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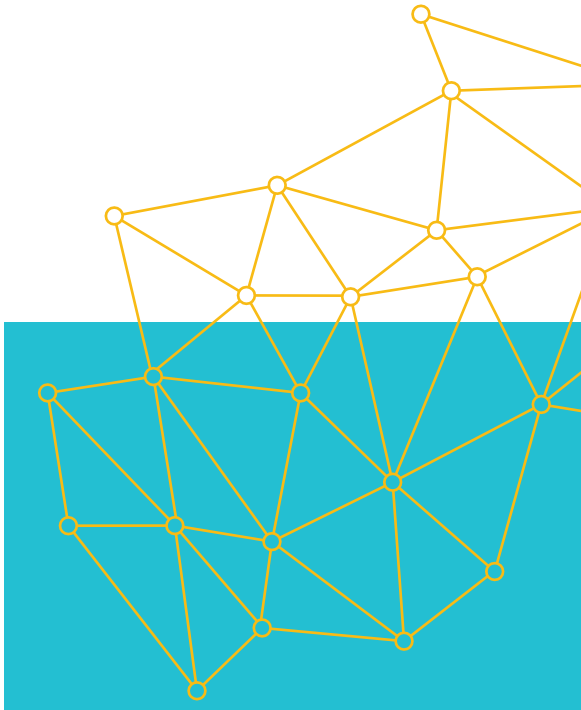

Systemic Design Method Guide for Policymaking:

A Circular Europe on the Way

volume 1

Edited by
Silvia Barbero

Allemandi

Retrace
Interreg Europe

European Union
European Regional
Development Fund

SYSTEMIC DESIGN METHOD GUIDE FOR POLICYMAKING

A Circular Europe on the Way

EDITED BY
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SYSTEMIC DESIGN METHOD GUIDE FOR POLICYMAKING: A CIRCULAR EUROPE ON THE WAY

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List of abbreviations

ADEME French Environment and Energy Management Agency

ANR French National Research Agency

BIT National Strategy for Bioeconomy

C2C Cradle to Cradle

C2CN Cradle to Cradle Network

CE Circular Economy

DfD Design for Disassembly

DG Directorate-General

EAP Environment Action Programme

EC European Commission

EcoSD Eco-design of Sustainable Systems

ENEC European Network of Ecodesign Centers

EPA United States Environmental Protection Agency

ERDF European Regional Development Fund

ERT European Round Table of Industrialists

ESF European Social Fund

ETC European Territorial Cooperation

EU European Union

FP7 Seventh Framework Programme

FVs Field Visits

GDP Gross Domestic Product

GODC Slovenian Governament Office for Development and European Cohesion Policy

GPs Good Practices

GPP Green Public Procurement

HD Holistic Diagnosis

ISWA International Solid Waste Association

LP Lead Partner – Politecnico di Torino

LSR Large Scale Retail

JTS Joint Technical Secretariat

MA Managing Authority

MSc Master of Science

MSW Municipal Solid Waste

NGO Non-Governmental Organization

NISP National Industrial Symbiosis Programme

OECD Organisation for Economic Co-operation and Development

OPs Operational Programmes

POR-FESR Regional Operational Program - European Regional Development Fund

PP2 Second Partner – Piedmont Region

PP3 Third Partner – Azaro Foundation

PP4 Fourth Partner – Beaz Bizkaia

PP5 Fifth Partner – Higher School of Advanced Industrial Technology (ESTIA)

PP6 Sixth Partner – Association for Environment and Safety in Aquitaine (APESA)

PP7 Seventh Partner – Slovenian Government Office for Development and European Cohesion Policy

PP8 Eighth Partner – Romanian North-East Regional Development Agency (NERDA)

R&I Research and Innovation

RAPs Regional Action Plans

RES Renewable Energy Source

RIS Regional Innovation Strategies for Smart Specialization

ROP Regional Operational Programme

SD Systemic Design

SG Steering Group

SYDERE Systemic Design Research and Education

SME Small Medium Enterprise

SRIP Strategic Research and Innovation Partnerships

TAA Total Agricultural Area

TEPCV Positive Energy Territory For Green Growth Label

ToR Terms of Reference

UAA Useful Agricultural Area

UNFCCC United Nations Framework Convention on Climate Change

WCED World Commission on Environment and Development

WTO World Trade Organization

ZERI Zero Emissions Research and Initiatives

ZGZD Zero Waste Territories Label

Preface

ERWIN SIWERIS

As Europe is moving towards an accelerated global economy, it is vital to adopt proper governance actions to achieve a sustainable future. In this context, it is necessary that new policies come from the effort and commitment of multidisciplinary teams. Interreg Europe helps regional and local governments across Europe to develop and deliver better policy. Supported by the European Regional Development Fund with 359 million euros from 2014 to 2020, the programme fosters regional policymakers through cooperation projects and policy learning platforms.

In 2016 we introduced the RETRACE Project (A Systemic Approach for Transition towards a Circular Economy)[1] which was financed under the first call for proposals of the Interreg Europe ETC Programme, 4.2 Specific Objective: Improving resource efficient economy policies. This project is a coordinated work between universities, local authorities, government offices, associations and public administration whose main aim is to address the EU challenge of transitioning towards a Circular Economy following the priorities set up by the "Flagship Initiative for a Resource-efficient Europe" for a shift towards a resource-efficient, low-carbon economy to achieve sustainable growth as enshrined in the Europe 2020 strategy and the EC Communication "Towards a Circular Economy: A Zero Waste Programme for Europe".

The outcome of the project over the first 16 months has been remarkable, facing stimulating challenges and achieving brilliant results by the eight partners of the project from Italy, Spain, France, Slovenia and Romania. Among the main achievements are:

6 field visits in the five partner regions and in The Netherlands;
48 good practices of Circular Economy and Systemic Design exchanged;
5 Holistic Diagnosis assessing the state of the art of the 5 partner regions in relation to Circular Economy related policies;
5 regional dissemination events, one in each country, with more than 250 attendees;
5 stakeholder groups formed in the partner regions, involving more than 70 entities;
4 videos showing the good practices encountered during the field visits;
2 newsletters sent to over 700 contacts.

This volume entitled *RETRACE Systemic Design for Policymaking: a Circular Economy on the Way* is addressed to regional policymakers and policy managers and is the first of a three book series that the RETRACE Project will deliver across a four-year period (2016–2020). Its main purpose is to illustrate to policymakers the Systemic Design as a tool to define sustainable activities based on Circular Economy.

The Systemic Design methodology and the results achieved in this first phase of the project constitute the main focus of the book which also offers a glimpse on what is expected in the next years with the definition of five Regional Action Plans focused on the development of Circular Economy policies in all partner regions. Eventually, the second phase of the project, from 2018 to 2020, will be devoted to the implementation of these policies.

ERWIN SIWERIS
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Lille, France

[1] www.interregeurope.eu/retrace

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Introduction

SILVIA BARBERO

The Circular Economy concept and terminology has gained *momentum* after the 2012 World Economic Forum, where a report, prepared in collaboration with the Ellen MacArthur Foundation and McKinsey & Company, showed for the first time its convenience and the way to drive a new economic development.[1] However, popularity very often carries disadvantages or risks as, for example, becoming just a buzzword. Some people affirm that the true substance of circular economy is lost in translation and is misunderstood. There are many misconceptions of circular economy such as that it is just another way of describing recycling, or that it encourages people to re-use and keep products for a longer time, therefore it decreases sales since it might be an opportunity for some people, but on the long term will have a negative impact on manufacturers, and so on.

This book aims to clarify the role of circular economy according to a sustainable development and how policymakers can address it in their activities. The main question is: which methodology can policy managers use in order to define a clear path towards a circular economy in their regions?

Effective circular economy policymaking requires the combination of many policy interventions, that do not rely on a "silver bullet" or on blanket solutions (Simon Boas et al., 2015) and on classical borders of a single organization (Frey, 2013). It is necessary to stimulate the cooperation among different actors over networks (Ruggieri et al., 2016).

The path towards circular economy means shifting form a linear and mechanistic approach to a holistic and integrated one, where the number of variables and relations generates a complex environment. So the policies should manage and solve complex problems with new approaches compared to the past. What is required now is a disruptive approach that helps people to "think outside the box" (Considine, 2012). In such a situation the role of design can be crucial because it is used to manage complex environments, find unusual solutions, visualize unexpected future situations, and promote openness and surprises. The thought-process typical of designers is useful and effective to undertake policymaking actions. Hence, this book gives large space to a design method that helps all the actors involved in policymaking processes to define a successful way towards the circular economy. Design policy can be based on the application of design methods and design thinking in order to extend to a new level the design methodologies and use them for policy planning. In policymaking processes many programs are developed by different stakeholders and actors. To face this kind of complexity it is now necessary to use creative and structured innovation processes and approaches. Specifically, the Systemic Design method provides specific tools in order to manage complex situations, to design new relations among the entities of a territory, to visualize the hidden potentialities and to boost proactive collaboration among local actors.

