DIGICIRC

WP2 – INVOLVE: Generating the DigiCirc Ecosystem

D2.5: Circular Innovation Priorities Circular Cities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

Document Information

Grant Agreement Number	873468	Acronym		DigiCirc
Full Title	European cluster-led accelerator for digitisation of the circular economy across key emerging sectors			
Start Date	1st May 2020	Duration		32 months
Project URL	https://digicirc.eu/			
Deliverable	D 2.5 Circular Innovation Priorities Circular Cities			
Work Package	WP2 Involve - Generating the DigiCirc Ecosystem			
Date of Delivery	Contractual	31st October 2020	Actual	30th October 2020
Nature	Report	Dissemination Level		Public
Lead Beneficiary	Cap Digital			
Responsible Author	Julia Morawski, CAP			
Contributions from	DRX, ICA, F6S, ARL			

Document History

Version	Issue Date	Stage	Description	Contributor
1.0	09/10/2020	Draft	1st draft for internal review	DRX, ICA, F6S, ARL
2.0	29/10/2020	Draft	2nd draft for last review	
3.0	30/10/2020	Final	Final version for submission	ICA, ARL

Disclaimer

Copyright message

Table of Contents

1 List of Acronyms

Acronym	Designation
CC	Circular Cities
CE	Circular Economy
ECCP	European Cluster Collaboration Platform
EU	European Union
EC	European Commission
GDP	
LE	Linear Economy
RTO	Research and Technology Organisations
SME	Small and Medium Enterprise
UNEP	United Nation Environemental Program

2 Introduction

2.1 DigiCirc at a glance

DigiCirc's ambition is to build a European ecosystem to enable the digital transformation of the Circular Economy (CE) in three specific sectors (circular cities, blue economy and bioeconomy). To do so, the DigiCirc project supports European SMEs by funding and accelerating their digital innovations in these emerging sectors.

2.2 Purpose of this document

This report is designed to present the consultation process and the outcomes from the engagement campaign for CC. The document is divided into three parts:

- The first section describes the methodology implemented, during the engagement campaign during 5 months from May to September 2020, including the target groups reached and key figures;
- The second section outcomes of the different activities led in the engagement campaign: results of the desk research on domain priorities, technology, market trends and regulatory landscape, and the results of the consultation (questionnaire, cluster meeting and DigiCirc partner meeting);
- The last part presents the DigiCirc priorities in the domain of CC (challenges & sectors).

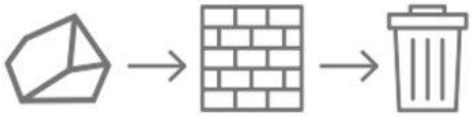
3 Circular Cities

The circular economy (CE) is becoming a familiar and understandable concept to the world, as shown by the European Commission (EC). A new Circular Economy Action Plan was adopted in the framework of the European Green Deal to introduce legislative and non-legislative measures to enable sustainable development. In this light, CE is engaging Europe towards a more sustainable future involving a large spectrum of actors (Members States, local authorities, citizens, productors, suppliers, innovators…) in the economic transformation with a positive environmental and societal impact.

To understand the transition, CE is often defined in contrast to the linear economy (LE). LE includes a supply chain in three main steps: extraction of materials, production of goods/consumption and waste production. In CE, products or materials considered as waste in LE can become a resource anew and so create a circular-shaped supply chain.

This could be illustrated with these following pictograms:

Linear Economy



Sources: Circular Economy action plan for local authorities

Extraction of materials will be used for *Production of goods /consumption*. At the end of the cycle of life of the product, waste that is produced is not reused by the supply chain.

Circular Economy

Sources: Circular Economy action plan for local authorities

By reusing waste in the supply chain, CE responds to multiples challenges, such as dependence on resources, lack of waste disposal, climate change, economic attractiveness of a territory, etc.

In the view of engaging European actors in CE transition, local authorities play a crucial role to enable, to initiate, support and boost actors. Furthermore, they can drive the CE agenda forward to unlock economic, environmental, and social benefits.

Moreover, considering that by 2050, two thirds of human population will live in cities[1], it is urgent for cities to adopt systems enabling them to be more resilient, and generate less waste and pollution. At the international level, cities represent a consumption of 70 to 75% of natural resources[2], are responsible for 60 to 80% of greenhouse gases[3], and produce over 50% of waste, according to the UNEP.

Inspired by CE, the CC concept is applied to urban areas. Along adopting the vision and strategy of CE, CC promotes the adoption of circular urban systems to increase the efficiency of cities, reduce their ecological footprint and the health costs of their citizens. Specifically, CC gathers three notions:

- ***urban territory scale*** (districts, metropole, regions…),
- ***flow*** (water, energy, waste, food, goods…) and
- ***competences*** (waste water, product, consummation, waste management, education…).

However, cities encounter major challenges to transition towards being circular. These are:

Organisational challenges*:* how to organise as a city, how to work with new stakeholders, to design urban services that will integrate CE principles (circular urban systems), how to design and maintain circular infrastructures? I.e.: we can cite projects of urban metabolism, urban and industrial ecology projects (EIT[4]).

Technological challenges*:* how to choose the best solutions to a given situation, how to integrate a chain of different innovative solutions, how to integrate new technologies to existing processes?

Social challenges: how to improve the global wellbeing of inhabitants? How to work on inclusiveness, integrating CE principles?

Environmental challenges: how to become productive cities (urban farming, restoring natural states…)? How to tackle pollution issues?

Impact challenges: how to measure impacts of such concepts? What are the existing tools (i.e. Zero waste index…) and what's missing? Several cities already define themselves today as CC.

These challenges lead cities to become a privileged place of experimentation to sustainably produce, consume and manage waste at a delimited urban territory scale thanks to digital technology and CE. To support circular sustainable development in cities, DigiCirc will run an acceleration programme on the CC. Beneficiary SMEs will be selected through an open call that will be launched in November 2020. To identify key challenges addressed in the open call and reach out European stakeholders in the field of CC, we followed the methodology described below.

[1] *68% of the world population projected to live in urban areas by 2050, says UN*, https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html

[2] Resilience and Resource Efficiency in Cities p.4 https://wedocs.unep.org/bitstream/handle/20.500.11822/20629/Resilience_resource_efficiency_cities.pdf?sequence=1&isAllowed=y

3 Idem

[4] Municipality-led circular economy case studies from EIT Climate-KIC and partner https://www.climate-kic.org/in-detail/municipality-circular-economy-case-studies/

4 Methodology

4.1 Methodology description

Cap Digital has developed a creative bottom-up approach to map the market trends by consulting key local players. This methodology was applied to define the DigiCirc key circular challenges in the domain of CC. Through a bottom-up process of consultation (questionnaires, interviews with experts, cluster meeting, and DigiCirc partners meetings) and by having respondents express and/or voting for sectors/challenges which were listed, we could be aware of challenges and sectors that may be considered important. This also helped to prioritize and get to know the DigiCirc community in the domain of CC.

1. Desk research - *Understanding the market trends (May-June 2020)*

The first task was to identify the main domain priorities by sorting out the technology, market trends, regulatory through an initial analysis. We called it 'desk research'. This preliminary work helped us to identify new clusters to engage in DigiCirc ecosystem, priorities for the CC and structure questionnaires for defining the challenges.

2. Cluster engagement campaign - *Building the DigiCirc Ecosystem (July August 2020)*

Courtesy of the desk research as well as events and interviews, a list of European clusters was identified. A questionnaire was sent to them to confirm their interest of being part of DigiCirc ecosystem.

The aim of the questionnaire was on one hand to characterized the clusters (e.g number of members, sectors…) by gathering the general information about them and on the other hand to understand the possible synergies with the DigiCirc project (EU project, areas of interest, etc. see Annex 1)

3. Market consultation - *Defining the challenges (July August 2020)*

In parallel of the Clusters engagement campaign, we have launched an open market consultation addressed to all types of CE stakeholders (see target section below). It helped us to define the key CC challenges thanks to an online questionnaire (see Annex 2).

The questionnaire "Shape with us the Circular Cities Challenges" was organized in four points:

- Understanding the vision of the CC and objectives of the stakeholders
- Identification of the challenge priorities
- Determining urban territorial scale for experimentation
- Detecting existing and future digital solutions.

The questionnaires were spread through DigiCirc communication channels as well as DigiCirc partners among its regional ecosystem.

Nota Bene: For both questionnaires, we decided to have some mandatory questions to make sure to collect enough information on few issues. To encourage the stakeholders and clusters to answer the forms, the time to fill it did not exceed 30 minutes. Besides, we alternated open and Yes/No questions to guide the stakeholders and let express themselves by giving their point of view in a dedicated space.

4. Cluster meeting - *Discussion on the key challenges (September 2020)*

As a result of the cluster engagement campaign, eight clusters were invited to participate to a cluster meeting online. The objective was to present the results of the market consultation and discuss them. We then had a guided discussion to identify key challenges and sectors of the CC

Figure 1 : Cluster online meeting picture

5. DigiCirc partner selection – *Selection of the challenges for the open call (September 2020)*

Finally, the results of the market consultation and the outputs of the cluster meeting were presented to the DigiCirc partners. After an open discussion, we have proceeded to a vote to establish the final list of challenges for the CC open call.

