Catalogue of Circularity Challenges, including Circularity Challenges Identification Methodology”

Contents

1	Background & Timeline	2
1.1	Background	2
1.2	Timeline	2
2	Methodology	2
2.1	Regional camps	2
2.1.1	Prior to camp	2
2.1.2	During camp	2
2.1.3	Subsequent to camp	2
2.2	European camps	2
2.2.1	Prior to camp	2
2.2.2	During camp	2
2.2.3	Subsequent to camp	2
	Appendix	2

Please note:

- Background reference document is “C-VoUCHER_Technical Annex_Section 1-3.pdf” (70 pages), referred to as “Technical Annex”.
- Just as in the Technical Annex, the terms “Domain”, “Industrial value chain”, and “Sector” are used synonymously, and similarly “Circularity” and “Circular Economy”.

Contributors:

Philippe M. Stotz & Niki Bey (DTU c/o MADE), Olga Skalska (FBA), Merete Nørby (MADE)
v4, 19 Sept. 2018, updates after European Camp on 6 Sept 2018, incl. final timelines/dates

1 Background & Timeline

1.1 BACKGROUND

This document describes contents and application of the “Circularity Challenges Identification Methodology” as part of Task 3.1 (in short: “T3.1”) which is the first task of Work Package 3 (“WP3”) within the H2020 project “Circularize ValUe CHains across European Regional Innovation Strategies – C-VoUCHER”.

Work Package 3: Circularity Challenges prioritisation and regional CE Champions identification

WP3 has as overall objectives to identify and prioritise Circularity Challenges (abbreviated “CCs”) in 5 selected industrial value chains and to identify Circular Economy (CE) Champions at regional level, which will address the prioritised CE challenges.

The 5 selected industrial value chains (or sectors) of C-VoUCHER are:

- Manufacturing,
- Agro-Food,
- Maritime Industries (formerly called: Sea Industries),
- Textile and
- Health

WP3 consists of five Tasks; T3.1 - T3.5. All tasks are performed in two identical time blocks, spanning over project months 1-11 and 15-24, respectively (see Gantt chart in Technical Annex, p. 45).

During each block, activities are:

- Circularity Challenges (CCs) are defined (Task 3.1),
- CE champions are identified via a Circularity Open Call (Task 3.2),
- Proposals are evaluated and selected (Task 3.3) and
- A circularity prototype-athon is held (Task 3.4)
- Leading to 12 voucher agreements to be awarded (Task 3.5).

All 13 C-Voucher partners are allocated to contribute to WP3 with between 1.0 and 8.3 Person Months.

Task 3.1: Circularity Challenges identification in prioritised sectors (M1-4/M15-17)

Task leader for Task 3.1 is MADE (from Denmark), and planned contributing partners are in particular:

- all Regional Innovation Hubs (RIHs; being GAIN, ADRNV, SAERG, SYS, ARMSA, and TRNGL) as well as
- all Clusters & Corporates

(refer to C-VoUCHER Technical Annex, pages 49-51, for details).

The principal objective of Task 3.1 is to identify sectoral/regional Circularity Challenges (CCs) in the 5 selected industrial sectors. A Circularity Challenge can be understood as an innovation barrier typically encountered in CE initiatives. This document describes, in Chapter 2, the methodology to be applied in the process of identifying the Circularity Challenges.

Task T3.1 has the Deliverable D3.1 “Catalogue of Circularity Challenges, including Circularity Challenges Identification Methodology”. The present document, in its final form, will be part of that deliverable.

The core of the challenge identification and definition process are two separate, consecutive types of camps (workshops) in each time block:

The first type of camp are regional camps.

They are arranged on regional level in collaboration with the respective clusters, organized by the respective Regional Innovation Hubs (RIHs). This will lead to a total of 12 regional camps across Europe (six camps x 2 time blocks). The outcome of those camps – a list of Circularity Challenges from each camp – is communicated to MADE (task leader) by the RIHs in a Conclusions Report on sectoral challenges at regional level.