This situation offers a not-to-be-missed opportunity for policymakers to collaborate with businesses that have already started the transition towards a circular economy. In addition, it is essential to cooperate and engage with local society stakeholders, including citizens and consumers, labour unions and environmental organisations. One more aspect of this broad co-design purpose should be taken into account: different government departments (including environment, business and industry, finance...) should collaborate and share the same goals to overcome unexpected policy barriers. Defining policies usually implies a top-down approach that rarely includes final users and citizens. However, in this new era, participatory processes are fundamental to design effective policy strategies. Systemic Design includes design thinking, bottom-up design, human and user-centred design, co-design, participatory design which all have in common a bottom-up approach and the active engagement of users in the designing process, thus the end-user becomes the centre of the policy formulation system, creating a new decisional process (Allio, 2014).

In this new coevolving network, the coordination of the many actors involved and their actions should be guaranteed since it ensures the stability of cooperation over time and avoids freeriding. This book testifies the strong collaboration that distinguish the RETRACE Project, where all partners directly involved in the project[2] and the local stakeholder (about seventy entities) are truly active in developing new strategies and plans. Each partner has curated at least one chapter of this volume based on their interests, experiences and tasks involved in the project. Furthermore, other acknowledged experts in this field enjoy the opportunity to share their knowledge providing a broad range of different points of view. Their contributions are mostly included in the first part of the book dedicated to a general overview on circular economy followed by a second part in which are mostly present contributions by the RETRACE Project partners.

The book opens with a contribution by Erwin Siweris, the Programme Director of the Interreg Europe programme, that funds the RETRACE Project which aims at promoting Systemic Design as a method allowing local and regional policies to move towards a circular economy, according to which waste from one productive process becomes input in another, preventing waste being released into the environment. This book comes after one year and half since the beginning of the project (1st April 2016) and aims to clarify the method that has been adopted to develop this project and to provide other policymakers and policy managers with tools to develop effective regional action plans respectful of sustainable growth. Following the priorities set up by the Europe 2020 strategy and the EC Communication "Towards a Circular Economy: A Zero Waste Programme for Europe", the main challenge of RETRACE — and consequently of this book — is to offer concrete examples and valuable tools to move towards a circular economy.

The first part of the book is dedicated to the evolution of the concept of circular economy, how it has been accepted and performed at European, national and regional level, with special attention to the Interreg programme (both the Interreg IVC and the Interreg Europe) and its policies in that field. The last part of this section leads to the second part of the volume focused on the "design toolkit" for policymakers and managers.

The core of the book is dedicated to the Systemic Design Methodology and how it can support this transition with the description of steps required for the development of complex systems. First, a complementary view on complex and systemic approaches introduces the definition and evolution of Systemic Design, described with a historical approach. Then, a detailed explana-

tion of the steps which need to be followed in the design process of Systemic Design, when it is applied to policy design and it fosters and promotes territorial relationships.
The third part of the book is an in-depth analysis of the RETRACE Project in order to help the reader to better understand the context in which it was developed and its successful results. The project goals, the expected results and the timeline are detailed with a specific attention to the partners and the local stakeholder involved and their role.
The last part of the book merges the theoretical part of the second section on the Systemic Design Methodology with the pragmatic part of the third section dedicated to the RETRACE Project, therefore it describes step-by-step the methodology that has been applied, divided according to its two main activities: the exchange of experiences and the communication/dissemination process. The exchange of experiences among the European regions plays a huge role in RE-TRACE, i.e. the Holistic Diagnosis on different territories, the field visits, how European good practices were selected, and eventually, how the Regional Action Plan and the Policy Brief were conducted. Also the dissemination activities are taken in great consideration because they reveal how to reach a broader audience and achieve collaborative participation from different actors. Due to this reason, the book also exposes the strategies employed to successfully communicate the project and the role held by the European Policy Learning Platform.
This book aims to be the first step of a journey towards a deeper understanding of circular economy and the Systemic Design Methodology, but above all, it can constitute the stimulus for targeted actions. Its scope is to lead the efforts of all those actors, especially policymakers, who want to initiate a sustainable growth in their territories.
Policymakers can play an important role in this process while creating the proper enabling conditions, setting the direction for the transition and fostering the dialogue between public and private entities. They can act immediately fixing market and regulatory failures and, in a longer perspective, actively stimulate the market activity by establishing new targets, changing public procurement policy, designing collaboration platforms and providing financial or technical support to systemic-design-oriented businesses. Moving towards the circular economy offers a unique opportunity for businesses and policymakers to collaborate and, at the same time, to achieve wider societal goals.
For policymakers using the Systemic Design Methodology and a holistic approach can sup-port the creation of more efficient policies for a transition towards a circular economy and find innovative solutions to reinvent and shape a more sustainable economy.
This book is the result of an intense dialogue with many people who present different perspec-tives and seek for a common language which is able to consider the bigger picture of the current complexity in policymaking and designing. The inspiring results of this book are the outcome of all contributors who put their experiences at the service of this broad community, and I am the only one to blame for any mistake there may be.
First of all, I would like to give special thanks to Professor Bistagnino who introduced me to this topic few years ago and constantly encouraged me in doing my best. Most of this work was possible thanks to his support and open mindedness in always being available in discussing with me and showing me the complexity of systems. He also introduced me to Gunter Pauli, who inspires me every time we have the chance to meet together.
I would like to express my sincere gratitude to Erwin Siweris, Director of the Interreg Europe Programme, for the preface of this book as well as for the great chance I was given of coordinat-

ing the RETRACE Project, a challenging and inspiring venture which allows me to broaden the horizon and responsibilities involved in the transition toward a circular economy.

I also would like to thank Daniel Calleja Crespo, the General Director for DG Environment of the European Commission, for his receptiveness and availability; he is able to show, with simple words, the hard decisions that the European Commission has taken with the definition of the Circular Economy Package.

The genuine perspective of Jocelyn Bailey from the University of Brighton on the role of design in policymaking was truly inspiring for me; and above all, for clarifying the original elements that designers and policymakers face nowadays together.

I would also like to express my gratitude to all the people involved in the RETRACE Project, among whom I had the opportunity to become acquainted with many engaged experts who have become hard-working, supporting travel companions. Their passion is testified through all their contributions to this book and the commitment they have taken to a more intense dialogue on the topics addressed in this volume.

Last but not least, I am grateful to my colleagues at Politecnico di Torino, who work with me on this project on a daily base and are always ready and open to discussing and supporting me in every task, especially the most challenging ones.

This book is the result of the collaboration and passion of all these people.

[1] Technical Report, World Economic Forum (2014). Towards the Circular Economy: Accelerating the Scale-up across Global Supply Chains. Avaliable https://www.weforum.org/reports/towards-circular-economy-accelerating-scale-across-global-supply-chains/ (Accessed 4th August 2017)

[2] Politecnico di Torino (IT), Regione Piemonte (IT), Azaro Foundation (ES), Beaz (ES), Higher School of Advanced industrial Technology ESTIA (FR), Association for Environment and Safety in Aquitaine APESA (FR), The Slovenian Government Office for Development and European Cohesion Policy (SI), The Rumanian NorthEast Regional Development Agency (RO).

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1.
Transition Towards a Circular Economy

1.1 The Circular Economy Package. Beginning of the Transition towards a more Circular Economy

DANIEL CALLEJA CRESPO

On 2 December 2015, the European Commission adopted a Circular Economy Package with the aim to support the transition towards a stronger and more circular economy in the EU, where resources are used in a more sustainable way and their value is kept in the economy. This package, which consisted of legislative proposals on waste and an action plan covering the whole lifecycle of products and materials, is a key contribution to the Commission's 10 priorities for 2014–19 and to the broader agenda of the EU for jobs and growth.[1]

After one of most detrimental financial and economic crises since World War II, the Circular Economy Package sets out to boost European competitiveness by protecting businesses against scarcity of resources and volatile prices, helping to create new business opportunities and innovative, more efficient ways of producing and consuming. But the measures proposed in the package are also closely linked with EU energy and climate policies. The Circular Economy supports implementation of the Paris Agreement and the United Nation's Agenda 2030 on sustainable development; the renewed global commitments on which the European Union and the vast majority of countries in the world agreed.

