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NATIONAL TECHNICAL UNIVERSITY OF ATHENS

INNOMED-UP

Guide for circularity strategy for Cultural and Creative Industries & Small and Medium-sized enterprises in the Mediterranean - INNOMED-UP model

Promoting UPcycling in Circular Economy through INNOvation and education for creative industries in MEDiterranean cities

BIRZEIT UNIVERSITY

cooperativa sociale CRESM centro ricerche economiche e sociali per il meridione

EPEM S.A. ENVIRONMENTAL PLANNING ENGINEERING AND MANAGEMENT

Città di Prato

comune di PRATO

FUTURE PIONEERS Empowering Communities

Promoting Upcycling in Circular Economy through INNovation and education for creative industries in MEDiterranean cities.

INNOMED-UP

Guide for Circularity Strategy for Cultural Creative Industries

& Small and medium-sized enterprises in the Mediterranean

Guide for Circularity Strategy for Cultural Creative Industries & Small medium-sized enterprises in the Mediterranean
INNOMED-UP MODEL

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“The 2014-2020 ENI CBC Mediterranean Sea Basin Programme is a multilateral Cross-Border Cooperation (CBC) initiative funded by the European Neighborhood Instrument (ENI). The Programme objective is to foster fair, equitable and sustainable economic, social, and territorial development, which may advance cross-border integration and valorise participating countries’ territories and values. The following 13 countries participate in the Programme: Cyprus, Egypt, France, Greece, Israel, Italy, Jordan, Lebanon, Malta, Palestine, Portugal, Spain, Tunisia. The Managing Authority (JMA) is the Autonomous Region of Sardinia (Italy). Official Programme languages are Arabic, English, and French. For more information, please visit: www.enicbcmed.eu”.

Statement about the EU: “The European Union is made up of 28 Member States who have decided to gradually link together their know-how, resources, and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance, and individual freedoms. The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders”.

Contents

Foreword

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INNOMED UP project “Promoting Upcycling in Circular Economy through Innovation and education for creative industries in Mediterranean cities”, proposes a strategy for Med-cities, where Cultural and Creative Industries (CCI) SMEs create Circular Economy (CE)clusters locally and participate at cross border innovation networks thus promoting urban and social inclusion.

INNOMED-UP aims to work with CCIs to shift local urban economies towards a circular production and consumption paradigm including optimal use of material resources, innovation enhancement for SMEs, knowledge transfer among Med-cities, social inclusion, and citizens’ engagement.

The addressed challenges

Mediterranean cities face the issue of overwhelming waste production demanding effective and urgent actions. Circular economy principles may offer a solution to this problem. As it is generally recognized that a noticeable percentage of waste in city centers is produced by Cultural and Creative Industries (CCIs), their involvement in circular economy schemes is of great importance. Although there are disparities between cities in the North and the South of the Mediterranean area, they share common cultural characteristics. Therefore, by building on their common identity and by integrating into their productive schemes the principles of the circular economy, Mediterranean cities can create resilient urban environments and communities, establishing a supportive framework for CCI SMEs clustering.

As European policies focus on the necessity to move towards a circular model regarding production and consumption, the INNOMED-UP Project seeks to enhance sustainability in urban settings through the adoption of best practices to promote circularity by small and medium-sized enterprises of Cultural and Creative Industry (CCI SMEs).

The Partnership

Through the highly qualified & well- balanced partnership, INNOMED-UP aims to address systematically cross-border leverage of CCI SMEs’ production novelties, synergies, and cooperation through the implementation of circular economy principles. Towards this target, a range of key factors are involved to generate new knowledge or turn knowledge into new products and procedures, building an effective system that could add value to societies and promote social inclusion through citizen engagement.

Specifically, NTUA – the Lead Beneficiary and Birzeit University are Universities with great project implementation experience and expertise in the fields of engineering, urban planning, creative economy, waste management, and institutional capacity building. They undertake the responsibilities of methodological issues, integration of new technologies and access to innovation through training.

The Environmental Planning Engineering and Management (EPEM) is one of the biggest environmental consulting companies in Greece, contributing to the transfer of external technological and theoretical knowledge to CCIs regarding the CE new technologies integration and clustering.

The Municipality of Prato transfers best practices and experiences on CE -as a member of the Urban Agenda on CE- and Municipality of Tunis on CCIs from policy maker’s perspective. Center for Economic and Social Research for the South of Italy (CRESM) and Future Pioneers for Empowering Communities’ Members in the environmental and educational fields (FPEC) are valuable partners regarding the socio-economic aspects and civic engagement, utilizing their

significant experience in fields of empowering communities, training, and other social inclusive activities (women, marginalized groups etc.).

INNOMED UP Goals and Results

Therefore, the main goal of INNOMED UP is to create and/or strengthen cooperation networks (clustering) in each city. Having followed a holistic methodology which included SWOT Seminars, Trainings, Clustering Roadmaps, Socio-Urban Open Workshops, and Memoranda of cooperation INNOMED UP partnership has integrated into its activities:

- Knowledge institutes as Universities, Schools, Laboratories - Maker spaces, Museums, etc.
- Public actors: Having legislative and regulatory role, such as Public Authorities, or Development Agencies at national and sub-regional level, i.e., Ministries, Municipalities, and other administrative entities, etc.
- Private actors who provide practical know-how and resources which include key stakeholders, such as Professional Chambers and Associations of Small and medium-sized enterprises (SMEs) of Cultural & Creativity Industry (CCI), Cooperatives, and Initiatives, i.e., Trade Associations, Recycling Agencies, Rehabilitation Centers, etc.
- Users as target groups and final beneficiaries, such as companies related with the Arts, Crafts and Design (ACDs), i.e., Clothing/ Textile, Jewelry, Architecture/ Design, Restoration/ Material processing, etc.

Moreover, the project aims to contribute to ameliorating the current social and urban situation in INNOMED UP cities, especially regarding the creative and cultural industries and their capacity or capability to adopt or spread circular practices.

The project is also acting at a cross-border level supporting both technological developments (such as modern procedures of upcycling, technological informative platforms, etc.) and traditional recycling practices.

The project's outputs include the development of the INNOMED-UP model and the creation of a Guide which could support the path of CCI SMEs towards a more thorough adoption of Circular Economy practices.

The INNOMED UP Model

The purpose of the Guide for Circularity Strategy for CCI SMEs in the Mediterranean is to capitalize on the whole knowledge gained from the implementation period of INNOMED-Up, to propose an encircling strategy for the Mediterranean, where ideas, designs and knowledge will be exchanged between countries and materials will be recycled and upcycled at a local level in local clusters, thus promoting urban and social inclusion.

Finally, the INNOMED-Up Model provides an important tool for public administration, regional and local authorities, professional organizations, chambers, and trade associations related to CCI SMEs, relevant administrative authorities, public or private institutes and organizations, etc. to foster Circular Economy Principles in their cities.

The draft Guide proposed by the Municipality and the University of Prato included guidelines, that were discussed among the INNOMED UP Partners at the Consolidation Workshop "CIRCULAR

ECONOMY IN MEDITERRANEAN CITIES “in Prato 07/06/2022 After a constructive comparison and creative discussion between the partners, necessary improvements were made to make the guide even more respondent to the needs of SMEs.

We are confident that the current Guide on Circular Economy practices combines the necessary circular practices with sustainable urban development practices for the Mediterranean cities and adds to the wide and global discussion on shifting towards a more livable urban environment in the future.

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INTRODUCTION AND AIMS OF THE HANDBOOK

The aim of this handbook is to provide an overview of the state of the art in upcycling practices at the urban level, with a particular focus on practices taken in place by Cultural and Creative Industries (CCIs).

According to many definitions, upcycling, within the framework of circular economy practices, is the way to reuse waste materials by creating something new that is more valuable than the original materials. It is configured as a cost and energy-saving production method that involves the creative reuse of waste products or materials to obtain new and more valuable items. Upcycling is becoming a trend, showing a growing increase in popularity. It involves, among others, the re-use of old homewares by means of small *do-it-by-yourself* (DYT), and thus, it is likely to be adopted within the production processes of CCIs.

This handbook may be a useful tool to lay the foundation for an overall strategy that looks for a new model of production, especially at the urban level, which respects local traditions as well as the territories. The CCIs sector is increasingly growing, bringing out opportunities for new jobs, collaborative economy, social innovation, start-ups, and urban regeneration. It is often sponsored as a booster for sustainable development since it relies more on human input, rather than on materials ones, thus it may relieve the pressure on the environment.

At the same time, the handbook intends to serve as a tool to stimulate strategic planning at the urban level and inspire new production models among industries. Thus, it targets local authorities and industries as main users. With a wide review and analysis of good practices offered by the manual, cities and industries may learn about the different solutions that can be adopted, considering their specific urban and economic features, such as the socio-economic fabric, the availability of raw materials and technologies, or the position along the global supply chain.

The handbook may provide suggestions to CCIs to achieve SDGs' goals. Upcycling within CCIs, which is the main topic of the manual, covers primarily SDG 11 (Sustainable cities and community) and SDG 12 (Responsible consumption and production), but it contributes also to implementing SDGs 8 and 9 (decent work and economic growth, Industry, Innovation, and Infrastructure, respectively)

The handbook is organized into three chapters.

- Chapter 1 deals with the circular economy's practices, opportunities, and barriers. The focus is posed on three main circular activities: reuse, recycle, and upcycle. Differences among those circular practices are deeply investigated to allow readers to get a comprehensive understanding. Moreover, since the circular economy's feasibility lies in territorial proximity, ways to enhance its urban planning and management are further explored.
- Chapter 2 mainly focuses on CCIs, offering an overview of their performances, possibilities, and restraints, and giving insights into CCIs policies and management. Linkages between CCI and circular economy practices, especially upcycling, are examined. Both chapters 1 and 2, try to provide not only an economic analysis, rather they seek to assess also environmental, social, and cultural benefits that circular economy and CCIs may bring.
- Finally, Chapter 3 proposes a model to plan and manage upcycling among CCIs at the urban level. It represents an effective tool for policymakers, that investigates the local urban metabolism and maps the CCIs' input needs, to organize a specific waste collection system and facilitate the flow of secondary materials. To monitor implementation plans, a list of indices and indicators is also presented.
- In the final Annex, the handbook presents pilot projects that have occurred within the INNOMED-

UP Programme. They represent practical examples of how to implement an upcycling system in the circular sector, which may be re-adapted by other territories.

THE MEDITERRANEAN BASIN

The Mediterranean region involves 24 countries from Europe, North Africa as well as the Middle East. Those countries share a long history of trade and cultural exchanges, and, for that reason, it is possible to detect several similarities between their economic activities. Tourism, service-based industries, and the agricultural and marine sectors are, among others, the main drivers of the region.

Mediterranean region is the world's main tourist area, and it accounts for about 30% of world tourism revenues, 20% of the world's hotel accommodation capacity and offers more than 10,000 destinations and some 100,000 hotels (Ditta, 2022). Four Mediterranean countries are among the world's top tourist destinations: France, Spain, Italy, and Turkey. In addition, Morocco, Tunisia, and Egypt top the lists of the most visited countries on the African continent (Ditta, 2022). According to the WTTC (2017), 16% of the Mediterranean population was employed in the tourism sector in 2016 either directly – by hotels, travel agents, transportation services, food and leisure industries directly supported by tourists — or indirectly —travel & tourism investment spending, government spending and supplier purchases. Fisheries, including aquaculture, rank third in socio-economic value after tourism and transport in the Mediterranean (Petrick et all., 2017).

Due to its strategic position, the Mediterranean has always been a vibrant economic space, enabling the transport of products, energy, and people. The region is important for global trade, as trade flows within the region account for 25% of all international seaborne trade (Petrick et all., 2022). Mediterranean countries are, as a result, key actors within the global logistic-supply chain. This is also demonstrated by the fact that the Mediterranean basin host more than 600 ports of varying sizes (Virto and Lode, 2014), and that the Suez Canal is one of the most important worldwide commercial routes. Nonetheless, the area is highly involved within the China-led Belt and Road Initiative (BRI), which includes ports on both the north and the south coast of the Mediterranean (Piraeus in Greece, Ismailia, and Port Said in Egypt). Overall, the maritime transport and trade industry generates around 550,000 jobs for local populations and accounts for approximately 20%-40% of GDP for most Mediterranean countries (MGI, 2017).

Countries in the Mediterranean are rich in natural resources, agricultural and manufactured goods, and have long-standing trading relations. In terms of value, intra-Mediterranean trade is dominated by the exchange of energy. Crude oil is traded from most North African countries and Syria, refined petroleum products are traded from Croatia, Cyprus, Greece and Malta to the majority of EU countries and Egypt, while electrical energy constitutes the main export of Bosnia and Herzegovina. Moreover, the rich Mediterranean soil encourages the exchange of natural resources including aluminum from Montenegro, precious metals, stones and pearls from Palestine and Israel, and gold from Turkey—a leading export for that country. Non-energy commodities traded within the Mediterranean region include medicaments from Italy and Slovenia, aircraft-related products from France, and vehicles from Spain and Morocco—with Albania and Libya being major regional importers (Panagiota, 2022).

Prosperity within the region was undermined in the last decades by social unrest, political instability, regional and international wars (Libya, Syria, Ukraine) and internal conflicts (Sahel, Algeria, Tunisia, Spain). The energy and food crisis triggered by the war between Russia and Ukraine, has now embittered the economic crisis already activate with the Covid pandemic.

Nowadays Mediterranean countries are facing the same challenges, due to their proximity and

the strong global interconnections: climate change, fish stock depletion, biodiversity loss, young unemployment, regional discrepancies, and migration, to name a few. Administrations are increasingly involved in economic cooperation programs and projects, seeking to solve those problems through a win-win approach. ENICBMED is a great example of how governments, academics, and civil society are trying to manage and address those problems through not just economic incentives, but especially by knowledge transfers.

THE INNOMED UP PROJECT

Overwhelming waste production among Mediterranean cities requires effective and urgent actions. Circular economy principles may offer a solution to this problem. Considering CCIs contribute to significant waste generation at the urban level, their involvement in circular economy schemes is of great importance.

Within the framework of the ENI CBC MED Programme[1], INNOMED-UP (Promoting Upcycling in Circular Economy through Innovation and education for creative industries in Mediterranean cities) proposes to work with CCIs to shift local urban economies towards a circular production and consumption paradigm, which includes optimal use of material resources, innovation enhancement for SMEs, knowledge transfer among cities, social inclusion, and citizens' engagement. The adoption of circular economy procedures at the urban level and within CCIs can contribute to lower waste generation thanks to technological absorption and innovative knowledge transfer, consequently, transforming Mediterranean cities into more resilient and sustainable territories. The implementation of these procedures is expected also to promote employment and SME productivity, thanks to research and cluster opportunities.

The general objective of INNOMED-UP is to propose a strategy for Mediterranean cities in which SMEs belonging to the CCIs' sector can create circular economy clusters at the local level and participate in cross-border innovation networks, thus promoting urban and social inclusion. Although there are differences between cities of the two sides of the Mediterranean, in terms of economic or social urban fabric, they share common cultural characteristics. Therefore, by building on their common identity and by integrating into their productive schemes the principles of the circular economy, Mediterranean cities can create resilient urban environments and communities, establishing a supportive framework for CCI SMEs clustering.

The project works at a cross-border level supporting both technological developments (such as modern procedures of upcycling, technological informative platforms, etc.) and traditional recycling practices. European countries, Greece, and Italy, and Mediterranean countries, Jordan, Palestine, and Tunisia, participate in the project.

INNOMED UP purposes could be declined into three main areas:

- **Creation of CCIs clusters in the historical centers** of the Mediterranean. This activity is intended to promote urban revitalization and social integration, as well as cross-border networking, access to knowledge for innovation, support for industrial symbiosis, social economy, cross-border schemes, and synergies with governments and local stakeholders.
- **Access to new knowledge** for cultural and creative small and medium enterprises, through

1- ENI CBC Med is the largest Cross-Border Cooperation (CBC) initiative implemented by the EU under the European Neighborhood Instrument (ENI). The Programme brings together the coastal territories of 14 EU and partner countries in view of fostering fair, equitable and sustainable development on both sides of the EU's external borders.
Through calls for proposals, ENI CBC Med finances cooperation projects for a more competitive, innovative, inclusive, and sustainable Mediterranean area.

circular economy experts targeted training on the use of new technologies, and smart tools to accelerate innovation, competitiveness, and the development of innovative products or business models.

- **Promotion of social commitment** thanks to the active involvement of businesses and local communities, the implementation of good circular economy practices, and six pilot case studies, which are supposed to increase job opportunities, enhance cooperative social entrepreneurship and collaborative economy, and promote social inclusion and gender equality policies.

NATIONAL TECHNICAL UNIVERSITY OF ATHENS (GREECE)

The National Technical University of Athens (NTUA) is the oldest and most prestigious public Technical University in Greece, offering high quality, tuition-free education. 'Ethnikon Metsovion Polytechneion' was established in 1836 as an academic institution for the tertiary education of architect engineers, civil engineers and mechanical engineers and since then has notably contributed to the scientific, technical and economic development of the country. Today NTUA is a top-ranked University of Science and Technology, with nine Engineering Schools, including Architecture, Civil Engineering, Mechanical Engineering etc and a School of Applied Mathematical and Physical Sciences. It is also the first university where urban planning and, later, spatial planning were taught in Greece.

As for its academic performance, according to QS World Universities Ranking 2021, NTUA is the leading academic institution in Greece ranked in the top100 universities in engineering and technology worldwide and top30 in Europe. NTUA operates 40 Departments and 194 laboratories, 140 of which are certified. In 2021, there were more than 1500 national and European research projects ongoing. NTUA Faculty members publish annually more than 3.000 scientific papers (in journals, conference proceedings, chapters in volumes etc.) which earn more than 20.000 citations.

NTUA is the Lead Beneficiary of INNOMED-Up program with three participating Laboratories from two Schools:

- Laboratory of Spatial Planning and Urban Development from the Architecture School.
- Architectural & Urban Design Laboratory integrating New Methods and Technologies from the Architecture School & Laboratory of Microprocessors and Digital Systems Lab from the School of Electrical and Computer Engineering.

NTUA, in addition to coordinating the project, is responsible for the project methodology and the research on the Strategic context at the level of the Mediterranean. Moreover, the three Laboratories designed the "smart" tools (bins and bicycles) and formulated the main principles of clustering.

ENVIRONMENTAL PLANNING ENGINEERING AND MANAGEMENT (GREECE)

EPEM S.A. established in Athens, Greece in 1992, is an environmental engineering and consulting company that is globally recognized for its expertise in environmental, waste management and Circular Economy projects. EPEM' s team thrives on the challenge of working in diverse and often challenging environments, both in developed and developing countries, and they are committed to delivering successful, high-quality projects that have significant impact.

Over the past two decades, EPEM S.A. has built extensive knowledge and valuable experience by collaborating with a range of waste management authorities, private operators, and institutions in

different contexts around the world. EPEM S.A. prioritizes cultivating relationships of mutual trust and cooperation with its partners to ensure that our work is fully integrated and of the highest quality. As a result, a robust international network of clients and partners has been developed, including the International Solid Waste Association (ISWA - Gold Member), the World Bank, and the Clinton Global Initiative, which speaks to their unwavering commitment to professionalism and client loyalty.

MUNICIPALITY OF PRATO (ITALY)

The Municipality of Prato is one of the largest Italian industrial districts and one of the most important textile and clothing production centers in the world. According to the Prato Chamber of Commerce, the production district counts 35,000 direct employees and 7,200 companies producing 17% of Italian textile exports. In the period 2018-2021, the Municipality of Prato has been the Italian representative in the European partnership initiative on circular economy, coordinating the debates on the issues of the re-use of wastewater, the economic incentives for the circular economy and the sustainable re-use of buildings and urban spaces. Prato is one of the 100 European cities included by the European Commission in the Programme “Climate-neutral and smart cities by 2030”.

CENTER FOR ECONOMIC AND SOCIAL RESEARCH FOR THE SOUTH OF ITALY (ITALY)

CRESM is a non-profit social cooperative founded in Belìce (Sicily, Italy) and operating also in Palermo. It has 50 years of experience in local and rural development planning, community regeneration, migration, and social inclusion. CRESM activities address farmers, entrepreneurs, youth, and vulnerable groups (unemployed, migrants, convicts, and ex-convicts’ prisoners, disabled) in Italy and in the Mediterranean area. CRESM deals with the educational poverty of young people, collaborates with schools and universities of all levels, promotes start-ups of cooperatives and social enterprises.

The creative craft sector represents a crucial segment in the CCI sector in Palermo and in Sicily. CRESM is actively engaged for its development in a Circular Economy sustainable perspective.

Circular Economy constitutes an important opportunity for facing the challenging problem of waste management, promoting, at the same time, the local CCI SMEs networks. Public policies, nevertheless, currently do not (at national, regional, and local level) include any small-scale local-based solutions or clear paths for a circular transition.

Despite the lack of encouraging public policies, some creative craft SMEs clusters are experimenting with the renovation of traditional techniques based on the use of traditional sustainable materials.

In Palermo creative craft SMEs, often organized as non-profit entities in the start-up phase, have strong cooperation networks with other non-profit NGOs.

In this context, the INNOMED-UP project in Palermo promoted the involvement of local creative craft CCI SMEs in a Circular Economy pilot cluster, thanks to the use of smart tools, for the development of innovative products and production chains implementing upcycling processes based on a mix of traditional and innovative techniques using mainly wood, fabric, and high-density cardboard.

The pilot cluster contributes to involving local communities and to launch a debate about innovative solutions for sustainable waste management and circular reuse of secondary raw materials.

MUNICIPALITY OF TUNIS (TUNISIA)

The Municipality of Tunis was founded on the 30th of August 1858. Tunis is the capital city of

Tunisia. Located in the north of the country, underneath the Gulf of Tunis, the city extends over the coastal plain and the surrounding hills, with a total territorial coverage of 13,136 ha.

Its historic heart is the Medina, listed as a UNESCO World Heritage. Tunis is also a member of UNESCO's Creative Cities, member of AIMF, and member of Learning Cities network.

Site since 1976. At the national level, Tunis is classified as the most dynamic city economically and the most important trade hub. Also, the density of Tunis city's roads and motorways network makes it a focal point of national transport. The presence of Tunis-Cartage airport, within the city of Tunis, further increases its national and international attraction.

Its population is estimated in 2014 of about 700 000 inhabitants. Nevertheless, Tunis receives about three million visitors daily. This important number of daily visitors requires the strengthening of the municipal efforts and interventions to guarantee necessary services.

Tunis, as well as Tunisia, gained independence in 1956, which is also the date of the personal statute declaration; an important declaration which grants women's rights.

Tunis has also acquired an international reputation thanks to the Revolution of 17 December 2010 – January 14, 2011. This pacific Revolution allowed the city to become part of the world's democratic capitals. The Revolution also enabled the city, and the country, to begin a process of deep changes, certainly long and difficult, but important and encouraging. This process started with the election of a National Constituent Assembly in October 2011. The first local government elections were organized in 2018, and this enabled Tunis to have its first elected woman Mayor of the capital.

The revolution has allowed for more open collaboration and participative planning and budgeting with civil society, which allowed the Municipality of Tunis, to participate in strengthening small youth led associations, partner with start-ups and community collaborations on social, gender and environmental issues. Municipality of Tunis is also the first Tunisian city to produce a mapping of a city with gender lens through the FEMMEDINA project.

BIRZEIT UNIVERSITY (PALESTINE)

Birzeit University is a national, non-profit, pluralistic, independent university, dedicated to producing leaders and knowledge in service of humanity and Palestinians everywhere.

Since its inception as a small school for girls in 1924, Birzeit University defeated all odds, including severe restrictions on academic development and freedom imposed by the Israeli military occupation, and embodied a success story that inspires all Palestinians.

The university celebrated its first graduating class in 1976, the same year when it joined the Association of Arab Universities and became a member of the International Association of Universities one year later in 1977.

By the end of the 1970s and well through the 1980s, Birzeit University went through an academic and urban resurgence, where it launched more academic programs and continued its community outreach tradition by building numerous institutes and centers.

Birzeit University entered the third millennium relying confidently on a legacy of academic distinction and its well-designed university campus while winning several local and international awards.

Committed to freedom of thought and expression, democratic practices and social diversity, the university offers distinguished and globally engaged teaching, research and community-based programs designed to cultivate leadership skills, national and humanitarian values, critical thinking,

lifelong learning and a spirit of initiative and responsibility towards society and the environment in the context of an institutional culture of sound governance, openness, pluralism, and autonomy.

Through 11 institutes and centers, Birzeit University engages in knowledge production both nationally and globally. It offers 127 academic programs, including 42 master's and three (3) PhD programs, serving 14, 743 students in nine (9) different faculties.

FUTURE PIONEERS FOR EMPOWERING COMMUNITIES' MEMBERS IN THE ENVIRONMENTAL AND EDUCATIONAL FIELDS

Irbid Governorate is in the northern part of Jordan. The Governorate enjoys a few natural resources, such as valleys, springs, fertile plains, and a diverse climate. These natural characteristics make Irbid Governorate one of the most important agricultural areas in Jordan in terms of the amount of cultivated land, constituting 11% of the total cultivated land in the country.

Irbid is characterized by being the second largest governorate in Jordan in terms of population. Furthermore, in terms of the number of economic enterprises in operation, Irbid is the second governorate after Amman, with a contribution rate of up to 71% of the total economic enterprises in operation in the north, and a rate of about 16.7% Kingdom-wide. On the other hand, it has the second largest industrial city in the Kingdom in terms of the volume of investment.

Irbid enterprises are distributed in diversified sectors, mainly commercial and industrial. Commercial activities include retail and sale processes in food, drink, and tobacco, followed by shops selling clothing, shoes and leather products, then computer and furniture shops. Wholesale and retail commerce, and vehicle and motorcycle repairs also constituted a good percentage. Irbid industrial activities include food industries, metal industries, non-metal industries besides furniture, clothing, and wood industries.

1. CIRCULAR ECONOMY AT THE URBAN LEVEL

1.1 Circular economy: a definition

Circular economy is a wide concept, applicable to all sectors. It is basically a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution (Ellen MacArthur Foundation, no date). It involves, among others, new production, and consumption models, as well as new forms of distribution or businesses' internal organization. A circular economy affects indeed all the dimensions of sustainability: economic, social, cultural, and environmental.

The use of the term *Circular Economy* has been first coined by Pierce and Turner in 1989, although the theory has older roots. In fact, the concept belongs to two conceptual streams that go back to the early days of the modern environmental movement in the 1960s and 1970s and have a subsequent symbiotic relationship with it. The first is related to the flow of materials through an economy (industrial ecology), and the second is concerned with thinking about the economic conditions that might bring about such a flow. (Ekins *et al.*, 2019)

It is easy to conceptualize circular economy by configuring it as the opposite of the so-called linear model of production. If the traditional linear economy pattern follows the *take-make-dispose* scheme, the circular model stresses the reduction of elementary input flows[1], and emphasizes the reuse, recycle, and recovery of products and their materials.

The linear model maximizes the uses of collected raw materials before it transforms them into products, eventually disposing of unusable material. Planned obsolescence is an underlying strategy of this model: products are designed to have a limited lifespan to encourage consumers to buy them again (European Parliament, 2022), then promoting a high production rate and generating a large amount of waste to be disposed of. The open cycle exhausts raw materials and energy, which results in CO_2 emissions and several environmental impacts.