The second type of camp are European camps.

They are organized by MADE on European level and bring all participating stakeholders together (SMEs, RIHs, Corporates). This will lead to a total of 2 European camps (1 camp x 2 time blocks). The participating SMEs are grouped in accordance with their sector, each led by the respective corporate partner (Manufacturing ☒ MADE; Agro-food ☒ GAIN together with ARLA; Maritime Industry ☒ SYS together with GSF; Textile Industry ☒ SAERG together with DAFI, and Health Industry ☒ coordinated by ARMSA together with NEUCA). Focus of each European camp is the refinement of the Circularity Challenges defined during previous regional camps. The challenges are mapped and overlaps defined. The overlapping challenges are prioritized in accordance with their relevance to the participants of the camp.

1.2 TIMELINE

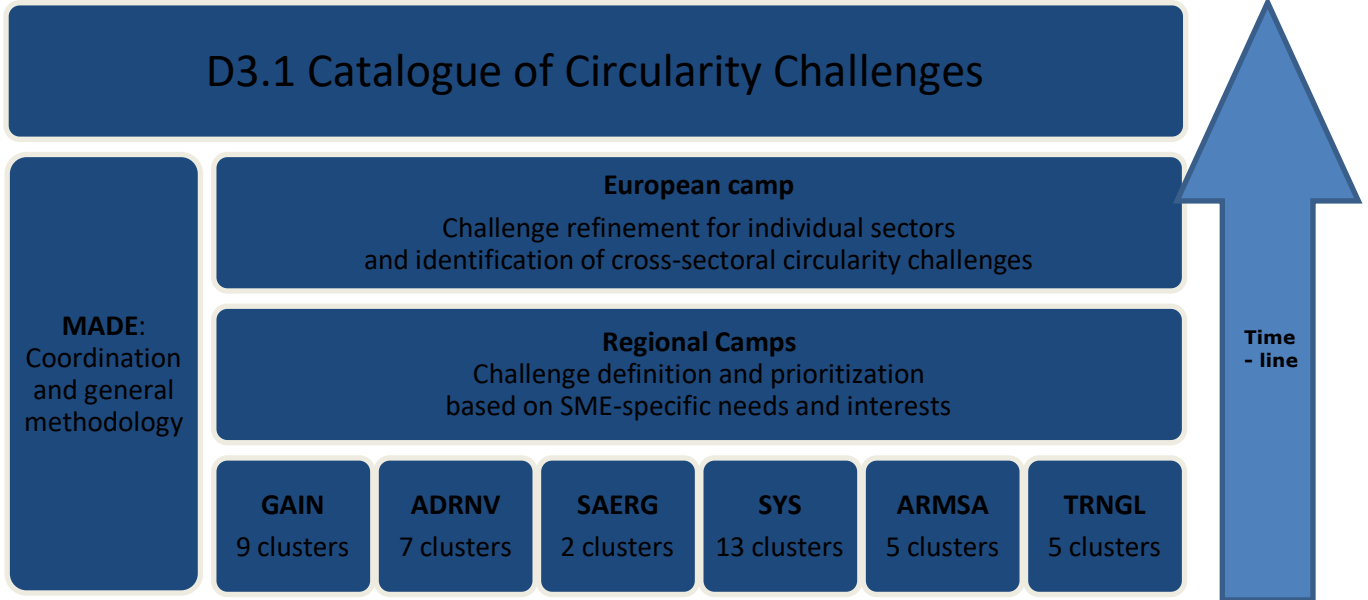
Official C-VoUCHER project start month (M1) was April 2018 (Technical Annex p.51). After adjustments discussed at the Kick-off meeting, Table 1 gives an overview of the activities and timeline of T3.1. Detailed activities are described in Chapter 2.