There are many benefits of moving away from our linear extremely resource intensive economic model. In a world where population increases every day, with huge demand placed on land, water, food, feed, raw materials and energy, we cannot rely further on a "take, make, use and throw away" approach. Especially, when it has been estimated that if we stick to current trends we will need three times more material resources by 2050.[2]

For this reason, the Circular Economy, as an agenda for change, is not only an environmental necessity, it is the only model that makes sense in the long-term for our European economy. From an economic point of view, it is plausible to use natural resources in a smarter and more sustainable way. Europe cannot compete on wage costs, and does not have the same natural resources as many other parts of the world. Consequently, the future lies in providing products that are used and re-used and don't contribute to depleting the Earth's natural resources. In addition to that, the Circular Economy Package will also allow us to continue as a market leader for green technologies.

In this sense, a Circular Economy means a switch in favour of more durable, repairable, and more resource-efficient products which do not become waste too soon. To this end, we are making a big commitment to develop requirements for products to be easier to repair, dismantle, recycle, through our existing framework on Ecodesign. This is further supported by voluntary tools like the EU Ecolabel or Green Public Procurement (GPP), the development of a methodology on Environmental Footprint, fighting misleading green claims, or investigating a possible testing programme to identify planned obsolescence.[3]

Our actions do not only focus on products. The demand for secondary raw materials should also be developed to feed EU industry and close the loop of material cycles.

This involves the development of quality standards for secondary raw materials, in cooperation with industry, but also improvements in tracking the presence of substances of concern in recycled material flows.

It is clear that the Commission alone cannot make the European Economy Circular; the transition will need a joint effort from everyone. To make all these things happen, it is necessary to mobilise all stakeholders in the European Union, including Member States, regional and local authorities, businesses and NGOs. But the role of local and regional authorities is of utmost importance in the implementation of European environmental policies. This is why initiatives, such as RETRACE, which aim at supporting local and regional entities to transition towards more sustainable and circular policies, are essential for the success of the Circular Economy Package. The Circular Economy Package is just the beginning of the transition towards a more Circular Economy in Europe and globally.

[1] Available https://ec.europa.eu/commission/priorities_en (Accessed 25th April 2017)

[2] UNEP, Decoupling natural resource use and environmental impacts from economic growth (2011). Available http://www.gci.org.uk/Documents/Decoupling_Report_English.pdf (Accessed 25th April 2017)

[3] European Commission (2015), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Closing the loop: An EU Action Plan for the Circular Economy, COM(2015) 614 final. Available http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614 (Accessed 25th April 2017)

1.2 Circular Economy: Definition and Evolution. Principles and Development

EMANUELE BOMPAN

The term "Circular Economy" is de facto a neologism, which combines both theory and practice. This essay aims at introducing the reader to the core concepts of circular economy. From the regenerative approach to new types of business model, the text analyzes and defines what are the constituent elements of this alternative approach to the linear economy and what are the challenges ahead to use this model to boost an alternative, sustainable development model.

1.2.1 THE FUTURE OF THE ECONOMY IS CIRCULAR

If you were googling at the end of 2017 "Circular Economy," you will get 8,65 million hits. The outcome is quite surprising if you consider that in May 2015 an identical search only yielded 471.000 results. A surge in both investigative and academic research and texts show lively interest around this new macro economic theory.

The theory is brand new since it has been around for only around five years. However, it expresses the intellectual heritage of over fifty years of debate on environmental and economic issues. Traces can be found in the works of economic service theorist Walter Stahel and in Amory Lovins, President of Sustainable Industrial Development and author of *Reinventing the Fire* (Lovins, 2013). The theory is also visible in William McDonough and Michael Braungart's "cradle-to-cradle" theory where no material is wasted (McDonough and Braungart, 2002). Then there is the guru of the "blue economy", Gunter Pauli (Pauli, 2010) and Nicholas Georgescu-Roegen's work on bioeconomy, where social and economic ambitions meet to create true sustainability (Georgescu-Roegen, 1976). The circular economy's intellectual heritage shows, once more, that the genealogy of a concept always has far, deep, complex and non-linear roots.

While other theories may be widely assimilated, circular economy has a clear industrial vocation as it is mostly tied to material goods, which from time to time are linked to finance, service economics, labor standards, digitalization, decarbonization of the global economy, etc.

The spread of the term circular economy primarily serves the ontological purpose of defining a necessary transformation of the production model. It offers a clear framework and direction for production and consumer patterns of the 21st century, given the current situation of an overcrowded world, and in the midst of immense climactic transformation caused by human actions over the past 150 years. Saying that circular economics already existed in a rural world do not capture the exquisitely global and industrial value of the model. They also make the mistake — and a serious one at that — of minimizing its application to merely an economy of waste.

A circular economy is in direct contrast to the symbol of modernity: the linear economy. A circular economy is a system that revolves around raw material extraction, production, consumption and waste elimination. Whether it is buried, dispersed or burned, waste has fully demonstrated its devastating force. Linear consumption of fossil fuels has devastated the planet's climate by shifting carbon from underground into the atmosphere. Soil use has decimated the earth's forests. Massive use of plastic in packaging has devastated the world's rivers and oceans. The struggle for raw materials has led to political tensions in almost every state in the southern hemisphere. Meanwhile, a generation of reckless waste has contaminated much of the industrialized word. The circular economy is the natural enemy of this virus.

The notion of a circular economy is not just an environmentalist or an ecological theory. For the industrial world, the linear economy has become a market problem: scarcity of resources, rising raw material prices, supply shortages, fragility at certain points of the global supply chain (wars, political tensions, catastrophic phenomena), the emergence of a new protectionism of raw material to ensure so-called strategic reserves and skyrocketing waste management costs.

The scarcity of material coupled with growing demand has led to a rise in prices since the end of the 19th century. It also has the effect of destabilizing industry and consumers, even to the negatively impacting of many countries' security. The latest food and political crises in Ethiopia, Sudan, Egypt and Syria have been driven by a mix of environmental crises like droughts and climate change, along with the rising prices of primary materials on global markets driven by a spike in demand.

The most obvious index for economists is prices. As if there are not already enough stories arriving every day of an exhausted and crazed planet, something has changed in historical performance of product value index on the market. According to global consulting firm McKinsey, the commodity price index declined from 180 points at the beginning of the 20th century to less than 90 points by the end of the 20th century. In the last 15 years, the price point turned dramatically, breaking 240 points (McKinsey Commodity Price Index, 2013). The shock has had serious repercussions on the global economy and could be one of the constituent elements of the ongoing crisis afflicting many countries in the world.

The answer to the question "where can we find new materials" to calm prices was found in a large primary resource, which remained untouched and has always been under our noses: the immense quantity of goods, materials, and production waste that is produced every year. Not to mention the uncountable items and machinery that remain unused in their boxes. In other words, material that is wasted and forgotten.

Estimates point to 1,3 billion tons of Municipal Solid Waste (MSW) thrown out each year. That is an average of 1,2 kg *per capita* per day. In the report, *What a Waste*: *A Global Review of MSW*, the World Bank estimates that in 2025 this figure may rise to 1,42 kg of waste *per capita*, which totals over 2,2 billion tons per year. Italy alone will generate over 65 million tons of MSW. Today we are at about 55 million tons of MSW (of which 13 million tons are recycled), but the waste could be much more. According to the International Solid Waste Association (ISWA) these statistics are not accurate.

An ISWA source said that, "We do not know with certainty how much waste exactly there is in the world." This sea of potential matter, with a volume equivalent to more than 7.000 times the Empire State Building, holds an incalculable and unknown monetary value.

1.2.2 The Rise of the Circular Economy

The circular economy arises from the need to stop the madness of its antithesis, the linear economy. If someone is to receive credit for the birth and dissemination of this concept, it is yachtswoman and intellectual Ellen MacArthur. Through the work of her foundation, the Ellen MacArthur Foundation, she is more committed than anyone else to promoting the concept of a circular economy in the global industrial and financial world. Her impact is also supported by a strong relationship with the World Economic Forum and the relentless work with corporations, universities and think tanks.
The definition of circular economy given by the Ellen MacArthur Foundation[1] and accepted in the academic world is: "restorative and regenerative by design. In a circular economy, there are two kinds of material cycles: biological, capable of being reintegrated into the biosphere, and technical, destined to be re-valorized without entering the biosphere." (Ellen MacArthur Foundation, 2017). Therefore, the circular economy is a constantly-evolving economic model of great complexity. All activities, from extraction to production and beyond, are organized in such a way that someone's waste and unused material becomes a resource for someone else.