> ***"Linear economy is an economy in which finite resources are extracted to make products that are used - generally not to their full potential - and then thrown away ('take-make-dispose')".*** **(Ellen MacArthur Foundation, 2013)**

By the adoption of a circularity approach, it is possible to close the loop of materials flow. Thus, life cycle extension strategies are pursued, extending the useful life of products acting at the designing stage, or carrying out actions at the end of the pipe, like recycling or recovery, to prevent the disposal of the product's component: when a product reaches the end of its life, its materials are kept within the economy wherever possible. These can be productively used again and again, thereby creating further value. Each life step of an output / product / commodity must be optimized until the end-of-life. At this point, it must be recovered and reused as starting material in another supply chain, adding value to the chain itself. Theoretically, where several industrial activities operate, many different by-products are generated. Therefore, an industrial ecosystem represents a group of enterprises that utilize each other's materials and by-products, reducing the generation of new waste and favoring potential initiatives of industrial symbiosis (Borsacchi and Pinelli, 2020). Moreover, within a circular production framework, the product value chain and life cycle retain the highest possible value and quality as long as possible and is also as energy efficient as it can be (Fontana, Rossi, and Barni, 2021).

The first theorizations of circular economy, as already reported, are from the 90s. A review of 2017 identifies 114 different definitions (Kirchherr, Reike and Hekkert, 2017), which have been synthesized as follows:

1- Elementary flows are defined by ISO 14044 as "material or energy entering the system being studied that has been drawn from the environment without previous human transformation, or material or energy leaving the system being studied that is released into the environment without subsequent human transformation".

"circular economy describes an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, thus operating at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations." (Kirchherr, Reike and Hekkert, 2017)

"Circular economy is a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution. It is based on three principles, driven by design: eliminate waste and pollution, circulate products and materials (at their highest value), regenerate nature". (Ellen MacArthur Foundation, 2013)

In particular, the three above-mentioned principles, are explained as:

- **Designing waste and pollution** – That is to design out the negative impacts of economic activity that cause damage to human health and natural systems. This includes the release of greenhouse gases and hazardous substances, the pollution of air, land, and water, as well as structural waste such as traffic congestion.
- **Keeping products and materials in use** - This means designing for durability, reuse, remanufacturing, and recycling to keep products, components, and materials circulating in the economy.
- **Regenerating natural systems** - avoids the use of non-renewable resources and preserves or enhances renewable ones, for instance by returning valuable nutrients to the soil to support regeneration or using renewable energy as opposed to relying on fossil fuels. (Ellen MacArthur Foundation, 2013)

The above-mentioned principles represent the tipping point from a linear economic model to a circular one, which is intended to close the loop. To better understand the concept of circularity, the economy must be conceived as a system made up of two kinds of material flows: biological materials, and technical materials. The former refers to materials which can safely re-enter the natural world, due to their biodegradability over time and the capacity to return the embedded nutrients to the environment; the latter pertains to materials, such as metals, plastics, and synthetic chemicals, which can't be dispersed and so they must continuously cycle through the system so that their value can be captured and recaptured (Ellen MacArthur Foundation, 2013), and their environmental damages can be reduced or avoided.

It should be noted, the scale of implementation of circular economy can vary from micro to meso to macro. The engagement of all levels is essential to reach a holistic approach. The macro-level efforts refer to policy changes on national and regional levels, the meso level includes industrial networks and symbiosis between companies, while micro level focuses on the companies and citizens as consumers.

So far, the circular economy represents a sustainable way able to preserve the environment while maintaining high-quality life standards. Moving toward a circular model could bring several benefits. The European Parliament reports that measures such as waste prevention, eco-design and re-use could save companies money while also reducing total annual greenhouse gas emissions. Currently, the production of materials utilized everyday within Europe territory accounts for 45% of the CO_2 emissions (European Parliament, 2022). Moving towards a more circular economy could deliver benefits such as reducing pressure on the environment, improving the security of the supply of raw materials, increasing competitiveness, stimulating innovation, boosting economic growth, and creating jobs (European Parliament, 2022).

1.2 Circular practices: recycling and upcycling

The EU Parliament defines the circular economy as a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products as long as possible (European Parliament, 2022).

As previously noted, circular economy is a wide concept, sometimes referred to as an umbrella concept. In fact, its mechanisms can potentially include several practices. For example, if recycling was a key element in circular economy thinking from the start, as time has gone on the number of *Rs* has multiplied. Among others, the Japanese Government's *3R Initiative* (reduce, reuse, recycle) dates from 2004, while the 2008 European Waste Framework Directive has four Rs (reduce, reuse, recycle, recover) (Ekins *et al.*, 2019). Kirchherr et al. (2017) in their review have identified nine separate *Rs* contributing to circularity:

- **Refuse**: to make a product redundant by abandoning its function or by offering the same function with a radically different product.
- **Rethink**: to make product use more intensive (i.e., through sharing products, or by putting multi-functional products on the market).
- **Reduce**: to increase efficiency in product manufacture or use by consuming fewer natural resources and materials.
- **Reuse**: to reuse by another consumer of discarded product which is still in good condition and fulfils its original function(s).
- **Refurbish**: to restore an old product and bring it up to date.
- **Remanufacture**: to use parts of discarded product in a new product with the same function.
- **Repurpose**: to use discarded product or its parts in a new product with a different function.
- **Recycle**: to process materials to obtain the same (high grade) or lower (low grade) quality.
- **Recover**: incineration of materials with energy recovery.

Moving beyond the "Rs-format", an overview of the state of arts of Life Cylce Extension Strategies (LCES) in Europe identifies 15 circular strategies (Fontana, Rossi, and Barni, 2021):

1	**Design for durability/ reliability**	The ability of a product to perform the function(s) it was designed and built for an extended period or a specified period, without experiencing failure or excessive wear and tear, also considering its environmental .performances
2	**Design for modularity and part standardization**	A design approach meant to achieve the maximum level of simplification and standardization in product design with a common product platform and more efficient use of resources. In manufacturing fields, universalization, .serialization, and modularization are the three most important metrics
3	**Design for ease of maintenance and repair**	It allows the products and parts to be maintained and repaired easily to retain the functional capability of a product or restore the working .condition of a damaged product
4	**Design for upgradability**	An approach to the design meant to facilitate the enhancement of a .product's functional as well as physical fitness for ease of upgrade
5	**Design for disassembly and reassembly**	This strategy allows for the separation and reassembly of products and parts in the most efficient way, i.e., the most suitable sequence is determined with minimal removal of components, ensuring environmental .safety, and avoiding future costly environmental liabilities
6	**Design for component recovery**	It includes design for refurbishment and design for remanufacturing. The concept of recovery stems from the fact that a certain number of parts or subassemblies have a design life that exceeds the life of the product .itself, making the idea of reuse practical

7	**Resell–Reuse**	Both strategies can be defined as the activity of recovering components and materials (still in good condition) for further use without any correction or repair action. The resold or reused products are intended to be put into .service for the same purpose for which they were conceived
8	**Pay per use**	In a classic pay-per-use model, the user of industrial equipment does not purchase and own the product. Instead, customers pay a fee that depends on usage and is measured according to clearly specified .consumption, output, or other indicators
9	**Repair or Corrective Maintenance**	They include a set of activities performed after the occurrence of a failure, or detection of a fault, of a product to restore it to a state in which it can perform the original and required function. Repair is also making a broken product operational again through fixing/repair/replacing failed .parts
10	**Preventive maintenance**	It refers to the performance of inspection and/or servicing tasks that have been pre-planned for accomplishment at a specific time schedule, and performed according to prescribed criteria, to retain the functional capabilities of operating equipment or systems and to reduce the probability of failure or prevent degradation of the functioning of a [2].product
11	**Remanufacture**	Remanufacture (or second-life production) is a strategy that implies using parts of discarded products in a new product with the same function. Used products are brought at least to the original equipment manufacturer performance specification. Remanufactured products guarantee the same quality of original products. Remanufacture applies where the full structure of a multi-component product is disassembled, checked, cleaned and, when necessary, replaced or repaired in an .industrial process
12	**Recondition**	This involves taking a product and restoring all critical modules that are inspected and upgrading it to specified quality level (with the same composition), typically corresponding to approximate original design condition or less than virgin standard. Any warranties issued are typically .less than a warranty given to a virgin product
13	**Refurbish**	It means restoring an old product and bringing it up to date, to maintain reliability or extend service life. In general, refurbished products are upgraded and brought back to specified quality standards or satisfactory working and/or cosmetic conditions and must fulfil extensive testing. Occasionally, refurbishing is combined with technological upgrading by .replacing outdated modules and parts with technologically superior ones
14	**Cannibalization**	Cannibalization is the activity of recovering parts from returned products. Recovered parts are used in repair, refurbishing, reconditioning, and .remanufacturing of other products
15	**Recycle**	Recycling is an activity of segregating and recovering components and materials for reprocessing. From the processing of materials, it is possible to obtain the same (high-grade) or lower (low-grade) quality of recycled materials. The purpose of recycling is to reuse or recover materials or waste materials from used products and components. These materials can be reused in production of original parts if the quality of materials is high, or else in production of other parts. Recycling begins when used products and components are disassembled into parts. These parts are separated into distinct material categories. These separated materials .are subsequently reused in the production of new parts

Table 1. Life Cycle Extension Strategies

2- Three types of preventive maintenance are recognized in the literature: Predictive maintenance, Time-based maintenance, and Condition-based maintenance.

For this handbook, recycling and upcycling will be further investigated, especially to effectively understand their difference. Of course, since both refer to the circular framework, and thus imply a certain way of thinking (c.d. circular thinking), they are interrelated with other practices, and they cannot be understood if isolated from their context. For example, the *reduction* (of new input) is always the starting point both for recycling and for upcycling.

Recycling has been defined by the United Nations as "the re-introduction of residual materials into production processes so that they may be reformulated into new products''(United Nations *et al.*, 2003). Reducing the extraction of primary resources through recycling can provide multiple environmental benefits (EEA, 2016) and help reduce GHG emissions associated with material resource use. Regarding the latter, on the global level, there is a direct relationship between resource use and climate change. Greenhouse gas (GHG) emissions account for 83% by weight of global material output, making the atmosphere by far the largest dumping site for the disposal of global waste (Behrens, 2016).

Recycling should not be confused with reuse as the latter does not require the reprocessing of materials into new products, materials, or substances[3]. At the same time, recycling should not be understood only as mere recovery of materials, but also to redirect the recovered materials towards their next lifecycle.

From an economic point of view, increased recycling can be cost-effective for industries, while for those sectors that depend on primary materials, the use of secondary materials may decrease the need to purchase or extract primary materials. In addition, the use of recycled material may reduce price volatility associated with primary raw materials and dependency on imports of materials. (Rizos, Tuokko and Behrens, 2017)

Upcycling could be defined as a process to convert and remake waste into new products of better quality or a higher environmental value through craftsmanship and design (Cassidy and Han, 2013). Upcycling may provide the most sustainable circular solutions since it typically requires little energy[4] input and can eliminate the need for a new product from virgin materials (Szaki, 2014).

Despite the rising interest in upcycling, the overall volume of literature dealing with it is still low. This might be partially attributed to the fact that the term upcycling is a neologism. The first recorded use of the term is traced back to 1994 in an interview with Reiner Pilz[5]. Probably for this reason, the global level of publications dealing with it is still modest and there is no universal definition of the term, bringing confusion or ambiguities with respect to what upcycling really implies.

The two most cited definitions of upcycling belong to Reneir Pilz, who coined the term, and Braungart and McDonough, whose definition is mainly used within academic papers.

"Recycling, I call it down-cycling. They smash bricks, they smash everything. What we need is upcycling, where old products are given more value, not less." (Kay, 1994)

From this point of view upcycling is an activity of creating newness or better quality from used or waste materials, while adding value.

"*A technical nutrient is a material or product that is designed to go back into the technical cycle, into*

3-Within the field of hydric management, water reuse and water recycling are often used as synonymous (Lazarova, Sturny and Sang, 2012).
4-Such object-level upcycling has been actively promoted and practiced by an increasing number of entrepreneurs including Teracycle, Freitag, Reclaimed, The Upcycling Trading Company and Hipcycle, among others.
5 Reiner Pilz is a German businessman and a mechanical engineer. In 1994 he strongly criticized the newly European waste regulation, defining it as "down-cycling".

the industrial metabolism from which it came. […] Isolating them from biological nutrients allows them to be upcycled rather than recycled – to retain their high quality in a closed-loop industrial cycle." (Braungart and McDonough, 2002)

This material approach conceives upcycling as the process to maintain or upgrade materials' value and/or quality in their second life and beyond.

Other authors similarly define upcycling as the recreation of new products (artistic, scientific, or functional) with higher values or qualities (Barber and Hale 2013, Eder-Hansen, et al. 2012, Garg 2012, Kibert, Chini and Languell 2000) and a more sustainable nature (Barber and Hale 2013), through three main processes:

- By converting, turning, transforming, or repurposing waste or used materials or products (Ali, Khairuddin and Abidin 2013, Bramston and Maycroft 2013, Garg 2012),
- By reusing an object in a new way without degrading the material (Ali, Khairuddin and Abidin 2013, Gomez 2014),
- By remanufacturing (Steinhilper and Hieber 2001), giving it another new life while reducing unnecessary resource expenditure (Ali, Khairuddin and Abidin, 2013; Bramston and Maycroft, 2014)

So far, there are two dominant viewpoints of upcycling. One is based on material recovery aimed to maintain the value and the quality of materials safely in their second life and beyond. This approach focuses on the contraposition between down-cycling and up-cycling, and it involves the material reprocessing within the industrial system. The other viewpoint is based on product (re)creation for higher values and qualities by transforming, repurposing or refashioning waste or used materials/products either by companies or by individuals (Sung, 2015). This approach refers to the creative reuse and repurpose of materials and products and does not necessarily involve industrial treatments. Upcycling may be configured as an individual creative activity, carried out not for economic purposes but just to retain materials and products value.

Despite this central idea, there are variations in use of language, focuses, and viewpoints by different subject areas and authors. For example, the literature in the context of plastic recycling sees upcycling as upgraded recycling as opposed to downcycling (Czvikovszky and Hargitai, 1997; Dobrovszky, 2011; Kreiger and Pearce, 2013). At the same time, the literature in fashion and textiles, not surprisingly, focuses on textile waste to *refashion* or *resurface* it, or make it a more valuable new product (Goldsworthy, Earley and Politowicz, 2018). Moreover, designers emphasise the importance of design assistance and the integration of bio-inspiration concepts (Santulli and Langella, 2013), whereas engineering researchers argue that remanufacturing is the key solution for transforming downcycling into upcycling of electronics (Steinhilper and Hieber, 2001).

It is also to be noted that, even though the term upcycling is a neologism, its practice has existed for thousands of years as an individual practice of converting waste or used objects into higher value/quality objects (Szaki, 2014). Reuse and upcycling were common practices around the world before the industrial revolution and are now more common in developing countries due to limited resources (Korsunova *et al.*, 2022). Recently, however, developed countries have paid more attention to object/product upcycling in commercial perspectives, due to the current marketability and the lowered cost of reused materials (Sung, 2015).

Upcycling brings indeed environmental benefits, such as solid waste reduction (and prevention), landfill space-saving, raw materials use reduction, energy use reduction, and greenhouse gas emission reduction. While, from an economic point of view, benefits generally refer to cost savings and new profit opportunities for manufacturers, entrepreneurs, and consumers.

For many decades recycling has been the most traditional way of implementing circular economy principles by capturing the value of existing products and materials and decreasing the use of primary materials. However, in recent times, instead of recycling, upcycling has been recognized as the better practice to implement circular economy. So far, upcycling could be conceived as a recycling strategy that aims to improve the quality of materials or of the final good. Thus, recycling could be implemented through down-cycling or up-cycling; with the former associated with the traditional way of recycling, while the latter implying more valorization of materials. Upcycling configures itself as an energy-saving practice since it does not imply significant materials' transformation processes. For example: recycling fabric implies a process to pull or shred the old fibers into new ones; while upcycling textile does not involve any important treatment, fabric is just reshaped. (Teli *et al.*, 2015)

Synthesizing, upcycling is about converting or transforming waste materials or products into high value and/or quality results either as products or materials (Sung, 2015), and it diverges from recycling because it gives materials an added value, without requiring energy or resource-intensive transformation processes. Differences among those two practices are summarized in the following table.

RECYCLING	UPCYCLING
To breakdown and reuse waste as raw materials to make new products.	To reuse waste materials in their current state without the need to break them down into their base state.
Treatment of waste material may imply energy or resource-intensive processes.	Since waste material does not need significant treatment, the process is energy saving.
New raw materials' input reduction, however, a quota of virgin raw material is still needed (i.g. paper recycling process).	Highly marked reduction of new raw materials use, virgin raw material is usually not required.
Solid waste prevention and reduction, landfill space-saving, and greenhouse gas emission reduction.	The environmental benefits associated with upcycling may be more significant.
Improving material quality is not the primary purpose.	Material and/or final good are upgraded in quality.

Table 2. Differences between Recycling and Upcycling

1.3 Circular economy at the urban level

Two-thirds of the global population will be living in urban areas by 2050. Despite taking up just 2 per cent of global landmass, our urban centers consume more than 75 per cent of natural resources, are responsible for over 50 per cent of solid waste and emit up to 60 per cent of greenhouse gases, contributing to pollution, climate change and biodiversity loss (Ellen MacArthur Foundation, 2013). At the same time, cities have a high concentration of resources, capital, data, and talent spread over a relatively small geographic area and are centers for innovation; and because of this concentration, cities are also uniquely positioned to support certain circular business models, such as sharing models, reuse systems or product-as-a-service models (Ellen MacArthur Foundation, no date).

The circular city is indeed emerging as a concept and form of practice in sustainable urban development. This is a response to the complex and pressing challenges of urbanization, as

highlighted in the New Urban Agenda (NUA)[6]. As stated by The Circular Cities Declaration[7], "a circular city is one that promotes the transition from a linear to a circular economy in an integrated way across all its functions in collaboration with citizens, businesses and the research community. This means fostering business models and economic behavior which decouple resource use from economic activity by maintaining the value and utility of products, components, materials, and nutrients for as long as possible to close material loops and minimize harmful resource use and waste generation. Through this transition, cities seek to improve human well-being, reduce emissions, protect, and enhance biodiversity, and promote social justice, in line with the Sustainable Development Goals."(European Circular Cities Declaration, 2020)

European cities and regions are starting to apply the circular economy at the urban scale, also following a series of policy documents of the European Commission[8]. At the European level, in fact, support for circular cities is increasingly growing. For example, the *New Urban Agenda for the EU* established a specific *Partnership on Circular Economy*, developing two orientation papers for the implementation of circular economy in cities and regions (Gravagnuolo, Angrisano and Fusco Girard, 2019).

Moreover, to help policymakers in developing appropriate frameworks to support circular economy at the urban level, several organizations and authors have pointed out key areas for the implementation of circular policy. According to the Ellen MacArthur Foundation, those are: built environment, energy systems, urban mobility system, urban bioeconomy (food, wastes, water, soils), and local closed production systems (Ellen MacArthur Foundation, no date). Similarly, other researchers (Gravagnuolo, Angrisano and Fusco Girard, 2019) indicates food, mobility, and built environment sectors as key areas, since they can be estimated to undergo a prospective reduction in greenhouse gas emissions of 48% by 2030 and 83% by 2050 as compared to 2012 levels (EEA, 2016).

The application of the circular approach to a territory engages municipalities, production activities, relevant stakeholders, and citizens to create opportunities for reducing the depletion of new resources (Borsacchi et al., 2019). Beyond the environmental aspect, the challenge of the circular city entails also economic and social facets. New policies must be taken into consideration, involving both citizens and entrepreneurs, to reduce the gap within potential bad waste management and to help rebuild social cohesion (Borsacchi, et al., 2018). The latter is pursued through the construction of an inclusive and supportive community, based on the principle of sharing and creative re-use to stimulate innovative driving forces for business activities, also considering social purposes and charity (Borsacchi and Tacconi, 2019).

1.4 Urban material flows analysis

Urban areas are home to more than 50% of the world's population. This imbalance has generated asymmetric patterns of resource utilization in recent decades that has resulted in environmental degradation and accompanying problems, such as higher population growth rates, often due to migration; a disproportionate increase in the use of resources; high levels of congestion and pollution due to inadequate road infrastructure (the delivery of transportation), especially in cities in developing countries; problems related to land and ecosystems; and environmental problems,

6- The New Urban Agenda was adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) on 20 October 2016. NUA represents a shared vision for a better and more sustainable future. If well-planned and well-managed, urbanization can be a powerful tool for sustainable development for both developing and developed countries.
7- The Circular Cities Declaration is a commitment document from cities and regions to use the levers at our disposal coherently across the organization to transition from a linear to a circular economy. Since today 68 European cities have signed the declaration.
8-Among others, "Towards a circular economy: A zero waste programme for Europe" (Deselnicu et al., 2018) and "Closing the loop—An EU action plan for the circular economy" (European Commission, 2015).

such as water and air pollution and improper disposal of wastes (Alfonso Piña and Pardo Martínez, 2014).

Ongoing urbanization, resource depletion, and climate change emphasize the need to design and plan cities that foster sustainable urban resource management. To plan cities that generate less environmental pressure, it is essential to understand how urban systems function with respect to resource flows. One way to understand such a system is to refer to urban metabolism theory. Metabolism is the set of internal mechanisms that reproduce and maintain a system. This simple concept is just extended from single living organisms to whole ecosystems. Urban metabolism is thus conceived as the total of the technical and socio-economic processes that occur in cities, resulting in growth, production of energy and elimination of waste (Kennedy, Cuddihy, and Engel-Yan, 2007). This approach allows to seriously consider the relationship between society and environment, covering not just resources extraction or disposal, but also all those middle-activities that affect the environment (i.e., transformation, transfer, stocking activities etc.).

One of the methods used for systematic assessment of urban metabolism is MFA (Voskamp *et al.*, 2017). MFA is the quantification and evaluation of matter (water, food, excreta, wastewater...) and substances (nitrogen, phosphorus, carbon...) mass flows and processes, in a definite system (city, country, etc.) during a defined period. This methodology assesses the efficiency of materials use, helping identify waste of natural resources which would otherwise go unnoticed in conventional economic monitoring systems (European Environment Agency, 2001), and quantifying the impact of potential measures on resource recovery and environmental pollution. There are several ways to realize MFA, they may differ in system boundaries or material flow considered (it is possible to consider just one or few materials or substances). The spatial scale of application of MFA may vary from regional, national to a single firm or product. The framework provides by the European Environment Agency and Eurostat may represent a good starting point to understand how MFA accounting works[9].

1.5 Waste management system

In 2020, the world was estimated to generate 2.24 billion tons of solid waste, amounting to a footprint of 0.79 kilograms per person per day. With rapid population growth and urbanization, annual waste generation is expected to increase by 73% from 2020 levels to 3.88 billion tons in 2050 (World Bank, 2022). Thus, managing waste properly is essential for building a sustainable and livable society.

Waste means any substance or object which the holder discards or intends or is required to discard. Different types of waste are usually distinguished based on the origin and the hazard level.

Depending on the origin, waste may be classified as:

- **Municipal waste** – it covers waste from households, including bulky waste, similar waste from business activities, yard and garden waste, and street sweepings. Usually, it is collected and treated by or for municipalities.
- **Special waste** – it is any material that is not municipal solid waste and that may require special handling. It includes agricultural waste, non-hazardous waste from industrial or commercial activities, including craftmanship, medical waste, and other waste coming from waste recovery activity, including the fuel obtained through those processes.

9- See Material flows and resource productivity - Environment - Eurostat (europa.eu)

Depending on the level of hazard, waste is usually divided into:

- **Hazardous waste** – it is waste that is dangerous or potentially harmful to our health or the environment. It usually has more stringent legal requirements, including storage and disposal as well as necessary record-keeping. A large amount of hazardous waste belongs to companies and worksites, but also households can produce it. Household hazardous waste can include anything corrosive, chemical-based, pesticides among others; the classic example of domestic hazardous waste is electronic material.
- **Non-hazardous waste**.

Since waste has the potential to harm people and the environment, often it represents a form of materials-loss, administrations worldwide are engaged in reducing its total amount, by planning specific waste management. With the affirmation of circular thinking in waste management, a sort of waste hierarchy has been developed, aiming to prevent and reduce the negative impacts caused by the generation and management of waste and to improve resource efficiency.

Top priority is waste **prevention**, so preventing and reducing waste generation and its harmful components, especially through eco-design. **Reuse** is the second preferred option. It covers all those activities aiming to reutilize materials within the same productive process with the same form and for the same purpose. Reuse aims to extend materials' life; thus, it may be conceived as an upstream tool (it postpones the waste stage of material). Materials that cannot be reused must be **recycled**. This involves any recovery operation by which waste materials are reprocessed into products, materials, or substances.

Where there is no technological possibility to recycle materials, those must be recovered. **Recovery** refers to any operation, the principal result of which is waste serving a useful purpose. It may include anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat, and power), and materials from waste. **Disposal** is the last option, and it refers to landfill and incineration without energy recovery.

So far is possible to identify four main intervention method:

- **Separate collection** – The collection of individual components of solid municipal waste from any source, usually separated into different collection containers, to recover, reuse or recycle the material or to facilitate its collection and disposal. Usually, it is implemented for just a few waste categories, such as paper, glass, plastic, organic fractions, textile, and wood.
- **Composting** – it is a process that, through a series of chemical reactions, transforms biomass into compost (a stable product, not susceptible of subsequent bio-chemical variations) suitable as organic amendments in agriculture.
- **Energy recovery** (incineration) – the process of burning solid waste under controlled conditions to reduce its weight and volume, and to produce energy.
- **Waste disposal in landfill.**

Disposing of waste on the landfill

Other waste management principles that have been established at the international level are, among others, *polluter pays* rule (who produces pollution should bear the cost of managing it), *proximity* criterion (waste should be managed as near as possible to its place of production, mainly due to the high impact of waste transfer), and *self-sufficiency* principle (the largest amount of waste should be treated or disposed of within the region in which it is produced, or rather each homogeneous territory must be able to manage its own waste).

Despite the international waste management framework, managing waste properly remains a challenge for many countries and cities, especially for the poorest. In low-income countries over 90% of waste is often disposed of in unregulated dumps or openly burned (World Bank, 2022), and the informal sector still plays an important role. The innovative value retaining practices for materials and goods in low-income contexts often tend to be overshadowed by calls for improved formal organization of waste management. Although informal waste management should not represent a development goal per se, it is worthwhile to identify the positive aspects of informal recycling for possible development interventions (Nzeadibe, 2009). So far, frugal household economics and the existence of local markets for used materials are influential factors in the sustainable recycling of municipal waste. These markets, as well as informal actors' waste recovery skills and ability to locate customers for the uptake of used materials, are at the very center of necessity-driven circular economy (Korsunova *et al.*, 2022).

1.6 Legislative constraints and cultural barriers

Despite the circular economy is recognized as a valuable paradigm to obtain both prosperity and sustainability, it still faces opposition. Barriers to circular economy implementation may be technological, policy and regulatory, financial, and economic, managerial, performance indicators, and social (customer interest and community awareness) (Araujo Galvão *et al.*, 2018). The White Paper *Breaking the Barriers to the Circular Economy* detects four barriers to circular economy: cultural (Lacking awareness and/or willingness to engage with the circular economy), Technological (Lacking (proven) technologies to implement circular economy), Market (Lacking economic viability of circular economy business models), and regulatory (Lacking policies that support a circular economy transition) (Kirchherr *et al.*, 2017). However, for reasons of simplicity, this handbook explores just legislative and cultural barriers.

Legislation shapes the possibilities for production, distribution, consumption, and disposal activities. Thus, it may act both as barriers or as drivers for the innovation of new technologies and services. Below is reported a synthetic review about the types of legislative constraints that may be detected on each stage of a product life (Technopolis Group, 2016).

