CICERONE

Coordination and Support Action (CSA)

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Proceedings of Workshop #1

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Summary

One of the main approaches of the CICERONE project towards establishing an effective platform and building a joint programming for circular economy is to engage stakeholders into a wide-scale consultation process. In this respect the first CICERONE stakeholder workshop on "Circular Europe: the future of circular economy programming" was held during the World Resources Forum conference 2019 in Antwerp. This deliverable is a summary of the outcomes of this workshop. The insights received from the stakeholders will be used for developing the draft SRIA (Strategic Research and Innovation Agenda) which is one of the main deliverables of the project.

Approval

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EXECUTIVE SUMMARY

One of the main approaches of the CICERONE project towards establishing an effective platform and building a joint programming for circular economy is to engage stakeholders into a wide-scale consultation process. In this respect the first CICERONE stakeholder workshop on "Circular Europe: the future of circular economy programming" was held during the World Resources Forum conference 2019 in Antwerp. This deliverable is a summary of the outcomes of this workshop. The insights received from the stakeholders will be used for developing the draft SRIA (Strategic Research and Innovation Agenda) which is one of the main deliverables of the project.

KEYWORDS

Circular economy, Priority themes for CE research and innovation, Circular cities, Circular industries, Circular supply chain

1 INTRODUCTION

Central in the CICERONE approach is the establishment of a platform which will determine the priorities and pathways for coordinated research and innovation (R&I) for circular economy. To create a successful platform, it is essential to establish an inclusive mechanism to jointly define the priorities. To do this, the CICERONE project has dedicated a Work Package (WP4) on Stakeholder Engagement and has identified a strategy to more effectively connect, engage and consult with the stakeholders and ensure a wide-scale international consultation process. One of the engagement channels for implementing this strategy is the organization of workshops (offline consultation). With this a lasting relationship can be built with stakeholders and they can be actively involved into face-to-face discussions.

During the implementation of the CICERONE project, three workshops will be organized. The current deliverable is a summary of the outcomes of the first stakeholder workshop titled "Circular Europe: the future of circular economy programming" which was held on 26 February 2019 in conjunction with the World Resources Forum conference in Antwerp.

1.1 Objective and expected outputs

While defining the scope of the CICERONE project on circular economy, four key challenge areas were identified by the project partners: Urban areas, Industrial systems, Value chain and Territory and Sea. In relation to these challenges, the project will define research and innovation pilots taking into account the priority themes on circular economy which have been already identified by European strategies as well as other relevant themes and issues that will be raised upon consultation. As shown in Figure 1, these priority themes are on raw materials, water, waste, plastic, chemicals, food, construction and demolition, and biomass and biotechnologies. The overall objective of this workshop was to determine the research and innovation needs and pathways for coordinated research and innovation for circular economy from the stakeholder's perspective. This knowledge will be fed into one of the main deliverables of the project, i.e. Circular Economy Strategic Research and Innovation Agenda (SRIA) which responds to the research needs of national and regional programme owners in Europe and aims to align European, national and regional as well as private research and innovation

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efforts. Structural funds will be the main target, due to their fragmentation not allowing significant impact on European transition towards circular economy.

Desired outputs of the workshop were:

1. Identification of **priority themes** (selecting among 8 priority themes already identified by European strategies) to be addressed in **integrated pilots**, for each of the 4 **challenge areas.**
2. Identification and prioritization of Circular Economy **Research & Innovation needs** that shall be addressed to tackle priority themes in the integrated pilots, for each of the 4 challenge areas.
3. **Increase awareness** about the CICERONE project and its objectives and reach out to more relevant stakeholders.

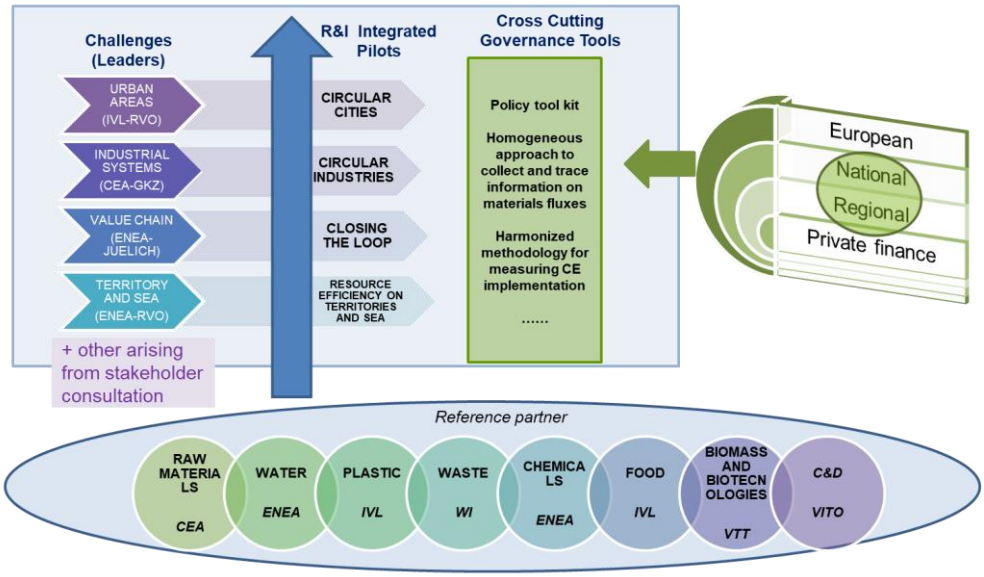

Figure 1: Priority themes and challenge areas addressed in the CICERONE scope of the circular economy

1.2 Participants

To involve the most relevant stakeholders into this consultation process, CICERONE took advantage of two channels: the project's stakeholder network and the audience of the World Resources Forum conference. Within the first months after the start of the project, CICERONE has reached out to the most relevant key experts and has established a stakeholder network composed of programme owners, research and technology institutions, NGOs, businesses and coordinators of the relevant EU projects. A group of participants at this workshop were explicitly invited through this network.

In addition to these groups, the workshop targeted the audience of the World Resources Forum (WRF) conference 2019, co-organized by the Public Waste Agency of Flanders (OVAM) and the World Resources Forum Association (WRFA), in Antwerp. This international conference had a focus on closing resource loops and making the transition towards circular economy work. The main audience of the conference (750 participants from over 60 countries) was policy makers from national, regional (such as the EU) and international governments (such as the United Nations) (27%), leading scientists (20%), NGOs (8%), international organizations (6%), businesses (21%), students (6%) and journalists (6%) who

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are active in either setting the agenda or developing solutions towards implementation of circular economy. The conference was a combination of plenary sessions with keynote speakers, panel discussions, workshops and several site visits. One of the main elements of the conference were 41 “deep-dive” workshop sessions which were organized by individual organizations or project teams. With attracting 67 participants, CICERONE had one of the most popular workshops among all workshop sessions and could on one hand enhance the visibility of the project among this community and on the other hand engage many new and relevant stakeholders into the consultation process and into its network.