4.2 Target groups for the open market consultation

We succeeded to reach four target groups for the market consultation. We exchanged with them through interviews and meetings.

- **Clusters:** Considered to be the gateway to regional ecosystems clusters across Europe, clusters help the DigiCirc consortium to establish the DigiCirc ecosystem. They will reach out their members, in particular SMEs. European Clusters can also support SMEs in the cross-border and cross-sectors activities. For example, we liaised with clusters by attending clusters brokerage event. Clusters already in contact with the DigiCirc partners were informed about the initiative and invited to join it. The list of clusters involved in the CC domain. See the list of Cluster in Cluster Engagement Campaign.
- **Local authorities:** Their competences can be numerous and diverse in the urban development (school building maintenance, mobility, social welfares, vocational trainings, facilities, economic growth…) They therefore play a crucial role in the DigiCirc ecosystem. Their expertise in the field of CE must be considered to develop the innovative solutions that can be uptaken for experimentation in the urban areas. Cap Digital contacted French local authorities based in Île-de-France and Hauts-de-France to inform them about the initiative and get feedbacks on their local expertise and needs (see WP5 reference group).
- **SMEs:** Keystone of DigiCirc ecosystem, they provide technology solutions in the emerging sector as the CC domain. Following the exchanges, it turns out that many have a strong expertise in CE. Some of them already collaborate with sectors willing to develop new cycle of life for products, process, or solution in the supply chain. They operate with corporates or/and local authorities on the subjects related to the CC priorities.
- **Competence partners:** They are the French reference bodies in CE domain. Experts would have the opportunities to support the DigiCirc Initiative. We reached out the French National Agency for the Ecological Transition (ADEME) and the French National Institute of Circular Economy (INEC).

5 Outcomes of the different activities

During the engagement campaign, several activities were implemented: **desk research**, **cluster engagement campaign**, **market consultation**, **cluster meeting** and **DigiCirc's partner meeting**. Each activity had a different objective (e.g. identify challenges, reach out cluster…) but, in a whole, it contributes to generate the DigiCirc Ecosystem.

In this section, we describe, in the first part, the results of the desk research (Technology Watch, Market Trends, Regulatory landscape), the conclusion of the cluster engagement campaign and the market consultation. The two last parts presents the discussions and votes of clusters invited in the cluster meeting and the final choice of the DigiCirc partners.

5.1 Desk research

The DigiCirc team (Arthur's Legal, DRAXIS, Inspiring Culture Association, F6S) led by Cap has performed desk research to identify a preliminary longlist of sector priorities as well as to identify market/technology trends and regulatory aspects. These trends are summarized below.

5.1.1 Technology watch

The focus of Technology watch was to carry out an initial desk research, in order to define high-level technology domains with existing applications in CE and CC and also technology trends that seem to be very promising in the CE thematic area. The identified technology domains are presented below:

- **Big data analytics**[5] - *Trending*

Big data analytics allow the transformation of raw data into knowledge and also allows us to overlay general patterns of human behavior on top of aggregated information in order to predict patterns at a local level[6].

- **Internet of Things**[7] - *Trending*

IoT enables connecting machine tools and devices as a network, thus monitoring and exchanging real-time data for decision making.

- **Geospatial information** - *Trending*

Geospatial information can provide visibility on the flow of materials, components, products and people across a city (including patterns of optimal mobility routes, energy demand peaks and valleys, congestion, and waste generation).

- **Cloud computing** - *Trending*

Cloud computing offers computation capabilities for complex and agile analyses, also leading the way to *dematerialization*; the process of replacing something physical with a digital alternative[8].

- **Blockchain** - *Promising*

Blockchain technology can facilitate circular pay-per-use models. It promotes access instead of ownership, namely paying for the use of a product instead of possession. It also helps the users avoid transaction costs and it makes transactions more secure[9].

- **5G** - Promising

5G constitutes an excellent IoT enabler, allowing cities to access the necessary fast connections to their infrastructure, devices and people.[10]

- **Virtual Reality/Augmented Reality** - *Promising*

VR and AR could represent a valuable element for improving disassembly and remanufacturing processes.

[5] The Smart Waste platform brings IoT and Big Daata to the management of waste collection and recycling, http://www.techspurts.com/the-smart-waste-platform-brings-iot-and-big-data-to-the-management-of-waste-collection-and-recycling /

[6] Cities in the circular economy: The role of digital technology, SUKHDEV A., VOL J., BRANDT K., YEOMAN R.

[7] Idem

[8] Waste to wealth – Executive summary, Lacy P. and Rutqvist J.

[9] HOW BLOCKCHAIN CAN ADVANCE THE CIRCULAR ECONOMY https://www.circle-economy.com/news/how-blockchain-can-advance-the-circular-economy

[10] 5G & Smart Cities Interplay – Will 5G make smart cities a common reality? – Keynote discussion on IEEE 5G World forum

They could enable simulations related to better management of complex supply chains or remanufacturing of complex products.[11]

These high-level technology domains represent the baseline on which specific applications will be built. Either individually or combined with one another, they enable the development of solutions targeted to the circular economy domain. They could allow better lifecycle management of products and services, optimization of remanufacturing practices, multi-agent systems for managing the use of resources and also the integration of data sources (high-resolution imagery, GPS movements, intelligent sensors, etc.) with an extensive user community to contribute to the CC. Examples of such applications, derived from the combination of these technologies are shown in Figure 2 and are presented below:

Asset tagging

Asset tagging can provide information about the condition and availability of products, components, or materials. This information can help extend the lifetime of an asset, increase its use, utilize it in additional use cycles, and also help regenerate natural capital.[12]

Sharing platforms

Users are able to exchange goods and services through an internet platform, thus fewer resources go into making products that are infrequently used.[13]

Optimised city mobility

Software that enables the users to get informed and access alternative transportation methods which especially useful for short distances and helps avoid fuel and maintenance costs.

Modular components tracking

Breaking down the whole into modular components makes it easier to track each part separately and to upgrade only those components that need replacing.

Waste management

Development and application of selective waste collection operations is already underway and includes efficient waste disposal by creating optimal dynamic collection routes and by monitoring waste levels in containers.

Symbiosis tools

Industrial symbiosis tools facilitate product/material/service exchanges and creation of circular processes between different parties.

Pay-per-use models

Pay-per-use models facilitate the shift from ownership to access. This model creates incentives for products that last, stimulates value chains to work together and places more responsibility on producers for the collection, processing and reuse of products.[14]

Localized pattern predictions

Data sharing, geolocalization and analysis by leveraging advanced algorithms and great processing capacities, enables predictions targeted to specific areas such as predicted energy consumption levels, suggested routes to avoid traffic etc.

[11] Integrating Virtual Reality and Digital Twin in Circular Economy Practices: A Laboratory Application Case, Rocca R., Rosa P, Sassanelli C., Fumagalli L., Terzi S., Sustainability 2020, 12(6), 2286; https://doi.org/10.3390/su12062286

[12] Cities in the circular economy: The role of digital technology, SUKHDEV A., VOL J., BRANDT K., YEOMAN R.

[13] Waste to wealth – Executive summary, Lacy P. and Rutqvist J.

[14] HOW BLOCKCHAIN CAN ADVANCE THE CIRCULAR ECONOMY https://www.circle-economy.com/news/how-blockchain-can-advance-the-circular-economy

Erreur ! Source du renvoi introuvable., originally included in *Intelligent Assets: Unlocking the Circular Economy Potential*[15], depicts intelligent assets that enable CE in cities and includes the aforementioned examples and more.