- Extraction-Production: existing legislations that lead to the on-going focus on virgin raw materials due to the lack of pricing in of externalities.
- Production, internal loops: legislations that make waste generation preferable compared to industrial symbiosis, internal loops, or resource efficient production.
- Production-use: legislation that hinders closer links between production/use phase beyond linear models (e.g., regarding product-service-systems).
- Collection: legislation that fails to feed waste streams into appropriate, high-quality treatment facilities and cause leakages like export, disposal, or incineration, e.g., legislation of reliable access to specific waste streams.
- Production-circular waste management activities: legislation that makes products less suitable for reuse or recycling.
- Circular waste management activities: legislation that fails to maintain the economic value and embedded resources of products or at least to achieve technically feasible recovery rates.
- Circular waste management activities-production: legislations that hinder the uptake of recycled markets or the development of markets for secondary raw materials.

In most regions, there are fragmented circular economy's regulatory systems. This complex structure results in poor accountability of local governments and leads to the creation of an inadequate legal system. Poor enforcement ability of legislations due to fragmented systems and, correspondingly,

the lack of policy support makes it difficult to apply circular economy by businesses. Furthermore, taxes and charges specified by public authorities act as another barrier. Current tax regulations do not promote the implementation of circular economy in most regions; instead, they discourage companies due to its financial burden (Geng and Doberstein, 2008; Kumar *et al.*, 2019). Many governments do not provide adequate subsidies and tax reductions to promote waste recovery. Ultimately, the number of materials recovered remains incapable of meeting the demand of companies in remanufacturing business and lead them to use virgin materials. These pieces of evidence show that there are many barriers to a successful implementation of circular economy (Kumar *et al.*, 2019).

As reported by the White Paper *Breaking the barriers to circular economy*, **cultural barriers** emerge as the main impediment regarding a transition towards Circular Economy, with the most pressing barriers identified being cultural ones. These are lacking consumer interest and awareness, entrepreneurial culture, and operating within a linear system (Kirchherr *et al.*, 2017).

Although in recent years governments and local authorities around the globe have started circular policies, and enterprises have started circular practices, the level of awareness of the public against circular economy is still quite poor (Winans, Kendall and Deng, 2017). Since public engagement is crucial for its success, an extensive public education is advisable. This could be potentially achieved via different channels: through advertisements on TVs, magazines, newspapers and billboards, government policies, development of new business models, etc. Moreover, the lack of qualified personnel on circular economy could undermine the potential of spreading circular thinking and public awareness (i.e., because of the lack of qualified personnel on circular economy, institutions and governments cannot become successful enough to promote it to the society (Kumar *et al.*, 2019).

"Salvation can only come from spreading the culture of hope and non-violence towards other human beings and nature. It is a question of recovering old and forgotten values of respect for others, of solidarity, of international relations cleaned of the violence of oppression, competition, power, and money. […] It is a question of bringing these new values into schools and universities, mobilizing teachers. […] It is a question of denouncing advertising which, by encouraging useless consumption and waste, has the effect of further degrading nature". (Nebbia, 2002)

Research indicates that most people care more about the appearance of products whilst purchasing. They do not pay attention to their sustainability and environmental effects and prefer the one with a better look, instead of manufactured from scrap (Pomponi and Moncaster, 2016). Recycled and upcycled products are still viewed as niche goods, and thus they are not appealing to everyone (Szaki, 2014). This reduces the demand for remanufactured products and low customer acceptance makes it difficult to maintain circular strategies. Since demand shapes market opportunity and innovation, making consumers aware of the externalities produced by their lifestyle is crucial to reach a circular system.

1.7 The social dimension of circularity

The social dimension of sustainability is especially relevant within the circular economy context due to the need for close cooperation and interdependence between multiple stakeholders beyond traditional supply chain or network relationships (Mies and Gold, 2021). Thus far, the circular economy framework appears to prioritize the economic system with primary benefits for the environment, either resource efficiency or environmental efficiency, and only implicit gains for social aspects. In other words, circular economy views usually privilege economic solutions as the driver for solving material and energy-related problems, rather than a sustainability paradigm, which should require

a complete mapping of three sustainability dimensions. Many conceptualizations of the term indeed seem to ignore socioeconomic effects and only emphasize economic issues, while simplifying the environmental dimension.

Even if it is difficult to measure social performance and there is no agreement about which are the proper indicators to be referred to, recently a considerable number of reviews have taken the challenge of undertaking research focused on the relationship between circular economy and a sustainability concept, as well as the large number of terms that are related to it. The social aspects most often cited, based on Padilla-Rivera, Russo-Garrido and Merveille review (2020), are:

- **Employment**: circular economy has the potential to create employment opportunities, which directly deals with regional unemployment disparities and occupational mismatch. Jobs in a circular economy can be newly created, or created by substitution, or redefined. To promote green and circular jobs, attempts must be carried out both at the industry and government levels. Both must strengthen employment through strategies and incentives, either to close material loops or to use products more efficiently. However, this transition would also depend on how workers receive the necessary training and skills to fulfil the employment demanded in CE. (Padilla-Rivera, Russo-Garrido and Merveille, 2020)
- **Social networking**: it implies collaboration enabling cost-reducing, or resource-reducing innovations. This topic will be further investigated later in this chapter.
- **Social inclusion (equity)**: Circular economy may improve social welfare distribution, at the same time help to further social justice, in particular intergenerational justice (Padilla-Rivera, Russo-Garrido and Merveille, 2020).
- **Participation and local democracy**: In terms of participation related to environmental issues, there are three levels of participation recognized: participation in the planning process, participation via information, and participation in finance decisions. From a community perspective, greater participation within and by local communities develops functional benefits (Korhonen *et al.*, 2018). From a stakeholder perspective, since this approach can generate better decisions that are more likely to be implemented, raise legitimacy, and promote a wider understanding of the complexity of societal problems (Padilla-Rivera, Russo-Garrido and Merveille, 2020).

For this handbook, the focus is set on social networking and social awareness as the driver for a successful circular system. Those two elements are interdependent: networking activity reinforces public awareness by circulating information, while social awareness fosters social networking by promoting stakeholders' engagement and community support. Both social networking and awareness lie in a certain measure on collaboration and communication. In other words, knowledge-sharing practices among the various actors of the supply chain are essential for the implementation of the circular economy.

Networking could be defined as "the exchange of information or services among individuals, groups, or institutions, to cultivate productive relationships for employment or business" (Webster, 2022). Advancing from a linear to a circular system entails cross-sectoral collaboration based on a systemic approach that enables partnerships, knowledge sharing, and collaboration to gain both economic and environmental benefits. Companies' networking leads to cheaper sourcing, avoiding disposal costs, and/or gaining extra profit from selling the by-products (industrial symbiosis) hence, improved organizational performance and developing competitive advantage (Mishra, Chiwenga and Ali, 2021; Köhler, Sönnichsen and Beske-Jansen, 2022; Sudusinghe and Seuring, 2022). Furthermore, environmental benefits associated with collaboration include reduced natural resource consumption, waste disposal reduction and reduction of emissions to air, water, and soil (Mishra, Chiwenga and Ali, 2021; Sudusinghe and Seuring, 2022).

Networking is viewed as an enabler to superior performance in firms due to capitalization on resources, capabilities, processes, and routines residing in partner firms. Establishing partnerships with firms along supply chains has the potential to generate gains in innovation while also increasing the competitiveness of entire networks (Mishra, Chiwenga and Ali, 2021).

So far collaboration, and so social networking, support the development of sustainable competitive advantage at the firm-level and interfirm-level through the joint implementation of circular solutions that could not otherwise be generated by the partners individually. The competitive advantage comes from knowledge-sharing routines, which comprise a "regular pattern of interfirm interactions that permits the transfer, recombination or creation of specialized knowledge" (Dyer and Singh, 1998). Knowledge-sharing routines can thus increase innovative activities both within and between firms, which is consistent with findings from previous studies indicating that innovations can be linked to the suppliers or networks in which firms are embedded (Köhler, Sönnichsen and Beske-Jansen, 2022). Moreover, access to knowledge is an important prerequisite for sensing and seizing opportunities and threats. Thus, knowledge sharing is crucial for enhancing open and collaborative innovation efforts for achieving a circular economy.

From a consumption-based point of view, collaboration entails the engagement of a wider group of stakeholders, i.e., final users, and local community. Establishing collaborations among a diverse group of stakeholders increases network complexity and generates challenges in terms of aligning goals, incentives, and practices conducive to the successful advancement of a circular economy (Rajala *et al.*, 2018). A certain awareness of the circular economy concept and its benefits, willingness to commit to mutual goals and consideration of the diverse needs and expectations of the involved stakeholders are indeed emphasized as key elements for circular network formation processes. Literature states the importance of collaboration in circular economy as it tackles increasing consumption, urbanization, and employment issues, by creating a movement that encourages stakeholders, beyond the company, to act circular (Köhler, Sönnichsen and Beske-Jansen, 2022). To enable the shift from a traditional supply chain, with a linear "take, make and dispose" model, toward a circular model, stakeholders need to work together through the value chain (Mishra, Chiwenga and Ali, 2021).

Social awareness about circular economy depends on the degree of knowledge-sharing practices among local communities. In other words, social awareness aims to integrate the consumption and production side, implying education and information of the local community on circular economy practices, benefits and state of art. So far, it refers to what has been previously defined as "participation via information". Social awareness indeed facilitates social acceptance of projects or policies. Community acceptance involves specific acceptance of citing decisions within projects, by local actors, particularly residents and local authorities (Mies and Gold, 2021). Social awareness makes the targeted community more engaged, favoring virtuous behaviors and avoiding strong conflicts among all the stakeholders.

By including the social dimension within the framework of circular economy, we propose to reformulate its definition as follow:

A coordinated set of systemic solutions capable of addressing global challenges such as climate change, biodiversity loss, waste generation and pollution. Doing circular economy means (among other things): eliminating and/or minimizing waste and pollution, to close the life cycle of materials and products and regenerate nature, by putting people at the center.

2. CIRCULAR ECONOMY FOR CULTURAL AND CREATIVE INDUSTRIES

2.1 Cultural and Creative Industries (CCIs)

Creative Economy, *Cultural* and *Creative Industries vague* concepts emerged in the last decades, which have not yet reached a universally accepted definition. Since creativity could be conceived as a complex process of innovation, combining some or all the following dimensions: ideas, skills, technology, management, production processes as well as culture; it can benefit almost all economic sectors (KEA European Affairs, 2006). Creative economy is thus an evolving concept, based on creative assets potentially generating economic growth and development. It can foster income generation, job creation and export earnings while promoting social inclusion, cultural diversity, and human development. It embraces economic, cultural, and social aspects interacting with technology, intellectual property, and tourism objectives.

The term Cultural and Creative Industries (CCIs) covers different realities and sectors, and even in lexical and linguistic differences[1]. The varieties of sectors involved - from fine arts to sometimes also telecommunications and software - lead to a variety of figures that do not favor comparability and to mixing up cultural activities with purely industrial activities with no cultural bearing.

The first official attempt to conceptualize, register, and classify CCI was made by the British Ministry of Culture in 1998. CCI were defined as businesses “based on individual creativity, dexterity and talent and at the same time include the prospect of economic prosperity, job creation and the exploitation of intellectual property” (British Governmental Department of culture media and sport (DCMS), 1998). Since then, the debate about CCIs’ characterization and classification has become more intense as social and economic transformations have taken place internationally, and various organizations had proposed their own definition and classification[2].

In the *Green Paper on Cultural and Creative Industries*, the European Commission offers the definition below:

***Cultural and Creative Industries are those industries that use culture as input and have a cultural dimension, although their outputs they are mainly functional, they include architecture and design, which integrate creative elements into broader processes, as well as subsectors such as graphic design, fashion design or advertising*” (European Commission, 2010).**

CCIs’ overall activity consists in producing and distributing goods or services which, at the time they are developed, are considered to have a specific attribute, use, or purpose which embodies or conveys cultural expressions, irrespective of the commercial value they may have. Besides the traditional arts sectors (performing arts, visual arts, cultural heritage – including the public sector), they may include film, DVD and video, television and radio, video games, new media, music, books, and press (European Commission, 2018). Moreover, it is important to consider the context within which CCIs operate and their interdependence with industries from other sectors. At a more peripheral level, in fact, many other industries rely on content production for their own development and are therefore to some extent interdependent with CCIs. They include among others tourism

1- Early policy work by UNESCO and others referenced cultural activities, by the late 1990s terminology had shifted towards cultural industries, reflecting a greater focus on the economic benefit they provide. A further shift in terminology occurred in the early 2000s, with policy work referencing creative industries, encompassing a wider range of activities which were not as overtly cultural as traditional sectors (such as dance or music), but required significant amounts of creativity (such as advertising or architecture). The broadening of definitional approaches continued, with recent work using the terminology of cultural or creative ecosystems, to denote the importance of culture and creativity to all aspects of the economy (OECD, 2022).

2- UNESCO defines CCIs as “Those sectors of organized activity that have as their main objective the production or reproduction, the promotion, distribution or commercialization of goods, services and activities of content derived from cultural, artistic or heritage origins.” (UNESCO, 2013) While UNCTAD states “Creative industries are vast in scope, dealing with the interplay of various sectors. These creative sectors range from activities rooted in traditional knowledge and cultural heritage such as art crafts, and cultural festivities, to more technology and services-oriented subgroups such as audiovisuals and the new media.” (UNCTAD, 2015)

and the new technologies sector (European Commission, 2010).

The classification presented below, and to which this handbook refers to, has been proposed by KEA European Affairs and is one of the most accredited/quoted[3].

Core Arts Field	• Visual arts (including crafts, paintings, sculpture, photography) • Performing arts (theatre, dance, opera, circus, festivals) • Heritage (museums, archaeological sites, libraries, archives)
Cultural industries	• Film, video, radio, television, music (including live music performances), including software games but excluding other software and databases. • Book and press
Creative industries & activities	• Design (fashion design, graphic design, interior design, product design), architecture and advertising
Related industries	• Cultural tourism

Table 3. Cultural and Creativity Industries classification based on KEA European Affairs (2006)

Creative activities and creative professions have traditionally been present especially in the Mediterranean countries, contributing to local and national economies and cultural landscapes. Even so, they have come to the fore under the conditions of global transformation and the transition to new economic, social, and technological conditions. The creative sector has proven its capacity to adapt to new global trends, such as digitalization or globalization, adjusting itself to the evolution of needs arising in society.

At the same time, producers were given the opportunity to gain access to new, worldwide distribution channels by increasing their production sizes through new reproduction technologies. In a global environment, creative industries have gained significant importance in responding to a global consumer audience.

New global trends have redefined also the way CCIs work, organize, and interact between them, both in a physical and virtually fashion. The increasing emphasis on collaboration and networking, proximity to the consumer, and quality of the output, represent just some examples. The reasons why CCI are organized and cooperated in these ways are based on the flexibility of their production, their intrinsic cultural characteristics and the other global trends described above.

So far, the creative sector has become a significant part of the economy, not just in the richest countries. Its output value is rising over time[4], and it accounts for increased job creation, particularly for young people[5]. Cultural and creative sectors drive innovation, acting as a catalyst for change in other sectors – and stimulate invention and progress across diverse cultural landscapes. With the emergence of progressively complex, creative, and intertwined business models, the cultural and creative sectors are increasingly becoming a decisive component of almost every product and service (European Commission, 2022b).

But CCIs do not account solely for economic benefit. Since they are knowledge-intensive activities

3- An alternative classification is provided by ESSnet-Culture (European Statistical System Network on Culture) Final Report, 2012
4- By scanning the results of most recent European studies about CCIs, their contribution in Europe to the national GDP ranges between 5 and 10%. By contrast, when it comes to the regional level, the enthusiasm about the CCIs' potential remains rather limited and not fully utilized. (Gerlitz and Prause, 2021)
5- CCIs employ approximately 30 million people across the world (UNESCO, 2005).

or based on individual creativity and talent, they tend to generate a shared sense of identity, culture, and values; thus, strengthening social cohesion. Moreover, it should be stressed that they provide meaningful work for their employees, which is one of the main prerequisites to flourish.

Finally, the creative sector has the potential for low carbon footprints. Usually CCIs provide service, instead of simple products, putting at the core the human input rather than the material one; they are generally not energy-intensive or material intensive.

Since the creative sector could provide meaningful work, contribute positively to community, and have a decent chance of being materially light, it is often viewed as key **towards a more sustainable paradigm.** Tim Jackson includes it under the umbrella of the *Cinderella Economy*: that part of the economy, often overlooked, that has the potential to foster prosperity creation without detrimental effects on the environment. Community centered enterprises engaged in delivering local services, such as nutrition, education, care, maintenance and repair, recreation, craft, creativity, culture: those activities contribute to flourishing and are embedded in the community (Jackson, 2016).

"The seeds for the new economy already exist in local, community-based social enterprise: community energy projects, local farmers' markets, slow food cooperatives, sports clubs, libraries, community health and fitness centers, local repair and maintenance services, craft workshops, writing centers, watersports, community music and drama, local training and skills. And yes, maybe even yoga (or martial arts or meditation), hairdressing, and gardening. People often achieve a greater sense of wellbeing and fulfillment, both as producers and as consumers of these activities, than they ever do from the time-poor, materialistic, supermarket economy in which most of our lives are spent. So, it's ironic that these community-based social enterprises barely count in today's economy." **(Jackson, 2010)**

2.2 Circular practices for CCI: reusing, upcycling, recycling.

CCIs sector can play a good role within the transition from a linear to a circular economy in the form of visualization and communication of resource and product consumption, establishing cultural ecosystems which unite and make visible the processes of remaking culture, local production, reuse practices, and other sustainable and circular practices.

Lots of focus on circular elements such as waste prevention, eco-design, reuse, and repair may be found within CCIs activities.

Several examples connect the circular economy and creative sector, especially place-based initiatives, which cannot easily be summarized. However, it has been noted that some initiatives seem to repeat themselves throughout many countries:

- Repair cafés or similar repairing communities (most often initiated by volunteers/civil society);
- Initiatives under the *maker movement* umbrella such as makerspaces, hackathons, etc. (most often initiated by public and/or private actors);
- Second hand selling, sharing and exchanging (both C2C and B2C);
- Local government's education activities for schools and citizens. (Interreg Baltic Sea Region, 2021)

Architecture, fashion, and design are already showing their potential in improving circular practices within a more formalized context. The precepts of reusing, recycling, or upcycling are by now being implemented within the industries in those sectors. Urban planning, for example, is increasingly involving the reuse of abandoned buildings and public spaces, or the implementation of *green*

buildings. Eco-architecture involves the reuse or the recycling of materials. The fashion industry is probably one of the main areas in which recycling and upcycling have been stressed out as a solution to reduce the impact of textile items.

It is important to note that resorting to circular practices means to retain the value of materials and to enhance creativity within productive processes. Again, is the human input which brings added value to the new item. Human input in terms of creative re-use of materials.

Below are synthetized some potential upcycling applications within the Creative and Cultural sector. For each sub-area related upcycling practices are identified, and, where possible, a few practical (projects or brands) examples are provided.

			UPCYCLING APPLICATIONS	PRACTICAL EXAMPLES
CORE ART FIELD	VISUAL ART	**CRAFTS**	Several examples of reusing product or parts of it, restoring or repurposing it into a new functional product. Examples may be found in the productive field, among handicraft SMEs, and in the domestic field. Emblematic of the latter case are the DYT movement, decoupage, or the repurpose of homewares and furniture. Academic literature on this regard is low, but a lot of handbooks and tutorials for consumer use are available.	**No War Factory** (Laos-Italy) produces jewelry starting from unexploded mines, and bombs' waste collected in Laos.
CORE ART FIELD	VISUAL ART	**PAINTINGS**	Upcycling painting means be aware of the material uses: often paints required several chemical processes to be made and sometime may be toxic. Artists should prefer natural colors, or at least certified. Alternatively, paints may be replaced with other materials, thus relying on the patchwork or the decoupage techniques	**Ian Berry**: English artist who made painting using jeans scraps.

CORE ART FIELD	VISUAL ART	SCULPTURE	Several examples of sculptures made by waste materials are available around the globe. This artistic trend aims to spread awareness regarding linear society. Plastic is indeed the most frequent waste material used .in this regard	**Benjamin Von Wong** is a Canadian artist who made sculpture with discarded plastics, specially using old single-use bottles. **Yong Ho Ji** is a South-Korean artist who made animal sculpture starting from old tires. **Seo Yong Deok** is another South-Korean sculptor who uses instead old bicycle's chains. **Scart** (Italy) is a project that uses industrial wastes like furniture's components, garments or lamps to create unique .artworks or installations
CORE ART FIELD	VISUAL ART	PHOTOGRAPHY	Nowadays photography is almost dematerialized. Even if analogic machines are coming back in vogue, they remain niche products. Nonetheless, photos are still printed for various purposes (advertising, expositions etc.). Particular attention should be paid to the printing phase. Both inks and paper may be potentially toxic or polluting. Choosing to print photos in a sustainable fashion is a way to spread upcycling in .the photography sector	
CORE ART FIELD	PERFORMING ARTS	THEATHRE	Within the performing arts sector, upcycling often deals with costume design and sustainable set design. Those two dimensions may pertain to the design field, but in this arts context their potential may be enhanced. In fact, performing arts' purpose is to convey a message, and so they may effectively boost community awareness about circular economy or environmental crisis if they show consistency between their message and their process (so the materials involved in costume and .(stage	**Reet Aus** is an Estonian set and fashion designer. She created the certification UPMADE for upcycling textile, and then she extended it to the theatre sector. The certification imposes the mapping of waste flow within the theatre. It also guarantees that almost all materials required in the set are collected locally, and materials should be assembled in a way to easy future disassembly .and reuse in other sets
		DANCE		
		OPERA		
		CINEMA		

CORE ART FIELD	PERFORMING ARTS	FESTIVAL	The festival field requires a separate discussion. Several festivals nowadays recognize the value of sustainability and circularity. Since they represent a spot in which people usually stay for more days, they experience a huge flow of materials, which eventually becomes a waste flow. Planning (starting from the decision of the location) and management (e.g., check of materials allowed to enter, rubbish bins) are two of the main important elements to bring the idea of upcycling in .this context	**WeLoveGreen** (Paris), **DGTL** (Amsterdam), **Woodster** (Lyon), and **Flow Festival** (Helsinki) are the most famous festivals coupling entertainment with sustainability. The latter aspect is generally implemented by supporting public or sharing transport to arrive at the festival's spot, not allowing the entrance of single-use plastic, providing free fresh water, and collecting separate waste flows. Eventually, festival stages are designed in an upcycled fashion, they may be made from recycled items, or they may be directly disassembled and reused .somewhere else
CORE ART FIELD	HERITAGE	MUSEUM	Waste museums, or museums hosting exhibitions based on waste, are becoming popular around the globe. They usually show sculptures or pictures made from residual waste. From the architectural point, renovation of museum's structures inspired to circular economy may enhance .buildings' performance	**Waste Museum** (Nigeria): the museum hosts a permanent section focused on plastic wastes collected in the ocean. **Archeoplastica** (Italy): the virtual museum collects various waste materials from the beaches, then they are catalogued to show their age and their original use. **Waste Museum SOS** (Mexico): it hosts sculptures and painting made from urban waste materials. **Plastic Museum** (Spain): a temporary museum built completely by plastic and showing several plastic items of common use. The whole construction can be disassembled and completely reused or safely recycled into .new high-quality plastic

	HERITAGE	ARCHEOLOGICAL SITES	Archeological sites may benefit from a circular management aiming to upcycle the system. Upcycling in this context may pertains the adaptive reuse of ancient building, the choice of materials and paint to restore buildings, sculptures and paintings into the site, or, at the same time, to manage public access (through a check of allowed materials, differentiate bins, the provision .(of drinkable water	
	HERITAGE	LIBRARIES	Libraries, adopting the idea of *books as a service*, configure themselves as an upcycling system from the beginning. It should be noted that in recent times Tool Libraries are .popping up around the globe	**Berkley Tool Library** (USA), the oldest of North America, and the **Library of Things of London** (UK), just to name a .few
	HERITAGE	ARCHIVES	Virtualization of Archives is the main action to upcycle this field. Archives usually involve huge amounts of paper (and ink), and even if they are well catalogued, researching papers and documents may be time expensive. Virtualization helps to reduce the material footprint, and ease research and knowledge-sharing. The digitization of archives, indeed, even if done for conservative purposes, opens the ways for creative readaptation of old collections.	Museums, Fashion Brands, Architects, not to mention governments, around the globe are starting to digitalize .their archives

CULTURAL INDUSTRIES & ACTIVITIES	AUDIOVISUAL	FILM VIDEO RADIO TV MUSIC SOFTWARE-GAMES	Within Audio-visual Industries, upcycling pertains to the organization of the whole supply-chain. The industry should be able to track and guarantee for all the machineries and plants, and their materials component. The internal organization of a firm should be oriented to circular thinking. Especially within those industries, whose outputs are mainly dematerialized, the focus should be put on the organization of work, employees' transfers, differentiate collection on site, .sustainable energy etc	**Green Film** is an Italian voluntary certification for audio-visual firms. It guarantees the respect of environmental and social standards. In detail, it involves the sustainable management of transfer (of machineries and employees), a set energy efficiency, the provision of sustainable food and beverage, the utilizations of certified and recycled materials to design and build the scenes, and, finally, a correct management of the .waste flows
CULTURAL INDUSTRIES & ACTIVITIES	TRADITIONAL	BOOK PRESS	Books and Journals may be dematerialized or printed using natural inks (dissolvable in water without risk and able to be completely recycled into new ink) or made by recycled fibers of different materials (not just old papers or wood .(fibers	**Stone paper** is a paper-like plastic product that is designed to be waterproof, durable, foldable, able to be bound, and recyclable with HDPE plastic. **CRUSH** is a production line of Favini (Italy), a well-known paper industry. Within that project, the fibres for paper from discarded .orange peel **SiegWerk** and **Hubergroup** are two companies certified Cradle to Cradle, producing sustainable ink and eventually returning de-inking sludges safely to the biosphere

CREATIVE INDUSTRIES & ACTIVITIES	DESIGN	FASHION DESIGN	To reshape and refashion old fabric waste, or to create new synthetic fibers able to feed the biological metabolism once .they cannot be utilized again	**Marni**, **Maison Margiela**, **Vivienne Westwood**, **Stella McCartney**, **Recollection01** (Atelier&Repairs - LA), **Upcycled by Miu Miu** (Prada), **Re-Nylon** (Prada), **Behen Studio** (Portugal), **Wrad** (Portugal), **Nasco Unisco** (Portugal), **Florania** (Portugal), **Bydeath** (Denmark) are just few examples of fashion project based on upcycling, refashion and reshaping of old textile .items
		GRAPHIC DESIGN	Within the Graphic Design field, upcycling could deal with open-source software and the visual communication of the .meaning of upcycling	
		INTERIOR DESIGN	Upcycling of old furniture through reparation, paintings, and other techniques. It is possible also to reuse different items for domestic purposes (e.g., cars seat remake into .(sofa	**See Chair** (Studio Swine) refers to a collection of chairs made from plastics recovered in the most polluted beaches .of England
		PRODUCT DESIGN	Modular design, design for disassembly and recycling, .design for repurpose	Heineken's **Wobo** (World Bottle): squared beer bottle usable in building; **Clever Caps** (Brazil): the company produces bottle caps compatible with lego bricks; **Interface** and **Bureo**: both uses to recover fish nets to produce, respectively, .skateboard and carpets
	ARCHITECTURE	ARCHITECTURE	Reuse of abandoned buildings, aware selection of construction materials. Eco- .architecture	**Upcycle house** in Nyborg (studio Lendager - Denmark); **Print your city** (The new Raw studio - Netherlands): printing 3D bike racks, potholders or benches using recycled .plastics

CREATIVE INDUSTRIES & ACTIVITIES	ADVERTISING	ADVERTISING	Upcycling may be applied within the advertising sector on two occasions: 1) when deciding which kind of advertising support to use; 2) when a message focused on sustainability has to be conveyed. In the first case, the focus is on the material: it is possible to choose old advertising support and directly reuse it; alternatively, paper-like, or plastic-like materials can be chosen if they show high degree of .recyclability	

Table 4. Potential and Practical Upcycling application within CCIs

2.3 Decision-making and financing

Policymakers are increasingly viewing culture as a booster for modern urban development, as it may foster cities' attractiveness and competitiveness in the race of attracting inward investments, talents and tourists (Florida, 2002). There is a well – known link between culture and CCIs and urban development. Many organizations recognize and promote this connection with a view to sustainable development. Culture and CCIs cross many aspects of cities (economic, social, cultural), create social and cultural networks, and contribute to the local economy. CCIs are organized in a variety of ways: clusters, networks, hubs, and co-working spaces compose the so-called creative ecosystem that can thrive when cities provide a strong milieu. It is also well known that the majority of CCIs SMEs are generally based in urban centers, flexibly exploiting the advantages of location, such as partnerships and cooperation with other relative enterprises, low costs of transporting raw materials and products, the ability to meet skilled labor, low rents, etc. The productive and economic needs are indeed driven by these businesses in locations within the urban fabric, where a privileged grid is formed for their operation, defined by the favorable traffic conditions in particular raw materials, products and the presence of business and labor, which simultaneously constitute vectors of traditional knowledge. In addition, the resulting social and economic interdependencies enhance this favorable environment and create a distinctive urban landscape.