1.3 Methodology

1.3.1 Workshop Components

The 1.5-hour workshop was structured into four breakout sessions focusing on four challenge areas: Urban areas, Industrial systems, Value chain and Territory and Sea (as shown in Figure 1). Participants were invited to choose one of the challenge areas and join the discussions which were facilitated by one of the project partners using a World Café methodology (Figure 2). The main outcomes from each challenge group were summarized and presented at the end of the workshop.

Before starting with the breakout sessions, CICERONE project coordinator introduced the participants to the vision, mission, objective and partners of the CICERONE project and presented the structure and objective of the workshop (ANNEX I – WORKSHOP AGENDA).

Figure 2. Structure of the workshop with four discussion groups

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1.3.2 Activities and discussion topics

The breakout sessions were structured into two set of activities and discussion topics:

Activity 1: Identifying constraints and needs

After giving an introduction to the context of the challenge area, the moderators engaged the participants into the questions listed below:

- *Where should efforts be focused in this challenge?*
- *Evaluate the main priority themes by ranking them between 1 (neglectable) to 5 (mandatory).*
- *Identify and evaluate the main constrains/obstacles, innovation and research needs.*
- *What would be the opportunities for new jobs/businesses?*
- *What approach would you propose to tackle altogether the R&I needs identified as priorities?*

These questions were presented by the moderators and provided to the participants in form of hard copy questionnaires. The research and innovation needs were discussed for different categories of application: business models, market, skills, technology/methodology, behaviour, management, other. The moderator had the role of consolidating the ideas from the open discussions and the participants had the chance to provide their individual opinions by answering to the questionnaire (ANNEX II – QUESTIONNAIRES FOR FOUR CHALLENGE GROUPS).

Activity 2: Prioritization of needs

After identifying the R&I needs, the participants were asked to map out the needs identified for each of the different four challenges on a prioritization chart based on impact and do-ability (Figure 3). For definition of do-ability, different factors such as financial and human resources needs, time horizon, complexity and general feasibility were considered. With this exercise, it was possible to identify the needs that have high impact and are easy to address (low-hanging fruit), and those which are difficult to tackle but are necessary to consider.

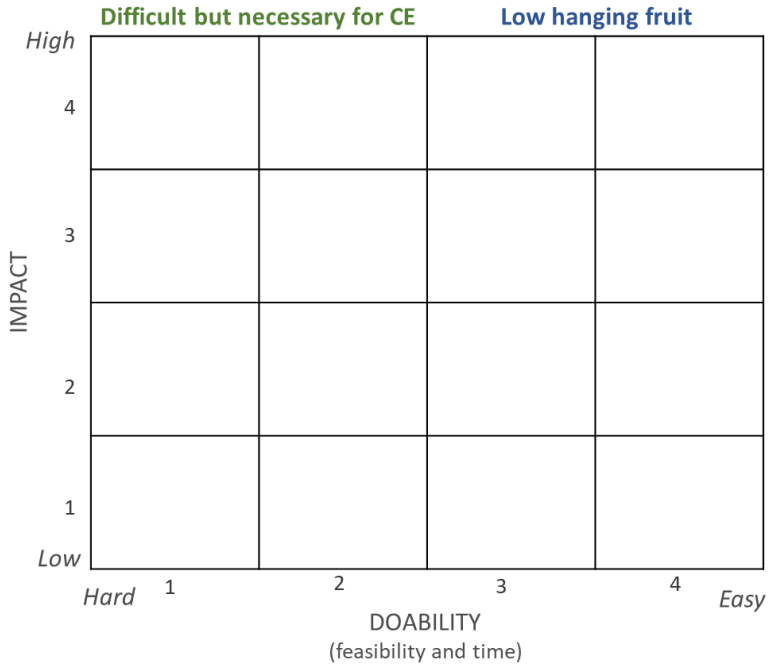

Figure 3. Impact/Do-ability chart for prioritization of needs

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2 WORKSHOP PROCEEDINGS

2.1 Welcome Address

Following her welcoming words, Cliona Howie (EIT Climate-KIC), coordinator of the project, presented the objectives, vision, mission and approach of the CICERONE project (Figure 4). Funded by the Horizon 2020 programme of the European Commission, CICERONE aims at closing the loop on circular economy programming in Europe. To do this, the project will bring together key stakeholders including programme owners, researchers and businesses to build a platform for efficient circular economy. Although the European Commission's package in circular economy has enabled an exposition of initiatives in Europe, the outcomes of research and innovation are not fully exploited and promoted at European level. Furthermore, circular businesses and projects are fragmented making international synergies difficult, it has become more and more apparent that joint programming is a must to optimise impact. In response to these challenges, CICERONE is developing the strategic coordination of objectives and programming of regional, national and European funding programmes.

To achieve its objectives, the project will first assess and benchmark the current performance of circular economy research and innovation funding in Europe. According to this baseline analysis, CICERONE will establish an efficient and inclusive mechanism to jointly define and prioritise circular economy research and innovation needs at European level. As the final step, the project will build and test a lasting organization and pathways to reach the desired impact, translated into a joint programming platform for programme owners. With a consortium composed of 24 partners from a variety of organizations across Europe, CICERONE can provide a robust, holistic pathway to advance the EU's transition to a circular economy.

After introducing the objective of the workshop, participants were invited to join one of the four challenge groups and participate in the corresponding discussions.

Figure 4. Opening session of the workshop and introduction of CICERONE

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2.2 Interactive Sessions

2.2.1 Urban Areas

Facilitators - Alexandra Wu, Swedish Environmental Research Institute (IVL) & Erik van Wijk, EIT Climate-KIC

Background - The main focus of this challenge group was on cities which represent the most powerful physical and political leverage points for transition to circular economy models. Achieving circular cities is a challenge because it deals with the complexity of urban territories with interrelation of several systems and sub-systems: waste, water, buildings, food, energy, mobility, etc. Due to this complexity, in cities the circular economy link to geographical scales is still under-tapped and cities struggle with their transition to a full circular economy model. Among many constraints, the most important ones are lack of intersectoral collaboration among cities, lack of new consumption models, lack of plants and sharing platforms and low citizen participation. An integrated action plan at different levels are then mandatory to achieve the transition towards circular cities.

Main outcomes – In response to the discussion topics of the workshop, the following feedbacks were received from the participants:

Q1. Where should efforts be focused in this challenge group?

Participants in this challenge group believed that the focus should be on a generic middle-sized EU city (0.5 to 1.5 million population), but they also acknowledged the importance of the geographical, political and economic conditions of the cities which must be also taken into considerations.

Q2. Evaluate the main priority themes by ranking them from 1 (neglectable) to 5 (mandatory).

Due to the complexity of systems and sub-systems involved in management of urban areas all priority themes are important for circular cities. As shown in Figure 5, the most important themes were considered to be water, plastic, waste, food and construction and demolition.

	Raw materials	Water	Plastic	Waste	Chemicals	Food	Biomass & Biotechnologies	Construction & Demolition
CITIES	2	5	5	5	1	5	2	5

Figure 5. Evaluation of priority themes for Urban Areas (Cities)

Q3. Identify the main research and innovation needs.