As a matter of fact, a circular economy is not easy to explain with a short and simple formula. For further explanation, my book *Che cosa è l'economia circolare* (*What is Circular Economy*)[2] is an attempt to create a framework for understanding this concept. Starting from the work of the Ellen MacArthur Foundation and major companies and universities involved, the volume traces a detailed history of 30 years of debate on sustainable development. My ten years of experience as a journalist in the field of environmental and innovation issues offer an in-depth perspective. While reflecting on the birth of the theory, my essay includes many aspects that still need to be investigated and verified by researchers.

As with all economic models, a circular economy is not a panacea for the world's troubles. However, it is an industrial and regional strategy that can correct the severe absurdities of petrocapitalism's linear matrix in a socially responsible way. The applications of the method are numerous and not all correct. Those who deal with it on a conceptual level feel the urge to avoid it becoming just a slogan like what has happened with the green economy, a buzzword that allows many corporations to hide behind a false, green-painted narrative while they continue to pollute.

As correctly reported by Ellen MacArthur, when speaking of a circular economy we refer to both biological and technological matter which is intended to be rejuvenated without being released back into the biosphere. This helps us to understand the organic and complex nature of the circular economy, whose only model is the most perfect system on the planet: the *bios* of the Earth. The perfect balance of life on the planet is a combination of organic and inorganic systems. We shall not forget that there are resources everywhere: from fertile soil to tropical plants, to rare earths or fossil fuels. The Earth supports all of us. It is time for us to return the favor.

1.2.3 Three Principles to Define a Circular Economy

The circular economy is holistic, since it considers each aspect of every production process. It is a revolution that could involve every aspect of our lives, with the goal of reconfiguring the problem of material scarcity, the Malthusian question of overpopulation, with tangible effects in the struggle for climate change and the resolution of economic crises (Bompan, 2016). Of course, it is not a salvific model nor should it become an ideology. Its honest application, intellectual evolution and critical use could make it a winning economic model. The circular economy differs from emerging models like green economy, degrowth economics and bioeconomics, which have led to overwhelming concepts like emission reductions, moderating consumption, an end to a fossil economy, output utilization, etc., because it embodies all the elements integrating them in a single holistic system that embraces elements of a market-driven economy (profit), Marxism (workers' well-being), ecology, and an overall non-linear impact.

To define the paradigm of a circular economy it is crucial to define a new economic model that satisfies three principles.

To rediscover discarded matter as sources of material, limiting processing as much as possible. Secondary raw material sources are so many, and are not yet thoroughly explored. Just a few examples include: waste collection, recycling, production output management and working objects thrown out because of poor stock management (including households).

The best place for "extracting" the raw secondary material is in cities, which are becoming the new "urban mines" to draw upon for producing new material goods. When looking at waste containers in the recycling sector, a circular economy no longer thinks of a concept of "waste." Instead, a circular economy sees a system for extracting materials. The society, is the unconscious miners of these materials, and your pay is the planet's welfare and social security. If we leave out domestic users, the other principle material source is the waste cycle in industrial production phases. Industrial production would require activating processes to recover material used in processing, to reuse water used in production processes, and to reduce energy not repurposed along the production chain. Eliminating industrial waste offers great potential for companies to save and to also guarantee their supply chain. Already today many companies incentivize collecting their products and materials at the end of their life cycle, whether it is a cotton T-shirt (for the process of re-spinning) or tires (for rubber recombination). Companies also have processes for waste collection or business practices like evaluating the use of scrap materials or buy-back.

Closely related to recycling is the concept of upcycle, that is, how much value scrap material becomes a new material of higher value than the original product in its previous life. There are plenty of examples of upcycling in a circular economy. Aquafil (nylon yarn manufacturers)[3] have designed Econyl, a system for enhancing scrap nylon. Econyl allows the use of post-industrial polyamide 6 , Nylon 6 or post-consumer waste, to manufacture new Nylon 6 by improving its quality. The key to success is the reclaiming program, a tool to foster a reverse supply chain and ensure reliable material inputs. On one hand the filament comes from carpets disassembled by Aquafil customers, like the Interface group.

On the other hand, the company based in Arco, Italy, along with Interface in Atlanta, USA, has implemented a process to get nylon from old fishing nets, establishing *de facto* an inverse chain that takes a product of mediocre quality, such as trawl nets, and transforms it into synthetic thread for the new-style carpet collection sold by American Interface (Bompan, 2017).

Then there is, of course, reuse and regeneration. When you disassemble a complex object, such as a car, at the end of its life cycle, not everything is necessarily recycled. Reuse and regeneration are convenient because they minimize energy input into processes (recycling from this point of view is energy intensive), directly using these parts or components in the production chain through quality testing and light machining. Engineers refer to this project as remanufacturing for heavy or resistant components, especially metals, particularly in the metalworking and mechatronics fields.

The second principle is linked to the end of the unused value of the product, even before being discarded. Warehouses full of machines waiting to be discarded, boxes in a cellar full of clothes with little affective value and items bought and used once a year. An unnecessary amortization of assets whose value is not utilized. Just look around with new eyes and you will see how much material is lying inert, wasted, before finally being thrown away unused. Leave the abandoned stuffed animals in the closet of childhood memories. The rest is just a waste of materials.

Examples of circular economy, of product as a service, are right in front of us. Take Michelin, who offers tires in the form of "product-like-service." Thanks to Michelin Solutions, you can lease your tires with a performance agreement. Since 2011 Michelin Fleet Solutions has contracted over 300.000 vehicles in more than 200 European countries. The group is thus able to offer high-quality wheels while making upgrades available from time to time. Maintenance and replacement are available to optimize the auto transport fleets subscribed to the service and to reduce costs for the company related to the sale of the product. By not surrendering the product, and thus keeping full control over their tires, Michelin can withdraw the product at any time when the tires are about to wear out. This critically extends the tires' technical validity through reconstruction or refurbishment for resale. The Clermont-Ferrand based company estimates that tire reconstruction requires half of the raw rubber material required for new tires. And Michelin can guarantee 90% of the performance of a newly produced tire. In any case, the tire is monitored and tracked by the company that knows the tire's perfect alignment, aging process and replacement times. Michelin's circular business does not stop there. The French group simultaneously activated four levers for using resources efficiently, following the 4Rs: reduce, reuse, recycle and renew. Under this initiative, Michelin's tires, even when they are new, employ a lower amount of rubber than their competitors. Additional services guarantee extra profit in return for maximizing fuel efficiency for trucks (and a consistent supply of high-quality tires) (Ellen MacArthur Foundation, 2017).

To stop the premature death of materials. Although recycling and reutilization are key strategies for recovering matter, we often condemn to death — that is, to disuse — perfectly good material. And it does not really matter if the material will be recycled. Often breaking or fading is just part of an object, while the other components remain perfectly functional, which is like burying a person because they have a broken arm. Repairing, upgrading, reviewing our ingrained practices of obsolescence are helpful strategies to stop this waste of material.

There is also another way according to which we provoke the death of everyday products and it is called fashion. While for classical sociologists such as George Simmel "fashion expresses the tension between uniformity and differentiation the contradictory desire to be part of a group and simultaneously stand out of the group, affirming their individuality," for contemporary sociologists like Roberta Sassatelli, fashion is "a myth created by the fashion industry and by the cultural intermediaries operating at its borders, along with a system of institutions that form the production and marketing industries" (Sassatelli, 2004). Fashion increasingly becomes a system for creating cultural models that define the life span of a product, whether it's a garment, a gadget or an object of design. The industry invents concepts like "season," "2017 style," or "color of the year." An expiration date is artificially created; it is symbolic, dictated by the "logic of fashion," the superficial and impalpable version of the monocratic logic of a dictatorship.

Although everyone focuses on waste when the life cycle of an object is over, few people think about the premature death of material. In order to sustain the high-replacement rate of goods, with a steady supply of new material, three elements are required: low cost for new products to be ever-more competitive; dramatic reduction of raw material costs; radical cut in labor costs (underpaid, automated, delocalized workers). If we think about it, we understand that the process of obsolescence is highly pernicious because it unnaturally increases waste, drives extraction and has a negative effect on society on a socio-economic level.

1.2.4 Measuring the Impact for New Emerging Economies in Europe

Until 2012, there were no studies on the value of introducing a circular model into real economy. From an economic point of view, it is difficult to quantify the value for companies that have embraced this model nor is it easy to define a circular enterprise or a circular region. What makes a business truly circular? Is it enough to recycle and reuse the waste? Is it enough to create a business line where the product becomes a service? Or is it the practice of life-extension, extending the life of products?