Examples of policies designed for the creative industries are commonplace across the world, and it is increasingly tempting for governments to simply pick a successful policy intervention from one place and transfer it to a new setting (Gasparin and Quinn, 2021). However, the policy process includes a few steps that need to be taken to produce effective, workable policies. The policy cycle includes numerous points at which the various stakeholders within an area of policy (communities, businesses, politicians) can interact and feed into the development of policy. Missing steps in the policy process weaken the understanding of the context that is vital in creating good policy (Cairney, 2015).

Governance should engage many different agents in an inclusive, participatory manner, and be supported by data. Within the context of creative cities, the European Commission has proposed a list of Creative Cities Indices to help policymakers in understanding their priorities. The Cultural and

Creative Cities Monitor involves 29 indicators relevant to 9 dimensions reflecting 3 major facets of the cultural, social, and economic vitality of cities:

- Cultural Vibrancy - it measures a city's cultural *pulse* in terms of cultural infrastructure and participation in culture. It measures sights and landmarks, museums and art galleries, cinemas, concert and music halls, theatres, tourist overnight stays, museum visitors, cinema attendance, and satisfaction with cultural facilities.
- Creative Economy – it captures the extent to which the cultural and creative sectors contribute to a city's economy in terms of employment, job creation and innovation. It includes jobs in arts, culture and entertainment, jobs in media and communication, jobs in other creative sectors, ICT patent applications, community design applications, jobs in new arts, culture and entertainment enterprises, jobs in new enterprises in other creative sectors.
- Enabling Environment - it identifies the tangible and intangible assets that help cities attract creative talent and stimulate cultural engagement. It quantifies graduates in arts and humanities, graduates in ICT, average appearances in university rankings, foreign graduates, foreign-born population, tolerance of foreigners, integration of foreigners, people trust, accessibility to passenger flights, accessibility by road, accessibility by rail, and quality of governance. (European Commission and Joint Research Center, 2017)

The Cultural and Creative Cities Monitor provides a holistic and actionable measurement framework that is intended to inform the development of culture and creativity-related policies (Montalto *et al.*, 2019).

As pointed out by the 2022 UNESCO report *Reshaping policies for Creativity*, policymaking within the creative sector has done some progress in the last years, such us:

- More integrated policies resulting from inter-ministerial collaboration and multistakeholder engagement mainstreamed in the governance of culture.
- The opening up of spaces for public-civil dialogue.
- The spread of domestic content regulation and support for local media outlets.
- Significant efforts to support digital adaptation in cultural and creative industries, spurred on by COVID-19.
- On the other hand, some challenges still must be addressed.
- Public investment in culture has been declining for ten years. As a result, there is a mismatch between education, training, and employment opportunities (i.e., cultural management is under-represented in higher education).
- Financial resources available to civil society are insufficient and opportunities to engage in policy processes, beyond dialogue and consultation mechanisms, are still scarce.
- Media monopolies and the continued under-representation and misrepresentation of some social groups threaten media diversity and freedom.
- Insufficient or inappropriate regulations and skills gaps in the digital environment, which increase inequalities.

Keys in answering those challenges may be fostering innovative funding and transversal collaborations at all levels, allocating targeted budgets, and sustaining transparent and participatory mechanisms (UNESCO, 2022).

Access to finance is indeed more challenging for small and medium-sized enterprises in the cultural and creative sectors than for conventional businesses. This is in part due to the intangible nature of their assets, the niche nature of some markets, and the lack of familiarity of the sector's specificities by the financiers (European Commission, 2022a).

Financing and funding in the markets of CCIs have traditionally relied on a combination of various public and private resources. Concurrently, existing participants and new entrants to the creative economy face renewed opportunities and new types of risks. For example, low interest rates have attracted investors to innovative companies backed by venture capital funds, incubators (including publicly funded ones), and the services of numerous crowdfunding providers (Block *et al.*, 2018). Novel technologies, including reward-based crowdfunding and peer-to-peer lending on platforms, and virtual currencies processed through the blockchain technology, can be expected to increase the efficiency of entrepreneurial finance by reducing transaction costs and information asymmetries, also in the CCIs.

In recent years, in many national legislatures the CCIs have simultaneously experienced an attenuation of direct government assistance and an increase in support for creativity-driven and innovative entrepreneurship. Both trends have been motivated by the belief that CCIs are a source of job creation and economic development. Today, there is a tripartite division between public, private, and hybrid or mixed funding, among which the boundaries are starting to blur. Shifts from direct public funding to the indirect support or support of entrepreneurship by governments, accompanied by the rise of new sources of private funding, are leading to a new funding landscape, also in CCIs (Loots *et al.*, 2022).

In terms of public funding, there is an observable shift from direct support, as in the form of lump sum subsidies, to indirect support. For example, in 2018 the European Council agreed to allow reduced VAT rates on e-publications. This important and indirect support in the form of reduced VAT rates has been a tremendous success in supporting European CCIs and the EU digital sector, and in increasing cultural consumption (Loots et al., 2022).

Another shift in terms of public funding has moved toward the promotion of self-employment and entrepreneurship. Founder loans, trade fairs, innovation and export promotion, and the provision of business advice are increasingly used by different levels of government. Incubation and start-up funding programs, initiated by national or regional economic development agencies, are aimed at supporting commercial entities operating in the CCIs. Government venture capital funds are projected to yield financial gains and societal benefits, in the form of regional development, job creation, and other positive externalities (Block *et al.*, 2018). Local authorities have started to collaborate with networks of impact driven financiers, private investors, banks, foundations, and venture capital firms, with the aim of effectively equipping local (social) entrepreneurship ecosystems. Examples of multi-party funding can be identified at all levels of government (Nogare and Bertacchini, 2015). In Europe, for example, the European Union and the European Investment Fund guarantee banks' loan portfolios to the CCIs (European Commission, 2022a).

In terms of private funding, low interest rates have steered investors toward innovative ventures in several sectors. Investments are facilitated by venture capital funds, incubators, and crowdfunding providers (Block *et al.*, 2018). In the CCIs, friends, family, and optimistic speculators play a key role in helping individuals make their creative dreams come true via the provision of equity finance. As a mode of altruistic giving by which single funders pool money for a project via internet-based platforms, crowdfunding is on the rise. Because of the absence of collateral, the uncertainty that comes with the novelty of many creative products, and the lack of data, micro-firms and small and medium enterprises in the creative sector find access to banks difficult and therefore frequently rely on *bootstrapping* (Blitterswijk, Haley and Febvre, 2019). Corporate venture capital is buoyant, under the conditions of financial returns and low-risk access to new markets (Blitterswijk, Haley and Febvre, 2019). However, the extent to which the CCIs benefit from private funding in its various forms needs further clarification.

The distinction between public and private support is attenuating, and several contemporary funding instruments combine aspects of a grant, a debt, and equity financing (Blitterswijk, Haley and Febvre, 2019). Examples of this include government venture capital funds operating by means of hybrid private–public funds, and social venture capital funds that provide seed-funding to social entrepreneurs with the dual aim of generating financial returns and social payoffs. Accelerators and incubators rely on mixed financing to offer start-ups financial resources, space, mentorship, access to networks, and other economies of scale. In turn, the revenues from such micro-clusters of innovation and knowledge are split between the funders and start-ups. The funding of innovative start-ups and the more traditional cultural organizations in the CCIs is becoming of an increasingly mixed composition (Loots *et al.*, 2022).

2.4 Legislative constraints and cultural barriers for CCI

As already pointed out, CCIs are facing many challenges to affirm themselves as key economic actors: even if they are already playing an important role in building the social and the economic fabric, often they are underestimated in mainstream economic outlooks.

Since CCIs deal with cultural assets, it is difficult to assess and recognize the real value of their output. This issue concerns both the economic and the social dimension. Even if culture and creativity are broadly recognized as crucial for development, their immaterial nature makes it difficult to quantify the real entity of their (re)production. Often CCIs are service-oriented, they do not produce material stuff; and when they do it, the value is not given by the material good per se, rather by the human input; thus, by the culture and creativity behind the product. Moreover, they act as knowledge brokers facilitating knowledge transfer by brokering not only ideas, but also dynamically bringing together different talents, skills, and disciplines. They also contribute to human resource development by organizing informal education. Briefly, their outcomes are largely nonmaterial. This immaterial condition makes it difficult to appreciate and effectively support CCIs, both for consumers and policy making.

On the one hand, consumers' willingness to pay for cultural products may be low. On the other hand, institutional indexes usually do not account for the indirect benefits that CCIs may bring, such as knowledge transfer, community-building, meaningful work. Thus, public support to CCI may encounter some resistance. One of the main concerns about the creative sector's growth may be the legislative framework.

Since CCIs frequently are community-based activity, often following a bottom-up development, they may encounter difficulties in finding a legal form. Especially as regards small non-profit organizations. Moreover, the rapid evolution of the actual economy makes it necessary to enter flexibility into legal frameworks. An important example may be intellectual property, which in the age of technological reproduction of works and objects is of great importance in the field of CCIs (i.e., copyright organizations should be involved in considering issues to be addressed in circular economy from the perspective of copyright law).

Another important example deals with those CCI adopting circular production processes: because their inputs are regulated as waste, they are subjected to stringent rules (i.e., end-of-waste legislation, use of secondary raw materials and by-products). Thus, even if there are many CCIs companies and initiatives that engage with circular products and services, they still operate in a business environment that is governed to a great extent by linear legislation, and that poses several challenges (Interreg Baltic Sea Region, 2021).

3. MANAGEMENT MODELS AND TOOLS FOR CIRCULAR UPCYCLING AT URBAN LEVEL

Awareness and knowledge of materials, a deep understanding of local context and supply chain, and community awareness with respect to upcycled products, are crucial points to be addressed to establish an overall upcycling management. The purpose of this chapter consists in proposing a model for circular upcycling management at urban level. The model is conceived for local authority, but it may be useful also for private organizations.

The model is organized in the following:

- Urban Metabolism analysis.
- Elaboration of local CCIs' need map.
- Planning of a short waste supply chain.
- Setting up administration tools to foster upcycling supply and demand.
- System evaluation and monitoring through management system or set of performance indicators.

The first step consists in investigating the *metabolism* of the area in which we are implementing the circular upcycling system. As reported in paragraph 1.4, **urban metabolism** refers to the energy and material flows occurring within a socio-ecological system. So far, investigating urban metabolism means to be able to quantify, or at least estimate, those flows and stock as well as their environmental impact. For this purpose, it is necessary to have a clear image of local demand and supply as well as their interconnection with the global market. Which goods are demanded by the local community? Which are produced within the local area? Which ones are just traded out to other regions? Which ones are produced outside and then imported? What are those goods made from? Which are the transformation processes and which infrastructures do they need? How and where are those goods then disposed of? How does the local waste management work? Which is the rate of recycling? Those are just some of the questions to be answered and evaluated to understand urban metabolism. Data may be gathered directly or through a local database.

Starting from the economic outlook of the local area, services and goods traded are accounted for in the form of energy and material embedded required for their extraction, transformation, and transfer processes. Investigating urban metabolism is crucial to point out critical materials and processes, to understand the environmental impact of human socio-economic activities, and to bring out potential synergies among sectors or processes. Key to upcycling management model is, indeed, the recognition of all potential by-products and secondary materials that may be reused in other transformation processes, reducing the demand of virgin raw materials. The EEA Urban Metabolism Framework proposes a set of indices enabling the analysis and the management of urban metabolism.

Once a clear image of which materials are moved within the socio-ecosystem is obtained, the next step consists in **mapping CCIs' input needs**. This means to understand which kind of materials they need and how those materials could be procured.

The main aim is to identify and design new ways to generate raw materials, not based on the extraction of virgin matter and that privilege the local dimension (the rate of input import by other regions should be minimized due to the environmental cost of transfer).

To detect new by-product or waste materials applications and to evaluate the local availability of the input needed by CCIs are the main purposes of this second step. Those activities may be based on the economic and physic outlook emerged by the urban metabolism analysis, but they also involved deeper research about local CCIs' needs. Data should be gathered directly from CCIs, through surveys, focus groups, workshops, and all the other instruments that facilitate the exchange of

knowledge. Those investigations do not just aim to identify CCIs' needs, but also their outputs: final good and waste. Which kind of raw material does the activity use? May it be substituted by another material (i.e., by-product, recycled matter etc.)? Which kind of waste does the activity produce? How much produced waste may be reused or recycled? How many wastes may be avoided by the adoption of circular solutions (i.e., eco-design, new technology, adoption of different raw materials, production of secondary material instead of waste etc.)? Those are some of the crucial questions to be assessed. Results of this investigation should be aggregated to realize a CCIs' map of input and outcome flows. Through its new potential exchanges between CCIs, or CCIs and other sectors, may be acknowledged and promoted, diminishing the total amount of waste, and making the local environment more circular.

To ensure that the resulting potential interconnections become effective, it is necessary to **plan and design a short waste supply chain**. Short, in the sense of local: a locally oriented collection system may be more efficient in meeting local businesses' needs, because, due to the proximity, getting access to information may be easier. Both sides of the waste local market must be considered: the system should be based on the secondary materials companies' requirements, and on the amount of waste produced at the local level. Secondary materials, by-products, recycled matter, and waste are not always locally available; their availability may differ based on seasonal trends, products' life cycle, different production processes, or environmental conditions. Thus, both spatial and temporal dimensions should be considered crucial while designing the short supply chain.

The design of the short supply chain should start from the results of the CCIs' needs map, and from that data developing a specific collection system, based on local demand and offer of those materials. The system may be parallel or integrated with the traditional collecting system, which also involves domestic waste. Industrial waste is usually homogeneous, and often it constitutes (at least potentially) by-product or secondary materials. The system may focus just on specific materials (those more required by the local CCIs) as regards the domestic waste collection. Examples of domestic waste urges by CCIs may be paper, plastic, textile, and furniture. If the former may be gathered through recycle bins or by door-to-door collection, furniture, and other bulky waste, like electronic items, need appropriate collection centers. A possibility may be to organize a neighborhood showroom, where citizens can bring their bulky waste and exchange it with privates or companies.

Local authority should play an important role in managing the overall cooperation and coordination among CCIs, traditional businesses, and final consumers.

As already reported, the needs map of CCIs must be carried out by the local authority also by grouping different actors to foster knowledge transfer and network creation. Cooperation among different economic actors acts as an innovation booster. Thus for, administration must sustain those networks also after the preliminary work (CCI's needs map), for example through a periodic organization of workshops or events. Providing specific training programs targeting the production-side actors, such as artisans, enterprises, and industries, is crucial. Those actors must widen their qualified knowledge, learning new efficient techniques of production and understanding the implication of their production, or rather the environmental and social impact of their products.

Local authorities must promote the adoption of upcycling practices among industries, and so the conversion of their production systems. So far, both supply and demand of upcycled products must be ensured. As regards companies, a set of tax reliefs or economic incentives may be set up. On the other side, consumer demand may be stimulated through sensibilization and educational programs, or rewarding virtuous behaviors (i.e., rate of domestic recycling) with economic incentives (i.e., shopping vouchers). Local administrations should also coordinate the overall system providing

tools to improve the transfer of knowledge and data, and references performance indicators. A useful tool may be an open databank for second materials, managed at the municipal level (both by the administration and by those working on the local reverse logistic[1]), showing available waste materials, their quantity, quality, and suggestions for their reuse. Examples of platforms of that type currently may be found at the macro and meso level, or rather, at the national scale or within clusters of industrial symbiosis and eco-parks. In Italy, for instance, a few years ago was created Borsino Rifiuti: an open platform, managed by Union Camere, aimed to ease the connection between the supply and demand of waste materials. Similar projects have been carried out in other countries or regions, to give few examples it is possible to mention the Upcycling Services of Malmo, the INUS platform in Germany, or the Nula platform in Singapore. The former aims to ease the collaboration between designers and end-users, fostering the transfer of knowledge (Borgvall & Gudmundsdottir, 2014). The second is a firm-oriented platform. It shows the material flow within the agricultural sector highlighting potential opportunities for the application of by-products and formerly waste materials by other industries (Hoffrichter et al. 2016). Finally, the Nula app offers some insight into available waste amounts and typologies, moreover, it provides some tools to upcycle those materials/products (Shan et al., 2021). The administration could also enhance the creation of industrial symbiosis or eco-parks, both directly, following a top-down management, and indirectly, through fiscal reliefs and bureaucratic simplifications.

Finally, once the management system is set up, it must be monitored, and eventually corrected and adapted to new emerging trends. For this purpose, it is necessary to establish either a set of performance indicators or an overall management system, able to show system achievements and failures. The EEA Urban metabolism framework may represent the starting point, but its indices do not specifically deal with upcycling management. Under the framework of the European Urban Agenda, an Issues and mapping paper on indicators for circular economy has been developed (Urban Agenda Partnership on Circular Economy, 2019). The project's result provides a set of indicators to facilitate circular urban management, which represents useful tool to enable upcycling at the urban level.

Self-sufficiency for raw materials	• Input of virgin materials per capita • Water is used for production processes and domestic water consumption. • Organizations that have implemented an environmental management system
Green public procurement	• Share of major procurement that includes environmental requirements. • Circular economy/waste prevention criteria developed in guidelines for procurement
Waste generation	• Annual amount of solid waste (domestic and commercial) • All waste for all industry sectors • Waste electrical and electronic equipment generation • Hazardous waste generation per capita
Overall recycling rates	• Recycling rate (% of the city's solid waste that is recycled)

1- Reverse Logistic encompasses all operations related to the upstream movement of products and materials, or rather the reverse supply chain of materials that moves goods from consumers back to the sellers and manufacturers.

Recycling rates for specific waste streams	• Breakdown of waste streams by different treatment options • Waste electrical and electronic equipment by waste management operation • Diversion of landfill of biodegradable waste • Availability of a strategy for waste management
Contribution of recycled materials to raw materials demand	• Contribution of recycled materials to raw materials demand -End-of-life recycling input rates • Circular material use rate in local industrial/economic processes • Activities performed by cities that encourage the implementation of eco-design measures. • Organizations that are implementing LCA schemes, EPR, Eco-label etc.
Patents	• Patents related to recycling and secondary raw materials
Private investments, jobs, and gross value added in circular economy business	• Direct jobs in Circular Economy • A few circular economy businesses offered business support. • Budget amount allocated to calls for projects on circular economy. • Number of pilot project in circular economy • Number of children and/or student trained in circular economy aspects or occupation

Table 5. Useful indicators to monitor Upcycling systems based on Urban Agenda Partnership on Circular Economy (2019)

The information provided by those indices must be aggregated with those dealing with the creative and cultural sector illustrated in paragraph 2.3.

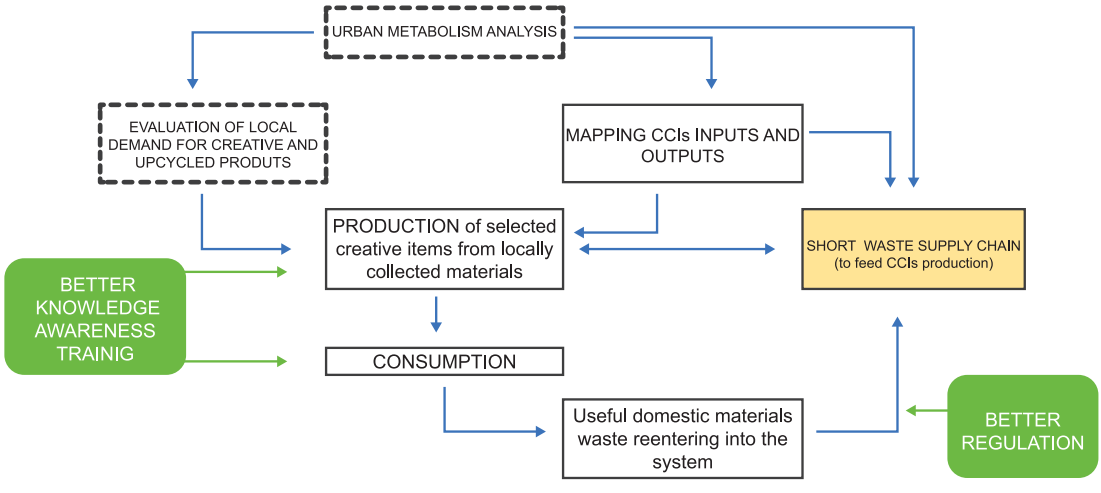
The creativity policy is inseparable from the aim of sustainable development of cities and regions. The demand for more sustainable products and services is a result of both the “creative turn” and “green turn”. Circular thinking among CCIs has already started to affirm, and, since upcycling requires creativity, it is likely to be adopted by those companies.

To enable CCIs in producing upcycled products, policymakers have to support, plan, and manage not just creativity per se, but also material input flows required. So far, the following points constitute the precondition for the effective implementation of an upcycling system.

Awareness and knowledge of the material	A deep understanding of the materials is needed to safely reuse them. Is necessary to know the product's materials, what is possible to do with those materials and so on. Legal constraints and products' standardization may hinder upcycling activities. If the legal dimension could be adapted to the upcycling framework, updating waste management laws (as we already have seen within the European Framework), the standardization could represent a real hurdle. Upcycling indeed involves the reuse of different materials to make unique products. And this is in contrast with the standardization concept. If, on the one hand, this could represent a way to differentiate products horizontally, permitting the application of higher mark-up and thus gaining more profit; in the other hands, upcycled products may do not respect international standards (i.e., ISO). This could lead to the impossibility of trading those products in the global market. So far, the harmonization of international standards, in line with .new upcycling practices, is needed
A deep understanding of the supply chain and local context	To meet demand and offer, while applying circular economy principles, a detailed context analysis is needed. In detail, local supply chain, local availability of secondary raw materials, local productions and cluster, local needs and demand must be mapped and further investigated. Through a deep context analysis is possible to orient the upcycling production to local needs, thus facilitating the matching between supply .and demand
Community awareness with respect to upcycled product	Often people tend to view upcycled and recycled products as low-quality goods. Even if this is not true, social prejudices may undermine the success and the feasibility of upcycling. To foster community awareness social networking and communication/information tools are needed. Local communities could be directly engaged within the upcycling framework, providing it a real understanding of what upcycling is and involves, how it works, and what are the main benefits. Local community thus should be involved on knowledge-exchanges, networking activities with productive .(.firms and other educational tools (i.e., events, workshops etc
System of incentives	Local authorities have an important role in fostering upcycling. They may implement a system of incentives to orient industries towards circular thinking. For example, VAT could be reduced for upcycled product, or a .system of tax relief could be set
Communication	As already noted, upcycled products are not standardized by nature. Their uniqueness may constitute a strength. Emphasizing this uniqueness .may help firms widen their market

Table 6. Precondition for an effective implementation of upcycling system

Below the discussed results are synthetized into a scheme. The proposed model has to be taken into account while planning, managing, and monitoring upcycling projects, programs or systems.



Analysis at different scales must be integrated. At the macro level, administration should plan a management and analysis system to investigate the urban materials and energy flows. At the micro level, single firms should internally readapt the system. While at the meso level, sectorial data are pooled together using the same standardized metrics. In the model, sectorial data both from consumer and production side are needed for CCIs area. Data from all levels feed the overall evaluation and monitoring system.

Behind the making of every product, there are physical inputs, but also stories of people and workers, of lucky and unlucky inventors, of successful and unsuccessful ideas. **(Nebbia, 2002)**

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APPENDIX:
PILOT PROJECTS

THE ATHENS CASE

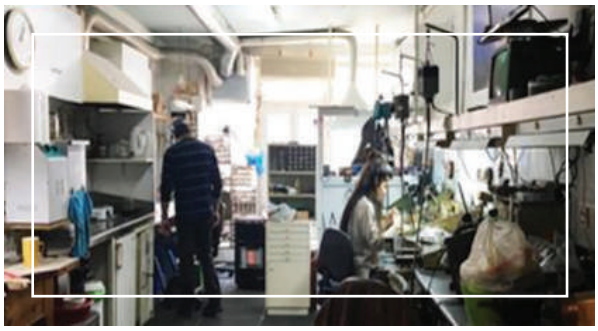
Summary

The city of Athens is an old, historic city with rich cultural heritage, which is the capital of Greece. The metropolitan area of Athens is the center of political decision-making and houses 40% of the total population and produces about 50% of the national GDP. It could be described as an open city as political and social movements often develop, as well as the social stratification is wide and includes minorities such as immigrants, refugees, LBGTQ communities and so on.

Monastiraki square and the Acropolis

There have been many changes in economic activities during the financial crisis, but the main one is that many trade companies have closed and given way to food and beverage serving services. Also, the development of tourist services (city break tourism) is intense, and it remains to be seen how these activities have been affected and to what extent by the recent pandemic. At the same time, Athens was and remains the gathering place of SMEs with a tradition in the creative arts professions (silver and goldsmithing, tannery, fashion design, clothing and footwear manufacturing, ceramics). The presence of creative professions remains obvious and dynamic despite the adversity created by the crisis. Especially in the historic center, the activities of jewelry, clothing and (more recently) design show remarkable dynamism.