Activity	Time/period
First draft of CC Identification Methodology released to RIHs	May 7, 2018
Second draft of the methodology (this document) released to RIHs	May 11, 2018
Feedback from RIHs on methodology at Kick-off meeting	May 14/15, 2018
Third draft sent to RIHs (incl. input from Kick-off)	May 23, 2018
Regional camps take place	all June 2018
Each RIH sends a Conclusions report to MADE	July 4th
European camp	September 6, 2018
Deliverable D3.1 deadline	End-September 2018

Table 6. Milestones of Task 3.1 timeline

2 Methodology

This chapter describes the approach taken in the camps, including required preparation of the camp participants, camp activities and dissemination of the results (internally, within the project consortium).



2.1 REGIONAL CAMPS

The regional camps are organized and led by the six RIHs (GAIN, ADRNV, SAERG, SYS, ARMSA, TRNGL) independently. Participants may be member SMEs of the respective regional clusters or other companies and representatives deemed relevant by the RIH. Aim is to be able at each Regional Camp to collect CE challenges from relevant participants. The RIHs are free to refine the suggested methods as long they serve to fulfil the objective of defining regional circularity challenges for each sector. A regional camp is expected to last one day.

2.1.1 Prior to camp

As preparation, the participants/SMEs conduct an initial individual self-assessment of their value network as described below. Target is to make the acquaintance with CE, with the possible paths to circularity and with the barriers to be expected. In a first step of the self-assessment, each SME chooses a specific example of a high-running product, product group or portfolio. In a second step, each SME completes the 'Circular Flow Worksheet' for the chosen example, provided in the Appendix of this document (also available at:

https://www.ellenmacarthurfoundation.org/assets/design/Circular_Flows_Final.pdf and <https://www.circulardesignguide.com/resources>).

The worksheet gives an introduction to the technical and biological cycles in CE and consists of a brainstorm session on how those cycles may be relevant for the chosen product/portfolio.

The worksheet then works with two sections relating to circular design options:

1. Section on 'How might this be possible for my product?' and
2. Section on 'What would be needed or is standing in my way?'

A copy of the worksheet is provided in the Appendix of this document.

As inspiration, Table 2 gives an overview of generic barriers for moving towards CE (from (Ritzén and Ölundh, 2017)).

Financial	Measuring financial benefits of circular economy
	Financial profitability
Structural	Missing exchange of information
	Unclear responsibility distribution
Operational	Infrastructure/ Supply chain management
Attitudinal	Perception of sustainability
	Risk aversion
Technological	Product design
	Integration into production processes

Table 7. Generic barriers for moving towards CE (from Ritzén and Ölundh, 2017)

The results of the initial individual self-assessment should be summarized by the SMEs/participants in the Circular Flow Worksheet and should be part of the introduction of each SME at the regional camp. The six RIHs are responsible to organize and host the Regional Camps. This concerns practical issues such as the recruitment of participants (SMEs, others), booking of venue, catering and exact date (within given timeframe).

Tasks, times, and responsibilities prior to camp		
What?	When?	Who?
Booking of camp venue	(done)	RIH
Organize catering for the camp	(done)	RIH
Invitation/recruitment of SMEs and others, deemed relevant by the RIH	(done)	RIH
Finalize CC Identification Methodology	May 2018	MADE/DTU
Conduct preparatory exercises	Early June 2018	SMEs/participants
Prepare SME introduction incl. preparatory exercise results	Early June 2018	SMEs/participants

Table 8. Overview of pre-camp tasks

2.1.2 During camp

Please note: Camp activities depend highly on number and type of participants. The RIHs are asked to adjust the below accordingly (e.g. activities in plenary vs. in smaller groups), as they would know best, what activities etc. may be most effective. DTU/MADE are available for a preparatory dialogue.

Introduction:

- General introduction by RIH
 - o What's the objective of the camp?
 - o What are CCs in general?
 - o How is the objective reached?
 - o Overview of the day's program
- Introduction of the participants

- Company information such as sector, products, size, geographical dispersion (international supply chains and market for products)
- Results from the individual preparatory exercise/assessment – gathered in the template provided by MADE/DTU.