The most important needs identified for this challenge group are summarized in Table 1 below.

Table 1. Identified R&I needs for the challenge group: Urban Areas (Cities)

	Needs identified
Business Models	• Develop innovative CE business models and flexible financial tools • Funding for product eco-design that focus on behavioural change and shifting attitude towards product ownership • Business models to access all income levels: considering the accessibility and inclusivity (CE products should not be only for rich)

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Behaviour Change	• The need to change the way consumers think about consumption • Choice engineering (e.g. programs that target zero waste in food sharing processes/food management systems)
Technology	• Data Collection – including smart metering, linking to the internet of things, life-cycle based tools • Utilize technology to collect the data necessary for CE shift
Skills	• Training to public servants and sustainability mangers in the public sector (local and regional) • Monitor twinning projects on CE (sister cities)
Management	• Development of tools to manage and make decisions with a life cycle approach (e.g. materials passport, building information modelling)

Q4. How do you prioritize the research and innovation needs identified above?

As illustrated in Figure 6, for this challenge group, behaviour change and support of business models to facilitate this change were considered to be the most important needs for transition to circular cities. Providing training programmes and improving skills of the public servants was considered as the next essential task to do.

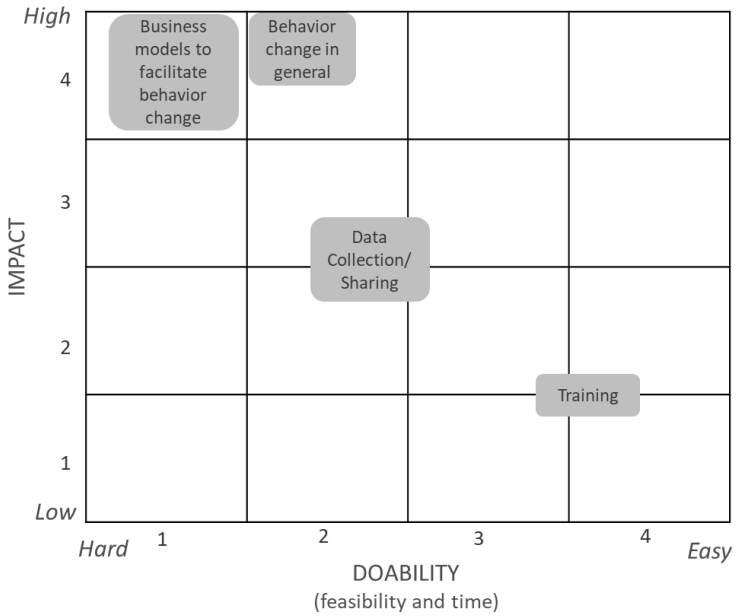

Figure 6. Prioritization of R&I needs for challenge group: Urban Areas (Cities)

Q5. What would be the opportunities for new jobs/businesses?

- Integration of value chains from different sectors
- Technology jobs (IT, engineering)
- Education (teachers, trainers, coaches)

Q6. What approach would you propose to tackle altogether the R&I needs identified as priorities?

- More regulation to boost circular economy
- Development of tools to facilitate life cycle thinking
- Development of flexible financial tools

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2.2.2 Industrial Systems

Facilitators - Jorge Nunez, Centre for European Policy Studies (CEPS) & Priscilla Reale, Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA)

Background – This challenge group dealt with the promotion of innovative technologies and tools for the efficient use of resources in industry and for sustainable production. The approach is based on innovative integrated solutions to be implemented in factories, industrial areas and production sectors (agro-industry, metallurgy, textiles, etc.). The actions are expected to concern innovation in production design, production process, efficient use and management of resources, reduction of emissions and waste and cross-sectoral collaboration.

Main outcomes – The following feedbacks and recommendations were received for this challenge group:

Q1. Where should efforts be focused in this challenge group?

- Rethinking production process and products
- Digital technology
- Detoxification of industrial process
- Consideration of the entire value chain (from eco-design to waste treatment)

Q2. Evaluate the main priority themes by ranking them from 1 (neglectable) to 5 (mandatory).

Participants in this challenge group believed that in order to integrate circular economy to industrial sector, it is essential to take all themes into consideration and it would not be possible to prioritize them.

Q3. Identify the main research and innovation needs.

The most important needs identified for this challenge group are summarized in Table 2 below. Participants believed that the most urgent need is to revise and clarify regulations and to re-design and enforce policies. Moreover, it was stressed that although conversion of existing systems is essential to integrate circular economy, it is important (for the policy makers) to consider the financial obstacles and the necessity of economic revenue for the businesses.

Table 2. Identified R&I needs for the challenge group: Industrial Systems

	Needs identified
Business Models	• Change model (Conversion of existing systems) • Consider the purpose of the product • Traceability of materials
Market	• Improve market for secondary (second-hand) materials
Technology	• Eco-design • Industrial symbiosis • Renew plants • Systemic approach (considering also energy needs) • Work on material property (e.g. polymer degradation) • Reduce number of materials used in production (Green Public Procurement) • Extend product life • Pricing externalities

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	• Small scale treatment systems
Skills	• Training for key actors in different levels of the process
Policy	• Public procurement • Prioritize recyclable materials and dismantlable articles • Obligation to deliver components for repairing • Support smaller scale systems • Taxation research
Behaviour Change	• Change the way consumers think about second hand products • Redefine what is value for the company • Encourage managers for sharing the information and resources

Q4. How do you prioritize the research and innovation needs identified above?

As illustrated in Figure 7, participants stressed that the most urgent need is in the area of regulation revision and clarification and this is specifically important for targeting eco-design.

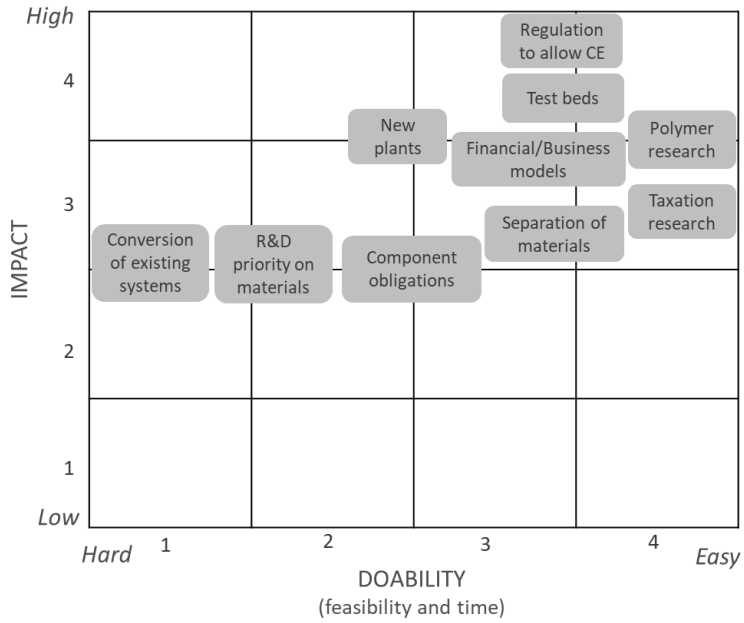

Figure 7. Prioritization of needs for challenge group: Industrial Systems

Q5. What would be the opportunities for new jobs/businesses?