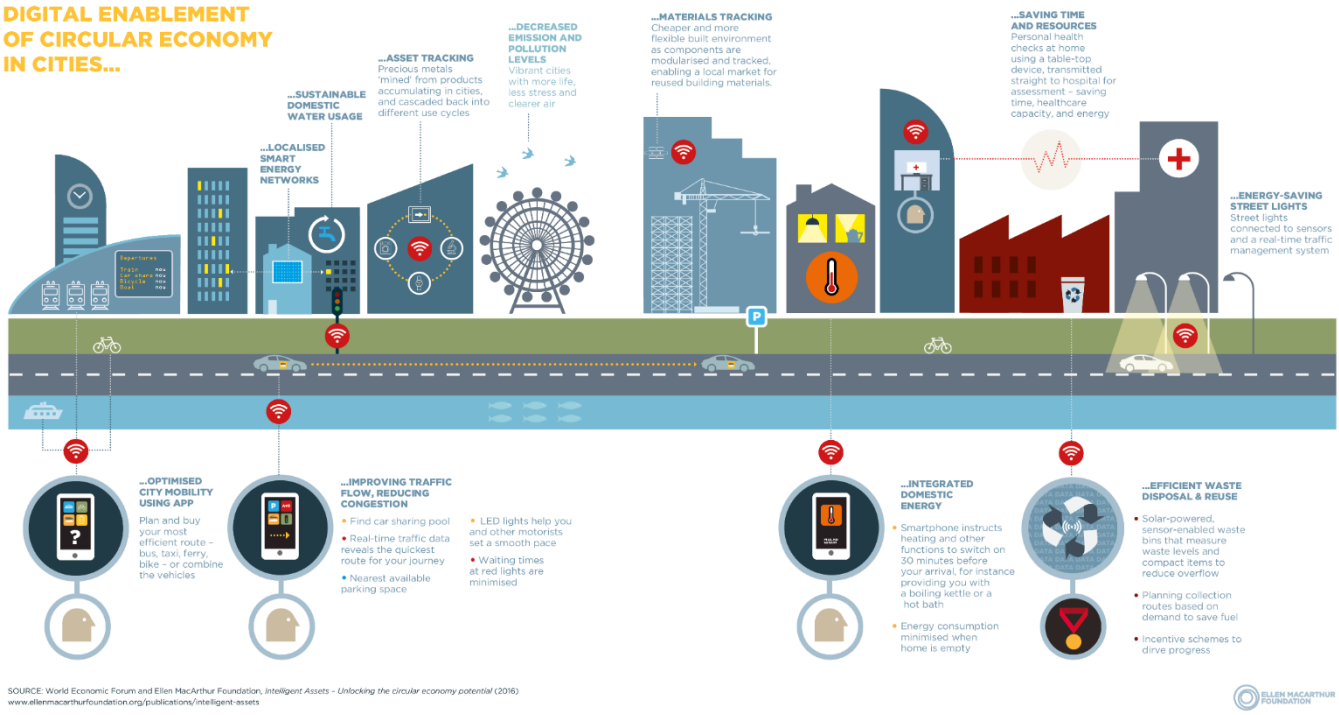


Figure 2: Digital applications examples for CE

5.1.2 Market trends

A market trend analysis in CC has been carried on in the months before the cluster meeting. Market studies, analysis and research has provided a thorough picture of market trends present in European cities.

More than 80% of global GDP is generated in cities, which therefore makes them ideal testing grounds for CE models. [16]). **Circular economies are indeed expected to re-shape current market paradigms, leading to great improvements and carrying valuable benefits in the cities.** These can be summarized as:

- **Thriving cities**: economic productivity increases through reduced congestion, eliminated waste, and reduced costs. New growth and business opportunities support skills development and jobs
- **Liveable cities:** with improved air quality, reduced pollution, and enhanced social interactions
- **Resilient cities:** reducing reliance on raw materials by keeping products in use and balancing local production with global supply chains

To begin with, **five megatrends** have been highlighted as the main precursors that will boost the adoption of CE solutions in the cities.[17] These are:

- **Urbanization:** Over half the world lives in urban areas and that trend will continue to grow. By 2025 the largest US cities will generate more than 10% of global GDP growth. By 2030, more than ½ the global population will live in emerging market cities with even more concentrated urban growth in countries such

[15] INTELLIGENT ASSETS: UNLOCKING THE CIRCULAR ECONOMY POTENTIAL https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_Intelligent_Assets_080216-AUDIO-E.pdf

[16] Circular Economy in Cities Evolving the model for a sustainable urban future, World Economic Forum, 2018 http://www3.weforum.org/docs/White_paper_Circular_Economy_in_Cities_report_2018.pdf

[17] ESPON 2020

as China. Concentration of populations in urban areas will unlock economies of scale needed to enable collecting and treating post-consumer materials for re-deployment[18]

- Empowered consumers: with greater access to data and social media, consumers will have more information on product impacts and greater expectations around product sustainability performance. Havas Media's "Meaningful Brands" reported the majority of consumers believe brands should help solve social problems and improve quality of life. The World Economic Forum's "Engaging Tomorrow's Consumer" show that millennials prioritize environmental impacts in their buying decisions. And the Regeneration Roadmap study highlights a large class of consumers they term "Aspirationals" that like to shop but don't want to harm the planet in the process
- Rise of the sharing economy: According to "Retail Horizons", people are increasingly sharing or renting things, rather than buying new products to consumer. This trend could grow and continue to create a new form of consumer economy in which experiences and access to items are more desirable than ownership. Where there is excess capacity, trust, critical mass and technology to the sharing economy leverages the "power of the inner circle", keeping products cycling in the market for as long as possible. connect markets, this trend should continue to grow
- Community reliance: Retail Horizons describes the trend of self- and community reliance where people cherish the things the build more than the things they buy and strive to provide more of their own basic needs rather than depending on multinational corporations and institutions. The increase in farmer's markets and community gardens and makers markets are just some of the signals of the movement. Moving towards more localized and self-contained markets offers great opportunity for people to live the CE founding principle of "Waste is Food" first-hand
- Resource scarcity and water insecurity: The resources are consumed 50% faster than they can be replaced. Obviously, these factors will lead to increase and volatility in material and energy prices. Companies that use the CE "powers" will keep raw materials in play through maintenance, re-purposing or transforming them into entirely new product categories

Besides, these five megatrends, four main CE market trends in European Cities are identified: Buildings, Mobility, Food, Products and Services.[19]

Future CE trends in buildings:

- *Creating flexible and dynamic buildings*: Easily assembled and disassembled, their different components or materials could be recovered and reused rather than being landfilled.
- *Building with new materials:* Sourcing renewable, non-toxic materials will increase reusability/recyclability, and ultimately allow for materials to be safely returned to the biosphere at end of life (living buildings)
- *Use of technology in buildings:*
    - integrating 'smart' technology such as responsive heating, ventilation, and air conditioning (HVAC) systems, and smart meters that provide greater transparency on energy consumption and cost.
    - Green roofs are able to filter and capture rainwater. Recirculation of water within homes (e.g. using shower water to flush the toilet) is another way to reduce a home's resource consumption

[18] Ellen MacArthur Foundation's "Towards a Circular Economy" Volume 3
[19] Ellen MacArthur Foundation, 2017

Future CE trends in mobility:

- *Circular mobility system:*
  - Connecting citizens with accessible, affordable, and effective transportation
  - A circular mobility system would be multi-modal, which means it would offer a diverse range of mobility options to reflect the diverse needs of cities and their citizens
- *Circular vehicle design:*
  - Enabling repair, reuse, remanufacturing, and recycling of components and materials.
  - we need to consider how vehicles are designed so that we can easily repair them during service, and recover and reuse their materials at end of use.

Future CE trends in Food sector:

- *Use of waste as production inputs:* A CE for food mimics natural systems of regeneration so that waste does not exist, but is instead feedstock for another cycle. Some of these by-products can provide additional value before this happens by creating new food products, fabrics for the fashion industry, or as sources of bioenergy.
- *Design and market healthier food products:* Food products must be designed through a system that provides healthy production as well as nutrition.
- *Source food grown regeneratively and locally:* Reconnect cities with food and farmers, supporting regenerative practices that benefit the environment

Future CE trends for product and services:

- *Eliminate packaging waste*: offer household collection of used product packaging for refilling, reuse, or recycling
- *Include circular economy in design phase*: make sure that the products and services are already designed to fit a CE-based market
- *Keeping clothing in use* for longer:
  - reduce the likelihood of impulse purchase
  - Enable and boost clothing recycling
  - Use eco-friendly fibers for clothing production

5.1.3 Regulatory landscape

This part highlights initiatives taken at an EU level, provides an overview of the regulatory landscape pertinent to DigiCirc and identifies relevant aspects that need to be considered. The part will demonstrate that, in essence, the current EU regulatory trend is to foster data sharing through policy actions, regulations and soft law instruments.

EU Initiatives

In the last few years, the European Union has taken great strides to achieve environmental and sustainable development targets through strategies, action plans, guidelines, regulations and the like. The 6 main priorities of the European Commission (2019-2024) included among others, the adoption of a European Green Deal, creation of an

economy that works for people and how to make Europe fit for the digital age. In this context, the initiatives mentioned below were considered particularly relevant to the scope of DigiCirc.

European Green Deal

The European Commission announced the European Green Deal in December 2019 with multifarious objectives including turning climate and environmental challenges into opportunities across all policy areas and making the transition just and inclusive for all. The Green Deal aims to boost the efficient use of resources by moving to a clean, CE. It further acknowledges the importance of circular economies and mobilisation of industry to making the EU's economy sustainable. Given that transforming the industrial sector and all value chains can take considerable amount of time, the Green Deal suggests that actions and decisions need to be taken in the next five years.

EU Circular Economy Action Plan

The Circular Economy Action Plan which is one of the main pillars of the European Green Deal envisions that a CE can strengthen the EU's industrial base and foster business creation and entrepreneurship among SMEs. The Plan presents initiatives to develop a holistic and coherent policy framework to encourage sustainable products, services and business models thereby transforming consumption patterns to prevent wastage. The Plan also takes a broader view of its impact by highlighting that Europe will lead the way to a CE at a global level by using its expertise, resources and will influence to implement the 2030 Sustainable Development Goals adopted by the United Nations

European Data Strategy

The European Data Strategy acknowledges the significant role that data plays in achieving the goals set out in the European Green Deal and aims at making more data available for tackling societal, climate and environment-related challenges, contributing to healthier, more prosperous and more sustainable societies. In this context, the European Commission aims at creating a common European data space for smart circular applications wherein it will make available the most pertinent data for facilitating circular value creation along supply chains.

Ethics Guidelines for Trustworthy Artificial Intelligence

The Ethics Guidelines for Trustworthy Artificial Intelligence which were presented by the High-Level Expert Group on AI in April 2019 suggest that sustainability and ecological responsibility of AI systems should be encouraged, and research should be fostered into AI solutions addressing areas of global concern, such as for instance the UN's Sustainable Development Goals.