Main session:

Divide participants into sector panels

- Within the sector panels divide in groups of the same cluster, but not more than one representative per company.
 - Establish overlaps from the preparatory exercise
 - What proposals to move towards CE were established?
 - Which barriers were encountered?
 - Expand on the overlaps within the group
 - Brainstorm on other possibilities for a given product/portfolio to become more circular.
 - Are there any other challenges that become relevant? Are all generic barriers considered (Table 2)?
- Within the sector panels, collect all challenges (ideally on PPT/computer, alternatively black-/white board)
 - Rank in accordance with their significance – e.g. how often is a challenge mentioned? Can the company influence it directly, or not?
Challenges may be specified very detailed (e.g. if many, relatively similar challenges are identified) or rather broad (if many challenges are identified).
- One representative of the sector panel prepares a brief presentation of the prioritized CC to present to the full plenum.

Wrap-up (in plenum):

- The sector representatives present the prioritized CCs (few minutes each)
- The RIH collects the challenges (e.g. in a ppt file) and highlights the cross-sectoral CC (In addition to the ad hoc collection and discussion at the camp, this shall later be refined/ revised independently of the camp as part of the conclusions report)
- (Feedback survey)
- Farewell

2.1.3 Subsequent to camp

Each RIH prepares a Conclusions Report on the outcome of the regional camp. The report should at least contain:

- Identified sectoral challenges on regional level
(Expectable maybe 10+ challenges, but very difficult to foresee)
- Cross-sectoral challenges on regional level
(Examples of such challenges might be e.g. „no direct interest of customers“, “missing information exchange“, “Lack of appropriate regulation”)
- A discussion of the challenges and how they link to the regions’ Smart Specialization Strategies. (tech. annex p. 50: Standardized procedure to ensure the link between the

Challenges and the Smart Specialization Strategies of the regions.
<http://s3platform.jrc.ec.europa.eu/what-is-smart-specialisation->

Further, the report should contain feedback on the circularity challenges definition camp. This information will be used to enhance the method for the second time block (project months 15-24). Ideally, it includes feedback from both the RIHs and the SMEs. The latter could be done by a brief questionnaire filled out by the end of the camp.

T3.1 staff (MADE/DTU) will provide a template for a Conclusions Report, to be used by the Camp-hosting RIH, and Feedback Questions, to be answered by Camp participants.

Tasks and responsibility		
What?	When?	Who?
Conclusions Report on sectoral challenges on regional level	July 4 th	RIH to MADE
Method feedback to MADE	July 2018	RIH to MADE
Improve CE challenge methodology	Sept. 2018	MADE

Table 9. Overview of tasks after a camp

2.2 EUROPEAN CAMPS

The European-level camps are organized by MADE. Per time block, there will be one camp each. The camps are identical and are structured in five panels corresponding to the five sectors. Each panel is led by the respective industry partner (Manufacturing - MADE; Agro-food GAIN together with ARLA; Sea Industry: SYS together with GSF; Textile Industry, SAERG together with DAFI and Health Industry coordinated by ARMSA together with NEUCA).

Objectives:

- Sector-specific circularity challenges definition on European level
- Synthesis and refinement of the CE challenges as defined in the regional camps

2.2.1 Prior to camp

MADE is responsible to organize and host the European camps. This concerns practical issues such as the recruitment of participants (SMEs, others), booking of venue, catering and exact date (within given timeframe). The RIHs collaborate with MADE for the recruitment of participants, e.g. they disclose information on participants from the regional camps.

The camp itself is supposed to last one day, but it is suggested to invite for two days in order to accommodate traveling to and from the venue (e.g. dinner invitation for the first day, camp on second day – similar to kick-off meeting).

The RIHs prepare a short presentation based on their respective Conclusions Report. The presentations are part of the introduction to the plenum. MADE will provide a template to the RIHs for these presentations, as a common format, in support of participants' understanding.

No preparation is required from the participants (SMEs, others).