- Opportunities for businesses connecting and enabling circulation
- SMEs providing plug-and-play solutions for circularity of other businesses
- New ownership business models for products/components/materials

Q6. What approach would you propose to tackle altogether the R&I needs identified as priorities?

- Systemic approach (offering "solutions that work")
- Stimulate new value chains/networks
- Stimulate cross-sectoral projects

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- Focus on “secondary-materials-pull” instead of “residue push”
- Transfer good practices between sectors/countries
- Present and promote a clear overview of the benefits that industry will have for sharing the knowledge and best practices
- Development of measurement tools for assessing circularity and comparing sustainable business ideas or practices
- Reward industries or organizations that are active in implementing circular economy as well as those who are willing to do so

2.2.3 Territory and Sea

Facilitators - José Manuel Martín Corvillo, EIT Climate-KIC & Laura Cutaia, Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA)

Background – Territory and sea is the challenge dealing with the complex relationship between mainland human activities and the open water, mainly represented by the technosphere environment of harbours. The goal is to set up a line of actions aimed to a suitable transition to the circular economy in the small and big ports management. To do so, it is essential to foster sustainable and circular innovations in the main productive sectors occurring in the ports and in the main activities and businesses linked to its economic life. In line with the emerging Blue Economy principles and the Blue Growth perspective, the main challenges to be tackled will be among others marine litter, sustainable tourism, integrated waste and water management, and also the issue of sea level increasing due to the climate change effects and solutions to its mitigation.

Main outcomes – The following feedbacks and recommendations were received for this challenge group:

Q1. Where should efforts be focused in this challenge group?

- Big commercial, industrial and touristic harbours
- Interconnectivity between ports and cities
- International trade and waste streams
- Polluting activities in ports
- Logistics and data management

Q2. Evaluate the main priority themes by ranking them from 1 (neglectable) to 5 (mandatory).

It was revealed from the discussions that also for this challenge group all priority themes are important. As shown in Figure 8, the most important themes were considered to be raw materials, water, plastic, waste and construction and demolition.

	Raw materials	Water	Plastic	Waste	Chemicals	Food	Biomass & Biotechnologies	Construction & Demolition
TERRITORY & SEA	5	5	5	5	3	2	1	5

Figure 8. Evaluation of priority themes for challenge group: Territory & Sea

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Q3. Identify the main research and innovation needs.

The most important needs identified for this challenge group are summarized in Table 3 below. Participants believed that when talking about the territory and seas as a challenge group, the focus should not be only on port activity but also on tourism and urbanism. Activities should be diversified to make them resistance to economic shocks.

Table 3. Identified R&I needs for the challenge group: Territory & Sea

	Needs identified
Business Models	• Seasonal fluctuation of eco. activities • Services substituting products • Design of eco-industrial parks • Sustainable logistics • Integrate logistics of different business sectors on cities with sea to avoid unnecessary transports • Diversification of activities to make them resistance to economic shocks
Technology	• Industrial symbiosis • Fuel waste technologies/management • Research on recyclable packaging • New technologies for construction and demolition
Skills	• Work with vocational schools to inspire and teach students about system thinking and modular design • Special training programs targeted for managers • Special training for data management and sharing (digitalization)
Policy	• Green legislation • Local policies to promote seasonal eco activities • Valorisation of marine product strains • Financial stimulation for green initiatives for logistic companies
Behaviour Change	• Assigning responsibilities and accountability to achieve behaviour change
Management	• Stewardship incentives • Eco-management schemes

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Q4. How do you prioritize the research and innovation needs identified above?

Research and innovation needs in this challenge group were prioritized as shown in Figure 9.

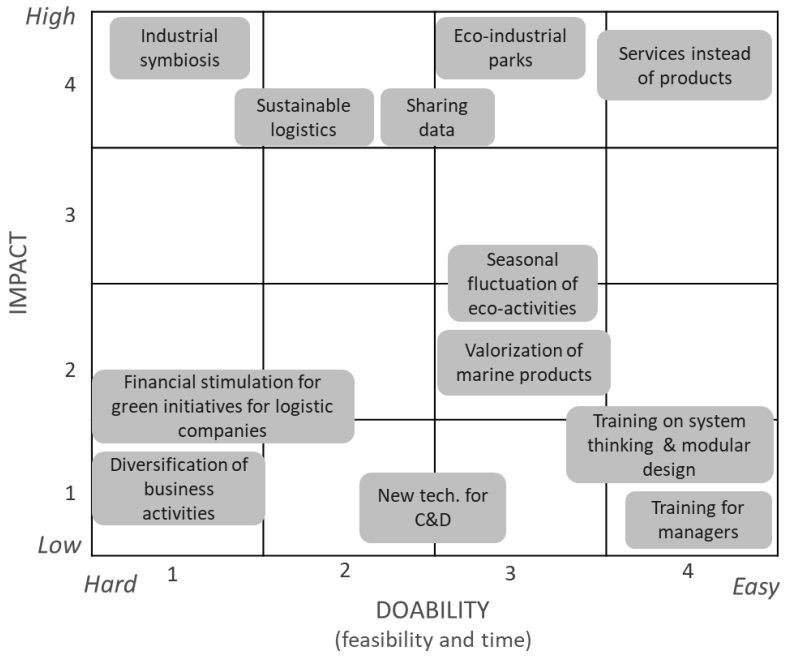

Figure 9. Prioritization of R&I needs in challenge group: Territory & Sea

Q5. What would be the opportunities for new jobs/businesses?

- Development of recycling facilities close to harbours
- Integrated mobility solutions in harbours
- Education programmes in cooperation with private sector
- Innovation in sustainable design and construction
- Facilitators for industrial symbiosis
- IT service providers to develop short solutions

Q6. What approach would you propose to tackle altogether the R&I needs identified as priorities?

- Enforce/stimulate cooperation between businesses and educational institutions to systematically identify opportunities for implementing circular economy
- Show benefits for private sector to incentivize cooperation and data sharing
- Integrated mobility solutions in harbours
- Education programmes in cooperation with private sector
- Integrate port activities to local economies, analysis and implementation of potential symbiosis paths
- Support start-ups with sustainable ideas
- Development of framework conditions to support systems innovation

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2.2.4 Value Chain

Facilitator – Claudia Brunori, Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA) and Cristian Stroia Centre for European Policy Studies (CEPS)

Background – This challenge group covered the main topics for closing the loop of specific materials (i.e. Critical Raw Materials or others), products (i.e. plastic packaging, WEEE, tyres, etc.) and more specifically supply chains (such as buildings, agro-industry, textile, etc.). Within this challenge group all value chain phases have been taken into consideration: design, materials supply and production, consumption and distribution and end of life with a territorial extension from national to global scale (depending on the geographical area of supply for primary resources). This challenge group aims to implement synergic actions involving all actors in the value chain in order to identify barriers and remove bottlenecks and broken rings hindering the closure of loop and implement a sustainable system for all the actors involved.