European Industrial strategy

Europe has a long history of supporting and enabling businesses and industries to thrive and it will have to do the same as it transitions towards digital leadership and climate neutrality. The European Industrial Strategy aims to support this twin transformation of making Europe greener and more digital while transforming traditional and new industries, encouraging SMEs and fortifying competitive sustainability across the EU. The strategy focuses on industrial ecosystems that factor in all the relevant players including academic and research institutes, suppliers, SMEs and larger companies.

Regulatory overview

In addition to the EU initiatives mentioned above, there are various EU legislations that directly or indirectly relate to the creation of circular products, services and business models. For the purpose of this deliverable, this section produces an overview of the most relevant applicable regulation, focusing on those that are of direct relevance for the scope DigiCirc.

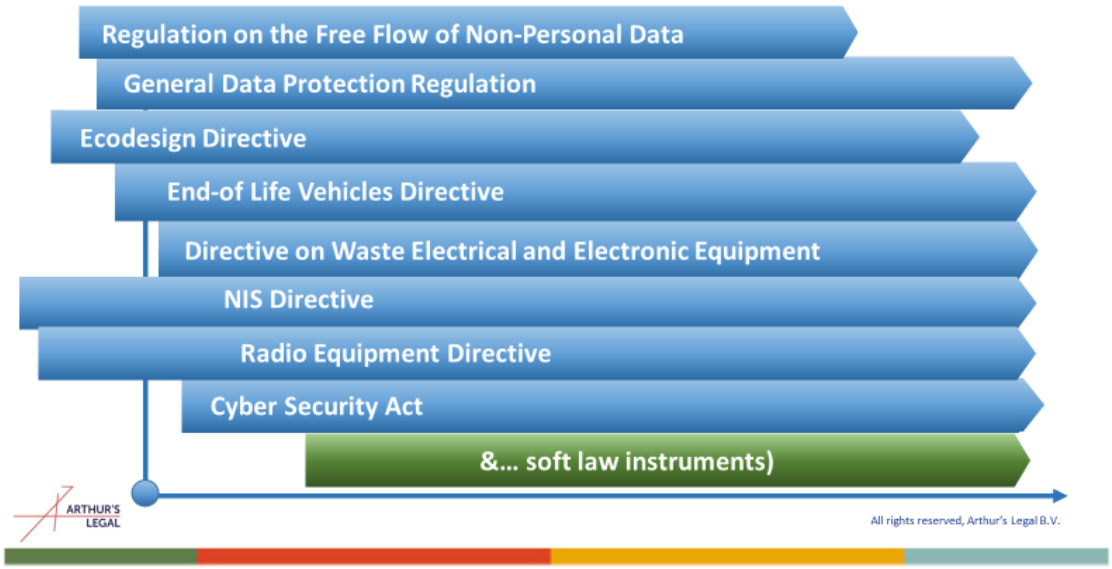


Figure 2: Overview of the most relevant applicable regulations

Regulation on the free flow of non-personal data

The European Commission's Regulation on a framework for the free flow of non-personal data (Regulation) in the EU, which became effective on 28 May 2019, primarily aims to ensure the free movement of non-personal data across borders and to enable organisations to store and process such data anywhere in the EU. The European Commission is of the view that to fully realise the benefits and potential of the data-driven economy, it is essential to enable public and private organisations to store and process non-personal data wherever they require to do so in the EU. In particular, the Regulation enshrines the principle of the free movement of non-personal data into EU law with clear obligations on national governments not to restrict the location, storage or processing of non-personal data in any specific territory, unless justified on grounds of public security. This Regulation along with the General Data Protection Regulation (GDPR) aim to provide for a stable legal and business environment on data processing.

Ecodesign Directive

The Directive establishing a framework for the setting of ecodesign requirements for energy-related products (Ecodesign Directive) provides a framework requiring manufacturers of energy-related products to improve the environmental performance of their products. The Ecodesign Directive acknowledges that energy-related products are responsible for massive consumption of natural resources and energy in the Community but that there is also potential for such products to be improved so as to minimise environmental impacts and to achieve energy savings with the help of better design which subsequently will lead to economic savings for businesses and end-users. In October 2019, the Commission adopted 10 ecodesign implementing regulations that set out energy efficiency and other requirements for different product groups including electric motors, electronic displays, external power suppliers, power transformers and wielding equipment.

End of Life Vehicles Directive

Given that every year, end-of-life vehicles (ELV) produce approximately 7 to 8 million tonnes of waste in the EU, the Directive on end-of life vehicles (Directive) was enacted to encourage the re-use, recycling and recovery of ELVs and to make dismantling and recycling of ELVs more environmentally friendly. The Directive also encourages vehicle manufacturers to work with material and equipment manufacturers to limit the use of hazardous substances in vehicles such as lead, mercury and cadmium so as to prevent their release into the environment while also making recycling of the vehicles easier.

Directive on waste electrical and electronic equipment

The Directive on waste electrical and electronic equipment (WEEE Directive) was implemented to control and manage one of the fastest growing waste streams in the EU i.e. waste of equipment such as computers, cell phones, refrigerators and television sets. The WEEE Directive lays down measures to safeguard the environment and human health by restricting or reducing the harmful impact of the generation of waste from electrical and electronic equipment. Moreover, the Directive contributes to a CE by requiring Member States to ensure that collection and transport of waste electrical and electronic equipment is done in a manner which enables optimal conditions for preparing for re-use, recycling and the confinement of hazardous substances.

Issues

Despite the numerous benefits that CE has to offer, it also presents certain issues that need to be taken into account at the outset and which incentivized EU regulator to take appropriate action, as described on the section above:

- Despite a wide array of legislation being adopted by the EU (on i.e. unjustified geo-blocking, digital contracts, online purchases), ***many regulatory barriers are still present in Member States***. Some create additional administrative hindrances and affect SMEs and start-ups in particular.
- ***Lack of interoperability*** –also, between regulations- often hinder data flows that are of key importance for the strengthening and sustainability of CE in EU.
- ***Lack of collaborative orchestration.***
- Ecological and societal benefits that can result from the creation of circular economies often come ***in conflict with economic benefits and short-term gains***.
- Due to the nature of the industry that organisations may belong to or due to the nature of data, ***there might be some restrictions to seamless sharing of data.***
- ***Privacy, security and trust are not a given, when it comes to actual engagement of relevant stakeholders.***
- ***Inability of certain sectors to optimally integrate the notions of CE*** so as to limit their environmental and societal impact in cities.

This initial desk research facilitated to draft two questionnaires: one to invite clusters to join the DigiCirc Ecosystem, the other to help us to shape the key CC challenges. This section will present the analyses of the market consultation and the clusters meeting.

5.2 Cluster engagement campaign

With the support of the European clusters and umbrella organisations active in CC and ICT domains, we can reach out actors (SMEs, local authorities, RTOs…) in the clusters across Europe. Cluster organisations and networks act in the role of "node" and can interact with their members and the DigiCirc consortium. To be connected to clusters, we considered to build off existing relationships and previous links as well conducted a complementary desk research on the European Cluster Collaboration Platform (ECCP) and participation in two Cluster meetings.

In total 62 clusters were contacted through a question to confirm their interest of being part of the DigiCirc ecosystem. 21 clusters were contacted through the ECCP and 2 clusters joined the DigiCirc Ecosystem and participated in the cluster meeting in September. 15 answers received from 12 countries and one cluster decided to join the DigiCirc ecosystem after the engagement campaign.

Through the questionnaire, clusters could validate their most significant areas defined in the DigiCirc project (CC, bioeconomy and blue economy). According to their thematic area interest, clusters will be also informed about the future engagement campaigns. Results showed that five main sectors were represented following this order Energy, Environment, ICT, Services and Materials. Other entries were also selected (Construction, Design, Transport, Fashion, Production, Security, Food, Agriculture, Tourism, Health…). Out of 15 clusters, 10 have a Cluster Excellence Label (2 Gold, 3 Silver and 5 Bronze). Clusters were also asked to spread the word about the market consultation by sharing the questionnaire "Shape with us the CC Challenge" among their regional ecosystem. Finally, regarding the possible synergies between the DigiCirc project and EU projects involved one of the clusters, we noted potential links between Interreg project dedicated to the CE and the DigiCirc Ecosystem (e.g mutual activities…)

Considering the questionnaire answers, we listed a list of criteria to invite eight clusters to join the Cluster Advisory Board (CAB) for CC (Interest in CC thematic area, Geographical diversity, Cross-sectorial, Responsiveness of clusters – cluster engagement, number of members, seniority). This meant to participate in the cluster online-meeting. The results of the questionnaire "Shape with us the CC Challenge" were presented to CAB followed by discussions about the key CC Challenges during the cluster meeting. Other clusters were invited to join the DigiCirc ecosystem and will be part of the Friendly Clusters (FC) community. All clusters will be posted on the launch of the first open call in November.