Tasks, times, and responsibilities prior to camp		
What?	When?	Who?
Selection/invitation of SMEs	starting June 2018	MADE/RIHs
Determination of suitable date	Done (6 Sept. 2018)	MADE
Booking of camp venue	Done	MADE

Organize catering for the camp + send out template	Done	MADE
Prepare presentation based on Conclusions Report	Before camp (done August 2018, sent out to partners)	RIHs

Table 10. Overview of tasks prior to a European camp

2.2.2 During camp

Introduction:

- General introduction by MADE
 - o What's the objective?
 - o How is the objective reached?
 - o Overview of the day's program
- Introduction by each RIH
 - o Present an overview of the Conclusions Reports

Main session:

Divide in sector panels

- The panel moderators – selected by the leading corporates & RIHs – introduce the CE building blocks as outlined in the Technical Annex, pp. 11-12. Each of the blocks is briefly described. (Hand-outs for the group work will have to be prepared (led by MADE/DTU), which include brief explanations of each CE building block).



Figure 2. Circular Economy building blocks (Technical Annex pp 11-12)

- Within the sector panels, divide in groups of the same cluster, but no more than one representative per company.
 - o Each group picks the four most relevant building blocks and briefly describes why they are relevant
 - o Brainstorm on how the SMEs/clusters could engage in each of the chosen building blocks
 - o Describe the barriers that could be encountered for each building block (ideally, address all generic barriers in CE implementation)
 - o Prepare a brief presentation, including:
 - Why were those chosen building blocks relevant and what challenges could arise in each?
 - Prepare a list of challenges in electronic form (ppt) (Template to be provided)
- Each group presents their building blocks/challenges to the sector panel
- The results are compiled by the panel moderators and prioritized in accordance with their number of appearance (could e.g. be done in a break).

Wrap-up (in plenum):

- The sector panel moderators present the prioritized CC (few minutes each)
- (Feedback survey)
- Farewell

2.2.3 Subsequent to camp

- MADE compiles the sectoral CCs (on computer/PPT) and highlights the cross-sectoral CCs
- MADE prepares D3.1 Catalogue of Circularity Challenges, including the used Circularity Challenges Identification Methodology (i.e. this present v4) – (updated prior to the first call) and makes it available for review by the project partners

Tasks and responsibility:

What?	When	Who
Integrate feedback in methodology (if applicable)	Right after camp	MADE
D3.1 CC catalogue and methodology DRAFT	20 Sept. 2018	MADE
D3.1 CC catalogue and methodology REVIEW	TBD	all
D3.1 CC catalogue and methodology DEADLINE	TBD	MADE

Table 11. Overview of tasks after a European camp

References

Ritzén, Sofia, and Gunilla Ölundh. 2017. "Barriers to the Circular Economy – Integration of Perspectives and Sectors." *Procedia CIRP* 64. Elsevier B.V.: 7–12. doi:10.1016/j.procir.2017.03.005.

Appendix

A.1 WORKSHEET “CIRCULAR FLOWS”, 4 PAGES

Developed by Ellen MacArthur Foundation (EMF), 2016

Downloaded in April 2018, from https://www.ellenmacarthurfoundation.org/assets/design/Circular_Flows_Final.pdf

The Circular Flows worksheet shall be filled in by the participants of a Regional Camp.
Ideally, participants fill it in before the Camp and take it along.

For discussion purposes within C-VoUCHER, prior to Camps, examples for other possible preparatory exercises or actual camp exercises are listed below:

- Map individual material flows (Material Flow Analysis MFA) highlighting non-circular flows
E.g. use of virgin materials, landfilled /incinerated production waste, products with unclear/undefined end-of-life
- Fill out Business Model Canvas highlighting aspects that are non-circular, retrievable from:
<http://circulareconomytoolkit.org/Assessmenttool.html> A useful tool, which highlights improvement potentials - could be used to group participants for Regional camps.
- Make a CE readiness assessment <http://www.matche.dk/en/>
Readiness of an ‘Organization’ measures the internal business capabilities of your company to be able to implement new concepts, such as the Circular Economy.