Since describing a circular enterprise is a difficult task, let's take a look at some existing literature. The first report published on the topic — which we consider to be the most relevant as does the Stern Report on the negative externalities of climate change — is *Towards the Circular Economy, vol. 1: An Economic and Business Rationale for an Accelerated Transition*, presented at the 2012 World Economic Forum in Davos by the Ellen MacArthur Foundation. The text stresses how a circular economy could save European manufacturing alone more than "600 billion euros per year, starting from 2025" (considering a reasonable time to fully introduce the model). However, the report analyzes only five key sectors, which represent less than half of the European manufacturing GDP. As a matter of fact, savings could be roughly estimated to be at least double.

In the most recent version of the report, made in collaboration with the McKinsey Center for Business and Environment, entitled "*Growth Within: A Circular Economy Vision for a Competitive Europe*," new estimates have been added.

The transition from a linear to a circular model could actually allow an 11% growth of European GDP by 2030 (7 percentage points higher than the growth allowed by the linear model), a 48% reduction in emissions (which could rise to 84% by 2050) and an increase in household income of 18%. If it grows steadily over the next five years, the circular economy could generate 450 million euros in savings on material costs, create 100.000 new jobs and prevent 100 million tons of waste from going to landfills globally, because in these five years companies will concentrate on promoting the formation of "circular" chains to increase the rate of recycling, reuse and regeneration of raw materials.

For China, the world's leading manufacturing country, the circular economy model presents immense opportunities. According to data collected by the Dutch Embassy in China (through a bilateral co-operation programme), the country could have assets deriving from metal waste for more than 50 billion euros, while other 10 billion could be generated by urban solid waste (Lacy, 2016). For this reason, Xie Zhenhua, Minister for the Environment and Chinese negotiator at UNFCCC, the United Nations Framework Convention on Climate Change, drafted a fifty-year plan to build a circular economy model to maximize resources and minimize pollution. To this end, 1,1 billion euros have been mobilized for technological research, while a circular economy plan will be included in the Intended Nationally Determined Contributions (the goals of emissions reductions linked to the 2015 Paris Climate Agreement).

Also the *Bel Paese* is at the frontline. According to the report *Italia in 10 Selfie (Italy in 10 Selfies)*, by the Symbola Foundation, Italian companies are at the forefront in Europe for environmental innovation, efficiency of consumption and reduction of CO_2 and Italy is an optimal candidate to enter into the circular economy. "Compared to similar conditions of production, according to the research, our companies use less energy and produce less emissions by doing even better than great manufacturing countries like Germany. We are the first in Europe in industrial recycling: we recover 25 million tons of matter every year out of a total of 163 tons in Europe." (Symbola Foundation, 2017). As a starting point, Italy could greatly support Green Public Procurement, strongly linked to the design, ecodesign and labeling guidelines that are mandatory for public administrations. That is, an obligation to buy products derived from circular economy models if such products are destined to the public administration. Which outcome might an initiative like this generate? We don't know because there are no data. However, it could be a major strategic leverage to increase the creation of specific designs for a circular economy like, for example, the Trentino Province has done with *Progetto Manifattura (Manufacturing Project)*, which has realized the first circular economy district in Italy.

Today the circular economy as an industrial process linked to associated phenomena (social enterprise, industry 4.0, sharing economy...) is in a post-birth phase, and is heading towards adolescence and there is still a long road ahead. The scope of transforming material streams from a geopolitical point of view, the commercial and legal impacts of a product or a service (from private property to shared property), the numerous complications associated with the extension of the life of matter (a criticism of fashion, revision of the laws on warranties for goods), are all phenomena whose impact in the medium-long term are unknown.

The heterogeneity of the final results is a recognized problem for those who think and operate with great levels of complexity on a global scale. How can we be sure that the infinite facets of a circular economy are all positive? Reducing dependence on Malaysia plantations could mean an increase in poverty and unemployment in those areas. If carried to the extreme, product as service may turn out to be budget-neutral for a company. An excessive informalization of the sharing economy (product-like service) is already having heavy consequences within regulated and corporate sectors such as hotels and taxis. If we want circular economy to grow, we need to research and study, which is the aim of the RETRACE Project and of this volume. How is a circular, sustainable economy genuinely oriented towards environmental social justice, taking into account all possible outcomes, even the most unexpected and surprising ones? Much research is needed at every level, with the involvement of a large audience as well as private research centers, possibly supported by the work of investigative journalists who are specialists in circular economics.

Equally necessary is the good will of administrators and managers who are not charmed by easy slogans, and accurately pursue and carefully trace the flow of primary material in their area, following the best cases available and work in a reticulate manner. The future is certainly challenging and complex, but the beauty of progress and the growth of human consciousness lies just in that.

[1] Dame Ellen Patricia MacArthur is a retired English sailor, world record for the fastest solo circumnavigation of the globe, and founder of the Ellen MacArthur Foundation, a charity that works with business and education to accelerate the transition to a circular economy.

[2] Edizioni Ambiente, 2016. Soon to be translated in English.

[3] This is mentioned as a Good Practice by the RETRACE Project, during Field Visit 5 in Slovenia.

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1.3 The Transition of European Countries Toward a New Economy and the Role of Regions

TIZIANA DELL'OLMO

European Countries and Regions are actively engaged in promoting the adoption of the model of circular economy, as the cases of territories involved in RETRACE clearly show. Regions play a key role especially in implementing policies and coordinating actors on a local level and are in the best position to identify and tackle the main challenges, many of them calling for inter-institutional policy responses at all levels.

1.3.1 THE APPROACH TO CIRCULAR ECONOMY FROM NATIONAL TO REGIONAL LEVELS

The circular economy paradigm calls for cooperation, coordination and integration amongst policies at every levels, institutions and public/private stakeholders, economic sectors. It also needs awareness and engagement of several concerned actors: public institutions, economic operators and civil society.

High level design and priority setting for circular and green economy have been largely established. Thus, today the main challenge is a concrete deployment on the ground, which is a key competence of Regions.

For this reason, Regions play a key role in effectively promoting a circular economy. Even considering the different institutional assets across EU Countries, Regions support the implementation of EU and national strategies, laws and regulations. They are charged of framing and implementing a wide range of policies, for example in the fields of innovation, growth, environment, education, social inclusion and health. In some cases, they have legislative and regulatory power to enforce their missions. They often are responsible for the management of EU Structural Funds, boosting innovation and resource efficiency. Above all, they have a deep knowledge of local territories and their potentials; as such, they are in the best position to create favourable framework conditions, deploy targeted policies, mobilise regional stakeholders and boost synergies between economic sectors.

All EU Countries and Regions are setting policies and actions to boost circular economy and meet EU targets, turning environmental challenges into growth opportunities. This requires a cross-sectorial and inter-institutional approach, and efforts in aligning programmes and funding and in coordinating policies and actions at all levels. An overview of what is going on in the territories involved in the RETRACE Project offers a good example of these efforts and of the concrete steps taken by the Regions.

In ITALY, the new National Strategy for Bioeconomy (BIT) (Agenzia per la coesione territoriale, 2017) aims at improving the sustainable production and quality of bio-products and at interconnecting and leveraging the concerned sectors more efficiently.

Better coordination between stakeholders/policies, tailored market development actions, investments in R&I, spin offs/start-ups, education, training, and communication to consumers will support goals achievement. Action plan includes the definition of a coherent legislative framework and set of standards, the creation of a bioeconomy marketplace and the development of a database to collect and share data, showcase industrial symbiosis, and technological innovation and best practices.
The National Plan for Industry 4.0 (Ministero dello Sviluppo Economico, 2017) also supports circular economy through targeting bio-based economy and including resource efficiency and reduction of wastes among its objectives.
In order to orient the public demand, the National Action Plan for Green Public Procurement (Ministero dell'Ambiente, 2017) fixed "minimum environmental criteria" for public procurement, which have been included also in the new Public Procurement Law.
Other relevant national policies are those for the recycling of raw materials and for promoting remanufacturing activities, in relation to EU regulations, such as the Regulation on end-of-life vehicles and the Regulation on ship dismantling and recycling, the "steel action plan" that promotes the production of steel from scrap, and policies addressed to the recovery and re-industrialisation of polluted or contaminated industrial sites.

PIEMONTE, which hosts some of the main global industrial players in the area of biofuels and bioplastic as well as in the agrifood industry, is launching, in the framework of its ERDF ROP and in coordination with the National BIT Strategy, a Bioeconomy Platform scheme, which will support R&I, investments and coordination actions aiming at developing bioeconomy and creating/consolidating value chains among regional agricultural, food and industrial sectors. Circular economy is explicitly foreseen as the model to be implemented.