Athens belongs to the network of Mediterranean Cities and has historically developed trade and economic relations with neighboring cities. As for CCIs, there is an exchange of dialogue on techniques and know-how, but there are still many steps to be taken to make the results more robust. The development of the dialogue on the integration of new technologies (e.g., 3D Printing), for models of cooperation and business at the Mediterranean level (co-working or making spaces), on materials and techniques that would enhance the transition to the cyclical production model is crucial



SMEs in the historical center of Athens

Local Strategy Design

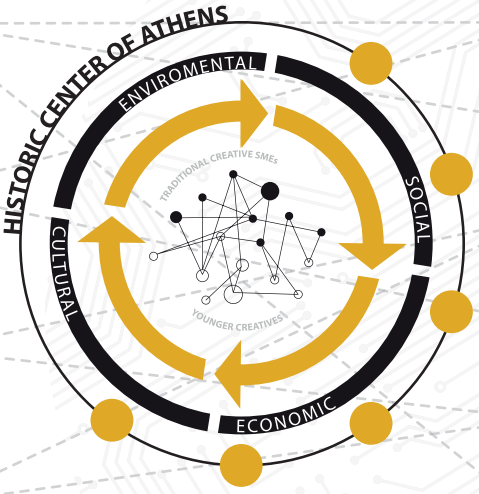
ATHENS CIRCLES of CREATIVITY

VISION

- **ENVIROMAENTAL** use/reuse of materials, reduce waste, raise awareness
- **SOCIAL** positive social impact, integration of marginalized groups
- **ECONOMIC** cooperation, sustainable value chains, urban revitalization
- **CULTURAL** critical, dynamic and original CCI sectors, eco-design/eco-prodution

GOALS

- **A** The maintenance,strengthening, support and networking of CCIs in the historic center of Athens.
- **B** The integration and / or upgrade of circular practices in CCI that can creatively produce suggestions and practices that will bring about positive immediate and indirect results
- **C** Drawing new and external knowledge from the research/ educational sector and experts on Circular Economy
- **D** Training in the use of new technologies and smart tools to accelerate innovation and boost their competitiveness



TARGETS

1. COLLABORATION & CLUSTERING OF SMEs (20 SMEs in ONE cluster)
2. SMART TOOLS (1 platform, 1 bicycle, 4 smart bins, 1 repository)
3. TRAINING (3training courses10-SMEs in each)
4. FINANCIAL SUPPORT & FUNDING OPPORTUNITIES (4 Innovation vouchers & 4Cross-border
5. CROSS-BORDER COLLABORATION (4 Innovative products)
6. AWARENESS (3 awareness campaigns / development of common branding)

Strategy Design Diagram for the city of Athens, Source: INNOMED-UP Project

"Motto" of ***Athens***	**Athens Circles of Creativity**
Vision statement of ***Athens***	• Emerge as critical, dynamic, and original so that on the one hand they integrate more and more cyclical practices in their production but also serve as a guide to good practices regarding the use / reuse of materials, eco-design of products and eco-production • Guide to good practices of cooperation, establishment of sustainable value chains, urban revitalization • Create a positive social impact through the integration of marginalized groups (homeless, refugee / immigrant women, garbage collectors, etc.)
General and specific **goals** of ***Athens***	• The maintenance, strengthening, support and networking of CCIs in the historic center of Athens • The integration and / or upgrade of circular practices in CCIs that can creatively produce suggestions and practices that will bring about positive immediate and indirect results. • Drawing new and external knowledge from the research/ educational sector and experts on Circular Economy • · Training on the use of new technologies and smart tools to accelerate innovation and boost their competitiveness.
Measurable **targets** of ***Athens***	• Collaboration of traditional creative SMEs with younger creatives (20 SMEs in total) • Participation of the above SMEs in a circularity cluster (1 cluster) • Design of a repository of secondary materials and other smart tools (1 platform, 1 bicycle, 10 smart bins) • Participation of SMEs in specially designed training courses (3 courses / 10 SMEs in each) • Promotion of cross border collaboration and knowledge transfer (2 Innovative products) • Financial support and funding opportunities (2 Innovation vouchers and 2 Cross-border mentorship vouchers) • Increasing awareness (3 awareness campaigns / development of common branding)

Community and Stakeholder Involvement

During the implementation of the project the Community and Stakeholder involvement were constantly of major concern. For this reason, several actions were taken to build a strong community and stakeholder network around the research team that eventually leaded to the signing of MoUs with major stakeholders, the active involvement of selected CCI SMEs in the pilot cluster and the dissemination of activities to the CCI community and the Athenian citizens.

The main activities that led to the Community and stakeholder engagement were:

- Establishment of the Stakeholder Advisory Group
- Organization of 5 SWOT/PEST Webinars with the interactive involvement of more than 70 Stakeholders

- Mapping of Cultural & Creative SMEs and compilation of databases of potential beneficiaries in Athens Municipality
- Survey in the Historical center of Athens, conducted with an online questionnaire sent to 40 CCI SMEs
- Socio-urban Circularity Workshop under the title '*Athens circles of creativity*', in the form of a walk in the historical center of Athens visiting selected workshops. Participants: 28
- Training Activities for SMEs in the form of a 20-hour blended face to face and online training program. Participants: 15 SMEs participated in the training seminars and the total number of participants (excluding project staff) exceeded 55.

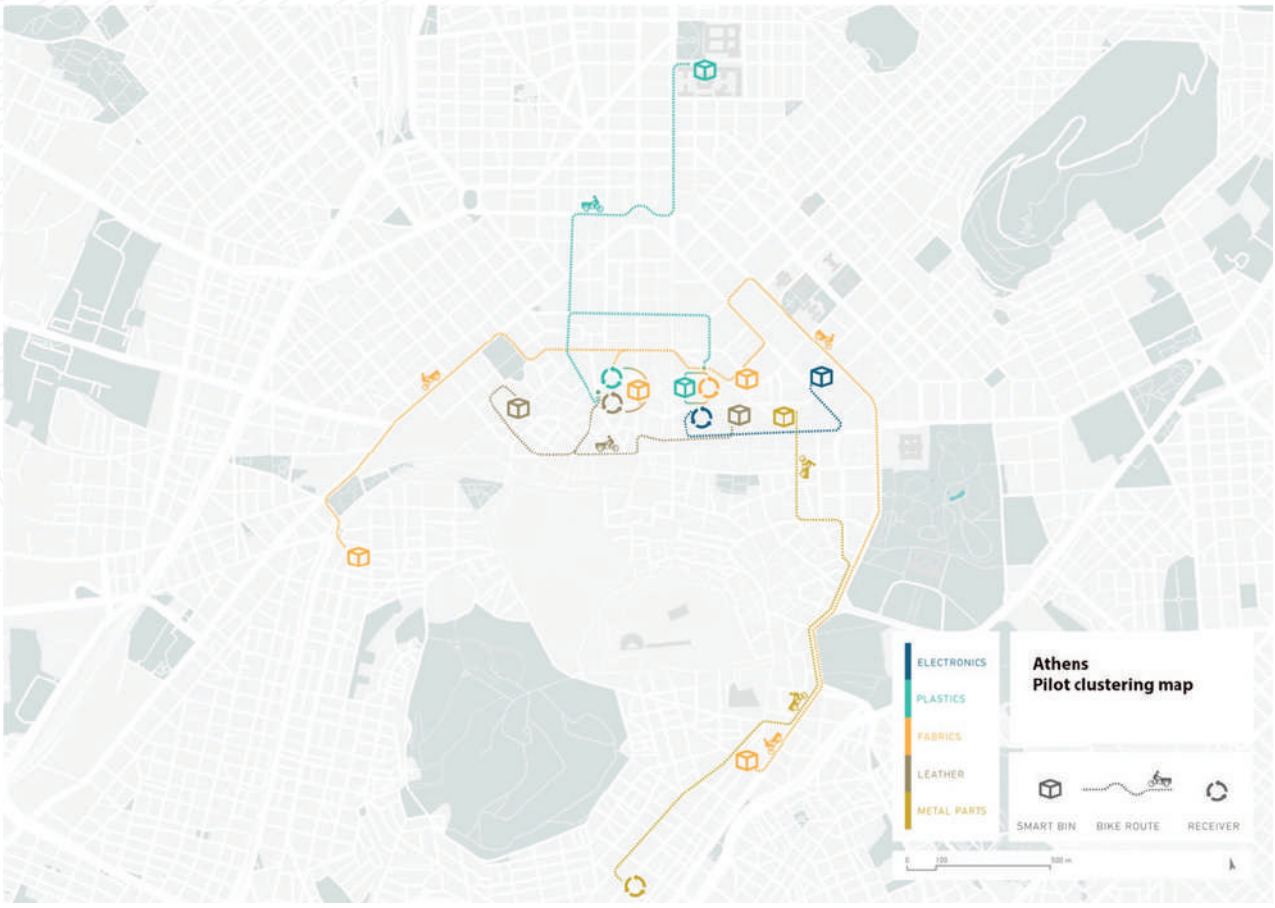
NTUA has signed five MoUs with important stakeholders, such as chambers, associations, and local authorities, that provided great support towards the establishment of the Pilot Cluster - Access to databases - Dissemination - Voucher award support.

1. Athens Chamber of Small & Medium Industries (Enterprise Europe Network Hellas), a chamber involved with the support and networking of Small & Medium Industries in Athens. (https://acsmi.gr)
2. Hellenic Confederation of Professionals, Craftsmen & Merchants - Small Enterprises' Institute (IME GSEVEE), a chamber involved with Research supportive to Professionals, Craftsmen & Merchants in panhellenic level. (https://imegsevee.gr)
3. Athens Trade Association, an association involved with Support and Networking of Trade Enterprises in Athens. (https://www.esathena.gr)
4. Silver and Goldsmiths' Association of Athens, an association involved with Support and Networking of Silver and Goldsmiths. (http://www.saath.gr)
5. Athens Development and Destination Agency, a local authority responsible for the Design and Implementation of programs relevant to Athens Urban Development and Destination Management (https://develop.thisisathens.org)

S. Antoniou, Director Athens Trade Association, during workshop "Athens Circles of Creativity"

D. Boucoyiannis, Dep.Secretary-General silver and goldsmiths' Association of Athens, during workshop "Athens Circles of Creativity"

Pilot Cluster



Athens Pilot Clustering Map

NTUA has chosen the historic center of Athens as Pilot Area of study. It is an area characterized by a deep-rooted existence of traditional creative activities such as leather, ceramics, carpentry, gold smothery etc., as well as clothing and footwear production and merchandise. Historically, these enterprises and their operating networks played a key role in shaping the urban space of Athens' center, becoming at the same time part of its cultural heritage. In recent years, the historical center has been more and more attractive to modern creative activities, including new fashion designers, jewelry, and object designers, as well as graphic designers, architects, and artists, but also touristic activities, including the emerging short stay rentals.

The CCI sectors that were chosen following the first year of research were: CRAFTS – DESIGN – MAKERSPACES. NTUA's working assumption is that the current situation, presents a unique opportunity to plan and apply an innovative model of circular clustering between the activities that reside in the Athenian city center: a. tourism related b. traditional crafts c. new CCIs, to cooperate in a circular cluster, enhance their resilience and promote circularity.

Ten spots were chosen for the placement of the Smart Bins to collect fabric (3 spots), plastic (2 spots), leather (2 spots), metal parts (1 spot), electronics (1 spot) and paper (1 spot). The SMEs that are interested in receiving these materials and giving them new life were mostly subgrantees, like Thela, 3Quarters, Thanou and LOCUL. Moreover, through the platform and the presentation of the available materials future collaborations with new SMEs can be promoted. The smart bicycle is hosted in the center of Athens in the 1st Municipal Community of Athens to be available for the cluster and the transportation of the secondary material to the interested SMEs.

The “smart” tools of the Pilot Cluster in Athens

Results

The project’s milestone is the establishment of the Pilot Cluster in the historical center of Athens. This is the testbed of all preparatory activities and the means to reach critical conclusions. The main goal of the Pilot Cluster in Athens has been to become a living lab installed in the historical center. This lab comprises of the projects Stakeholders (5), the Sub-Grantees (6) and the hosts of the Smart Bins (10).

In parallel, through the communication actions: the development of three campaigns, the establishment of the platform and the targeted actions taken in the social media, the awareness and involvement of the local community has been guaranteed.

The six subgrantees that were selected have worked in three directions according to the type of voucher they were awarded and have brought different results. More specifically, Thanou worked with fabric waste in order to create a new product of wellbeing. LOCUL experimented with metal remnants in order to produce everyday objects with a patina of the jewelry sector residues. In the category of Cross-border mentorship, Boukogianni took part in a mentorship program in Italy, to learn how to incorporate circular practices in the jewelry production. Kotecha, an SME that is already applying circular practices in her activity by making bags and other accessories with plastic bags.

Eating the Goober - Upgrading equipment	Akrivi Moudilou	Technical equipment to produce upcycled products inhouse.	Innovation Vouchers
Creation of a Center for Fabrics Upcycling	Garyfalia Pitsaki	Technical equipment (schreder) for the shredding of disposed fabrics from relevant CCI SMEs	Innovation Vouchers
Incorporating upcycling practices in the jewelry making process	Erato Boukogianni	Mentorship program to incorporate upcycling practices in the jewelry making process	Cross-border Mentorship

Developing Educational Curriculums on Circularity	Diti Kotecha	Mentorship program to develop an innovative educational program on Circularity	Cross-border Mentorship
re-Futon: Objects of body and ecologic wellbeing through upcycling	Ioanna & Polyxeni Thanou	Innovative product based on the shredding and upcycling of fabric remnants	Innovative Products
LOCUL: Pottery with metal finishes	LOCUL (Kizis Deligianni EE)	Object design using the remnants of silver and goldsmiths' workshops	Innovative Products

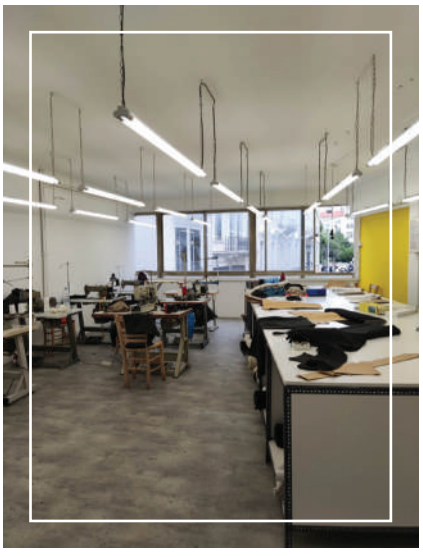
With its completion, INNOMED-UP, integrates the experience of all research and practical activity in the "Circular Strategy Model" for Mediterranean cities and aims in the long term at the following in the city of Athens:

- Revitalization of the historical center of Athens through the adoption of circular processes by creative SMEs.
- Utilization and promotion of local know-how.
- Creation of new cooperation networks and circular clusters.
- Production of new creative products from recycled and reused materials.

The project introduces a new approach by combining creativity with the circular economy. It proposes their combination of local societies and economies, attempting to offset the negative effects (environmental, tourism, deindustrialization, social inequalities) to ensure the vitality and sustainability of Mediterranean cities.

However, INNOMED UP remains a pilot application with all the limitations this implies (time, financial, geographical), while during it new research questions and hypotheses arise, for the answer of which a subsequent systematic interdisciplinary investigation is required.

Eating the Goober: new equipment



Collection point of fabrics

Thomas shoes: collection point of leather

OR Handmade: collection point of fabrics

LOCUL: metal remnants from jewelry workshops

LOCUL: pottery with metal finishes

THE PRATO CASE

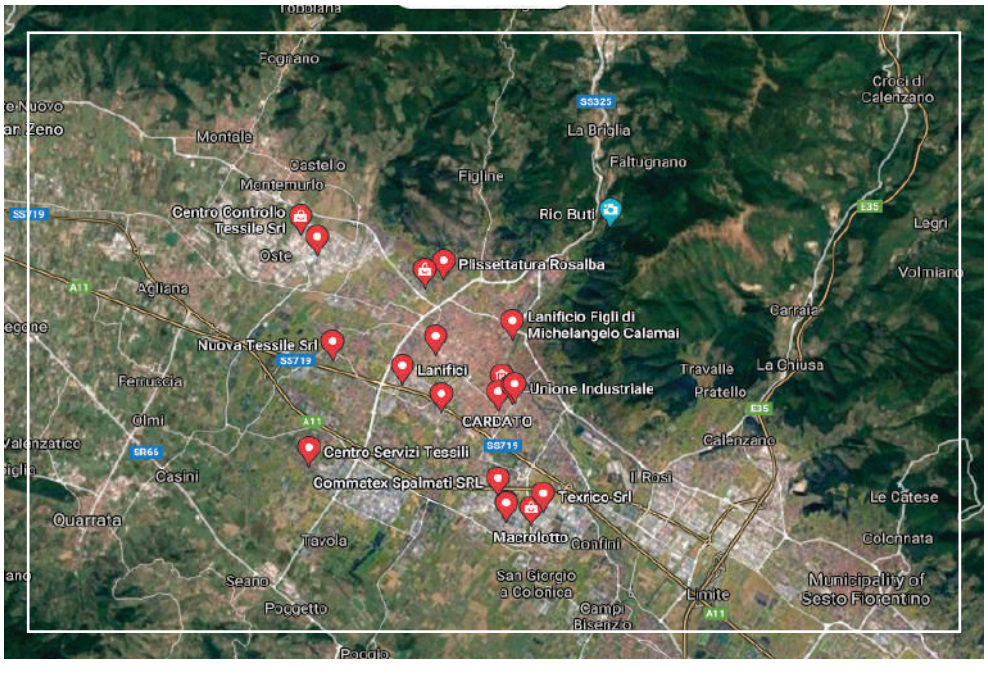
Summary

The Municipality of Prato is one of the largest Italian industrial districts and one of the most important Textile and Clothing (T&C) production areas in the world. According to the Prato Chamber of Commerce, the district counts 35,000 direct employees and 7,200 companies, producing 17% of Italian textile exports.

T&C has been the pivot for the city's growth, particularly after the 2nd World War. With the third wave of industrialization starting in the 1970s, Prato became Europe's most important T&C productive center, and the entire area came to be known as Prato's "industrial district". Prato's activities in T&C go back to the 12th century, when the manufacturing of clothes was regulated by the Wool Merchants' Guild, but it was just with the introduction of machinery in the 19th century (and the accompanying boost of capitalistic production) that a very strong geographic concentration of producers in the city occurred. Next to that, the industrial district got increasingly stronger as, between the 1950s and the 1970s, fashion and design turned into a mass phenomenon.

These were the years of "economic boom", when the city saw the simultaneous – spatially very concentrated – growth of residential and industrial buildings, next to each other. As an example of that, areas the "Macrolotto Zero" (Macrolotto = Industrial Area) developed within the city. At that time, the Macrolotto area, lying next to the city center, had textile mills frantically working and producing new items (mostly fabrics), and therefore wealth for the people, whose daily life was geared to the pace and modes of industrial production, and that alone.

In the period 2018-2021, the Municipality of Prato represented Italy in the European Partnership for the circular economy, coordinating the debate on the re-use of wastewater, the economic incentives for the circular economy, and the sustainable re-use of buildings and urban spaces. From 2022 Prato has been selected by the European Commission as one of the 100 European cities participating in the "Climate-neutral and smart cities by 2030" programme.



Geographical location of textile firms involved in the INNOMED-UP project by the city of Prato

The Macrolotto Zero area (red rectangle) in the larger context of the city

Local Strategy Design

Prato's objective to become a sustainable and thriving city is pursued through its local development strategy whose motto is "Prato, a sustainable, innovative and circular city".

The strategy envisions the creation of a city where residents enjoy a high quality of life, the economy is strong and diversified, the environment is healthy, and culture and creativity are thriving. The goals of the local strategy include:

1. A sustainable urban development: the city of Prato aims to reduce its carbon footprint by promoting sustainable urban development and green infrastructures.
2. Economic diversification: Prato seeks to diversify its economy by promoting innovation and entrepreneurship; this includes supporting startups and small businesses and fostering innovation and collaborations within the textile district.
3. Urban regeneration: Prato seeks to revitalize its urban areas through regeneration projects that improve the quality of life by improving public spaces, improving the quality of houses, and promoting the reuse of abandoned or under-used buildings.
4. Circular city planning: the city aims to incorporate circular principles into urban planning, which includes designing buildings and public spaces that are energy-efficient and accommodate green spaces.
5. Zero waste: the city aims to minimize waste and promote recycling and upcycling. The city upholds local businesses that use circular business models.

To achieve its goals and targets, Prato's local strategy uses a collaborative approach that involves stakeholders from various sectors, including the local government, businesses, community organizations and citizens. Overall, the local strategy aims to create a sustainable, innovative, and inclusive city that ensures a high quality of life for residents. Through its collaborative approach and evidence-based decision-making, the city is positive about achieving its vision and goals for the future.

Community and Stakeholder Involvement

The stakeholders involved in the pilot cluster include textile manufacturers, the local government, the chamber of commerce, trade unions, consumer associations, and academic institutions.

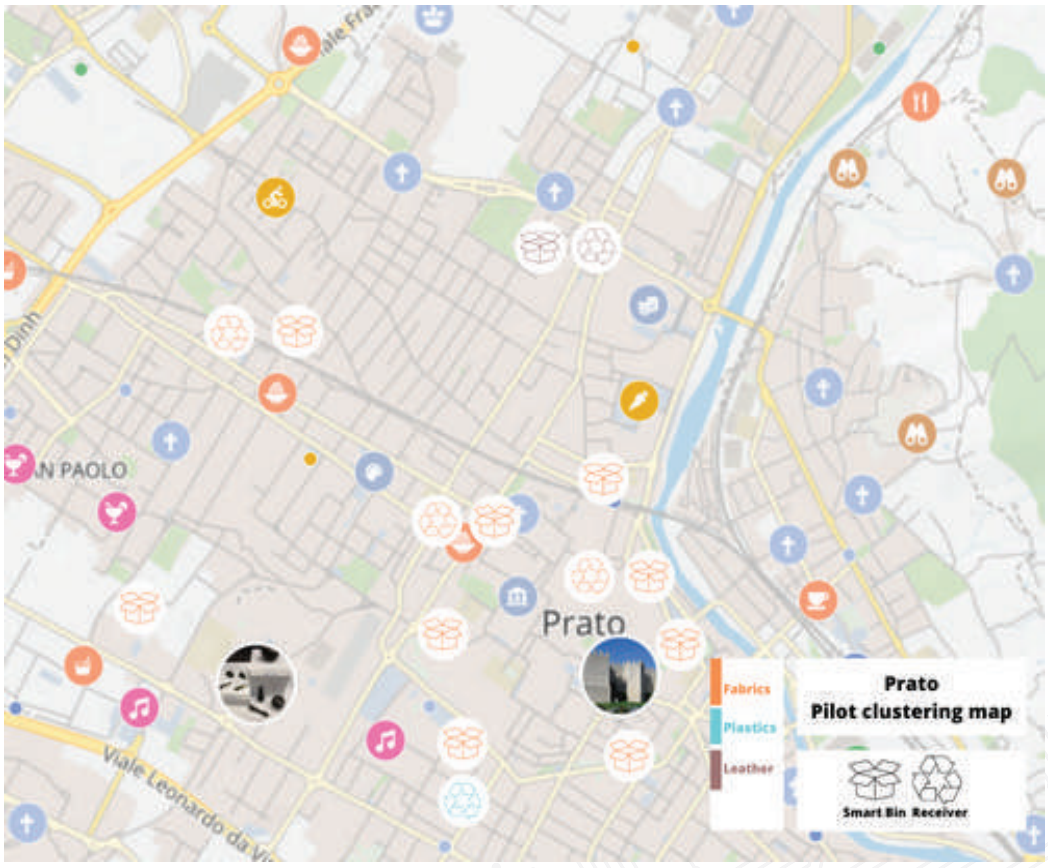
Textile manufacturers play a crucial role in the cluster as they drive the industry's growth and represent the main source of employment in the area. The local government and the chamber of commerce provide support to the textile industry through infrastructure development, financial aid, and marketing strategies. Trade unions and consumer associations represent workers and customers, respectively, and advocate their rights and interests. Academic institutions provide research, education, and training in the circular economy and in sustainability-related disciplines. A vibrant community of CCIs, NGOs and startups contribute to the diversification of the socio-economic activities and inject innovation and creativity into the cluster.

The cluster was designed to act as a meeting point for these diverse groups, allowing them to connect, share knowledge and collaborate on the pilots. Through this approach, the project aims to create a sustainable CCI ecosystem that could support the growth and development of the T&C sector in the long term, through an open and collaborative approach.

In practical terms, the community of stakeholders was involved through the organization of two workshops and the set-up of the reuse market, open to the participation of both stakeholders and community members. The in-depth knowledge of the textile district, paired with good technical and design competences, provided by the participants guaranteed high quality contents for both workshops, where the community of stakeholders was guided by experts through specific topics, thereby improving their understanding and sensitivity about sustainability issues.

Workshop – Creative clusters and circularity; Prato Textile Museum

Pilot Cluster



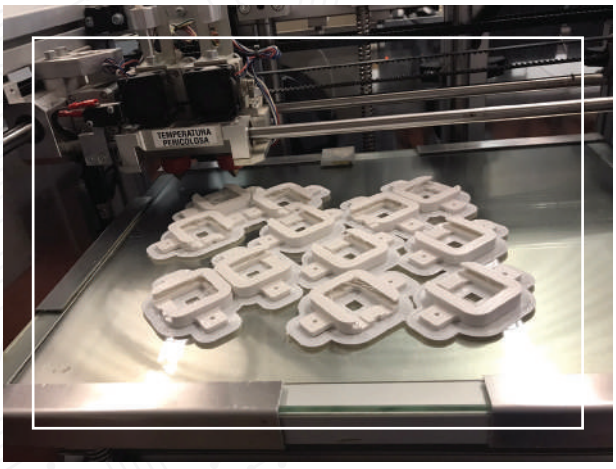
Pilot Cluster map of Prato

The pilot installed ten Smart Bins in the city, in very strategic positions. Five out of the ten smart bin stations also worked as collecting and processing points for the local host that, thanks to the presence of local laboratories and storage facilities, could collect, sort, and upcycle large quantities of material onsite.

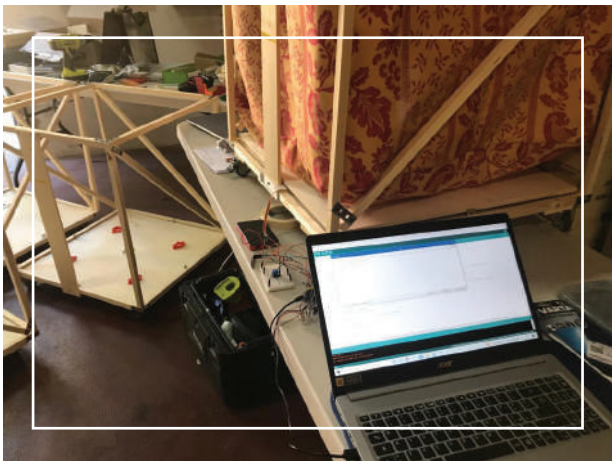
Given the textile tradition of Prato, the collected material was mostly fabric, clothes, or textile waste (scraps from textile production). Two of the smart bin stations also accepted leather, plastic, and rubber, thanks to availability of ad-hoc machinery to process the same.

The choice of positioning the smart bins in private, public, and non-profit associations helped to combine the social and commercial features of the pilot. By bringing together subjects of different types in the same cluster it was possible to create new symbiosis and collaborations, which resulted in innovative ideas that could be developed in the sector with the help of creative and cultural industries.

On the other hand, the long experience of the stakeholders receiving the material in the circular economy has ensured the correct re-use and/or disposal of the material collected through the smart's bins.



3D Printer; Smart Bins components.



Smart Bins testing

Building of the Smart Bins' structure.

Upcycled objects

Results

Eight €5,000 vouchers were awarded to the following winners:

- 3 vouchers for the implementation of cross-border tutoring and consultancy in the Cultural and Creative Industry sector.
- 2 vouchers for the acquisition of innovative equipment needed to kick-start circular production processes and business models.
- 3 vouchers for innovative products and services, experimenting with upcycling techniques to develop new circular marketable products.

The successful tenderers have worked in the Prato area to introduce new Circular practices in the traditional production, by leveraging creativity. The pilots had a duration of 5 months and ended with an open event where results were presented. Overall, the sub-grants were instrumental in triggering new synergies and collaborations among the different stakeholders.