Circular flows



At its core, a circular economy means that products no longer have a life cycle with a beginning, middle, and end, and therefore contributes less waste and can actually add value to their ecosystem. When materials stop getting used, they go back into a useful cycle, hence the circular economy. Imagine what would happen if everything was designed to be restorative and regenerative?

STEPS

- 1 Download the Circular Flows Worksheet and get acquainted with the different ways of being circular. At a glance, which of these loops feels most relevant or achievable for what you are designing? If you are working with an existing product or service, consider its current position within the flows.
- 2 Now dive deeper, and go through each loop as a lens for your new product or service. For each loop, ask yourself: "What would it take for this to work for my new product or service idea?" and "What's standing in my way from this working now?"
- 3 You may notice that there is a pattern as you go from the inner loops to the outer loops: the inner, tighter loops preserve more value and embedded energy.
 - Reused goes directly back to your users
 - Refurbished comes back to you (as the service provider)
 - Remanufactured goes through the manufacture process
- 4 Ask yourself, can you try to stay in the inner loops? What would I be able to affect right now? Once you feel like you have a starting point, try the Circular Opportunities activity or the Service Flip which might prompt different ideas.



WORKSHEET

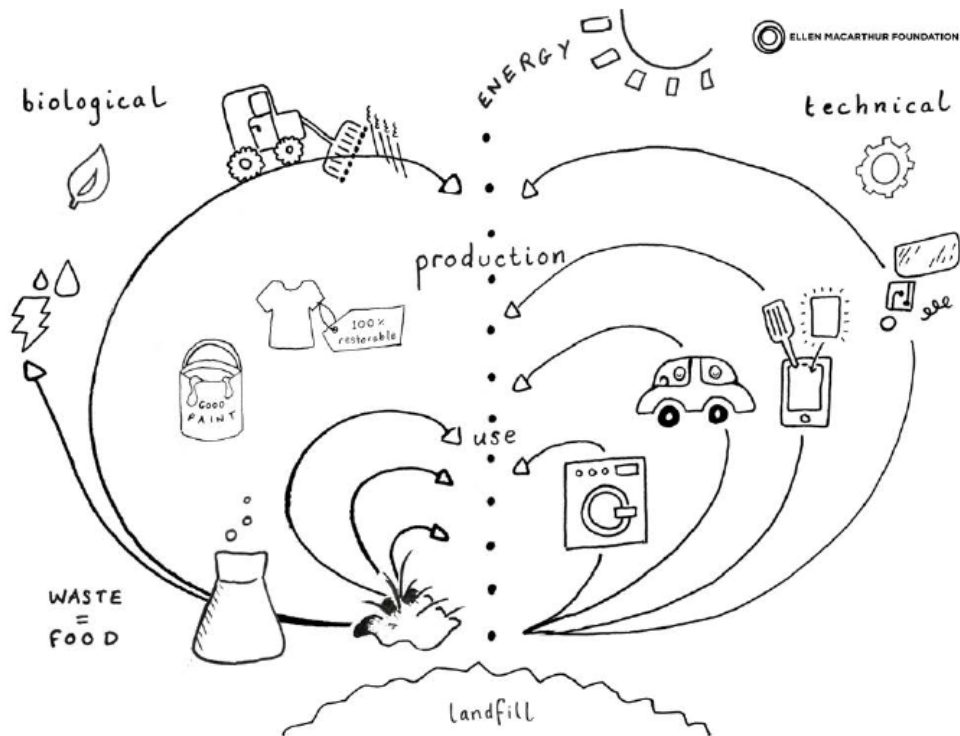
Circular flows



A4

Get acquainted with the different ways of being circular. At a glance, which of these loops feels most relevant or achievable for what you are designing?

www.circulardesignguide.com



IDEO



There are many ways to design for circularity. The left side is when you design for a biological cycle, whereas the right side represents when you design for a technical cycle, meaning man made materials.