Green Chemistry and Agrifood, the economic sectors mainly concerned by the Bioeconomy Platform, are among the priority sectors identified by the regional Research and Innovation Strategy for Smart Specialization (RIS3),[1] and are part of the Regional Innovation Cluster Policy, together with the Smart Manufacturing, Textile, Life Sciences, ICT and Energy and Clean Tech sectors. The latter has a transversal character, providing for clean solutions and technologies for the other sectors. Circular Economy is one of its priority intervention areas, focusing on recycle and reuse of secondary materials, waste and water management, end-of-life vehicles and the decommissioning of industrial and residential brown sites.
Other regional policies/plans/tools contribute to a new, sustainable and circular model: Regional (domestic and industrial) Waste Plans (Regione Piemonte, 2017); the regional Energy-Environmental Plan, which includes also a chapter on Green Economy (Regione Piemonte, 2016); the regional Price list for Public Works, which includes a chapter on recycled construction materials (Regione Piemonte, 2016); initiatives aiming at training new professional profiles in the field of green economy.

In FRANCE, there are several initiatives supporting circular economy and resource efficiency. Issued in 2015, the law "Energetic transition for green growth" includes a chapter on circular economy as a way to support responsible consumption of natural resources and of primary raw materials and the reuse of secondary raw materials (Legifrance, 2015).

ADEME, the French Environment and Energy Management Agency, aims to support the environmental and energy transition (ADEME, 2017). With its 26 regional divisions, it provides expertise, support and funding for research and innovation projects; it also support projects, from research to implementation, in the following areas: waste management, soil conservation, energy efficiency and renewable energy, air quality and fight against noise.
In order to stimulate local communities in pursuing virtuous development models, managed by ADEME, two dedicated labels have been introduced: ZGZD (Zero waste territories), to support mobilisation of all local actors in an exemplary participatory approach to promote circular economy, and TEPCV (positive energy territory for green growth), where the communities commit to reduce their energy needs (Ministère de la Transition écologique et solidaire, 2017). Moreover, the National Industrial Symbiosis Programme (NISP) supports the generation of cross-sector supply chains, reusing underused or undervalued resources and previously wasted materials, energy or water, and strengthening competences and skills (PNSI, 2017).
Other national policies, such as the "Usine du futur" (Factory of the Future) Plan, supports circular economy, for example through targeting the design of eco-efficient and sufficient models and new human centered organizational model for manufacturing processes (L'usine du futur, 2016). Finally, a national institute for circular economy was created in 2013 to promote the circular economy model.

The NOUVELLE AQUITAINE region is actively engaged in circular economy. Besides taking part in national programmes, it also defined its own regional roadmap with 20 key actions divided in four areas: waste and recycling; eco-design and economy of functionality, industrial and territorial ecology and a cross section. Among the actions promoted: Recita (Recita, 2017), a digital participative platform for spreading good practices and information; the Regional Observatory of Waste; the Circular Economy Committee; the Analysis on the Life Cycle and Ecodesign and identification of priority sectors; identifying synergy of all actions carried out on the territory; supporting professional and vocational training.

Among the initiatives launched in SPAIN, it is worth mentioning the new National Framework Programme for Waste Management (Ministerio de Agricultura, Alimentación y Medio Ambiente, 2016), approved in 2016, which gives orientation and directives to efficiently manage all kinds of wastes, thus supporting the circular economy model.

The BASQUE COUNTRY supports the circular economy through various strategies and plans, such as the Environmental Framework Programme 2020, the EcoEuskadi Strategy 2020, the Eco-efficiency Programme, which led to the creation of the Basque Ecodesign Center, and the Waste Prevention and Management Plan 2020, which adopts a circular economy approach.
IHOBE, the regional Environmental Agency, fosters the adoption of circular economy by public and private stakeholders, through the management of different grant programmes for the support of investments and demonstration projects leading to more eco-efficient industrial processes.
In particular, the support programme for *Demonstrative Circular Economy Projects in the Basque Country* was launched with more than 36 projects presented to date (IHOBE S.A, 2017). The aid has been in force for three years and thanks to its good reception, the governmental authorities decided to multiply its budget by five.

Circular Basque (Circular Basque, 2017), promoted by Innobasque, is a network of organisations that are committed to promoting and implementing a circular economy in the Basque Country. It aims to encourage the development of new innovation models and a forum for raising awareness about initiatives that are taking place in this field and sharing the latest news.

Regarding BIZKAIA, the County Council has launched, together with other agents, the project *Circular Bilbao Bizkaia*. The objective of the project is to carry out an investigation of the economic particularities of Bizkaia, with the aim of identifying sectors in which to develop circular economy projects together with companies of the territory. At the end of the project (fourth quarter of 2017) six pilots will be developed. The *Circular Bilbao Bizkaia* project involves the main Basque agents related to business and entrepreneurship, circular economy and sustainability, specifically: The County Council of Bizkaia, The Bilbao City Council, The Environment Cluster Association and Ihobe.
Finally, the County Council of Bizkaia and the regional actors who work closely with municipalities and local companies are developing a joint project to identify and properly direct the detected opportunities regarding circular economy.

The national S3 of SLOVENIA includes a sub-area named "Networks for the Transition to Circular Economy" (Government Office for Development and European Cohesion Policy, 2015), which aims at establishing new value chains and business models for the transition to circular economy, by connecting all relevant stakeholders — business entities, education and research system, non-governmental organisations, the state and civil society. In order to accomplish these objectives, it has fixed the targets for 2023: to raise the material efficiency index; to establish 5 new value chains with closed material cycles, to identify the areas and technologies — technologies for sustainable biomass transformation and new bio-based materials; technologies for the use of secondary and raw-materials and reuse of waste; production of energy based on alternative sources.
In the context of the national S3, a new policy on Strategic Research and Innovation Partnerships (SRIP) has been recently launched, with the aim of supporting the generation of appropriate value chains in 9 areas (Štajerska Gospodarska Zbornica, 2017). Circular economy has been identified as one of these areas, though it is expected to be reflected in all 9 Action plans, which are currently under development.
In 2015 the government adopted a framework programme for a transition to a green economy and a related action plan for 2015–2016, which incorporates and coordinates initiatives in all relevant policy areas and puts a special emphasis on circular economy (Republic of Slovenia, Government Office, 2017). The document sets up a "Partnership for Green Economy", coordinated by the Prime Minister's Office, where regional stakeholders meetings/consultations are being conducted with the aim to identify the regional potentials for circular economy. The government hold a special session on Circular Economy with a lecture by Mr. Janez Potočnik, former Commissioner for the Environment, responsible for the preparation of the first CE package in 2014 (Republic of Slovenia, Government Office, 2016).

The Slovenian Government is also being active on an international level. In 2016 it became a member of the CE 100 initiative organised by the Ellen MacArthur Foundation in the Governments and Regions Program whose aim is to improve the level of knowledge of the civil servants as well as the key players to better support the transition into circular economy. In addition, Slovenia participates in the Partnership for Circular Economy in the framework of the EU Urban Agenda and aims to become a circular hub under the related World Economic Forum initiative.

In ROMANIA circular economy is not directly targeted by national strategies and plans, but by the transposition of EU directives such as the Waste Framework Directive or the National Waste Management Strategy which promote resource efficiency and waste recycling/reuse, thus introducing a favourable legislative framework for circular initiatives. Other initiatives go in this direction, such as the Ecodesign National Network (Centrul National Productie Consum Durabile, 2017) and the Zero Waste Romania Network.

The NORTH-EAST REGION offers strong potentialities: industrial agglomerations and clustering initiatives, that can be considered as preconditions to enable circular economy adoption and establish regional value chains; universities and higher education institutions specialised in the most important regional economic sectors which prepare highly qualified competences, and a high number of companies engaged in product and process innovation. In order to foster transparent processes, the Regional Operational Programme, within the SME's support measures, has fixed selection and award criteria for the use of RES, on energy and resource efficiency, on reducing waste at the source and increasing the degree to recover and recycle waste (ADR Nord-Est, 2016).

1.3.2 CHALLENGES AND OPEN ISSUES FOR CIRCULAR ECONOMY

A prominent challenge for the success of such a collective effort and the adoption of circular economy model at a large scale is to make circular economy attractive for both businesses and consumers, while encouraging eco-friendly changes in the behaviour of multiple levels of society. This implies the capacity of the EU, national and regional policymakers to create favourable framework conditions and a wide range of policy actions, which in turn requires an open dialogue between policy levels, policymakers and stakeholders.
The RETRACE analysis focused on some relevant economic sectors of the Regions involved, such as agrifood, wood/furniture, biobased/biotech industries, biofuels production, metallurgy, automotive, electrical equipment, construction, textile and paper industry. As a consequence, a number of recurring issues arose also from the dialogue with regional stakeholders. Although most of them have been acknowledged and targeted by existing policy documents and many actions have already been undertaken, they still represent open matters that require a shared debate. Furthermore, a continuous exchange of practices among Countries and Regions, together with inter-institutional dialogue, could support coordinated and effective inter-policies responses to these issues.