Cluster Advisory Boad for Circular Cities – participated in the Cluster online meeting on 15th of September 2020

- Cluster Sofia Knowledge City (Bulgaria)
- INDURA Cluster for Sustainable Infrastructure (France)
- ICT Cluster of Central Serbia (Serbia)
- Umweltcluster Bayern (Germany)
- Fondazione Torino Wireless (Italy)
- Catalan Fashion Cluster (Spain)
- Paper Province (Sweden)
- Baltic Eco-Energy Cluster (Poland)

Friendly DigiCirc Clusters for Circular Cities that join the DigiCirc Ecosystem

- Green Synergy Cluster (Bulgaria)
- CLEVER (Italy)
- Cluster of Bioeconomy and Environment of Western Macedonia (Greece)
- Fibres Energivie (France)
- SCOR CLUSTER (Romania)
- Distretto Tecnologico Nazionale sull'Energia Scarl (Italy)

5.3 Market consultation

Market consultation overview

In order to consult the market stakeholders on the CC, an online questionnaire was created and spread out across the DigiCirc communication channels and Cap Digital's ecosystem. The questionnaire was divided into 3 sections:

- Questions from 1 to 3 aim to understand the vision of the CC and objectives of the stakeholders.
- Questions from 4 to 6 help to identify the key sectors and cross-cutting issues
- Finally questions from 7 to 10 investigate in existing and future digital solutions.

The online questionnaire was opened from the 30th of July to the 6 September. It had 465 views and 61 submissions mainly from European countries.

Main conclusions

According to the consultation, the city of tomorrow should be liveable, thriving and resilient but also cooperative, sustainable safe and secure. The improvement of environmental and social impacts is strongly emphasized with a willingness of living in a pollutant free, waste free city, which integrates nature and bio-diversity, as well as a city that is inclusive and equal-access by providing a good standard of living and services accessible to all. Finally, the economic attractiveness of the city is underline with the emergence of new business opportunities that should be line with the communities needs and allow the inclusion of all the actors and promote local production and consumption.

To achieve this, waste, food, buildings and construction, water and energy were voted as the main sectors that needs to integrate rapidly notions of CE in their value chain to mitigate their environmental and social impacts that were. Electrical and electronical equipment, plastics and public procurement were also cited several times as sectors of interest.

Regarding the future digital solutions, it turns out that in general digital solutions are seen as a tool to help to go towards the circularity of our economy in order to better collect and map the data, to connect the different products, services, flows, and actors and finally to optimize the current value chain operation. Nevertheless, it should be noted that despite the convincing help brought by digital tools, we will have to rebuild and rethink some value chains which is rather a human and organizational challenge than digital one.

5.4 Clusters meeting

Meeting overview

Eight clusters plus the three DigiCirc cluster partners (Cap Digital in France, Digipolis in Finland and Marine Technology Centre, in Spain) participated in the cluster meeting. The meeting was split into two parts: one was dedicated to liaise with other cluster by presenting DigiCirc and each cluster activities and ended with the matchmaking tool presentation.

The second part aimed to establish a list of key issues. The results of the market consultation were presented, followed by the discussion. To do so, we conducted a guided discussion and votes thanks to an Ideaboard. The discussion was divided into 3 main topics: thematic, openness of the challenges and impacts. Each time questions were raised and discuss and concluded by a vote.

Main conclusions

The challenges can be categorized by cross-cutting issues and sectors. Cross-cutting issues seems more relevant to allow to develop innovative and impactful solutions. Nonetheless, a matrix with on one side cross-cutting issues and on the other side the most relevant sectors and flows could be relevant.

Regarding the challenge openness, those ones should be broad enough to allow a high rate of response to the open call.

During the definition of the cross-cutting issues and sectors/flows:

- the most voted cross-cutting issues were: Better manage waste, Better produce, Education, Better consume; Public procurement
- the most voted sectors were: Waste management; Energy; Transport; Building & Construction; Water Management

Some examples of challenges were discussed: Reuse of used water; Create new value chains for the textile waste; Increase recycling rates by smart collections systems; Create shared platforms; Smart public transport; Create consom'actors, etc.

Regarding the impacts, the environmental and social impacts seemed to have higher importance than the economic one.

The details of the questions and votes results can be found in Annex 4.

5.5 DigiCirc Partners selection

Partner selection overview

Following the Cluster meeting we organized a meeting with the consortium partners in order to report on the results of the questionnaire and the conclusions of the cluster meeting. We then proceeded to an open discussion and selected the final challenges for the Open Call. We were also able to discuss the desired impacts of the developed solutions.

Main conclusions

After discussion, it was decided to choose to present the challenges as a double entry matrix with on one side cross-cutting issues which will be the main categories and on the other side sectors of interest of which several can be selected for the same cross-cutting issue. This matrix vision allows us to remain broad enough while orienting the solutions providers towards themes that are of interest to the market.

The cross-cutting issues that have been selected are the following:

- **Autonomous cities;**
- **Waste Management;**
- **Sustainable consumption and Education.**

They enable the search for solutions on a local scale to be highlighted by including the production, consumption and recycling of waste, by addressing all the players in the market (citizens, businesses and public players) and by considering the importance of accompanying change.

Concerning the sectors, the sectors that stood out the most in our analyses and market consultation were selected. These are as follows: Buildings & Construction; Plastics; Food; Energy; Water.

Finally, concerning the impacts, it was emphasized that the environmental and social impacts were the most highlighted, but that it was also necessary to ensure the positive economic impact of the solutions developed. It was decided not to develop the expected impacts in the challenges section but rather to integrate them into the selection criteria for the solutions.

6 Circular cities challenges

The DigiCirc Initiative benefited from the engagement campaign in the CC domain through the initial desk research and the elaboration of questionnaires. This enables the promotion of the DigiCirc ecosystem and helps us to reach out stakeholders to build up the ecosystem. The action with clusters and interviews with experts created the feeling of belonging of an ecosystem and gave the possibility to share common interest on a mutual concern. Moreover, we liaised with unexpected stakeholders (e.g French National Agency for the Ecological Transition, French National Institute of Circular Economy…). Thanks to the archived work, we laid the foundation stone of the DigiCirc Ecosystem. The results of desk research and the cluster meeting led us to investigate on the CC domain and bring the DigiCirc priorities for this domain. Hereunder the scope and the challenges selected for the CC Open Call.

Scope

The CE aims to change the paradigm from the linear economy (produce, use, dispose) to a circular one that turn waste into resources. This implies limiting the resources usage, minimizing the environmental impacts, and increasing efficiency of product usage during its entire life cycle from its production, through its consumption, to the management of the waste produced.

Because of their scale and competences, urban territories are key players in the transition towards a CE by being privileged places of experimentation. This requires the willingness of all cities stakeholders from the public authorities, the private sector and especially the citizens to change the existing schemes and approaches. For cities to become circular they will have to reinvent themselves.

Challenges

To help them in this circular transition, DigiCirc's CC accelerator, is looking for solutions to tackle 4 cross-cutting issues:

Autonomous cities

The CE applied to the city could lead to autonomous and resilient CC by creating loops of resources produced and consumed locally

Waste Management

Ensuring that a waste is no longer a waste by minimizing its production and extending the duration of its use (reuse, repair, sale, donation, etc.) and by recycling the raw materials.

Sustainable consumption

Whether as a citizen in our private life or as a professional actor during project development, the notion of circularity must be integrated for any act of purchasing.

Education

The transition to a circular economy must be supported by the education of professionals, children's and citizens so that everyone can be an actor of the change.

To answer those cross-cutting issues, our accelerator, will focus on the following CC key sectors that need to be circularized:

- Buildings & Construction
- Plastics
- Food
- Energy
- Water

Application form

Challenges Domains
Please tick the box where your solution applies

	Autonomous cities	*Waste management*	*Sustainable consumption*	*Education*
Buildings & Construction				
Plastics				
Food				
Energy				
Water				

Challenges Description
Please describe the exact challenge you are tackling

7 References

- 5G & Smart Cities Interplay – Will 5G make smart cities a common reality? – Keynote discussion on IEEE 5G World forum
- Circular Economies in Cities, https://www.ellenmacarthurfoundation.org/our-work/activities/circular-economy-in-cities
- Circular Economy Action Plan for Districts - Économie circulaire plan d'actions pour les intercommunalités, (February 2018), available at https://www.adcf.org/files/Public--publications/AdCF-Guide-Transfert-Eau-Veolia-page.pdf
- Circular Economy Action Plan, https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf
- Circular Economy in Cities Evolving the model for a sustainable urban future, tp://www3.weforum.org/docs/White_paper_Circular_Economy_in_Cities_report_2018.pdf
- Circular economy in the food sector, https://www.bsigroup.com/en-GB/blog/food-industry-blog-news/circular-economy-in-the-food-sector/
- Circular Economy Trends, http://projects.mcrit.com/esponfutures/index.php/home/63-circular-economy-trends
- Circular Economy/Economie Circulaire National Agency for Ecological Transition ADEME – Agence Nationale de la transition écologique https://www.ademe.fr/expertises/economie-circulaire/leconomie-circulaire
- Cities in the circular economy: The role of digital technology, SUKHDEV A., VOL J., BRANDT K., YEOMAN R. https://www.ellenmacarthurfoundation.org/assets/downloads/Cities-in-the-Circular-Economy-The-Role-of-Digital-Tech.pdf
- Cities in the circular economy: The role of digital technology, SUKHDEV A., VOL J., BRANDT K., YEOMAN R.
- Cluster Organisations Mapping Tool, https://www.clustercollaboration.eu/
- Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles OJ L 269
- Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products OJ L 285/10
- Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment OJ L 197/38
- Ethics guidelines for trustworthy Artificial Intelligence, available at: https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=60419
- European Data Strategy, available at: https://ec.europa.eu/info/sites/info/files/communication-european-strategy-data-19feb2020_en.pdf
- European Green Deal (2019), available at https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf
- European Green Deal, https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
- European Industrial strategy, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1593086905382&uri=CELEX%3A52020DC0102