WORKSHEET

Technical Cycle



Brainstorm some of the cycles that your product or service could be designed for.

HOW MIGHT THIS BE POSSIBLE FOR MY PRODUCT?

WHAT WOULD BE NEEDED OR IS STANDING IN MY WAY?

Copyright © Ellen MacArthur Foundation 2016

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1 IT GETS REUSED

You extend how long a product or material stays in use. This might mean offering a product as a service, as in car sharing schemes.

e.g. ZIPCAR

2 IT GETS REFURBISHED

You design a product that can be easily repaired or upgraded to prolong use.

e.g. PATAGONIA

3 IT GETS REMANUFACTURED

Your product returns to the manufacturer after use to have any necessary components replaced before reentering the market

e.g. RENAULT

4 IT GETS RECYCLED

You design a product that is made from pure materials, standardised to be recycled and returned to a raw natural state.

e.g. PET PLASTICS

IDEO





WORKSHEET

Biological Cycle



Brainstorm some of the cycles that your product or service could be designed for the biological cycle

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www.circulardesignguide.com

IDEO



HOW MIGHT THIS BE POSSIBLE FOR MY PRODUCT?

WHAT WOULD BE NEEDED OR IS STANDING IN MY WAY?

1 MATERIALS GET CASCADED THROUGH OTHER APPLICATIONS

Your product allows the biological materials to get cascaded through other applications - this means that more of the embedded value and energy can be extracted before the nutrients are going back to the soil. For instance, if you burn a tree directly for energy, you lose out on the value that could be harnessed as wooden products before eventual incineration.

e.g. PATAGONIA

2 VALUABLE FEEDSTOCK GETS EXTRACTED

Your product allows for extraction of valuable bio-chemical nutrients in biorefineries. This applies to the biological components in your product. Orange peel, for example, can yield limonene, which might be in your next cosmetic product.

e.g. PATAGONIA

3 IT RETURNS TO THE BIOSPHERE

Your product returns nutrients back to the earth after use (by composting, biodegrading, etc)

e.g. ECOVATIVE

A.2 TEMPLATE FOR CONCLUSIONS REPORT

See separate file "Conclusions Report Template.docx"

A.3 EXAMPLE QUESTIONS FOR CAMP EVALUATION

Included in separate file "Conclusions Report Template.docx"

Appendix B – Conclusions Report Template

H2020 project C-VoUCHER

Circularity Challenges Identification Methodology

A part of Deliverable D3.1 “Catalogue of Circularity Challenges, including Circularity Challenges Identification Methodology”

Appendix – Conclusions Report Template

Filled in by: [C-VoUCHER partner organisation name, details]
For the Regional Camp held on: [date]

Please fill in and return to
Niki Bey: niki@dtu.dk and Amanda Koppel (MADE): akoppel@made.dk

Template author: Niki Bey (DTU c/o MADE)

1 Introduction

This document is a template that RIHs (Regional Innovation Hubs) shall use to report outcomes of their Regional Camps on Circularity Challenges identification in the 5 selected industrial sectors. The regional camps are organized and led by the six RIHs (GAIN, ADRNV, SAERG, SYS, ARMSA, TRNGL) independently.

Camp participants may be member SMEs of the respective regional clusters or other ones.

A Circularity Challenge can be understood as an innovation barrier typically encountered in Circular Economy initiatives.

This template is an Appendix to the “Circularity Challenges Identification Methodology” document, which is part of Task 3.1 (in short: “T3.1”) which, in turn, is the first task of Work Package 3 (“WP3”) within the H2020 project “Circularize ValUe CHains across European Regional Innovation Strategies – C-VOUCHER”.

The template is a minimum reporting instrument, meaning that RIHs/partners are welcome to add further information on own initiative or after dialogue with T3.1 leading partner MADE.