A Clear, Coherent and Circular-Friendly Legislative and Regulatory Framework

A pre-condition for industry to undertake investments in the field of circular economy is the existence of a stable, clear and coherent legislative and regulatory framework.
Thus, conflicting or inconsistent objectives, requirements in the legislative framework and the lack of EU standards are a main concern hampering industrial initiatives.

Some key issues preventing the exploitation of potential wastes and byproducts concern, for example, the conflict between the waste legislation and the REACH Regulation on chemicals clearly needs to be faced at a EU level in coordination with Member States; the End of Waste process and its application within differing national legislations leading to different legal environments; a somehow unclear distinction between wastes and byproducts, which in turn implies the application of different legislative frameworks; the lack of official product quality and safety reference standards for products made from recycled materials.

Legislation can also be a powerful policy instrument to boost circular economy, for example, by setting rules and standards for the ecodesign of new products, to increase durability, reparability, ease of reuse and recycling and use of biomaterials (European Commission, 2017); or by establishing targeted incentives and tax reductions to compensate higher production costs in circular processes.
Simplifying and clarifying the legislative framework, promoting its smooth and homogeneous application throughout Europe, setting standards and incentivising rules would largely support circular industrial initiatives.

Building Value Chains Based on Circularity

Moving from sectors to systems by building value chains to reuse wastes and byproducts is a key factor to deploy circular economy model, especially at a regional/local level, and it is also an area where Regions can play a key role. Establishing locally rooted value chains means adding value to local resources and increasing quality employment; moreover, involving local communities in such an innovation process can increase awareness on territorial potentials and proudness on local capacities, thus leading to positive social effects.

In this respect Regions are already providing support, especially in promoting networking and coordination among value chain actors, R&I and investments measures to exploit local circular potentials.

Some major challenges have been clearly detected. Building value chains entails the identification of the resources that need to be employed and the connection/coordination of suppliers and users while ensuring stability in the supply and profitability for all participants. This means appropriately organising the supply chain and filling possible gaps, for example through intermediary actors managing the collection of byproducts/wastes and the delivery to users. Some supply chains have already been established, but others (especially those related to agriculture) need a strong support through flexible policies allowing the combination of different funds and measures.

There are also some critical points that go beyond the regional level and scope. Ensuring stability in the supply can be a critical issue, especially in the case of agricultural byproducts and wastes that can be affected by seasonality and other variables.
Moreover, when the demand increases in order to feed large industrial application, the question of ensuring the appropriate critical mass becomes a key challenge. On one hand, this can also lead to competition for resources; on the other hand, the question of value chains dimension rises: how to guarantee an appropriate supply chain while avoiding adverse environmental and market effects?

Last but not least, there is the issue related to global value chains. Global markets put a strong competitive pressure on some materials, which frustrates the circular processes and feeds a huge phenomenon of import-export of wastes. Reasons and dynamics differ depending on the sectors involved and in the majority of cases they cannot be counterbalanced by local/regional policies or initiatives at a higher level. Nevertheless, some coordinated actions could be undertaken at different levels, such as setting favourable regulations and incentives, investing in new treatment plants, strengthening competences.

Boosting the Demand

The success of the circular economy paradigm largely depends on the demand, which includes not only final private consumers, but also companies using raw materials and public administrations in a procuring role. Therefore, boosting the demand means to understand the reasons of an insufficient demand and take appropriate actions.

Awareness on the importance of sustainability is constantly rising within society and environmental considerations play a growing role on consumers choices. However, the cultural gap based on scepticism and mistrust towards products made from recycled materials or wastes needs to be overcome; at the same time, the quality and safety of products with affordable prices need to be ensured in order to attract all segments of consumers.

A large use of secondary raw materials in production processes is a key factor to widen the market; nevertheless, the demand of companies is still weak. Generally speaking and once more, reasons can be found in the lack of awareness and information and in higher prices of secondary materials compared to raw ones, though specific limiting factors may differ and should be analysed according to each economic sector.

To face such a multifaceted matter, policy responses need to be deployed at different levels (EU, national and regional) and through a more proactive attitude of the public administration.
Information campaigns on circular economy play a key role, especially towards the general public, in raising awareness and increasing trust. Involvement of trade associations in targeted actions to increase companies' awareness could have a multiplier effect.

Setting favourable rules and standards, simplifying the legislative framework and introducing incentives to promote the use of secondary raw materials are other examples of effective policy measures.

Support to R&I targeted measures may help in developing advanced technological solutions to lower costs and increase quality of secondary raw materials and products made from recycled materials.

Public administrations can play a key role in boosting the demand also through a procurement policy, by largely introducing environmental requirements including the use of recycled materials when purchasing goods and services. Making more use of innovation and pre-commercial public procurement could also integrate traditional R&I measures and foster the development of new and more performing products.

Such an increased public demand could create a cascade effect, leading to a widened offer and to lower prices, which in turn could raise the interest of more segments of final consumers.

Exchange of practices that have proven effective could support public administrations in identifying and deploying targeted policy actions for their territories.

Filling the Gap between Scientific Feasibility and Industrial Application

A considerable part of R&I funding granted by the EU, Member States and Regions has been addressed to investigate the potentials of transforming wastes and byproducts into new and value-added products. In many cases, scientific feasibility has been demonstrated and pilot technological solutions delivered, but the transition towards an industrial application at large scale often fails.

Reasons can range from difficulties in building a reliable supply chain (which means ensuring the supply of appropriate quantity of wastes and byproducts with a consistent quality) to expensive transformation processes leading to higher prices of derived products (a particularly crucial issue for biobased products), to regulatory barriers (for example the lack of standardisation for secondary raw materials), to global market conditions and an insufficient demand.

Filling the gap between scientific feasibility and industrial application is not an isolated issue as it is somehow embedded in other questions that have been raised. Hence, related policy responses should be taken at the pertinent level.

It should be noticed that successful stories do not necessarily need large scale applications; for example, many small initiatives built around local needs and problems work very well and do not need to evolve towards bigger scales. This is often the case of initiatives creating local networks to reuse local agricultural and/or industrial biowastes. Other examples can be found in small entrepreneurial initiatives developing high quality products for small market niches. In these cases, supporting the replication of successful initiatives can be an effective policy response.

In order to promote replicability and scalability of initiatives, a key role can be played especially by incubators, circulating ideas and experiences and supporting startups and new businesses.

Flexible Policies

All the above issues call for tailored responses. A matter which clearly arises from the RETRACE analysis is the need for a responsive policy framework, able to quickly apply a set of instruments and administrative rules to emerging needs, a particularly crucial issue for circular economy process due to its complexity and cross-sectorial character.

A clear example is the support to the generation of circular value chains, which requires policy measures allowing a combination of actions and the cooperation between different actors from different sectors; in some cases, integration of different funds could be necessary.

Nevertheless, adjusting or even redesigning existing policy measures can be a very problematic issue, due, for example, to rigid regulatory frameworks and administrative rules not allowing (or setting complex and time-consuming rules for) the combination of different funds, or the integration of new kind of actions and new types of beneficiaries. Having in mind this issue when setting legislative, regulatory and policy frameworks would be a good starting point for future circular-friendly actions.

1.3.3 The Contribution from the RETRACE Project and the Regional Action Plans

The actions carried out in the framework of the RETRACE Project during the first year included an intensive exchange of practices and a territorial and policy analysis based on the Systemic Design methodology,[2] with the aim of identifying local potentialities and gaps that need to be filled in order to generate and consolidate value chains and industrial symbiosis. Input/output flows in selected subsectors, size and characteristics of economic sectors concerned, availability of technological knowhow, existing policy instruments were considered and assessed, in cooperation with regional stakeholders, that were involved in both the exchange and the analysis.

The role of stakeholders is a particularly distinctive element of the RETRACE approach; their contribution is essential in identifying the most promising circular potentialities, connecting competences and sectors and designing future actions within a true bottom-up process.

As a consequence, the results of the analysis and the exchange of practices will help to establish Regional Action Plans in each of the RETRACE territories, with the aim at improving policy instruments targeted by the project. This is the impact expected from the RETRACE Project plan although the large scope of the analysis and its holistic approach have initiated a mobilisation and cross-fertilisation process that could lead to opportunities of policy improvement that go beyond the scope of the project.

If such an unexpected positive effect actually takes place, it will prove the validity of the RETRACE methodology in connecting different stakeholders, supporting the coordination of different policies and contributing in raising awareness on circular economy.