- Food and the Circular Economy, https://www.ellenmacarthurfoundation.org/explore/food-cities-the-circular-economy
- How blockchain can advance circular economy. https://www.circle-economy.com/news/how-blockchain-can-advance-the-circular-economy
- Integrating Virtual Reality and Digital Twin in Circular Economy Practices: A Laboratory Application Case, Rocca R., Rosa P, Sassanelli C., Fumagalli L., Terzi S., Sustainability 2020, 12(6), 2286; https://doi.org/10.3390/su12062286
- Municipality-led circular economy case studies from EIT Climate-KIC and partner https://www.climate-kic.org/in-detail/municipality-circular-economy-case-studies/
- Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union, OJ L 303/59
- Road map on Circular Economy, 50 measures for 100% Circular Economy - Feuille de route Economie circulaire, 50 mesures pour une économie 100% circulaire , (April 2018), available at https://www.ecologie.gouv.fr/sites/default/files/Feuille-de-route-Economie-circulaire-50-mesures-pour-economie-100-circulaire.pdf
- The Smart Waste platform brings IoT and Big Data to the management of waste collection and recycling http://www.techspurts.com/the-smart-waste-platform-brings-iot-and-big-data-to-the-management-of-waste-collection-and-recycling/
- UN Sustainable Development Goals, available at: https://www.un.org/sustainabledevelopment/
- Waste to wealth – Executive summary, Lacy P. and Rutqvist J.
- Website French Circular Economy Institut Site de l'Institut National de l'Economie circulaire (INEC) https://institut-economie-circulaire.fr/

8 Annexes

Annex 1: Cluster questionnaire

DigiCirc is an H2020 Innosup project that brings together 11 partners. It aims to boost the circular economy using digital tools by supporting innovative SMEs in the development and marketing of solutions based on circular value chains through 3 acceleration programs on the following themes: "Circular cities", "Blue Growth" and "Bioeconomy". €2.4 million will be distributed to 45 consortia to be selected through open calls.

Join the DigiCirc Ecosystem to support circular innovation in your region by helping us to:

- Register your members in the matchmaking tool,
- Define the key challenges in circular cities thematic area (e.g. answering to questionnaires, participation in Cluster online-meeting)
- Spread the open calls among your members

We will also share the tools we develop (e.g. Geolocation of material, Industrial symbiosis platform), our course materials and insights.

DigiCirc Team

*Mandatory answers

1. General Information

- Name of Cluster organisation*
- Country*
- Website organisation
- Adresse of your organisation*

How many members?*

- 0-50 members
- 50-100 members
- 100-150 member
- 150-250 members
- 250-400 members
- More than 400 members please specify:

Composition of you community members*

- How many SMEs?
- How many Academic?
- How Many local Authorities?
- Other

Sectors (Multiple choice)*

- Energy
- Construction
- Environment
- Food
- ICT
- Services
- Creativity
- Tourism
- Production

- Materials
- Design
- Health
- Transport
- Other

Do you have a Cluster Excellence Label?*

- Gold
- Silver
- Bronze
- None

What is your expertise?* (500 words)

What kind of activities do you offer?* (Multiple choice)

1. Technology services
   - Collaborative R&D
   - Technical support on upscaling
   - Testing and validation
   - Other Technology Services

2. Business Services
   - Incubator/Accelerator support
   - Access to finance and funding
   - Skills and education
   - Market Intelligence
   - Access to Competence Centers
   - Other Business Services

3. Ecosystem Services

(How do your cluster encourage the cooperation in your ecosystem?)

   - Community building
   - Visioning and strategy development
   - Other Ecosystem Services

You could share a short presentation of your organisation

2. DigiCirc project

Which DigiCirc thematic area is the most relevant for your ecosystem?

(Rank DigiCirc thematic areas according to your priorities and interests 1= High 2 = Medium 3 = Low)

- Circular Cities
- Bioeconomy
- Blue Growth

Do you have EU projects in link with Circular Economy? * Yes/No

Please precise the type of project (interreg, H2020, websites…), your role in the project and if it is related to the Ciricular Cities

Do you think we can create synergies between DigiCirc project and your EU project(s)?*

Yes/no
Please, specify (joint activities, spreading mutual open calls…)

Comments/Remarks (1000 words)

Which person in your organisation will be the contact point (CP), preferably manager position with DigiCirc project?*

- Contact
- position
- Email
- Tel

Annex 2: Market consultation questionnaire – Shape with us the Circular Cities Challenges

Introduction

DigiCirc is an H2020 Innosup project that brings together 11 partners. It aims to boost the circular economy using digital tools by supporting innovative SMEs in the development and marketing of solutions based on circular value chains through 3 acceleration programs on the following themes: "Circular cities", "Blue Growth" and "Bioeconomy". €2.4 million will be distributed to 45 consortia to be selected through open calls.

The circular economy considers the entire life cycle of a product from its production, through its consumption, to the management of the waste produced.

It responds to multiple challenges such as dependence on increasingly scarce resources, lack of waste disposal, urbanisation, the resilience of a region and its economic attractiveness, the empowerment of citizens, etc.

In a simplified way, the Circular cities is the notion of Circular Economy applied to a defined territory (city, region, etc.). Because of their scale and competences, territories are key players in the transition towards a circular economy by being privileged places of experimentation.

How to sustainably produce, consume and manage waste at a defined territory scale thanks to digital technology and circular economy?

To answer this question, DigiCirc will run an acceleration programme on the Circular cities. The beneficiaries will be selected through an open call that will be launched in November 2020.

In order to define the current challenges of the Circular cities that will be included in the call for projects, we would like to collect the testimonies of the different key actors of the market (local authorities, companies, citizens, etc.) thanks to the questionnaire below.

The answers to this questionnaire will be analysed and discussed during a meeting with representatives of European clusters relevant in this domain. The outputs of this meeting will be the definition of key challenges that will appear on the call for projects.

Contact details

Last name* / First name*:
Company* / Position*:
Would you like to be contacted or otherwise kept up to date, please also provide us with your mail address:

Questionnaire

To begin, we would like to understand your vision of the Circular cities and its objectives.

How would you characterise the cities of tomorrow?* (multiple choice)

- Thriving cities: economic productivity increases through reduced congestion, eliminated waste, and reduced costs. New growth and business opportunities support skills development and jobs
- Liveable cities: with improved air quality, reduced pollution, and enhanced social interactions
- Resilient cities: reducing reliance on raw materials by keeping products in use and balancing local production with global supply chains
- Other: (to be completed) - 1 phrase

In your opinion, what impacts should be considered for defining the cities of tomorrow?* (multiple choice)

- Personal
- Societal
- Ecological
- Economic
- Other: (to be completed) – 1 phrase

What objectives would you like to achieve for each of the impacts you have selected?

For example: Consumption models/culture, Inequality in goods distribution, pollutant free city, etc.
(Free answer) - 1000 characters

In order to achieve these objectives, we will now try to identify the challenges that we should address first.

The circular economy makes possible to move from a linear to a circular flow management model. When we talk about Circular Cities, in your opinion, what are the most important flows to be optimised?* Give a score from 0 to 4 for each flow.

- Waste
- Textile
- Food
- Furniture
- Water
- Energy
- Building materials
- Other: (to be completed) - 1 phrase

Which sectors need to rapidly integrate the notions of circular economy in order to mitigate their environmental and societal impacts in cities?* Give a score from 0 to 4 for each sector.

- Buildings & Construction
- Food
- Products & Services
- Waste Management
- Water
- Energy
- Mobility & Logistics
- Public Spaces & Urban Planning
- Other: (to be completed) – 1 phrase

In order to create new solutions to meet these challenges, we would like to determine the best territorial scale to experiment them.

In your opinion, which territory is the best field of experimentation for the notion of Circular cities?* Rank them from 0 to 8.

- Neighbourhood
- City District
- City Centre
- Business Centre
- Public Urban Space
- Metropolis
- Urban Region
- Other: (to be completed) – 1 phrase

Finally, we would like to know about existing and future digital solutions that will help to tackle the circular cities challenges

Do you think digitalization can help to boost the circular economy? Why do you think so?

(Free answer) – 1000 characters

Which digital technology do you think are the most relevant to reach a 100% circular economy territory?* (multiple choice)

- Big data analytics
- Internet of Things
- Geospatial information
- Cloud computing
- Blockchain
- 5G
- Virtual Reality/Augmented Reality
- Machine Learning/Deep learning
- Other: (to be completed) - 1 phrase

Which digital applications derived from the combination of these technologies do you find the most relevant?* (multiple choice)

- Asset tagging
- Sharing platforms
- Optimised city mobility
- Modular components tracking
- Waste management
- Symbiosis tools
- High-speed connectivity
- Pay-per-use models
- Localized pattern predictions
- Dematerialization
- Internet of Energy
- Other: (to be completed) - 1 phrase

Finally, are you or do you know any companies offering digital solutions that meet the challenges of the Circular cities? Do not hesitate to share with us a link to your/a website presenting these solutions.

(Free answer) – 500 characters + website link

Thank you for your participation!