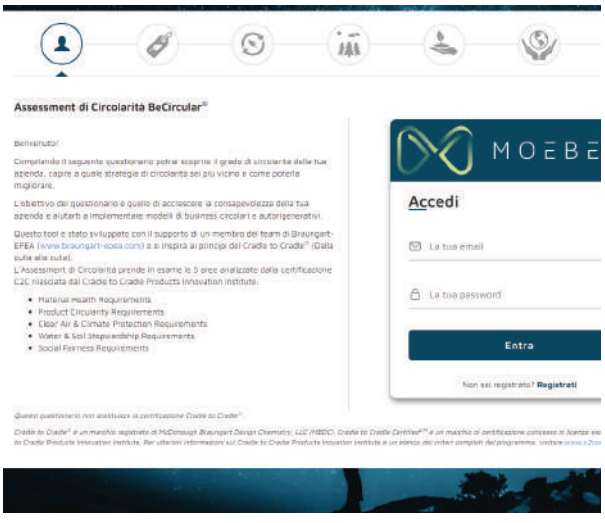
Name of the beneficiary	Type of voucher	Total amount awarded	Name of the project	Results
Moebeus srl	3 - Cross border Mentorship Scheme	5.000 €	*"New market positioning for Moebeus innovative services"*	Business plan and marketing plan on sustainability and circularity; supply chain; ethical branding
Mariplast spa	3 - Cross border Mentorship Scheme	5.000 €	*"Rethinking Spools"*	Benchmarking and industrial research on circular, creative and collaborative economy practices related to the plastic industry, design thinking for potential upcycling scenarios of the company
Ipercollettivo & Codesign Toscana	2 - Innovation voucher	5.000 €	*"Plasticraft"*	Successful pilot: samples of objects made with shredded plastic using new innovative machinery. Creation of a collection point and workspace.
Lottozero	2 - Innovation voucher	5.000 €	*"Circular Wool Lab"*	Successful pilot: samples of yarn were made with the use of waste material and new machinery. Creation of a Lab for artists and designers.
Moebeus srl	1 - Pilot Innovative Products	5.000 €	*"Innovative service with C2C approach for the adoption of circular business models"*	Successful pilot: development of a web app for SMEs and companies for the Cradle-to-Cradle assessment for circularity
Acceventiquattro Arte APS	1 - Pilot Innovative Products	5.000 €	*"Arte Industriale"*	Successful pilot: collaboration between artist and local companies to create an exhibition on waste fabric
Recuperiamoci! Onlus	2 - Innovation voucher	5.000 €	*"Poltrone Rifà"*	Successful pilot: samples of objects were made with the use of specialized machinery and a lab for recovery and upcycling of specific scrap material was established
Recuperiamoci! Onlus	3 - Cross border Mentorship Scheme	5.000 €	*"Vetrina Upcycling & Ecodesign"*	Communication activity through the exhibition along the city of upcycled lamp, realized with waste material

Lottozero – “Circular Wool Lab”; samples

“tra lairtsudnI” – SPA etrA ortauqitnevaccA

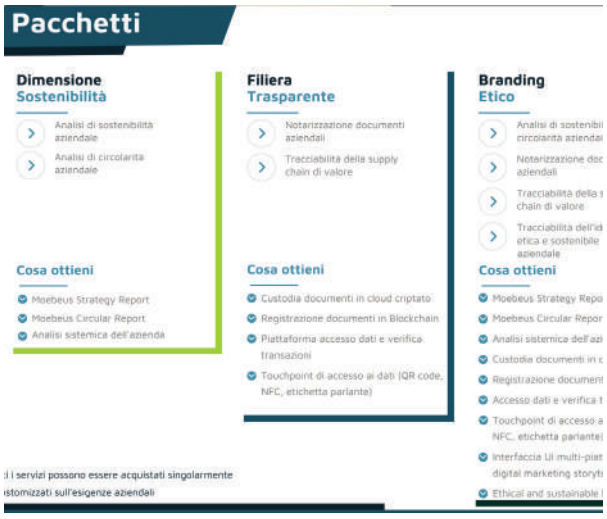
Mariplast spa – Rethinking Spools; recycled spools

Recuperiamoci! - “Poltrone RIfà”; chair made with inner tubes



“hcaorppa C2C htiw ecivres evitavonnI” – lrs suebeoM

IPERcollettivo – “Plasticraft”; samples



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Overall, the pilots' results were very positive. The project faced various challenges, including the lack of awareness, and understanding of circular economy concepts among the community, despite the in-depth textile knowledge of SMEs and stakeholders.

On the other hand, several important lessons were learnt, such as the importance of communication and cooperation between stakeholders, as well as the need for tailored training and support for CCIs.

The expected impact of the pilots is a shift towards more sustainable and circular practices in CCIs, leading to a reduction in waste generation and an increase in resource efficiency, which in turn will transform the traditional textile district of Prato into a more circular one.

Finally, the lack of proper regulations to qualify waste as reusable material by all actors, thereby avoiding the necessity to dispose of it as special waste, has been the focus of some sub-grants' activities, and one of the problems underlined by almost everyone in the cluster. This kind of acknowledgement is a positive step forward to trigger new debates amongst stakeholders and the public decision-making bodies.

The Palermo CASE

Summary

The creative craft sector represents a crucial segment in the CCI sector in Palermo and in Sicily.

Circular Economy constitutes an important opportunity for facing the challenging problem of waste management, promoting, at the same time, the local CCI SMEs networks. Public policies, nevertheless, currently do not (at national, regional, and local level) include any small-scale local-based solutions or clear paths for a circular transition.

Despite the lack of encouraging public policies, some creative craft SMEs clusters are experimenting with the renovation of traditional techniques based on the use of traditional sustainable materials.

In Palermo creative craft SMEs, often organized as non-profit entities in the start-up phase, have strong cooperation networks with other nonprofit NGOs.

In this context, the INNOMED-UP project in Palermo promoted the involvement of local creative craft CCI SMEs in a Circular Economy pilot cluster, thanks to the use of smart tools, for the development of innovative products and production chains implementing upcycling processes based on a mix of traditional and innovative techniques using mainly wood, fabric, and high-density cardboard.

The pilot cluster contributes to involving local communities and to launch a debate about innovative solutions for sustainable waste management and circular reuse of secondary raw materials.

Local Strategy Design

Motto:

The INNOMED-UP strategy promotes cooperation among profit and non-profit creative craft SMEs for the renovation of traditional techniques based on natural materials, mainly through the introduction of digital fabrication, in the framework of creative craft-ship and of the development of CE networks.

Vision statement of Palermo:

In a context where public policies do not actively support the circular transition, networks of CCI SMEs will promote Circular Economy focusing on cooperation and renovation of traditional techniques within their businesses.

General goal

Supporting the development of CE business models among local CCI SMEs.

Specific goals

- Supporting the renovation of traditional techniques from a CE perspective in the field of creative craft.
- Supporting the design of innovative products from a CE perspective.
- Targets
- Number of products developed in a CE perspective.
- Number of SMEs trained in circular, sustainable and green practices.

The analysis conducted in the framework of the INNOMED-UP project, identified the peculiarities of the pilot case area, in terms of business models, models of cooperation and urban fabric:

- A focus on the creative craft sector, within the CCI.
- A tight link between the creative craft sector and the non-profit one.
- A high interest in low-cost practices.
- A high interest in the reintroduction of some traditional renovation techniques, based on natural materials.
- A high interest in the introduction of digital fabrication techniques both to renovate the traditional ones and to reach economic sustainability.

The creative craft sector represents a crucial segment in the CCI sector in Palermo and in Sicily. It includes several SMEs, mostly located in the historic city-center of Palermo. The establishment of small craft shops and of other CCI activities significantly contributed to the revitalization of the area in the last decade.

The creative craft sector nowadays includes two main categories of SMEs:

- Family-run enterprises usually have solid manufacturing skills based on strong family tradition and experience. They often face troubles in surviving the contemporary market dynamics.
- New enterprises are often founded by highly educated young people with strong technical skills and attitude to innovation.

In both cases, and often from different perspectives, creative craft SMEs focus a lot on renovation of traditional techniques and reintroduction of eco-sustainable materials. The development of a network of creative artists/crafters trying to innovate local traditions is quite transversal to these categories.

The most peculiar element of the CCI SMEs business model in Palermo and in Sicily is probably the tight connection with the non-profit sector.

CCI SMEs, in fact, during the start-up phase, are often organized in the form of non-profit entities because of the very high management costs of a new-born enterprise. This circumstance fosters cooperation between the world of social work and the cultural & creative one. For this reason,

several CCI SMEs are involved in social inclusion and/or educational projects. At the same time, “traditional” NGOs are influenced by creative and innovative processes.

This peculiar creative context both facilitates the involvement of SMEs and makes it necessary for their real engagement. For this reason, CRESM has always adopted a widely participatory approach.

The renovation of traditional techniques, through digital fabrication tools, represents an interesting path in terms of market positioning, cultural heritage protection and reintroduction of traditional eco-sustainable materials.

Creative craft SMEs often have quite a high environmental awareness resulting in the choice of natural materials. Nevertheless, there is a very low awareness about the concepts of Circular Economy and about the life-cycle management of production systems. Upcycling examples are just isolated experiments.

Green and circular transition needs to be promoted also as a cheaper and easier alternative to standard waste disposal (actually very expensive and complicated, according to local regulations).

Creative craft SMEs often have no entrepreneurial education or experience and struggle in reaching economic sustainability, heavily relying on tourism flows. Networking skills are often lacking.

The INNOMED-UP cluster, through the INNOMED-UP InfoPoint, are experimenting with innovative models of cooperation, focusing on sharing equipment, knowledge, and skills, to develop sustainable business models and the use of secondary raw materials.

Community and Stakeholder Involvement

Please present in brief the Stakeholders and their role in the cluster and

any actions taken for community engagement. Use graphic material wherever possible (500 words)

INNOMED-UP developed a network for the promotion of the pilot cluster, the project activities and the cross-border cooperation including:

- Local CCI SMEs.
- Local NGOs are active in the field of circular and green economy.
- High education institutions, contributing to the innovation of the cluster.
- Local Chamber of Commerce.
- Local cooperatives networks (Conf cooperative).
- The municipality.

As previously mentioned, a widely participatory approach has been adopted to involve CCI SMEs in a network fostering the development of the cluster, as well as its long-term sustainability and scalability.

For this purpose, the Info-point for consultation of SMEs implemented in the framework of the INNOMED-UP project played an important role. Challenges and opportunities for SMEs have been identified and analyzed, to respond to their needs in the configuration of the cluster, in terms of business models, product design and production chains.

Attention has been paid to the complex topic of waste disposal and to the wider subject of compliance with national and local environmental regulations for creative craft SMEs. For this reason, local authorities and experts have been involved to start a dialogue with the aim of developing, even after the end of the project, standardized easier and cheaper procedures for small-scale production plants.

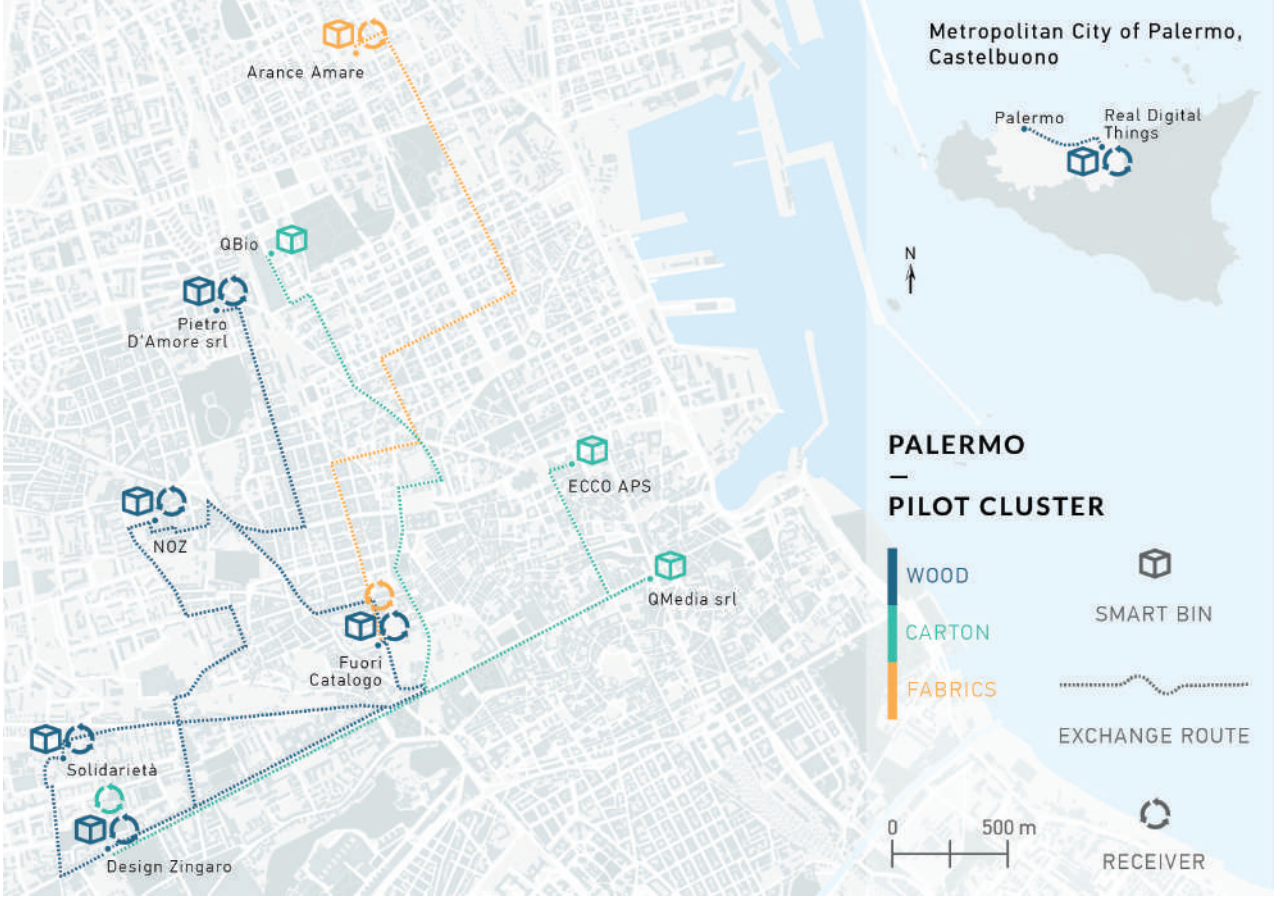
The needs analysis arisen from the exchanges with SMEs, experts and local authorities contributed to the identification of innovative services to be proposed to CCI SMEs such as support for the administrative procedures for the business establishment, strategic marketing, business development, support for the access to funding, support for the circular transition to collect leftovers as secondary raw materials, before they turn into waste.

The collaboration with the local cooperatives networks and Chamber of Commerce has been essential for the dissemination of the project results, for the involvement of CCI SMEs within and outside the cluster, as well as for developing exchanges with policymakers and local authorities.

The tight link between the profit and non-profit sectors in CCI on the one hand facilitated the dissemination and the involvement of local communities, on the other hand, fostered synergies in developing innovative business models.

Despite the limitations related to the Covid-19 emergency, the project activities involved the local communities. On the 15th of June 2021, for instance, the Socio-urban Circularity Workshop was the occasion both to engage volunteers in the construction of a temporary bio-architecture structure made of reeds (arundo donax), inspired by the typical buildings of Sub-Saharan Africa and Middle East (such as the floating houses of the Tigris-Euphrates Delta). That was the occasion for raising awareness not only about environmental sustainability, but also about the opportunities that come from the Circular Economy for creative craft SMEs, as well as for the local civil society.

Pilot Cluster



The Palermo pilot cluster is in the city-center. It also has a “satellite” division in Castelbuono, a small town within the Metropolitan City.

Nowadays, the expression “city-center” commonly identifies two areas in Palermo, both interesting in the framework of the project:

- The ancient city-center of Palermo (the *walled-city*).

The area is extremely rich in terms of cultural heritage, with highly gentrified neighborhoods next to traditional inhabitants (such as families working in traditional markets), as well as university students and many migrant families.

Here creative craft SMEs have been spreading in the last decade, mainly because they focus on tourists as a target, creating hybrid production and sale spaces.

- A wider historical area (developed between the 1860s and the 1920s), the art nouveau center.

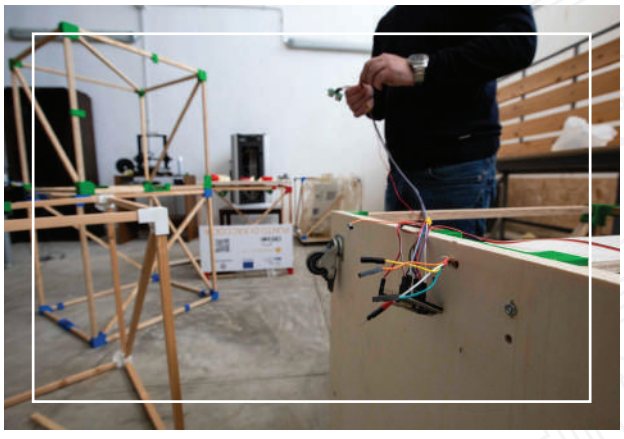
It includes a former early-1900s industrial area, nowadays dedicated to cultural activities (Cantieri Culturali alla Zisa). Here the Municipality of Palermo entrusted CRESM – PP3 with the management of a 1.200 sqm pavilion that today hosts NOZ – Nuove Officine Zisa, an innovative handicraft.

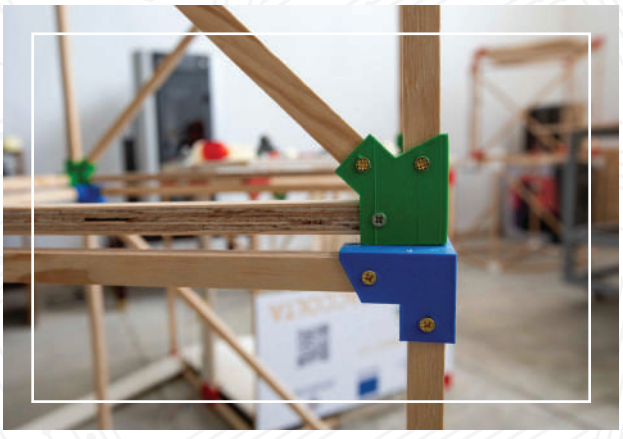
workshop for the development of innovative CE practices, as well as the Info-point for consultation of SMEs. Cantieri Culturali alla Zisa hosts several other CCI SMEs. In the surrounding area it is still possible to find some of the last traditional craft workshops.

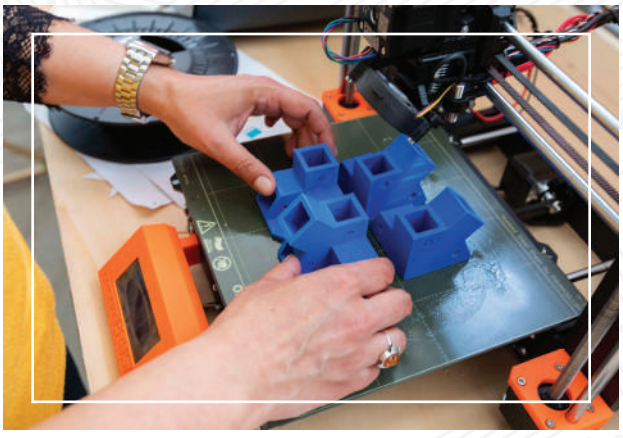
The INNOMED-UP cluster, through the Innomed-up InfoPoint, is experimenting with models of cooperation to develop sustainable business models and the use of secondary raw materials. It focuses on sharing equipment, knowledge, and skills, to support innovative product design and production chains.

SMEs exchange mainly wood, carton, and fabric. The choice of materials was made focusing on the availability and the potential for upcycling processes, thanks to the creativity of SMEs.

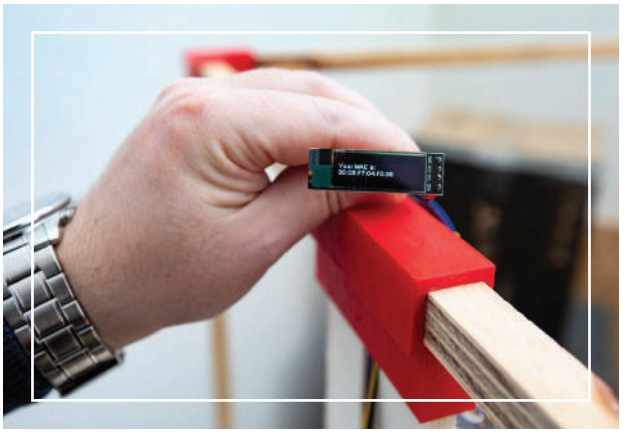
Results

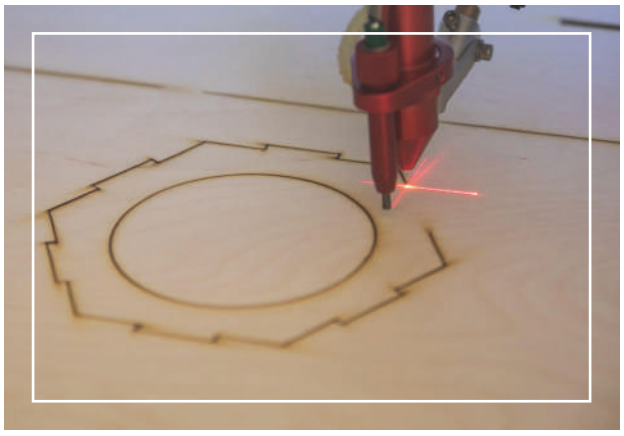


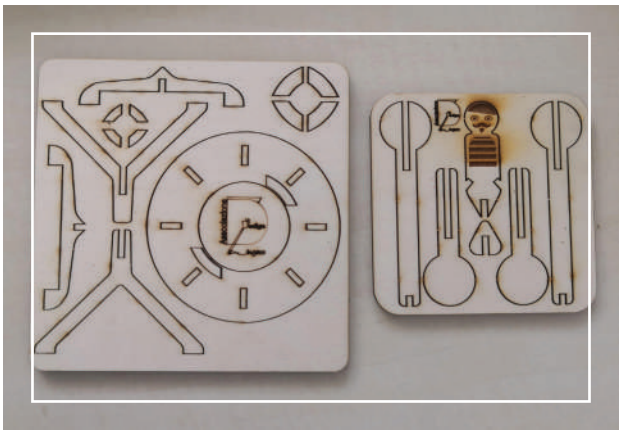





INNOMED-UP
CRESM
PUNTO DI RACCOLTA







Presentation of the cluster: subgrantees, other members, focus, materials.

The pilot cluster includes the six sub-grantees, as well as other CCI SMEs. All of them contribute to the achievement of the following results through their engagement in the re-use of materials and their creativity in developing innovative business models and products. The cluster, in fact, focuses mainly on sharing equipment, knowledge and skills.

The local CCI community has been involved in the development of the cluster, through the Info-point for consultation of SMEs.

The INNOMED-UP Info-point is in NOZ, a multifunctional space where other services dedicated to SMEs, in particular in the framework of eco-design, are available. NOZ is a project of CRESM for promoting the innovative transition of creative local SMEs. It aims at supporting creative SMEs on a double level. On the one hand it fosters their sustainable and circular transition drawing on their disposition to innovation. On the other hand, it supports SMEs in designing effective long-term sustainability strategies, crucial for emerging on the market in a difficult economic conjuncture. It operates on two different and synergic sides:

- The helpdesk offers consultation on:
  - Sustainable and circular transition of SMEs, supporting the development of new business models.
  - Economic long-term sustainability of SMEs, supporting the access to funding and the development of effective business plans.
- A dedicated area in the workshops of NOZ is available as a place to promote knowledge exchange, experimenting materials and upcycling processes, prototypes testing, product development, networking.

NOZ, thus, is a place to share knowledge and equipment and became the heart of the cluster.

Nine of the smart bins are hosted by ten SMEs participating in the cluster (including the six subgrantees and some NGOs). The tenth is in NOZ, where wood and carton waste are produced by the cluster members in the experimental product design phase.

Sub Grants: Ten MoU's have also been signed.

Name of the Beneficiary	Type of voucher	Total amount awarded	Name of the project	Results
Design Zingaro	Pilot innovative products.	5.000€	Giochi circolari.	It is mainly designing toys, toy kits and jewelry made of pressed carton and wood waste.
Pietro D'Amore srl	Pilot innovative products.	5.000€	Ruggine.	It is producing furniture accessories out of wood and building industry waste.
Fuori Catalogo di Ciaperoni Aurelio Innovation vouchers.		5.000€	La piccola industria dell'economia circolare.	It concluded its project aimed at completing its production cycle in order to focus the businesses on self-designed production.
Real Digital Things	Innovation vouchers.	5.000€	Real digital things (printed).	It concluded its project aimed at completing its production cycle to focus the businesses on self-designed production.
Arance Amare social cooperative	Access to cross-border mentorship schemes & new financial tools.	5.000€	Scarti d'autore.	It is developing an updated marketing and business plan for optimizing the promotion of its green brand.
QMedia srl	Access to cross-border mentorship schemes & new financial tools.	5.000€	CUNTO – Storytelling per l'economia circolare e la valorizzazione del patrimonio immateriale.	It received training for developing an innovative form of storytelling in the framework of sustainable economy.

Challenges, solutions, and lessons learnt.

The most important challenges are connected to the lack of national or local regulations concerning Circular Economy and upcycling.

National waste management legislation forbids not-certified transport of waste. According to the law, in fact, exchanging production leftovers could be equivalent to illegal waste trafficking (which is a criminal offence in Italy). After exchanges with local authorities and environmental lawyers, the implemented solution is that SMEs produce a delivery note receipt highlighting that the collected materials are not waste but Secondary Raw Materials (as defined in the EU strategy for Secondary Raw Materials and the Italian regulations).

Obviously, this problem does not favor the development of Circular Economy practices. It is necessary to engage experts and policymakers in a debate to propose new answers to create a legal framework for the exchange of materials for SMEs.

The second important challenge concerned the implementation of smart bikes. National transportation legislation, in fact, forbids the use of non-certified or modified vehicles. For this reason, CRESM was not allowed to produce or circulate smart bikes. Nevertheless, the cluster focuses on a strong collaboration.

SMEs members, thus, meet often in NOZ (where they also work and experiment for the development of innovative products and services) and deliver materials by their own means of transportation. NOZ, thus, has the role of “intersection point” for the exchange.

The app, nevertheless, is very useful for SMEs, to be informed about the available materials and their quantities.

Impact at urban level

The impact of the INNOMED-UP cluster is not only connected to raising awareness about Circular Economy and its advantages for CCI SMEs.

The innovative product design, in fact, also addresses cultural heritage protection. Digital fabrication is a means for crafters to reproduce traditional objects and decorations keeping a very high quality together with low production costs. At the same time, traditional techniques using traditional sustainable materials can be easily renovated.

The debate about the exchange of materials, moreover, will put pressure on the involvement of policymakers and local authorities in the development of new regulations more adapted to the circular transition.

The use of smart tools has been tested in the pilot clusters and will possibly be scaled up to new clusters to be constituted by other SMEs involved thanks to the Info-point.