Main outcomes - Following feedbacks and recommendations were received for this challenge group:

Q1. Where should efforts be focused in this challenge group?

- End of life and waste treatment at national level
- Design phase and production technologies at European level
- Key bottleneck is information (linked to standardization, traceability, digitalization)

Q2. Evaluate the main priority themes by ranking them from 1 (neglectable) to 5 (mandatory).

As shown in Figure 10, the most important themes for this challenge group were considered to be raw materials with a specific focus on critical raw materials, plastic and food. It was stressed that the other themes such as water and waste should be considered in any case, in particular along the value chain of the other sectors which have been identified as priorities.

	Raw materials	Water	Plastic	Waste	Chemicals	Food	Biomass & Biotechnologies	Construction & Demolition
VALUE CHAIN	5	1	5	3	2	5	1	1

Figure 10. Evaluation of priority themes for challenge group: Value Chain

Q3. Identify the main research and innovation needs.

The most important needs identified for this challenge group are summarized in Table 4 below. The participants stressed on the need for investment in new technologies and methodologies, with a special focus on recycling and urban mining. It was emerged from the discussions that the closure of the loop is strongly dependant on the market and behaviour, therefore there is an urgent need for investment in awareness raising and promotion of the circular products.

Table 4. Identified R&I needs for the challenge group: Value Chain

	Needs identified
Business Models	• Long-term vision and long-term integrated flexibility • European integrated value chains (replication of the model of the European Battery Alliance)

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	• Industrial symbioses • Investment in R&D to upscale material innovations for eco-design
Market	• Develop a strong market for secondary raw materials • Internalization of externalities in the prices of products and services • Labelling
Technology	• Specification and standardization for both raw materials and products (no toxic or hazardous products) • More investment in technologies for recovery of the secondary raw materials (urban mining) • Eco-design • Investment in new plants
Skills	• Provisions on the use of less raw materials (Green Public Procurement) • Public administration to be informed about green procurement (awareness raising) • Invest in education and training of designers and producers
Behaviour Change	• First understand and then change behavior by e.g. greenwashing marketing • Dedicated incentive mechanisms • Simplified communication of complex issues
Other	• Transparency and traceability of the value chain for horizontal information (Gamification)

Q4. How do you prioritize the research and innovation needs identified above?

Because of time constraints, the "prioritization of needs" exercise was not performed in this group.

Q5. What would be the opportunities for new jobs/businesses?

- Involvement of supply chain managers with a holistic view
- Facilitators for repair/refurbish events (similar to Repair Café)
- Developing industries and business models which are based on the usage of secondary raw materials (e.g. batteries made in Europe from European secondary raw materials)
- More recycling plants

Q6. What approach would you propose to tackle altogether the R&I needs identified as priorities?

- Build models and frameworks for predicting consumer behaviour
- Develop and apply marketing and educational tools intended to change consumer behaviour
- Establish business networks and alliances; cooperation between different sectors of the value chain is a key approach
- Focus not only on initiatives on EU level but on those fully supported by a few Member States and try to involve their industry champions
- Improve data collection on secondary raw materials and enhance cooperation among the involved stakeholders

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3 FINAL CONCLUDING REMARKS

Cliona Howie presented the main outcomes and conclusions derived from the interactive discussions in this workshop:

- For all challenge groups (Urban areas, Industrial systems, Value chain and Territory and Sea), it is essential to take all priority themes into consideration because these are composed of complex and interlinked systems and sub-systems. However, it was revealed from the discussions that there is a need to have more focus on raw materials, waste, plastic, water, food and construction and demolition.
- Investment in research and development to upscale materials and production technologies towards eco-design was highlighted as one of the most important needs. Although it is a difficult approach, it deserves our attention because of its high impact on transition to circular economy.
- Although investment in new technologies and business models is a key need, alone it will not be enough to shift to a circular economy. Increased investment in behavioural change and stimulation of market demand are a must to successfully transition to circular practices. It is essential to build and connect to business models and frameworks for predicting and changing consumer behavior.
- It was stressed that training for key actors in different levels and sectors of the value chain, from citizens to civil servants, managers and business owners is a basic step to take. However, to increase the impact, it is essential to combine the training modules with the application strategies.
- An efficient approach towards implementing circular practices is highly dependent on the degree of cooperation between different sectors of the value chain. Finding synergic actions involving all actors in the value chain, analysis and implementation of potential symbiosis paths and establishment of business networks and alliances are key solutions.
- Data is seen as a key bottleneck towards transition to circular models. Creating accurate data, improving unified data presentation systems, sharing the data and standard reporting are key steps to take.
- More focus and investment in urban mining and usage of secondary raw materials for the European economy is a necessity.

In her closing words, Cliona thanked the participants for their active participation and valuable contribution to the workshop and invited them to join the CICERONE stakeholder network and follow the activities and progress of the project.

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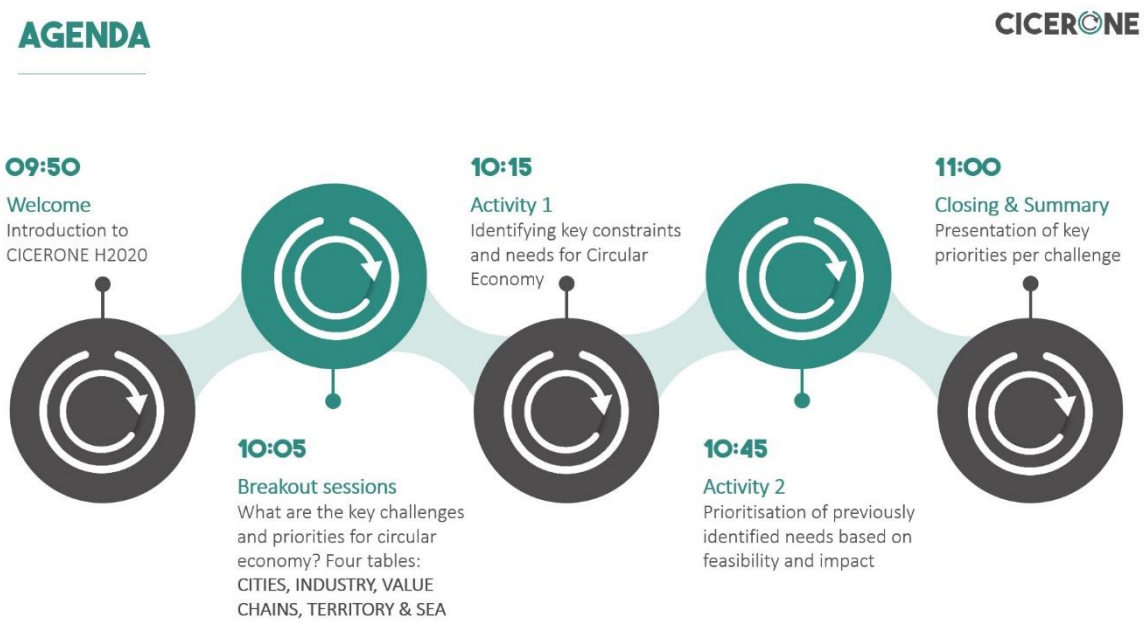
ANNEX I – WORKSHOP AGENDA



ANNEX II – QUESTIONNAIRES FOR FOUR CHALLENGE GROUPS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 820707.