For making and submitting a conclusions report after your camp

1. Please fill in fields indicated with *[italics]* throughout this template.
2. Please submit the report by e-mail to
Niki Bey: niki@dtu.dk and Amanda Koppel (MADE): akoppel@made.dk
3. When submitting, please also attach PowerPoint slides, pictures, and other material from your camp.

All conclusions reports will be used by MADE to summarize and structure the circularity challenges identified during the Regional Camps as input for the European Camp planned for 6 September 2018, in Denmark.

2 Conclusions report

This report summarises contents and outcomes of the Regional Camp held by [fill in your organisation name]. Aim of the camp was to identify circularity challenges perceived by the participants.

2.1 Contents of the camp

Please fill in the right side of the below table.

Hosting organisation:	[C-VoUCHER partner]
Date of the camp:	[date]
Location of the camp:	[city, country/region]
Number of participants:	[no.]
Brief description/characterisation of participants:	[e.g. sector, size of company, etc.]
Received, pre-filled “Circular Flows” worksheets from participants:	[How many participants had filled-in the two 1-page “Circular Flows” worksheets?]
Comment (optional):	[e.g. “Second camp, held after a smaller first camp” or “..held based on large interest”...]

Agenda of the Camp: [either write it here or insert a picture/scan of it]

List of participants: [either write it here or insert a picture/scan of it]

2.2 Outcomes of the camp – identified circularity challenges

During the camp, the below Circularity Challenges were identified. They are presented first according to relevance in a particular sector or across several sectors. Then, these challenges are ranked according to their overall relevance/size.

A. Sectoral and cross-sectoral challenges in the region:

1. Identified sectoral challenges (i.e. specific challenges within the sector, in the region):
 - (Challenge a)
 - (Challenge b)
 - ...

2. Identified cross-sectoral challenges (i.e. challenges across sectors, in the region)
 - (Challenge a)
 - (Challenge b)
 - ...

B. Most challenging ones, in the region:

(Please rank them according to your perception from the camp.)

1. [Circularity challenge, name]:
[Circularity challenge, description + reasoning]

2. (HYPOTHETIC EXAMPLE “Lack of in-house material recyclability knowledge”:
The technical recyclability of materials used in product X is not known. Also economic feasibility is very unclear.
Many participants mentioned this several times, thus we rank it high.)

3. ...

C. Relation to the Region’s Smart Specialization Strategy:

(Please discuss here, how above challenges link to the regions’ Smart Specialization Strategies, see Technical Annex, page. 50:

Standardized procedure to ensure the link between the Challenges and the Smart Specialization Strategies of the regions.

<http://s3platform.jrc.ec.europa.eu/what-is-smart-specialisation->

2.3 Reflection points after the camp

Aspects of camp preparation and execution that went well:

- [please fill in]...
- ...

Aspects of camp preparation and execution that may be improved for the second round of camps:

- [please fill in]...
- ...

Although potential “Solutions” are not in focus in this first round of Regional Camps, please mention here, if participants came up with such, related to a respective challenge and describe the solution(s) from the camp.

Additional remarks (optional):

[e.g. How experienced reg. Circular Economy did the audience seem? How did the dialogue go – you “pushed/gave constantly input” or rather “self-propelled by participants”?]

3 Inspiration

As inspiration, Table 2 from the “Circularity Challenges Identification Methodology” document gives an overview of generic barriers for moving towards CE (from (Ritzén and Ölundh 2017)).

Financial	Measuring financial benefits of circular economy
	Financial profitability
Structural	Missing exchange of information
	Unclear responsibility distribution
Operational	Infrastructure/ Supply chain management
Attitudinal	Perception of sustainability
	Risk aversion
Technological	Product design
	Integration into production processes

Table 11 Generic barriers for moving towards CE (from Ritzén and Ölundh 2017)

Details in article:

Ritzén, Sofia, and Gunilla Ölundh. 2017. “Barriers to the Circular Economy – Integration of Perspectives and Sectors.”
Procedia CIRP 64. Elsevier B.V.: 7–12. doi:10.1016/j.procir.2017.03.005 .