Please visit our website and subscribe to our Newsletter in order to enjoy up to date DigiCirc News, and updates about Open Calls & Accelerator Program and DigiCirc Events.

Annex 3 : Market consultation questionnaire results

DIGICIRC Circular City challenges definition – Market consultation results

Market consultation results

Analytics overview

30th of July - 6th of September

465 views
61 submissions

Italy (14) France (10) Greece (9) United Kingdom (3)
Germany (3) Serbia (3) Belgium (2) Spain (2) Romania (2)
Others (13)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

DIGICIRC Circular City challenges definition – Market consultation results

Question 1 : How would you characterize the cities of tomorrow? (multiple choice)

126 responses

Others

Cooperating city
that develops an industrial symbiosis with the companies that are in it

Adaptable cities
cities which continuously adapt to new and changing requirements without having to demolish/rebuild.

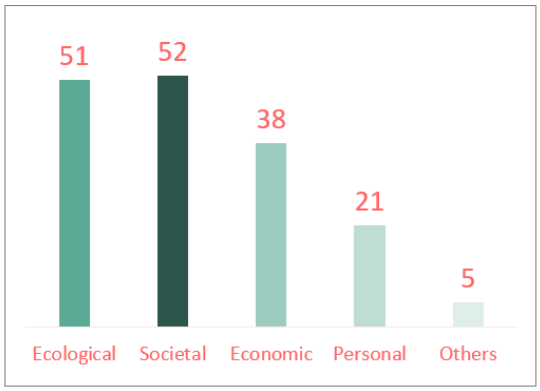
Smart Communities
citizens will behave in alignment to the circular economy principles, being supported by the Cities with digital instruments

All of the above, and more
Safe, secure, sustainable, circular & resilient urban societies, that embrace the neighbouring urban and rural communities and areas

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

DIGICIRC Circular City challenges definition – Market consultation results

Question 2 : In your opinion, what impacts should be considered for defining the cities of tomorrow? (multiple choice)



167 responses

Others

The symbiosis of all four: *personal, societal, ecological and economic, always combined, balanced out per situation and context*

Regenerative

Wellness

Digital

Systemic

Equitable

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

DIGICIRC Circular City challenges definition – Market consultation results

Question 3 : What objectives would you like to achieve for each of the impacts you have selected?

Companies more aware of their impact on the environment
Complete involvement of society in driving these changes
ACTORS INVOLVEMENT
citizens are more involved and aware of their contribution to reduce pollution

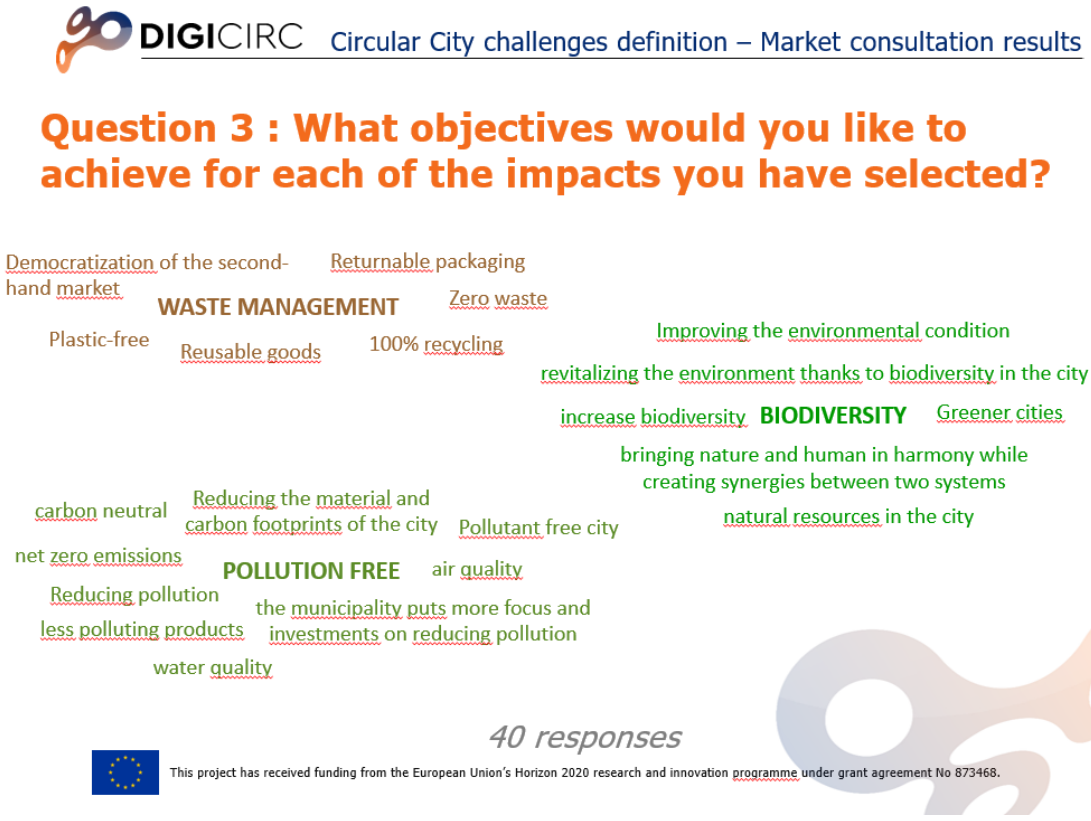
Reduction in the number of unemployed
job diversity
new business models
Affordability
new ways of consumption
rewarding back
ECONOMIC
business opportunities
return / sharing
OPPORTUNITIES
accessible to citizens
Economic growth
business opportunities.
Avoid poverty
Enhancement of the individual skills aligned to the needs of their community

ensuring food self-sufficiency
Local based production
generating local jobs
Local consumption
LOCAL
local development
Local production
closed circles for local products
autonomous units of development

40 responses

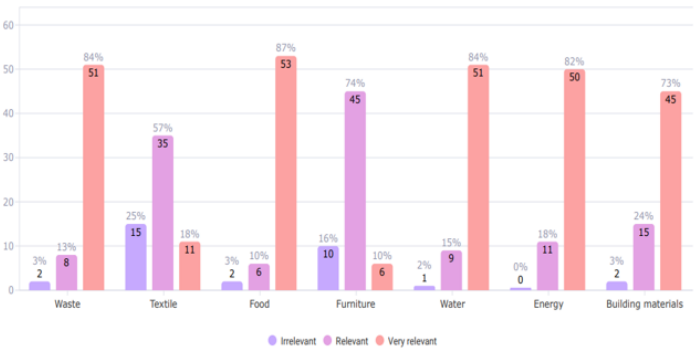
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.


DIGICIRC Circular City challenges definition – Market consultation results
Question 3 : What objectives would you like to achieve for each of the impacts you have selected?
A society which is inclusive and a community which grows together
EQUALITY
equal opportunities
equity of access in goods and services
easy access for all to goods & culture
Reducing the gap between rich and poor ensuring that envisioned changes are not a zero sum game.
shared used of individuals belongings
More social inclusion
INCLUSION
cooperation
More interaction
mutualization economy
Opening up of territories in order to promote inclusive city
living together
Sustainable personal and societal lifestyles
health
Better relationship with the city
LIFE QUALITY
Easy access to high standard and shared services
Better quality life
Good working conditions
Security
development of a better transportation
Reduce the use of cars in the city
TRANSPORT
clean transport solutions
less traffic
less time wasted in commuting
40 responses
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.


DIGICIRC Circular City challenges definition – Market consultation results
Question 3 : What objectives would you like to achieve for each of the impacts you have selected?
Democratization of the second-hand market
Returnable packaging
WASTE MANAGEMENT
Zero waste
Plastic-free
Reusable goods
100% recycling
Improving the environmental condition
revitalizing the environment thanks to biodiversity in the city
increase biodiversity
BIODIVERSITY
Greener cities
bringing nature and human in harmony while creating synergies between two systems
natural resources in the city
carbon neutral
Reducing the material and carbon footprints of the city
Pollutant free city
net zero emissions
POLLUTION FREE
air quality
Reducing pollution
the municipality puts more focus and investments on reducing pollution
less polluting products
water quality
40 responses
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

DIGICIRC Circular City challenges definition – Market consultation results

Question 4 : The circular economy makes possible to move from a linear to a circular management model. When we talk about Circular Cities, in your opinion, what are the most important flows to be optimised?



Others

Data People

Plastics

Electrical and Electronic Equipment

Sewage sludge Sand

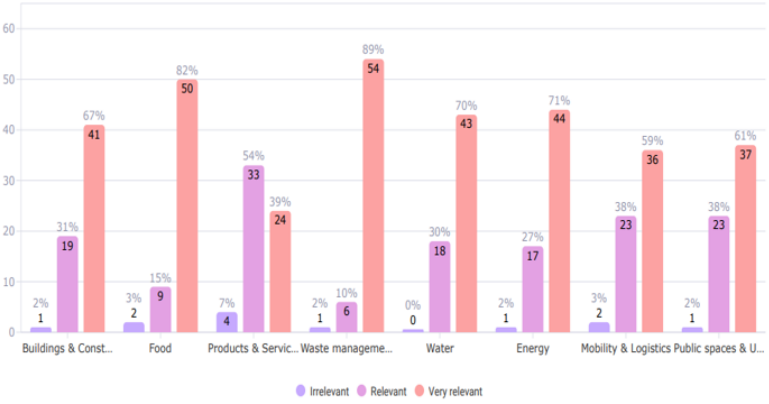
Organic materials

62 responses

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

DIGICIRC Circular City challenges definition – Market consultation results

Question 5 : Which sectors need to rapidly integrate notions of circular economy in order to mitigate their environmental and societal impacts in cities?