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JOINT R&I PROGRAMS*: Joint calls delivered by regional and/or national programme owners dedicated to the funding of integrated pilots.*

ADDRESSED CHALLENGE: URBAN areas

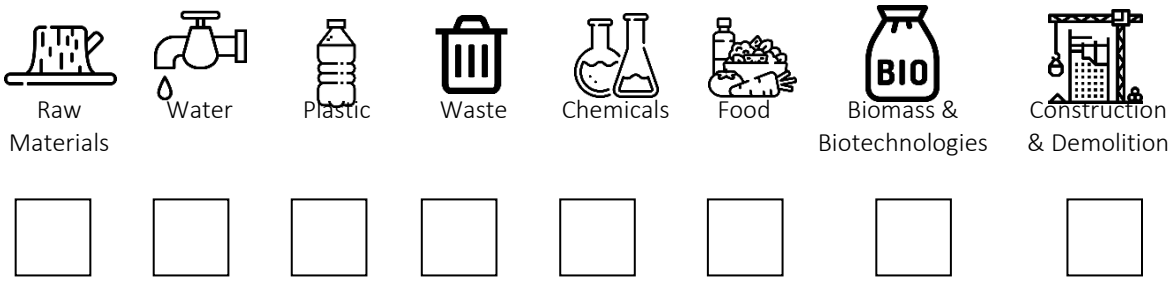
Cities are the most common human habitat and primary economic drivers, so they represent the most powerful physical and political leverage points for transition to circular economy models.
Circular cities is the challenge dealing with the complexity of urban territories, that can be considered like complex systems of other many complex sub-systems: wastes, water, buildings, food cycle, energy, mobility, etc.
Due to this complexity, in cities the CE link to geographical scales is still under-tapped and cities struggle in their transition to implement a full CE model.
An integrated and systemic approach is therefore the only possible approach aiming to define strategies, methodologies, instruments and technologies to improve cities' environmental performances, to maximize positive social and economic impacts ant to stimulate the necessary changes in terms of culture and mindsets.
In line with the 2030 Agenda on Sustainable Development, the Pact of Amsterdam for an Urban Agenda for the EU, and the Draft Action Plan for Urban Agenda for the EU Circular Economy, stressing cities role as powerful drivers of innovation and economic sustainable development, how is it possible to manage and to deal with this complex transition?
The main constraints are lacks of intersectorial collaboration and of collaboration among cities, lack of new consumption models (sharing economy, pay for use, reuse), lack of plants and sharing platforms, low citizens participation, and much others are the needs, e.g. implementation of stakeholders platforms, sharing economy platforms, development of technologies and plants and more citizens' involvement.
An integrated action plan at different levels and integrated projects are then mandatory to achieve the transition towards circular cities .

Where should efforts be focused in this challenge?

- City districts
- Small towns
- .....
- .....
- .....

Please, evaluate the main priority themes from 1 (neglectable) to 5 (mandatory):

1 – Neglectable
2 – Almost neglectable
3 - Moderately relevant
4 – Relevant
5 – Mandatory



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1 – Neglectable
2 – Almost neglectable
3 - Moderately relevant
4 – Relevant
5 – Mandatory

	CONSTRAINTS	NEEDS	APPLICATION	PRIORITIZATION (scale 1-5)
BUSINESS MODELS	Lack of intersectorial collaboration	Implementation of multistakeholders platform	To create a network among different stakeholders (government, research, citizens, enterprise,...)	
	Lack of collaboration among cities in European countries	Implementation of a circular city platform	A Circular City Platform among cities and for cities, in which it is possible to exchange urban circular best practices	
	Lack of new consumption models (sharing economy, pay for use, reuse)	Implementation of sharing economy platform, reuse centres)	To develop new business models and new skills and jobs	
	Lack of new production models (e.g. Urban	Implementation of cooperative approach between the citizens,	To develop new business models to close resource-waste cycles by re-using	

	Symbiosis)	and between citizens and local government	materials, energy and water, at different geographical scales: building, neighbourhood, district, city.	
MARKET	Lack or scarcity of green products	To develop green products and quality certified products	To enhance green public procurement	
SKILLS	Lack of skills with a systemic approach to the challenge circular city	To invest in masters and PhDs in which an integrated approach to the circular city is highly developed	To have high level experts able to coordinate the implementation of integrated circular city projects	
	Lack of formation for local governors or retraining for existing professions	To invest in new kinds of formation	To have new experts in the cities management	
TECHNOLOGY	Lack of treatment plants for complex end of life products	Material flow analysis tool Technologies and plants Digitalisation	Efficient resources management	
	Lack of integrated water management	Technologies and plants Digitalisation	Efficient resources management	
	Lack of Food waste prevention	Implementation of food exchange platform	Efficient resources management	
	Lack of Sharing economy Platform	Implementation of sharing economy platform	Efficient resources management	
	Lack (or scarcity of reuse centres)	Implementation of repair cafè or reuse centres	Efficient resources management	
	Lack of a construction and demolition (C&D) integrated management	Implementation of a C&D platform	Efficient resources management	
BEHAVIOUR	Low participation of citizens	To develop urban network to involve citizens for circular behaviours and to manage common spaces	To implement urban synergies to valorise local resources	
	Low consumers awareness to sharing, pay for use or reuse	To implement sharing economy platforms and reuse centres	To implement urban synergies to valorise local resources	

MANAGEMENT	Low consumers awareness to sharing, pay for use or reuse	To implement sharing economy platforms and reuse centres	To implement urban synergies to valorise local resources	
	Low involvement of city makers	Implementation of urban living labs or other open innovation urban labs	Co-governance of commons	
OTHER				

What would be the opportunities for new jobs/businesses?

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- .....

What approach would you propose to tackle altogether the R&I needs identified as priorities?

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JOINT R&I PROGRAMS*: Joint calls delivered by regional and/or national programme owners dedicated to the funding of integrated pilots.*

ADDRESSED CHALLENGE: INDUSTRIAL SYSTEMS

The challenge is to promote innovative technologies and tools for the efficient use of resources in industry and for sustainable production.
The approach is based on innovative integrated solutions to be implemented in factories, industrial areas and production sectors (agro-industry, metallurgy, textiles, etc.).
The actions should concern innovation in product design, production processes, efficient use and management of resources, reduction of emissions and waste, valorisation of process waste, collaborative exchanges between different industries and cross-sector collaboration (for example through industrial symbiosis), the sustainable and circular management of industrial areas, the redevelopment of industrial areas and the conversion of existing factories to the circular economy.

Which is the interested area?

- Region
- Nation
- Europe

Where should efforts be focused?

- Industrial sector
- Industry networks
- Industrial areas
- .....
- .....
- .....