Tunis Case

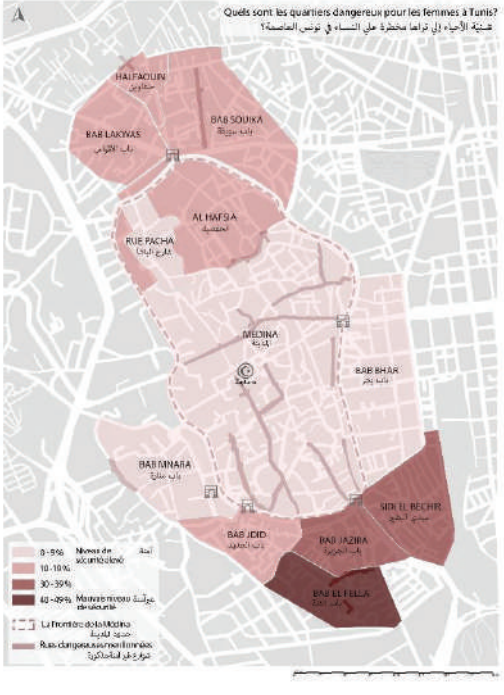
The Municipality of Tunis was founded on the 30th of August 1858. It is the first municipality created in the Arab world. Its historic heart is the Medina, has been listed since 1979 as a UNESCO World Heritage. Tunis is also a member of UNESCO's Creative Cities, member of AIMF, and member of Learning Cities network.

Thanks to safeguard projects, an economic, social, and touristic dynamic has been created in the city. But the projects realized could only be considered as successful pilot interventions because a major part of the Medina suffers from a general degradation: built heritage collapsed, infrastructures deteriorated, and networks of water, gas, communications, and wastewater very old and often over exploited. It is consequently necessary to consider innovative solutions and to ensure youth and civil society mobilization to succeed a real and fruitful transition.

Its population is estimated in 2014 to be about 700 000 inhabitants. Nevertheless, Tunis receives about three million visitors daily. This important number of daily visitors requires the strengthening of the municipal efforts and interventions to guarantee necessary services and to manage waste as well as general degradation of city's infrastructure. It is also a major challenge given the decline of resources. That's why circular economy is a real solution for the city.

Tunis has also acquired an international reputation thanks to the Revolution of 17 December 2010 – January 14, 2011. This pacific Revolution allowed the city to become part of the world's democratic capitals. The Revolution also enabled the city, and the country, to begin a process of deep changes, certainly long and difficult, but important and encouraging.

These changes have allowed for more open collaboration and participative planning and budgeting with civil society, which permitted to the Municipality of Tunis, to participate in strengthening small youth led associations, partner with start-ups and community collaborations on social, gender and environmental issues. Municipality of Tunis is also the first Tunisian city to produce a mapping of a city with gender lens through the FEMMEDINA project. This new governance is based on partnership, clustering and encouraging innovation.



FEMMEDINA mapping of the Medina of Tunis from women's prespective.

Summary

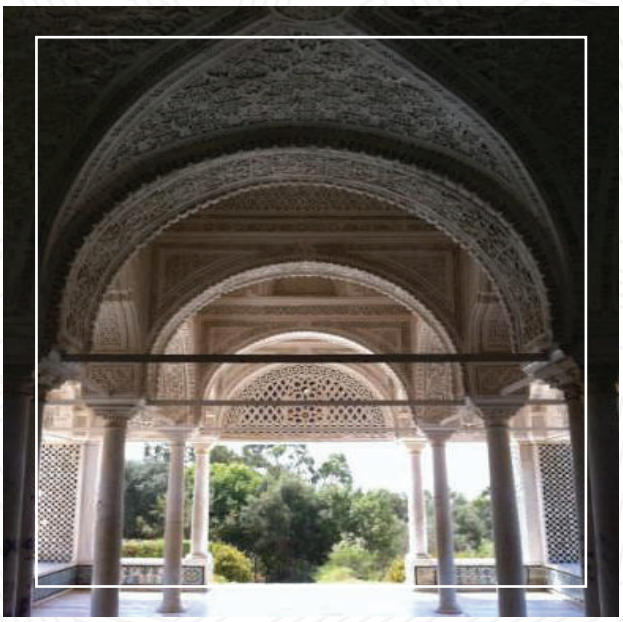
The 13 hundred years Medina was chosen by the Municipality of Tunis to be the geographic focus of INNOMED-Up project. Medina's souks have been the trade center for arts and crafts, ever since its foundation around the 8th century. Shared economy and cluster economy have always been an integral part of Medina's business model. Mediterranean migrations settled in the Medina at different eras, moving in the Medina with their craft skills, to convert it into a souk, with interdependent micro-business, each with a specific skill, at small workshops in Medina's hidden alleys; contributing to product production, until the final product is sold on the main souk shops.

The Medina of Tunis is also the hard core of the capital that exports to the different other cities on the national and regional levels, new initiatives, smart know-how, innovative ideas, and challenging projects. Its inhabitants are very proud of their city and engaged to prove its resilience and its capacity to offer modern services and adapt new technologies to its unique heritage.

Thanks to its new and innovative projects the city of Tunis received Agha khan price at four sessions.

The city renewed an old presbyter that becomes a canter for innovation in handcraft and art and a hub for innovation and startups. The aim is to encourage innovative initiatives and to encourage young SME's and young entrepreneurs in general.

The future development strategy of the Medina is based on its heritage, its culture and traditions and its handcraft. The aim is to tap into this precious wealth, to innovate and to create a new dynamic profitable to the city and its inhabitants.



Local Strategy Design

During the INNOMED-Up survey, the Municipality of Tunis was able to map and identify SMEs located in the Medina of Tunis, which are 59% artisan workshops, 15% restaurants, cafes, and guesthouses; 8% street stands and 8% homebased businesses. Those SMEs generated waste was analyzed, and due to the important artisan presence, we found an important amount of glue plastic cans and metallic pots, which are hazardous and expensive to clean for upcycling purposes. Nevertheless, SWOT and PEST analysis generated opportunities in circular economy, which could render the Medina more resilient.

Despite challenges in using smart tools, when dealing with artisan groups, with low technological use, and challenges in negative market perception of upcycled products, and financial viability of CE SME, the Municipality of Tunis, was able to identify youth with innovative CE ideas, who have tried modest attempts in collaborations with Medina artisans. Most of this young group participated in most INNOMED-Up workshops and training.

During the training, the main expressed challenges are economic viability of CE business model, market awareness, adapted mobile solutions and collaborations with public sector challenges.

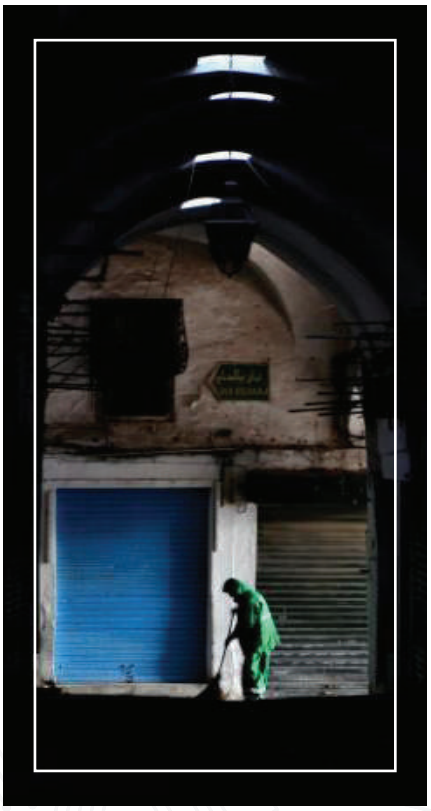
As awareness activities, public space workshops, with youth to design urban furniture, in collaboration with youth lead NGOs were organized, as well as a Future School workshop, with the community, to imagine a zero-waste medina.

INNOMED-Up mapping in Tunis, included a first-time mapping of all abandoned collapsed historical buildings in the Medina, and intensive research to identify which are public owned. Public owned spaces were subject, at a later stage, to repurposing ideas, for use as community spaces, that improve women public space participation, and safe space for youth and families.

The current implementation challenges faced are mainly adapting project's smart tools, to Medina's urban circumstances, for a more sustainable and usable solution. The direction of waste management commanded modification to the supplier who succeeded in delivering smart tools adapted to the medina characteristics and which are used now productively by the clusters. The sub grants permitted the Municipality to encourage beneficiaries who are young people with innovative ideas, but modest entrepreneurial experience. Thanks to clusters in the Medina, the beneficiaries have been able to implement creative and innovative projects. Also, INNOMED-Up enables the Municipality of Tunis, through these different opportunities, to be closer to the real needs of SME's and to make from youth a real force of change.

INNOMED-UP SWOT & PEST ANALYSIS SUMMERY

Community and Stakeholder Involvement



The Medina has initiated several activities related to waste valorization and advocacy; most important is the initiation of 'Ecole de la Proprete' a school that is dedicated to youth environment education and municipal staff, skills development, and environmental education. The Medina also hosted the first 'Zero Waste' exhibition last year, during which important awareness activities, workshops and dedicated newspapers were published to spread the 'Zero Waste City' objective. There are also 2 urban composting/farming pilot projects realized in the Medina, the first is related to school gardening at 2 Medina based schools and the 2nd tries to initiate inclusive urban farming practices within the Hafsia area.

To grow the impact and sustainability of INOMED-Up pilot cluster, the Municipality of Tunis signed 4 MoU's, 2 of which with educational institutions, the first private and the second public. The first with Esprit University, to collaborate on academic and technical assistance in cluster development as well as dissemination of smart tools and sub- grants Similarly with public University 9 April, to improve graduates job creation through awareness of opportunities in alternative economies especially circular the municipality improves research publication visibility and integration into field work, improve accessibility of students to market opportunities and job creation.

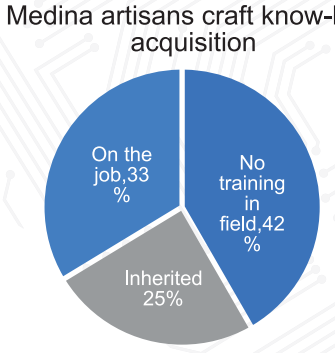
An MoU was also signed with AIMF (association International des Maires Francophone) to assist municipality in setting up process for better public space management mapping, legal & real estate investigation of municipal properties as well as improving internal municipality property management, which will improve CE ecosystem development and sustainability in Tunis.

Finally, an MOU was signed with the city of Namur (Belgium) to improve circular economy opportunity initiation through adapted space for SME's lead by youth assistance to launch a Co-Creative Hub for Medina's youth, to meet, investigate, exchange, and initiate their innovative microbusiness in circular economy.

Nevertheless, the municipality of Tunis is permanently in close collaboration with all active civil society representatives in the Medina of Tunis, which participated in all INNOMED-Up trainings, workshops, and awareness sessions.

Pilot Cluster

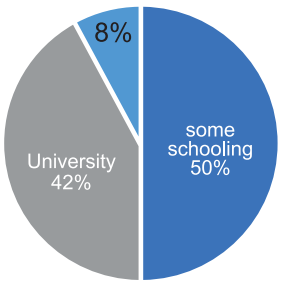
Following the INNOMED-Up survey, we have found that Medina SMEs are 83% led by men and 17% led by women. Even though women businesses seem low, this is considered progress, considering that traditionally Medina's souks and urban spaces, are traditionally male dominated, but depends tremendously on women labor, which is often homebased and informal. Souks such as Chachia Souk, or the red boiled men's headwear, nevertheless the important women's manual labor involved in the production



of Chachia, is never seen on trading groups. This trend is changing slowly, with women led businesses occupying some workshops in the Medina today and found thanks to INNOMED-Up.

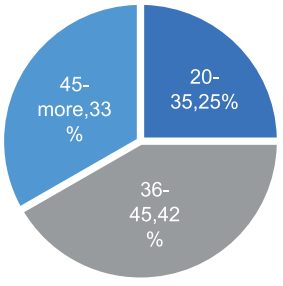
The age groups of artisans, business owners and traders in the Medina seem to show that the economic dynamic impacts all age groups, with 25% age 20 to 35 and 42% age 36-45 and 33% are over 45 years of age. As with education level, 50% have attended school and 42% have a university degree.

Medina artisans education level



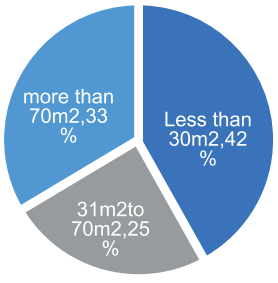
As with regards to existing business, within central medina, Municipality of Tunis survey found that 59% of existing businesses are artisan production workshops, 8% are restaurant, 8% are cafes, 8% are street stands, 8% are homebased businesses, and finally 9% are Dar's which includes all sort of traditional home repurposing projects, such as guesthouses, cultural centers or NGO working spaces.

Medina artisans age



Out of all surveyed Medina based businesses, only 25% have more than 5 employees, and 75% have 5 or less employees, which is probably the reality of Medina based businesses since it's foundation, which further supports the need for clustering to create shared economy, as a business model for better financial sustainability and growth.

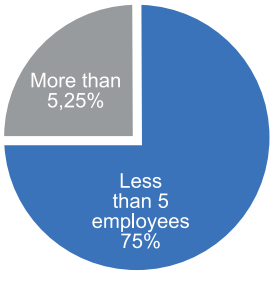
Workshop size



The interviewed artisans during the INNOMED-Up survey showed that 33% gained craft knowhow on the job, 25% had the craft knowledge passed down from generation to generation, and 42% had no training in the field of practice.

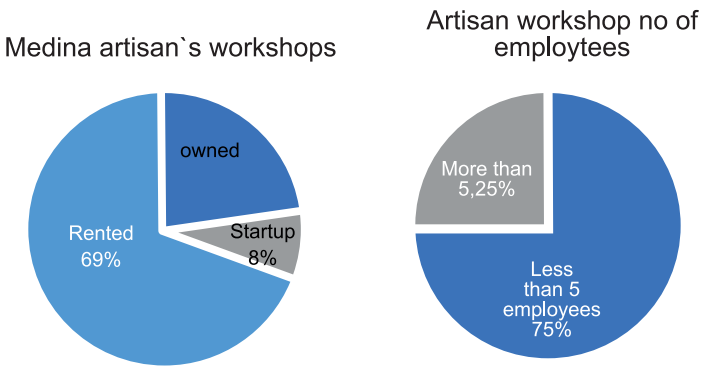
As with regards to location or working space ownerships, only 23% of interviewed business own their place of work, 8% are start-ups with no permanent address, and the majority or 69% rent their working space. As with actual space size, the majority of 42% have less than 30m2 and 25% have a working space of between 31m2 to 70m2 and only 33% work in a space that is more than 70m2.

Artisan workshop no of employtees



Even though the Medina's souks were organized in artisan cooperatives, that managed most of Souk's governance aspects, today the corporate system have unfortunately disappeared, due to many factors, leaving 83% of business owners in the Medina today with no affiliations. Lately an economic group, called M'dinti, uniting multi-sectorial businesses, has become more appealing to Medina's business owners, as an economic lobby to defend their

businesses, but also to sustain and grow the economic dynamics of the Medina.



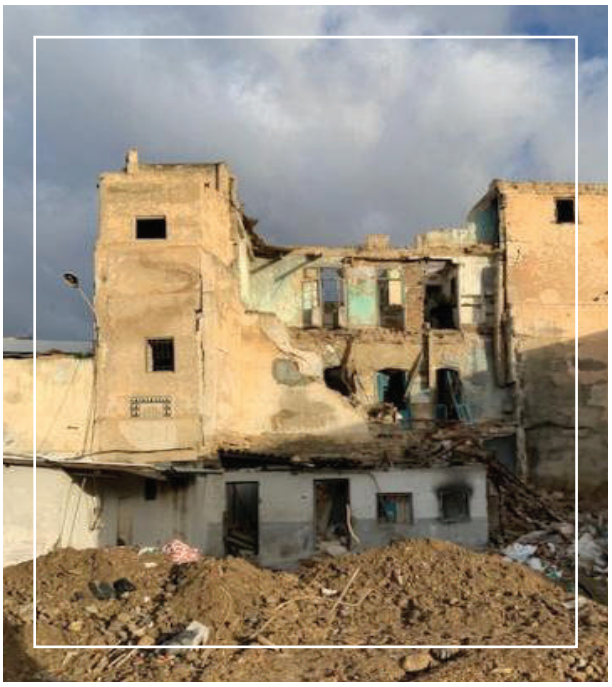
Circular Economy challenges in Tunis

The main challenges faced by young investors in the fields of circular economy could be summarized in 3 main points:

1. **Promoting** an **upcycled product** requires much more marketing effort than market promoting a normally produced product. The circular economy investor, no matter how small or big, is obliged to promote the whole concept of circular economy, to create local market demand, which is often time consuming and hence costly.
2. Often upcycled products require important volumes, to ensure **financial sustainability** of entrepreneurship ventures in circular economy. This often requires longer time commitment of the entrepreneur, to reach breakeven or even profit making. Due to this challenge, entrepreneurs in upcycling often convert their ventures into NGO, to adapt business model for a more financially resilient venture.
3. Finally **local legislation**, especially collaborations with local governments, require important administrative process, which demands time, effort and paperwork; and since local governments are the most important potential clientele for circular economy entrepreneurs, their ventures remain unscalable faced with very demanding processes to collaborate with localities.

Nevertheless, INNOMED-Up has helped, brought those challenges on a table uniting the municipality of Tunis with young start-ups, active in circular economy and pilot cluster scenarios, in the Medina of Tunis will include some of the solutions.

Cluster roadmap



For the development of roadmap strategy, considerations were made, to ensure that identified circular economy opportunity areas. Those considerations include using 'Ecole de la Proprete' as base for logistical assistance to SME cluster members, and review of alternative administrative processes, to improve links between municipality and start-ups and civil society, in a way that helps leverage potential environmental outcomes.

Cluster road mapping, focused on Medina's artisan workshop generated waste types and volumes, which were carefully analyzed, during the pilot cluster phase. Gathered volume and type of waste data, helped estimate financial outcomes of entrepreneurship ventures' that use them, and this helped have a much better view of the economic feasibility, and what volumes are needed for a more financially resilient business model.

Municipality of Tunis abandoned buildings, which were mapped at the onset of INNOMED-Up, are now being evaluated as potential contributors to project roadmap; either as spaces for urban gardening or composting, or through legislative adaptation to improve building repurposing and hence contribution to Medina's socio-economic dynamic.

Finally, the union of informal plastic collectors, has been invited to become part of the INNOMED-Up roadmap, to improve working conditions of collectors through better understanding and collaboration with the Municipality of Tunis, but also to include new opportunities in other material collection (such as paper) and research new supply chains, that empowers new vulnerable communities.

Today Borj Chakir, Tunis's public dump, welcomes over 750tons of waste per day, Borj Chakir has reached its full capacity, and its closure is planned early next year. In the meantime, the municipality of Tunis, and all municipalities in Tunisia, need to urgently rethink their waste management, which cannot continue to be, taking waste from point A to point B. There have been previous attempts in waste sorting, in other urban quarters of Tunis, but sorted waste ended up meeting again at the public dump, due to nonexistence of recycling, upcycling supply chains or circular economy clusters.

Nevertheless, INNOMED-Up is an excellent opportunity to pilot small scale circular economy operations, to find solutions that are

up-scalable, financially sustainable and match Medina's reality as well as community expectations. Also, Medina's creative cultural industry richness allow for various and diverse roadmaps. Some are complex and some have great potential to leverage.

One success factor, that the Municipality of Tunis, perceives as essential for the success and the implementation of the pilot cluster, especially considering Medina's dense residential area, is community involvement. Medina's community is an integral part of roadmap success, and hence INNOMED-Up awareness campaigns will need to go hand in hand with pilot cluster implementation.

With regards to SMEs selection criteria, Municipality of Tunis focused on 3 Medina opportunities:

1. Medina's artisan workshop waste, and the existing supply chains model,
2. Smart tools within the clustering process.
3. Sustainable business model, which includes product outcome, market needs, marketability, and business potential, as well as the potential financial results, including costs and expenses and estimated market size of first 3year operations. B

Business modelling also includes communications and market access plans. The final selection criteria was based on the entrepreneurial thinking of cluster leader, and this could be evaluated through their motivation and past experience of cluster leader or cluster team, sensitivity to the environmental and social cause and their willingness to work in cluster, share, learn and document pilot experience.

The use of smart tools was of great concern for the implementation of the cluster roadmap implementations, since survey outcomes proved that most Medina based business owners, do not have mobile phones, and access the internet only once or twice a day. The municipality of Tunis also faced important issues acquiring the smart tools, due to supplier availability but also the lengthy purchasing process made it difficult for suppliers to keep their prices, as the country faces inflation and local currency devaluation. Smart tools were a challenging aspect of pilot project implementation due to technical capabilities of the supply chain and also the administrative process, and rising costs of material.

Results

List of sub-grantees and a description of their projects

N°	Project Name	Sub-Grantee	Project description	% Grants
1	Green Alafco	Maher OUDIRA Tel: 24624310 intertraders@live.com 87, Route Chinoise, El Bassatine 3, Mnihla 2094	Recycling of waste aluminum cans and waste plastic bottles with the social and financial inclusion of informal waste collectors and by setting up smart waste collection bins that will be used by informal collectors and by the public.	30 70%
2	GénomiK laboratoires	Zouhour BEHI 28215251 behi33zouhour@gmail.com Rue jabeur ibn hayen ,bhar lazreg la marsa	Genomik Laboratories consists of the responsible recovery of organic biomass (discharges, organic waste) relating to fruit processing activities (Grapefruit, Sweet orange, Pomegranate, grapes, Apricot, etc.) towards new products with high added value oriented towards several cosmetically and agri-food uses (seeds, dried powder, exfoliating soaps, natural and ecological cosmetic treatments, etc.)	30 70%
3	Zobra Design	Seiffeddine trabelsi 24303235 trabelsi.seifeddine@outlook.com Rue el masoudi sidi fredj soukra	Manufacture of decorative sound insulation from the collection of wood waste, from artisan workshops in the Medina	30 70%
4	RECYCLAGE DE PLASTIQUE	Mohamed anis ben aissa +216 53 737 459 ben.aissa.med.anis@gmail.com 21,Rue Mustapha Rafii Ennasr 1-2037 Ariana Tunis-Tunisie	3D printing using recycled plastic water bottles	30 70%
5	Ahmed BOUFAHJA	Ahmed BOUFAHJA 55149754 ahmed.boufahja.cisco@gmail.com Ben arous , Boumhel, résidence Eklil 2 bloc 11 app 3-1	Collecting organic waste from restaurants and cafes in the Medina, upcycling to compost. Composting is a process of transforming organic waste in the presence of water and oxygen through microorganisms. It can be done in a heap or in a composter	30 40% 30
6	Bobin	Makram Mahjoubi 53209673 akrem.mahjubig1@gmail.com rue du docteur Cassar, 2020 Hafsia, Tunis (R529+WQH, Tunis)	Collection of household waste from the medina of Tunis, which are used to produce a series of marketable lamps with a new and innovative design	30 40% 30

7	Jewelery workshop	Bouthaina HOSNI 23532310 hosni.bouthayna.pro@gmail.com 29 bis rue el bacha .hafsia .tunis	recycling of used materials and wastes from artisan workshops into innovative and unique pieces of jewelries and accessories	30 40% 30
8	Voltigio	Haithem GHARBI 28690107 artisanscreatifs2020@gmail.com 32 rue taher sfar essaisidia bardo	Upcycling of used wood, leather, wool, fabric, imitation leather, into innovative products.	30 40% 30
9	“Lamba”	Marouen ZBIDI 25443446 marouan.zbidi@gmail.com 17 rue du divan 1006 Tunis	Creating lamps based on souk waste cardboard packaging and using unique designs and creative models	30 40% 30
10	Plastika	Hatem Draoui 94126070 Hatem_draoui@hotmail.fr 5 imp Barness rue Mferrej.bab souika.1006 TUNIS Repère placé https://maps.app.goo.gl/YLho7G2sajxK4M1q7	Upcycling of plastic bags are sorted and collected separately from other materials to be then crushed and melted down to make plastic products of lesser quality.	30 40% 30
11	The up game	Eya Mustapha 27589611 eyamustaphaa@gmail.com Rue maktaa,la medina,1006,tunis	Upcycling of plastic waste	30 40% 30
12	Vague verte	Bouzid Methni 50220443 Ziedmethni123@gmail.com	Collecting eggshells by transforming them into fertilizer, to be used as fertilizers	30 40% 30
13	Le tapissier de la medina	Mohamed Aziz Romdhani 28579449 azizromldhani119@gmail.com Rue Hakim Kassar numero 10, situe en bas de l’immeuble 1 Escalier c	Collection and upcycling of plastic second-hand bags in several forms such as seats, backrests, and so we save at the same time integrate this recycled material into what we call modern, original, contemporary carpentry	30 40% 30

14	Bagzz tronja	Youssef Mechichi 50675080 mechiciiyoussef@gmail.com 37 rue kaadin, beb souika	upcycling old plastic bags using unique techniques and original ideas and forms and make it reusable bags for every type of work in a fashionable way	30 70%
15	Recyclage pour une économie circulaire	Rachid ben Slama 98370005 presidentcuat@gmail.com Maison des associations culturelles /Medersa El achouria Sis 62, rue achour 1006 Tunis	Recycling of fabrics, leather, twine, coffee scraps, scraps of good carpentry, eggshells, fish scraps, planting trees, ornamental plants, distilling flowers, and integrating the cultural path into the local business cycle	30 70%

THE Nablus & Hebron CASE

Summary

INNOMED UP / PP5: Two cities from Palestine are nominated to be partner cities in the project.

Nablus City:

Nablus is a Palestinian city in the northern region of the West Bank, approximately 60 kilometers north of Jerusalem.

Located in a strategic position between Mount Ebal and Mount Gerizim, Nablus is considered the largest commercial and cultural center in Palestine.

Founded by the Roman Emperor Vespasian in 72 A.D as Flavia Neapolis, the city has been ruled by many empires over the course of its almost 2,000-year-long history. In 636 A.D, Neapolis, along with most of Palestine, came under the rule of the Islamic Arab Caliphate of Umar Ibn al-Khattab, where its name was changed to the Arabic name of Nablus.

In the heart of Nablus lies the old city consisting of eight major quarters: Yasmina, Qaryun, Aqaba, Qaysariyya, Habala, Faqous, Naser and Gharb. The old city is densely populated with 9000 inhabitants whereas Nablus district is populated with 389,328 inhabitants.

There are two churches, twelve mosques and a Samaritan synagogue in around the densely populated residential areas. The Old City is the home of several mosques and two Turkish baths (Al-Shifa and Al-Hana) as well as a few historic monuments.

Famous for its Kunafa, soap and busy markets, Nablus is also home to many of Palestine's industries and commerce. Among the main attractions that Nablus has to offer are Jacob's well and the town of Sebastia also has beautiful sites to visit.

Nablus' rich history lies in its Old City with its distinct stone facades, beautiful architecture, narrow streets, and old urban spaces.

Hebron City:

Hebron is a hauntingly beautiful, ancient city twisted and torn by decades of unrest and conflict. It is the largest city in the West Bank, and second largest in Palestine after Gaza. It is home to around 215,000 Palestinians. Its Old City of stone roofs, archways and never-ending alleyways is the perfect playground for the sensory delight of the markets and bazaars. It is also a modernizing city, home to Hebron University and the Palestine Polytechnic University. Hebron is a hub of trade, primarily with the sale of marble from nearby quarries.

The area is also renowned for grapes, figs, limestone, pottery workshops and glassblowing factories.

The city of Hebron (al-Khalil in Arabic) is one of the oldest inhabited cities in the world, and its history dates back more than 4,000 years BC. According to Islamic tradition, God chose Abraham as his friend, and Hebron houses the tomb of Abraham: Khalil al-Rahman.

Hebron is the fourth holiest city for Muslims after Mecca, Medina, and al-Quds. Al-Haram Al-

Ibrahimi, the Sanctuary of Abraham, or the Tomb of the Patriarchs, in the old city of Hebron is one of the ancient historical, religious, and heritage sites in Palestine. Throughout the centuries, the city of Hebron was a constant target for Persian and Roman invaders until the Islamic conquest during which the city prospered and Muslim emirs and caliphs showed unwavering concern for the city. The ancient architecture of the old city, which dates to the Mamluk and Ottoman periods, has witnessed the development and sophistication of the city of Hebron.