Others

Hotel & Restaurant

Culture

Public procurement

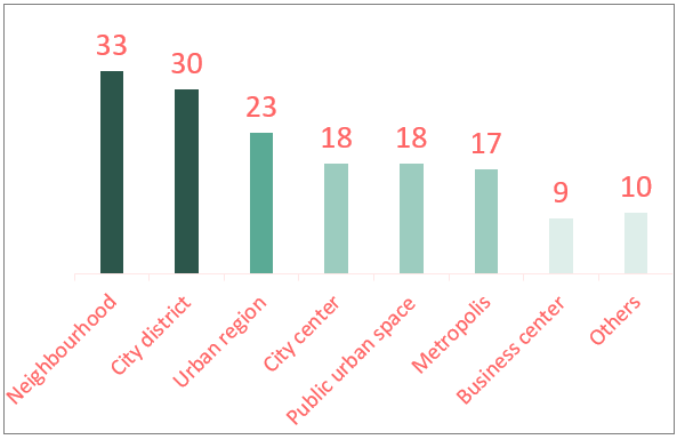
Health, Safety and security

61 responses

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

DIGICIRC Circular City challenges definition – Market consultation results

Question 6 : In your opinion, which territory is the best field of experimentation for the notion of Circular City? (multiple choice)



Others

Combinations of the above, *based on domain and use case. Starting small with the ability to scale is key.*

Educational Campus

Industrial areas

Bioregions

Middle town in surbub

158 responses

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

DIGICIRC Circular City challenges definition – Market consultation results

Question 7 : Do you think digitalization can help to boost the circular economy? Why do you think so?

MAP

Manage the information flow

Mapping lifecycles

Digital Awareness

Create a trust framework

Products location

Work on data governance

Data collection, process management and monitoring

CONNECT

Connecting supply and demand

Improve collaboration

Share information

Connect the different actors, authorities, policy makers, consumers, final users and citizens

OPTIMIZE

Suggest and overview profitable ecosystems

Impact assesment

Material surplus identification and procurement

Creating new business model

Ensure the return of waste at the end of the product life cycle

Waste minimization

Local procurement

Each step of the global trade organization must be organized in the smartest way possible

Rethink and rebuild existing infrastructure when it has been designed in a very non-circular way. No amount of digitalisation will solve these kinds of issues.

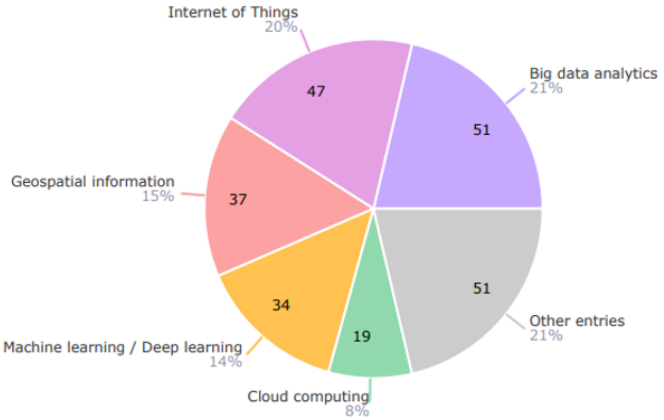
Circular economy is a physical concept which can only be supported to an extent by digitalisation but the core concept can only be driven by human behaviour.

45 responses : 40 YES / 5 YES BUT

DIGICIRC

DIGICIRC Circular City challenges definition – Market consultation results

Question 8 : Which digital technology do you think are the most relevant to reach a 100% circular economy territory? (multiple choice)

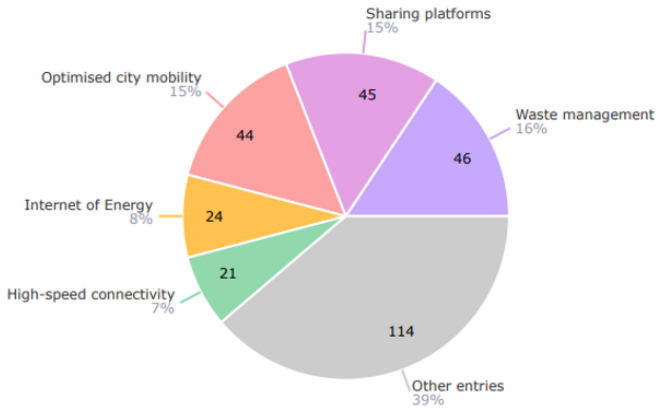


239 responses

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

DIGICIRC Circular City challenges definition – Market consultation results

Question 9 : Which digital applications derived from the combination of there technologies do you find the most relevant? (multiple choice)



289 responses

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

DIGICIRC Circular City challenges definition – Market consultation results

Question 10 : Finally, are you or do you know any companies offering digital solutions that meet the challenges of the Circular City? Do not hesitate to share with us a link to your/a website presenting theses solutions.

Upcyclea - an AI-powered circular management software for buildings and ressources.

Cyrkl - platform for sharing material

carbonlocal.net - platform allowing citizens to estimate carbon footprint and donate to local eco-friendly activities/initiatives.

BUCHL Clever Waste - smart waste management tool for waste collection

VanO - an on-demand van service dedicated to a town to revolutionize daily mobility.

Too good to go - app and service to restaurants and food stores to make otherwise wasted food available to the public for a low price

Refurbed - an online marketplace for refurbished products in German-speaking countries

Living packets - innovative and connected shipping packaging that can be reused up to 1000 times

Circularise - a decentralised information storage and communication platform to exchange anonymously and selectively information between participants in value chains.

26 responses

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.

Annex 4 : Cluster meeting open discussion

Thematic

In order to develop innovative and impactful solutions do you think the challenges should be categorize by sectors/flows (energy, water, waste, etc.) or by cross-cutting issues (better produce, better consume, public procurement, etc.) ?

- Sector: 2 votes
- Cross-cutting: 6 votes

If you had to select flows, which ones would they be?

- 6 votes : Water
- 5 votes : Construction materials ; Textile
- 4 votes : Energy ; Packaging
- 3 votes : Food
- 2 votes : Electrical & Electronics equipment ; Plastics

If you had to select sectors, which ones would they be?

- 6 votes: Waste management; Energy
- 5 votes: Transport; Building & Construction; Water Management
- 2 votes: Hotel & Restaurant; Manufacturing (metal) automotive
- 1 vote: Food retail; Public spaces
- 0 vote: Culture

If we had to select cross-cutting issues, which ones would they be?

- 7 votes: Better manage waste
- 5 votes: Better produce; Education
- 4 votes: Better consume; Public procurement
- 3 votes: Reducing air pollution; Local production and consumption
- 2 votes: Autonomous cities; Social equity
- 1 votes: Repair services/cafes; Autonomous driving/green cars

In your opinion, would a matrix vision including the major cross-cutting issues and sectors/flows be relevant?

- Matrix: 6 votes
- Simple presentation: 2 votes

Openess of the challenges

In order to have a high response rate to our call for projects, do you think it would be more relevant to have broad challenges with flexibility in the proposed solutions or specific challenges?

- Broad: 6 votes
- Specific: 2 votes

Examples

Reuse of used water; Create new value chains for the textile waste ; Increase recycling rates by smart collections systems ; Create shared platforms ; Smart public transport ; Increase recycling rates by smart collection systems ; Smart Buildings ; Reduce packaging waste by deposit scheme for multiple-use packages ; Electric and Electronics extended life with free repair centers ; Storage water ; Fashion/textile repairing centers ; New materials from waste water ; Create consom'actors

Impacts

Which impacts seems the most important to select the solutions ?

- 8 votes: Environmental benefits
- 7 votes: Social benefits
- 6 votes: Economical benefits
- 3 votes: Health benefits
- 0 votes : Disruptive

Annex 5 Key Figures

Some key figures can illustrate the work achieved through the clusters engagement campaign and market consultation:

CLUSTERS

2 Meetings dedicated to reach out clusters*

62 Clusters or umbrella organisation contacted in 19 countries through the questionnaire

15 answers from 12 countries

8 clusters invited to the meeting and represented 5 main sectors (Energy, Environment, ICT, Services and Materials)

OPEN MARKET CONSULTATION

465 Views

61 Submissions

list of the eight clusters invited

-Cluster Sofia Knowledge City (Bulgaria)

-INDURA Cluster for Sustainable Infrastructure (France)

-Umweltcluster Bayern (Germany)

-Fondazione Torino Wireless (Italy)

-Baltic Eco-Energy Cluster (Poland)

-ICT Cluster of Central Serbia (Serbia)

-Catalan Fashion Cluster (Spain)

-Paper Province (Sweden)

*Cluster-to-Cluster Meeting & Innovat&Match Brokerage Event from 10 to 12 June supported by Enterprise Europe Network https://innovatmatch-2020.b2match.io/

*Global Cluster matchmaking event 24 September organized by Enterprise Europe Network https://global-cluster-matchmaking.b2match.io/

DIGICIRC

End of Document

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873468.