Please, evaluate the main priority themes from 1 (neglectable) to 5 (mandatory):

1 – Neglectable
2 – Almost neglectable
3 - Moderately relevant
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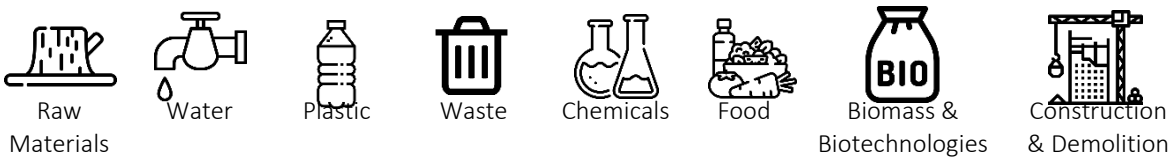

Raw Materials	Water	Plastic	Waste	Chemicals	Food	Biomass & Biotechnologies	Construction & Demolition
☐	☐	☐	☐	☐	☐	☐	☐

Please, evaluate main constraints/obstacles, innovation & research needs and their potential application from 1 (neglectable) to 5 (mandatory):

1 – Neglectable
2 – Almost neglectable
3 - Moderately relevant
4 – Relevant
5 – Mandatory

	CONSTRAINTS	NEEDS	APPLICATION	PRIORITY (scale 1-5)
BUSINESS MODELS	Lack of intersectorial collaboration	Implementation of multistakeholders platform	To create a network among different stakeholders (government, research, citizens, enterprise,...)	
	Poor interconnection among the different productive sectors	Spread awareness of the benefits of symbiotic production models	Industrial symbiosis within activities from different productive sectors in the surrounding territory	
	Lack of new production models (e.g. industrial Symbiosis)	Implementation of cooperative approach between the companies, also from different productive sectors, in order to share resources and services	To close resource-waste cycles by re-using materials, energy and water, at different geographical scales: neighbourhood, region. To realize the an economic advantage by sharing services like logistic and waste treatment plants	
MARKET	Distrust in the use of waste and by-products for production processes	Disseminate knowledge and information on the performance of waste and by-products as secondary row materials	Reduce the overall waste production, by giving them a second life	
	Lack of demand for articles made by recycled materials in different sectors	Disseminate knowledge and information on the performance of recycled materials in place of the original ones.	Enhance the use of secondary row materials	
SKILLS	Lack of skills with a systemic approach to the industrial system	Invest in masters and PhDs trained to integrated approach to manage the resources in a company	To have high level experts able to - highlight synergies between companies - project a symbiotic path - coordinate an integrated symbiotic project	
	Lack of information capacity	Promote tools useful for processing budgets of resources, audit of resources, in terms of input and output, capable to shed light on the use of resources, aimed at sharing resources toward other companies	Enable companies to be informed on available resources to be shared	
	Poor predisposition of local governors to sharing resources business models	To train or update local governors to new business models	Manage industrial relationships, to facilitate sharing procedure	

TECHNOLOGY	Effectiveness of sharing resources platform	Digitalization Develop new tools for processing budgets of resources, audit of resources, in terms of input and output, capable to shed light on the use of resources, aimed at sharing resources toward other companies	Implement industrial synergies to valorise local resources, realize a more efficient resource management, have an economic advantage	
	Lack of integrated waste treatment plants	Technologies and plants	Efficient resources management	
	Lack of integrated water management	Technologies and plants Digitalisation	Efficient resources management	
BEHAVIOUR	Low participation of companies	Sensitize companies for circular behaviours and to share resources	Implement industrial synergies to valorise local resources, realize a more efficient resource management, have an economic advantage	
	Lack of the culture of sharing and exchange within the company	Sensitize managers for sharing information on resources (materials, energy, but also services, skills, etc.)	Implement industrial synergies to valorise local resources, realize a more efficient resource management, have an economic advantage	
MANAGEMENT	Lack of a “continuous model” that implement a system of industrial symbiosis	To stimulate the industrial symbiosis in a bottom up system, for a continuous model to manage districts of industrial symbiosis (e.g. Kalundborg type) or Eco-industrial park	To manage industrial symbiosis system in term of companies organized in symbiotic exchange of resource. The application consists in a levy action that gives rise to spontaneous experiences of industrial symbiosis	
	lack of a “batch model” that implement a system of industrial symbiosis	To realize Industrial Symbiosis interventions very targeted on specific need territory’s. Is needed a central governance to manage all the industrial relationships	The application consists in a "top down" approach: the system of relationships between companies is given independently of a specific program, but on the basis of specific agreements between actors who agree to carry out exchanges of materials, energy or services	
OTHER				

What would be the opportunities for new jobs/businesses?

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- .....

What approach would you propose to tackle altogether the R&I needs identified as priorities?

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***JOINT R&I PROGRAMS**: Joint calls delivered by regional and/or national programme owners dedicated to the funding of integrated pilots.*

ADDRESSED CHALLENGE: Territory & Sea

Territory & Sea is the challenge dealing with the complex relationships between mainland human activities and the open water, chiefly represented by the technosphere environment of harbours. The goal is to set up a line of actions aimed to a suitable transition to the Circular Economy in the small and big ports management. How to do it? Fostering sustainable and circular innovations in the main productive sectors occurring in the ports and in the main activities and businesses linked to its economic life. In line with the emerging Blue Economy principles and the Blue Growth perspective, the main addressed topics to be tackled will be among others marine litter, sustainable tourism, integrated waste and water management, but also the sea level increasing due to the climate change effects and the solutions for its mitigation. Innovation could lead, for example, to the fishing traceability and valorization of the fish supply chain residues in new products, to the integrated waste and water management, to an industrial symbiosis platform implementation, to sustainable logistics in tourists and goods management and to new jobs opportunity and businesses. Managing this complex transition to a circular and sustainable anthropic connection between territory and sea should be driven by an integrated approach and a holistic view in order to create a feasible model for economic capital creation and natural capital safeguard.

Where should efforts be focused in this challenge?

- Big commercial, industrial and touristic harbours
- Local maritime communities
- Small harbours
- ……
- ……
- ……

Please, evaluate the main priority themes from 1 (neglectable) to 5 (mandatory):

1 – Neglectable
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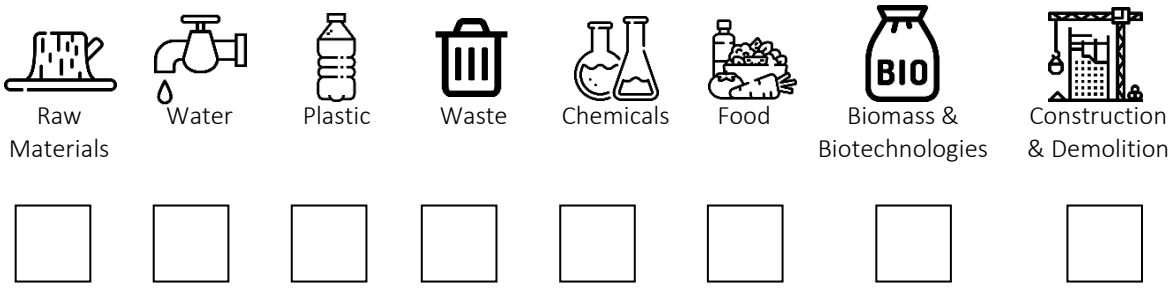