Main Characteristics of partner cities Hebron & Nablus:

Nablus City Main Features & characteristics

Jacob's Well

The 35m deep well stands in the land which Jacob bought from Hanor for a "hundred pieces of silver" (Genesis 33:19). It is also the location where Jesus asked a Samaritan woman for water. The well has become an object of pilgrimages since then. The first church built on this site dates to the end of the 4th century. The well inside the church forms the centerpiece of the crypt beneath the high altar. In the 12th century, the Crusaders constructed a new church on the Byzantine foundations. Today, the existing church which lies six meters below ground level is owned by the Orthodox.

Mount Gerizim - The Samaritans

Mount Gerizim rises over 500 meters above the ancient city of Flavia Neapolis (Nablus). The mountain is a special place of sanctity for the only remaining Samaritan community, custodians of the most ancient religious tradition in Palestine and indeed the entire Middle East. Just beyond the plateau, a pathway leads to Tel Er-Ras, where a Samaritan temple was built during the Hellenistic period.

Old Market

In the heart of Nablus lies the old city, composed of six major quarters: Yasmina, Gharb, Qaryun, Aqaba, Qaysariyya and Habala. The area of the Old City is densely populated. There are two Turkish Baths (hamaams), souqs, pottery and textile workshops. There are also numerous historic monuments such as the Khan al-Tujjar and the Manarah Clock Tower.

Nabulsi Soap

Nabulsi soap is a type of castile soap produced only in Nablus and made of three primary ingredients: olive oil, water, and a sodium compound. Since the 10th century, Nabulsi soap has enjoyed a reputation for being a fine product and has been exported across the Arab world and Europe.

Tell Balata

The village of Balata, a suburb of Nablus lies on the Tell Balata hill. The houses of the village occupy nearly one third of the Hill. Excavations have uncovered an extensive collection of archeological remains indicating that it was first settled during the 5th century BC. The hill itself includes an abundance of architectural elements such as the city walls and several entrance complexes.

Tile industry

Established in 1930, Aslan Tiles' factory is advertised as the last workshop in the West Bank in which handmade and colored tile is produced for those with a strong cultural appetite and ample cash to purchase a product once considered an affordable necessity in many Palestinian households.

Hebron City Main Features & characteristics

Tomb of the Patriarchs

The Ibrahim Mosque is one of the oldest historic buildings that exist in the world in terms of its seniority and its sacredness. Its walls have witnessed important events in the history of mankind for more than two thousand years. Studies indicate that it was built during the reign of Herod in the last decade of B.C.

Sultan's pond

It is in the center of the city of Hebron, to the southwest of the Ibrahimi Mosque. It was built by Sultan Saif al-Din Qalawun al-Alfi, who assumed the sultanate over Egypt and the Levant during the Mamluk days, with polished stones, and its depth is about 25 meters.

The old City

The Old City of Hebron is the historic city center of Hebron in the West Bank, Palestine. The Hebron of antiquity is thought by archaeologists to have originally started elsewhere at Tel Rumeida, which is approximately 200 meters west of today's Old City and thought to have originally been a Canaanite city.

Erama mamre

The Well of the Temple Mount, a Palestinian archaeological landmark, located in the city of Hebron. In the past, the town of Turpentis was based on this spot, and it is located near the entrance to the northeastern city of Hebron. The area was known during the reign of the Roman Emperor Hadrian (117-138 AD) as an important trade center.

Local Strategy Design

<table>
<tr><td>Motto of Hebron and Nablus</td><td colspan="2">Sustaining History for Sustainable Future</td></tr>
<tr><td>Vision statement of Hebron and Nablus</td><td colspan="2">Creative and cultural industries are reusing existing resources and bringing cultural industries to our daily life’s needs</td></tr>
<tr><td>General and specific goals of Hebron and Nablus</td><td colspan="2">General: Revitalizing creative and cultural industries through innovation and circular economy models and cross-border cooperation, more specifically:
• Developing clear, smooth, and sustainable supply chains of wasted materials from the existing sources
• Clustering Capacity Enhancement of SMEs in Innovation, Research, Recycling, Marketing, Design, Production and Pricing
• Encouraging key stakeholders to prepare the ground for a sustainable eco-system for the purpose of promoting and overcoming obstacles standing in front of this sector.
• Promoting the sector by awareness campaigns
• Cross-border cooperation schemes in innovation, external knowledge inclusion and clustering with EUMC cities.</td></tr>
<tr><td rowspan="4">Measurable targets of Hebron and Nablus</td><td>Goal</td><td>Measurable targets</td></tr>
<tr><td>Developing clear, smooth, and sustainable supply chains of wasted materials from the existing sources</td><td>At least 2 supply chains of waste types have been set and operated in each city</td></tr>
<tr><td>Clustering Capacity Enhancement of SMEs in Innovation, Research, Recycling, Marketing, Design, Production and Pricing</td><td>At least 15 CCI SMEs in each city have been trained and proposed new products</td></tr>
<tr><td>Encouraging key stakeholders to prepare the ground for a sustainable eco-system for the purpose of promoting, and overcoming obstacles standing in front of this sector</td><td>At least one MOU signed with one key stakeholder in each city</td></tr>
<tr><td></td><td>To promote the sector by awareness campaigns</td><td>two awareness campaign have been launched in each city with cooperation with one key stakeholder in each city</td></tr>
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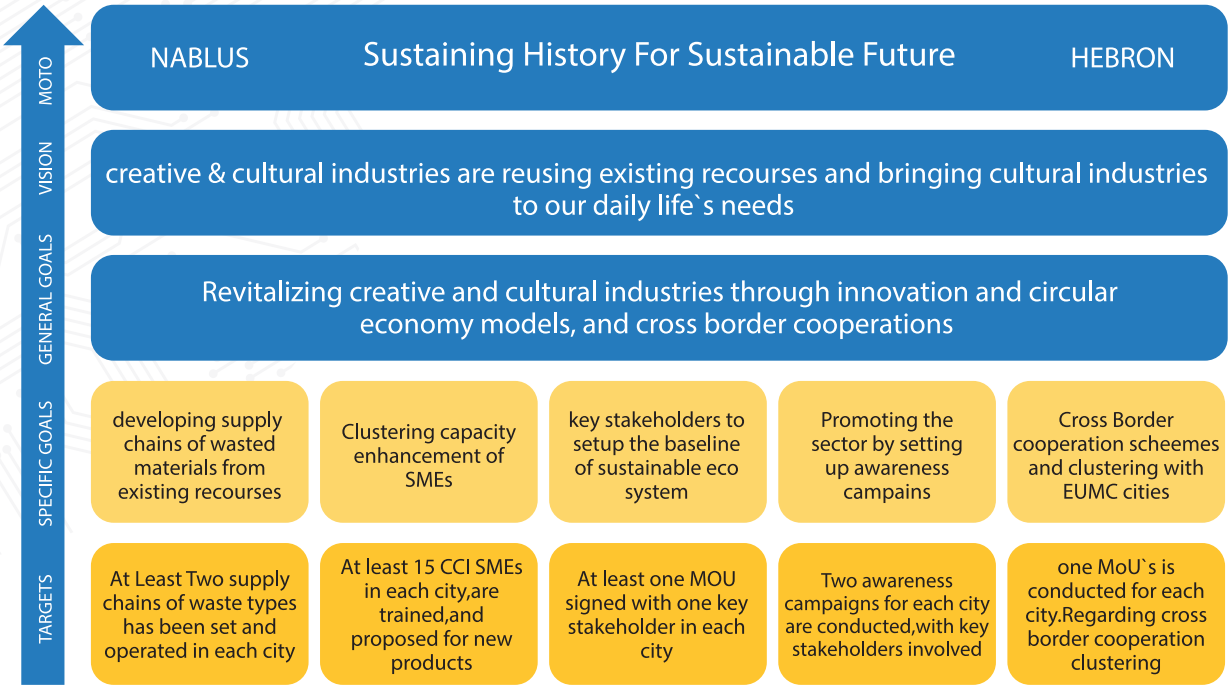
Strategy diagram:



Community and Stakeholder Involvement

Key stakeholders have been identified, and two MoU's have been finalized, for the partner cities (Hebron & Nablus), through the SWOT-PEST Analysis. These stakeholders have also proposed a cooperation model for the mission of INNOMED-UP:

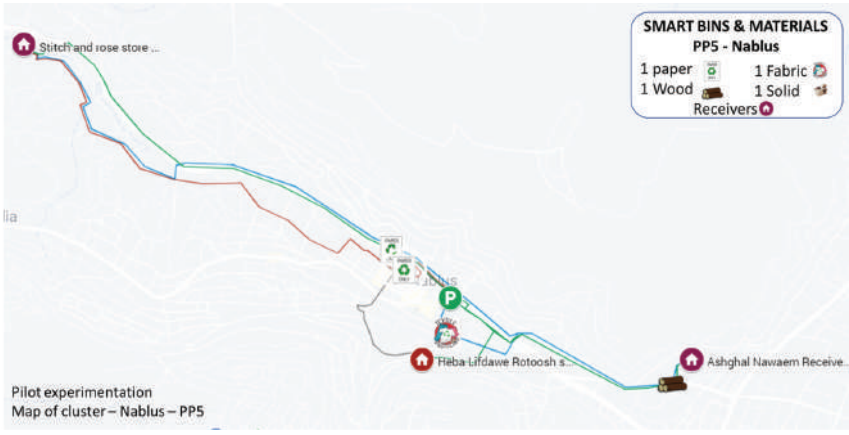
- Chambers of Commerce, Governorates and Ministry of Tourism and Antiquities: they proposed to establish a special incubator for SMEs and creating an umbrella for CE players. They can provide venues, data, and community awareness campaigns in addition to e-marketing of SMEs CE products through their websites and developing an initiative to purchase all Governorate official gifts from recycled cultural products.

In addition, Ministry of Tourism proposes to create tourists' information brochures and distributing them in every Palestinian city.

- Environmental Quality Authority: to cooperate with SMEs to participate in the corner of the environmental exhibition held by them.
- Ministry of Social Development through its network of relationships and database.
- Association of Engineers: can support the research centers in universities in recycling R&D initiatives.
- Universities in Birzeit, Hebron, and Nablus can enhance the role of higher studies and environmental awareness to adopt and support projects within the circular economy; in addition to participate in delivering training programs and even establish an academy for CCIs and supporting CCI sector in scientific research.
- Media official channels are willing to cover and promote awareness about unique handicrafts and SMEs cases.
- The National Employment Council will be responsible for creating job opportunities and delivering training based on market needs in CE and CCIs.

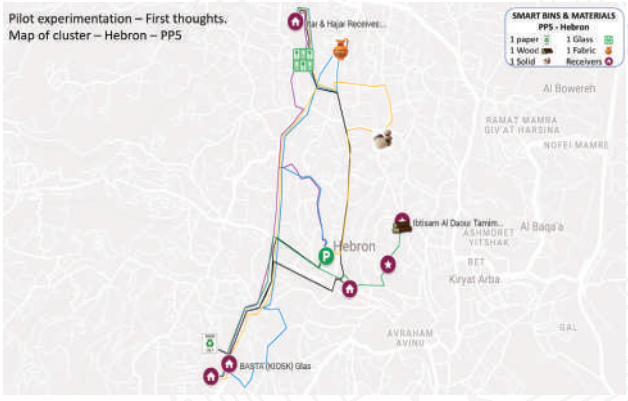
Pilot Cluster in Hebron & Nablus cities:

Nablus Pilot Cluster:



Bin #	Country	City	Description	Material	Route Color	SME Receiver 1	SME Receiver 2	SME Receiver 3	SME Receiver 4
21	Palestine	Nablus	Karawan Printing	Paper	Black	Heba Lifdawe			
20	Palestine	Nablus	Al Ithad Printing	Paper	Red	Iman Zaid			
19	Palestine	Nablus	Salma carpentry	Wood	Green	Iman Zaid	Rania Saymeh	Heba Lifdawe	
18	Palestine	Nablus	Kahf Gallery of Curtains	Fabric	Blue	Iman Zaid	Rania Saymeh		

Hebron Pilot Cluster:



Bin #	Country	City	Description	Material	Route Colour	SME Receiver 1	SME Receiver 2	SME Receiver 3	SME Receiver 4
17	Palestine	Hebron	Jou'beh store	Paper	Black	Fedaa Ghaith	Najah Zahdeh	Khetam Shaheen	Jehan Al Qawasmeh
16	Palestine	Hebron	Daour wood	Wood	Green	Khetam Shaheen	Suaad Shaheen	Fedaa Ghaith	
15	Palestine	Hebron	Itar & Hajar	Solid	Orange	Khetam Shaheen	Suaad Shaheen	Fedaa Ghaith	
14	Palestine	Hebron	Bounga Glass	Glass	Purpel	Khetam Shaheen	Suaad Shaheen	Fedaa Ghaith	
13	Palestine	Hebron	Tamimi Fabric	Fabric	Blue	Fedaa Ghaith	Suaad Shaheen		

Beneficiary Full Name	ID Number	Full Address	title of the sub grant	Coordinator in case of a multi-beneficiary sub-grant	Budget Amount Euro
Fida' Mohammad Ghazi Abd Ja'bari	410634901	Palestine - West Bank - Hebron	Pilot Innovation Products	Fida' Mohammad Ghazi Abd Ja'bari	5000
Khitam Hasan Salam Shahin	850553207	Palestine - West Bank - Hebron	Pilot Innovation Products	Fida' Mohammad Ghazi Abd Ja'bari	
Najah Mohammad Hussien Zahdeh	939256632	Palestine - West Bank - Hebron	Pilot Innovation Products	Fida' Mohammad Ghazi Abd Ja'bari	
Suad Ayoub Mohammad Shahin	900079989	Palestine - West Bank - Hebron	Pilot Innovation Products	Fida' Mohammad Ghazi Abd Ja'bari	
Jihan Mousa Mohammad Qawasmeh	969483346	Palestine - West Bank - Hebron	Pilot Innovation Products	Fida' Mohammad Ghazi Abd Ja'bari	
Ibtisam Abd Rahim Abd Men'em Al Daour Tamimi	946860269	Palestine - West Bank - Hebron	Pilot Innovation Products	Fida' Mohammad Ghazi Abd Ja'bari	
Islam Ali Issa Abu Qweder	854324456	Palestine - West Bank - Hebron	Pilot Innovation Products	Islam Ali Issa Abu Qweder	5000
Salam Mohammad Qatasheh	402817142	Palestine - West Bank - Hebron	Pilot Innovation Products	Islam Ali Issa Abu Qweder	
Sawsan Abd Majid Yasin Niroukh	981888670	Palestine - West Bank - Hebron	Pilot Innovation Products	Islam Ali Issa Abu Qweder	
Kholud Wasel Mohammad Qa'kour	920297421	Palestine - West Bank - Hebron	Pilot Innovation Products	Islam Ali Issa Abu Qweder	
Lamis Mohammad Ateieh Jaradat	941469306	Palestine - West Bank - Hebron	Pilot Innovation Products	Islam Ali Issa Abu Qweder	

Sajida Mohammad Sameh Said Abu Sharekh	920661766	Palestine - West Bank - Hebron	Pilot Innovation Products	Sajida Mohammad Sameh Said Abu Sharekh	5000
Manar Ahmad Mohammad Said Ja'bari	850791773	Palestine - West Bank - Hebron	Pilot Innovation Products	Sajida Mohammad Sameh Said Abu Sharekh	
Sumod Wasel Mohammad Al Bostanji	920298072	Palestine - West Bank - Hebron	Pilot Innovation Products	Sajida Mohammad Sameh Said Abu Sharekh	
Suhaila Majid Abd Rahim Zaro	946944931	Palestine - West Bank - Hebron	Pilot Innovation Products	Sajida Mohammad Sameh Said Abu Sharekh	
Savana Sadek Mohammad Seiaj	976872507	Palestine - West Bank - Hebron	Pilot Innovation Products	Sajida Mohammad Sameh Said Abu Sharekh	
Heba Ghassan Mohammed Zawawi	411429004	Palestine - West Bank - Nablus	Pilot Innovation Products	Heba Ghassan Mohammed Zawawi	5000
Nihad Abd Rahman Abdullah Khalili	411429012	Palestine - West Bank - Nablus	Pilot Innovation Products	Heba Ghassan Mohammed Zawawi	
Sahar Ali Issa Abu Wardeh	956976377	Palestine - West Bank - Nablus	Pilot Innovation Products	Heba Ghassan Mohammed Zawawi	
Ala' Ghassan Mohammad Khalili	411429020	Palestine - West Bank - Nablus	Pilot Innovation Products	Heba Ghassan Mohammed Zawawi	
Aman Ghassan Mohammad Al Khafsh	411428998	Palestine - West Bank - Nablus	Pilot Innovation Products	Heba Ghassan Mohammed Zawawi	
Nojoud Ghaleb Faleh Zeid	907427686	Palestine - West Bank - Nablus	Pilot Innovation Products	Heba Ghassan Mohammed Zawawi	

Products & Outputs of subgrants:

Nablus City Outputs:




Heba Ghassan Mohammed Zawawi
Coordinator – Pilot Cluster


Ali Hasan Dawud Hasanien
Innovation Vouchers

Hebron City Outputs:




Islam Ali Issa Abu Qweder
Coordinator – Pilot Cluster

Ala' Abd Aziz Ratib Abu Haikal
Innovation Vouchers

THE IRBID CITY CASE

Future Pioneers: PP06 Jordan

Summary

Irbid Governorate is in the northern part of Jordan. The Governorate enjoys a few natural resources, such as valleys, springs, fertile plains, and a diverse climate. These natural characteristics make Irbid Governorate one of the most important agricultural areas in Jordan in terms of the amount of cultivated land, constituting 11% of the total cultivated land in the country.

Irbid is characterized by being the second largest governorate in Jordan in terms of population. Furthermore, in terms of the number of economic enterprises in operation, Irbid is the second governorate after Amman, with a contribution rate of up to 71% of the total economic enterprises in operation in the north, and a rate of about 16.7% Kingdom-wide. On the other hand, it has the second largest industrial city in the Kingdom in terms of the volume of investment.

Irbid enterprises are distributed in diversified sectors, mainly commercial and industrial. Commercial activities include retail and sale processes in food, drink, and tobacco, followed by shops selling clothing, shoes and leather products, then computer and furniture shops. Wholesale and retail commerce; vehicle and motorcycle repairs also constituted a good percentage. Irbid industrial activities include food industries, metal industries, non-metal industries besides furniture, clothing, and wood industries.

Local Strategy Design

Motto of Jordan: “Repair-Reuse for as long as possible”

Vision statement of *Jordan:* To reach to Zero waste through supporting CCI SMEs to adopt CE in Jordan.

General and specific goals of Jordan:

General Goal: Enhance livelihood among SMEs in Jordan while protecting the environment.

Specific Goal

1. Strengthen the production and performance of the CCI SMEs in Jordan to adopt the CE principles.
2. Advocacy and lobbying among relevant authorities to amend the legalizations to provide legal and financial support to the CCI SMEs.
3. Provide opportunities for exchanging experience and market linkages at national and international levels.

Measurable targets of Jordan

1. (100) SMEs have been supported through technical training.
2. (40) SMEs have been supported in terms of finance.
3. Create jobs for 100 unemployed youth and women.
4. Contribute to reducing waste by 25% among targeted SMEs, private and industrial sectors.
5. 30% of targeted SMEs tuned from linear to circular economy.

Community and Stakeholder Involvement

The involvement of the community and stakeholders was a fundamental factor in the success of the pilot in Irbid city. The main relevant stakeholders were a fundamental part of the pilot and the selection of CCI.

SMEs are Ministry of Local Administration (MOLA), Ministry of Environment (MoEnv.), Greater Irbid Municipality, Chamber of Commerce of Irbid, Chamber of Trade of Irbid, Local communities representative and Handicrafts and Cultural & Heritage CSOs /NGO.

The local community was mobilized through the awareness workshops, where the project objectives, activities and the importance of Circular economy were clarified. This has facilitated the involvement of the community in establishing and operating the two clusters in Irbid. Ten people hosted ten smart bins and ensured collecting the recyclables from their neighbors and cooperating with the bicycle's driver who were collecting these recyclables and send them to the SMEs that are interested in these materials for their production.

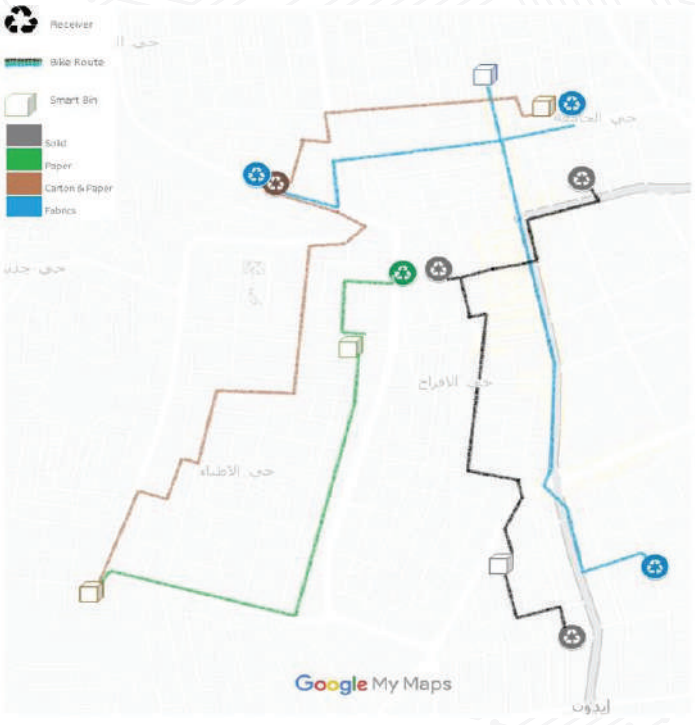
On the other hand, the INNOMED-UP framework is built in a way to address several cross-cutting issues: including those related to the promotion of democracy and human rights; social aspects to promote the inclusion of social groups at risk of poverty and exclusion (i.e., individual recyclers, immigrants); environmental sustainability, along with its socio-economic dimension is on the center of interest.

This was made possible by the selection criteria for SMEs, for the vulnerable women, as they were trained to adopt innovative and technologically enabled circular procedures that holistically improved municipal waste management, increased citizen engagement, well-built SMEs clustering, and as a result, the cultivation of conditions for open and cooperative local communities that are environmentally conscious, technologically oriented.

Furthermore, special attention was devoted to women who were enabled to enhance their home businesses and improve their livelihood conditions.

Pilot Cluster

Please provide a map of the pilot cluster.



Future Pioneers conducted two awareness workshops for the local community of the trained SMEs to educate them about the project activities, objectives, the importance of adopting circular economy by SMEs and how to support this concept through the establishment of the clusters based on the materials that are most needed by these SMEs.

At the same time, FPEC managed to construct the (10) smart bins and the smart (2) bicycles. Accordingly, the most active ten people from the participants were selected to host the constructed smart bins and be responsible for collecting the

materials from its neighborhood in these bins. We have signed MOUs with these people to ensure full responsibility and cooperation.

On the other hand, we have signed an MOU with the local authorities in Irbid mainly Municipality of Irbid, Chamber of Commerce of Irbid and Chamber of Trade of Irbid to support our efforts to encourage the SMEs to adopt the circular economy practices and to encourage the waste management practices in general such as sorting, ruse and others.

We managed to activate the clusters once the sub-grants were awarded, which took much longer time than anticipated. Accordingly, the clustering pilot is active since August 2022 only, and the process was under our close mentorship for three months. Based on the results of the follow-up, the location of the smart bins was changed and divided into two clusters to be more active and efficient and can be reached by the bicycles.

The smart bins were allocated on the digital platform and the bicycle driver was provided with a username and a password for the application installed on his mobile to receive the alerts of the full bins and send reports. The main collected materials are plastic, paper and carton, clothes and fabric, wood, and others.

Results

38 sub-grants were awarded to CCI SMEs in Irbid, distributed as 20 sub-grants for pilot innovative products, 10 sub-grants for equipment and 8 sub-grants for cross border mentorship in cooperation with various universities. Here is the list of these grants:

Pilot Innovative products	Innovation vouchers(equipment)	Cross-border mentorship
Recycle Plastic bags into bags and Wallets.	Recycle waste tires and clothes into bags.	Recycle of Wood In cooperation with National University College of Technology
Al-Yarmouk Women for handicrafts	Machines to facilitate use of Sawdust, plastic, and waste into Mushroom industry for local shops	Recycle of Plastic, Cartoon, and clothes in cooperation with National University College of Technology
Four seasons sewing shop for clothes recycling.	Improve the quality of recycled clothes.	Production of Dolls In cooperation with National University College of Technology
Innovative pilot products- recycle plastic and cork into pieces of arts	Produce accessories and pieces of arts out of waste	Design and draw wall paintings using reused materials with Irbid National University (INU)
Innovative pilot products- recycle wood waste into pieces of arts	Recycle animal bones to make accessories	Design and implement Aqua-phonic Systems In cooperation with German Jordanian University (GJU)
Recycle Plastic bags into Folders and envelopes	Mechanical Cultural Embroidery on Plastic	Mosaic of Tile Residues In cooperation with The National University College of Technology (NUCT)
My wood	Recycle of Glass	Fabric recycling to create garbage bags for cars in cooperation with The National University College of Technology (NUCT)
Helen Soap	Recycle of Banana leaves into handicrafts products	Fermi Compost In cooperation with The National University College of Technology (NUCT)
Produce incense burners with a fragrant smell out of waste	Recycle of old fabric and clothes	
Yousef Honey and its natural products	Recycle of wool and threads into new designs	
Aibroo – Producing wall clocks out of waste		
Reuse and recycle damaged wood from old furniture to make eco-friendly sessions, chairs, picture frames and tables		
Kashabati		
Making a rocking chair from leftover wood and burlap sacks		
Furniture made of recycled Cartoon and tires		
Recycled Cultural products and accessories		
My decorations – recycle of wood to make decorations		
Home Woods – recycle of wood to make different products		
Sustainable agriculture and recycling		
Recycling of Fabric and old clothes		

The results in general were very positive and the sub-grant contributed to improving production and increasing the income for these people.

Product Outputs:

The project's results are in general positive, and the provided technical and financial support to the SMEs have improved the quality and quantity of their production in the field of circular economy. The experience was good, but there were some challenges that can be used as lessons learned for future activities. These are mainly:

1. Majority of the SMEs are not registered officially and are operating from home especially for women to reduce the registration fees and taxes. The INNOMED-UP project provided a valuable opportunity for these producers as it did not require the official registration.
2. The provided technical support and training proved that the SMEs are in real need of such support, and it will be very beneficial to have several Info-Points in different locations to provide such support.
3. The received applications from SMEs for the sub-grants showed clear weakness in terms of preparing a detailed market plan and estimated market size of upcoming years operations. This should be one of the capacity building topics to be addressed for SMEs.
4. The sub-grant's application in general was considered a little bit challenging for the applicants and this made some of them hesitant to apply.
5. There is lack of interest in the Cross-border mentorship grant, as the value of 5,000 euro is considered modest for research academies. Although we reached out to several universities and organizations, we received only two applications.
6. The SMEs need more support in terms of marketing, branding, packaging, and improving the quality of designs. INNOMED-UP granted Future Pioneers the opportunity to provide such support to the SMEs through opening an exhibition for their products and improving their packaging quality.

Promoting **UP**cycling in Circular Economy through **INNO**vation and education for creative industries in **MED**iterranean cities

ENI CBCMED
Cooperating across borders in the Mediterranean

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INNOMED-UP

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