Raw Materials	Water	Plastic	Waste	Chemicals	Food	Biomass & Biotechnologies	Construction & Demolition
☐	☐	☐	☐	☐	☐	☐	☐

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	CONSTRAINTS	NEEDS	APPLICATION	PRIORITIZATION (scale 1-5)
BUSINESS MODELS	Poor interconnection among the different actors running their business in the port		Industrial symbiosis within port activities and between the industrial activities in the surrounding territory Optimized fisheries supply chain Sustainable logistics Production of innovative recyclable boats and recycling plants	
MARKET	High seasonal variability of touristic flows	Tools for tourists flows sustainable management		

SKILLS			Resource manager Operators and facilities for port and sea waste management and treatment Operators and facilities for bilge water management and treatment Experts in water integrated management Experts in sustainable logistics	
TECHNOLOGY/ METHODOLOGY		Technologies and methodologies for plastic waste prevention Technologies for marine litter prevention, removal and treatment Bilge water treatment and valorisation Tools for sea level variation modelling as effect of climate change Technologies for fishing traceability and valorisation of residues Tools for tourists flows sustainable management Tools for materials flows monitoring	Plants for port and sea waste management and treatment Plants for bilge water management and treatment Mitigation actions to deal with climate change effect on sea level	
BEHAVIOUR	Lack of collaboration			

MANAGEMENT	Low involvement of touristic operators	Waste management in touristic areas Water integrated management Analysis and implementation of potential symbiosis paths	Certification of sustainable and circular ports	
OTHER				

What would be the opportunities for new jobs/businesses?

- ……
- ……
- ……
- ……

What approach would you propose to tackle altogether the R&I needs identified as priorities?

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JOINT R&I PROGRAMS*: Joint calls delivered by regional and/or national programme owners dedicated to the funding of integrated pilots.*

ADDRESSED CHALLENGE: Value Chain

The challenge '**Value chain**' covers the main topics for closing the loop of specific materials (i.e. Critical Raw Materials or others), products (i.e. plastic packaging, WEEE, tyres, etc.) and in specific supply chains (such as buildings, agro-industry, textile, etc.). Within this challenge all value chain phases need to be taken into consideration: design, material supply and production, consumption and distribution, end of life as new production of materials. This type of challenge has itself a wide territorial extension that typically is form national to global scale (depending on the geographical area of supply for primary resources).

It aims the implementation of synergic actions involving all the actors of the value chain (designer, producer, distributor, user, end of life manager, recycler) in order to identify barriers and remove bottlenecks and broken rings hindering the closure of loop and implement a sustainable system for all the actors involved.

On the light of circular economy some relevant topics to be considered are listed here below:

Design	Eco-design with regard to: substitution of critical raw materials and hazardous substances, reduced resources/raw materials consumption, reparability, easy dismantling, enhanced durability.
Production	Production process eco-innovation, Low consumption of water and resources, low emissions and energy consumption, valorisation of production scraps.
Consumption and distribution	Reuse, repair, sharing economy, sustainable consumption product value chain traceability
End of life	Collection, separation, recycling

Where should efforts be focused in this challenge?

- Local level
- National level
- Global level
- .....
- .....
- .....

Please, evaluate the main priority themes from 1 (neglectable) to 5 (mandatory):

1 – Neglectable
2 – Almost neglectable
3 - Moderately relevant
4 – Relevant
5 – Mandatory


Raw Materials


Water


Plastic


Waste


Chemicals


Food

Biomass & Biotechnologies


Construction & Demolition

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Please, evaluate main constraints/obstacles, innovation & research needs and their potential application from 1 (Neglectable) to 5 (mandatory):

1 – Neglectable
2 – Almost neglectable
3 - Moderately relevant
4 – Relevant
5 – Mandatory

	CONSTRAINTS	NEEDS	APPLICATION	PRIORITI-ZATION (scale 1-5)
BUSINESS MODELS	Lack of inter-stakeholder collaboration and integrated management along the value chain	Implementation of a multi-stakeholder platform along the value chain	To exchange experience and data making all the actions synergic and symbiotic	
			To create an enterprise network involving all the actors along the value chain (from supply to reuse and recycling)	

MARKET	Lack of demand for recycled materials in different sectors (i.e. plastic, construction…)	Marked place and sharing platforms	To match supply with demand	
			To create and support the market of recycled materials	
SKILLS	Lack of skills with a systemic approach	To invest in masters and PhDs with integrated approach	To create a high level of experts in integrated approach	
	Lack of education for local governors or lifelong learning for existing professions	To invest in dedicated lifelong learning courses dedicated to public authorities	Dedicated and mandatory e-learning courses for public authorities	
	Lack of repair and refurbish competences	To invest in dedicated courses for professionals with integrated approach	To create a high level of experts in integrated approach	
	Lack of competences in material downgrade	To invest in dedicated courses in Engineering faculty and PhD	To create a high level of experts in integrated approach	
TECHNOLOGY/METHODOLOGY	Lack of information on resource/waste flows along the value chain	Material flow analysis and monitoring tools	Resource efficiency plans and protocols at different scales	
	Lack of traceability (RM, resources, waste)	Innovative tools for integrated traceability and identity card for complex products and buildings	Resource/waste traceability	
	Lack of information on stocks	Methodologies and tools to estimates stocks along the value chain, in urban mine and industrial areas	To develop an integrated plan for supply (primary and secondary supply)	
	Lack of integrated approach for managing stocks	Pilot applications (i.e. urban mining feasibility studies and applications)	To integrate secondary supply and urban planning	
	Down cycling (lower quality and lower	Implementation of standards for management	To improve the quality of recycled materials	

	functionality of the recycled material rather than the original one)	and treatment (i.e. standard for selective demolition and for recycled materials in the construction sectors)		
	Lack on flexible infrastructures with integrated approach	Implementation of new technologies and plant	To improve the quality and to ensure the performances of recycled materials	
	Product design does not allow economical sustainability of recycling			
BEHAVIOUR	Low stakeholders awareness	Creation on suitable stakeholder platforms	Long term sustainable stakeholder platform for exchange information, data and resources	
	Low involvement of civil society in the value chain organization	Awareness campaigns and dedicated incentives mechanism	Virtuous mechanism involving all supply chain components	
	Low consumers awareness	Awareness campaigns and dedicated incentives mechanism	Virtuous mechanism involving all supply chain components	
MANAGEMENT	Lack of support to the creation of a market for recycled materials	Tools and guideline to support PA and policy makers (i.e. Green Public procurement implementation and harmonization)	Long term support for public authorities and policy makers, aiming to create a direct link between needs and application	
		Guideline and support for the implementation and application of "end of waste" criteria	Long term support for public authorities and policy makers, aiming to create a direct link between needs and application	
OTHER				

What would be the opportunities for new jobs/businesses?

- .....
- .....
- .....
- .....

What approach would you propose to tackle altogether the R&I needs identified as priorities?

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