[1] RIS3 (or S3) are regional innovation strategies identifying R&I investment priorities to enhance productive capacities and increase competitive advantages of the regions; S3 are a prerequisite in order to receive funding from the European Regional Development Fund (ERDF). Available http://s3platform.jrc.ec.europa.eu/ (Accessed 25th April 2017)

[2] See Chapter 4, RETRACE Project's Methodology.

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1.4 Evolution of Interreg Europe Projects on Circular Economy

MARJANA DERMELJ

The Government Office for Development and European Cohesion Policy (GODC) currently participates in two Interreg Europe projects, focusing on circular economy. This involvement stems from the Interreg IVC Programme of which GODC was partner in the Cradle to Cradle Network (C2CN) project, whose aim was, among others, to inspire actions towards a more recycling society. Since its inception, the Interreg IVC Programme has the new insights on the resources scarcity and importance to address this issue had emerged globally and led to the changes at the EU policy level. This change was also reflected in the scope of the Interreg Europe Programme, which puts more emphasis on the resources efficiency issue as demonstrated by the higher number of projects focusing on circular economy.

1.4.1 Circular Economy: Beyond the Terminology

When assessing the success of the Interreg Europe Projects as well as the circular economy, one of the challenges is to prevent "circular economy" becoming just another buzzword, keeping us in a comfort zone of doing business as usual in spite of jeopardising the quality of living of future generations, as Emanuele Bompan well explains in chapter 1.1.

In 2015 the Office for GODC was invited to take part in the two Interreg Europe Projects focusing on Circular Economy.[1] We are quite honoured and happy to see that the debate and actions on circular economy have gained *momentum* in the past years since our first project fostered by the Interreg IVC Programme.

One of GODC's main tasks is to coordinate the preparation of the National Development Strategy to 2030 that will adequately address circular economy.

1.4.2 A Retrospective from the Interreg IVC Programme

We could actually argue that the story of circular economy in Slovenia started with the involvement of the current GODC during the C2CN Project that was supported under the Interreg IVC Programme, within the Fast track capitalisation network.[2] The distinct feature of the capitalisation projects, including the Fast Track Projects, were specifically on transferring regional development good practices into structural funds mainstream programmes. The Fast Track projects also benefited from the additional expertise of the European Commission and a close collaboration of their representatives during the partners events. In addition to the Interreg IVC Programme, another project related to the Cradle to Cradle (C2C) principle was supported under the Interreg IVB Programme.

The project started back in 2008, when the European Commission encouraged the Dutch Province of Limburg to cooperate with other European regions on opportunities and conditions for enabling European goals such as jobs and growth, innovation and an efficient use of scarce resources (INTERREG IVC, 2010). Consequently, the Province of Limburg proposed the C2CN project, which started in 2010 and lasted for 2 years. The project connected 10 project partners from 10 different Member States who differed in their knowledge of C2C. The Province of Limburg was lead partner of the project, which aimed at reducing the use of raw materials, generating less waste and environmental pollution as well as enhancing innovation and economic development. Additionally, the activities implemented during the project aimed at inspiring actions towards a more recycling society. The overall objective of the project was to develop regional action plans, reflecting the principles of the C2C concept, systematising its regional interpretations and setting out how good practices critically assessed by the network could be implemented within regional mainstream Structural Funds Programmes (INTERREG IVC, 2010).

The project was implemented during two phases. During the first one, the partners mainly focused on transferring the good practices that had already been identified while the main activity during the second phase was focused on preparing regional actions plans. Their development was supported by both regional and collaborative activities: meetings of experts and perspective studies on each of the four predefined thematic target areas (industry, governance, building design and spatial development) as well as workshops to transfer good practices into action plans.

In the framework of the project several meetings were organised and publications were prepared. These latter provided the theoretical background for the work of the partners. The most fundamental publication was *C2C: Theoretical Framework*, which set the common language for the network partners and their stakeholders. The framework helped the partners and their stakeholders to select good practices and it proved to be useful in preparing regional action plans. The document focused on a general description of the C2C theory, stressing the importance that, "C2C is not a waste management concept but a radical innovation in a business context that aspires to get rid of all negative environmental impacts associated with human activities, including waste" (Stouthuysen P., le Roy D., 2010). The theoretical framework helped to put in relationship the C2C concept with the four target areas of the C2CN project, i.e. building design, governance, spatial development and industry along with an inventory of the target area specific principles that were inspired by the C2C concept and its general principles.

The theoretical framework was backed by four perspective studies in the four focus areas and each of them looked in more detail at the application of C2C principles in specific areas. These studies served as a basis for the future work of the project partners and aimed to reflect current challenges and opportunities associated with implementing a C2C approach in each specific focus area. Partners tried to consider actual delivery of the C2C philosophy and reflected on both its theoretical and practical implications rather than comparing C2C with other approaches in the broad area of sustainability. The perspective studies were informed, among others, by thematic seminars organised in the frame of the project.

In the perspective study on Industry, the authors pointed out that the C2C production processes focus on far reaching recycling possibilities and the safety of materials, which on one hand improves the efficiency of resources and, on the other, the competitiveness of the business. The document also refers to the product-services systems and provides an insight into the state-of-the-art as well as future developments on how the C2C approach can be applied to the industry. The perspective study on Buildings indicates that the application of C2C principles on construction requires an extremely high level of ambition and holistic considerations, therefore, results cannot be achieved immediately or as isolated elements. The perspective study on Area Spatial Development underlines the fact that waste, raw materials, energy and wastes cycles are being incorporated into the design of the developing areas that is linked to employment possibilities and the integration of local inhabitants (Vezzoli C., Orbetegli L., Cortesi S., 2010). This description interestingly resembles to the concept of the Systemic Design which is the subject of the RETRACE Project. The study also introduces the so-called Limburg principles[3] that the project partners modified[4] and used as guidelines throughout the project, also when selecting the good practices. The perspective study on Governance recognises that applying the C2C principle requires besides the knowledge on how to better close the loops of material use, also how to (en)close a circle of actors around these flows, operating on different parts of the production and consumption cycles. The governance requires new tasks and competences for government bodies at various levels, as well as for other parties involved; each actor has to establish new relationships which will eventually change their communication and management practices.
The theoretical part of the project represents a cornerstone for the selection of good practices. Altogether the partners and their regional stakeholders identified numerous projects from which more than 150 were collected in the C2CN Initiatives Guide (Sips K., Kuppers P., 2011). In the selection process, project partners faced a dilemma: to include less cases which were closer to the ideal C2C concept or to include a broader range of practices, thus giving a better idea of the variety of C2C and its potentialities. Arguments for including broader number of cases prevailed while at the same time partners decided to illustrate the limits of each case. The key interface between the selection of the good practices and the preparation of the Regional Action Plan for Slovenia was the selection procedure of good practices (GPs) that the stakeholders considered relevant for Slovenia. During this process, 18 good practices were identified. Eventually, not all good practices were included since the transfer process had to be optimised. In the transfer process it became clear that, the public institutions are crucial as their interest in transferring the particular GPs with their financial commitment. At the end of the selection process in Slovenia, four clusters of good practices were selected:

- Cluster "Supporting the development of the closed-loop economy system (CLES)";
- Cluster "Eco-design";
- Cluster "Wood value chain";
- Cluster "Closed-loop food chain" (Dermelj M., Rosegger R., Tantrow T., 2011).

Under each cluster the Regional Action Plan provides an introduction followed by proposed actions and identified actors, a timeline for the implementation and the budget. The main barrier that prevented implementing the proposed measures was due to the fact that when the RAPs were drafted, the funds available for the projects under the 2007–2013 perspective had already been allocated in Slovenia.

Therefore, there was no more time left for proposing measures established by the action plan. Despite the fact that several civil servants from relevant ministries were involved to a certain extent in the process of the RAP writing, it became clear that a stronger political leadership was necessary for the successful implementation of the proposed action. I believe the challenge still remains under the current Interreg Europe Programme. Nevertheless, some successful results could be attributed to the project implementation. The main benefit has been that the number of civil servants and other stakeholders who have become more familiar with the C2C concept has increased significantly. The project activities that contributed the most to this increased awareness were the various public events organised in the framework of the project with speakers from the prominent organisations (e.g. EPEA, Biennale of industrial design) and companies (Philips, Desso, etc.).

The field visits, which have given us the opportunity of inviting various stakeholders, have proven to be an important element. For example, one stakeholder who took part in the field visit where Bo.Mo (a wood chain project) was presented, is now head of the newly setup InnoRenew Centre (a good practice that was presented during the field visit within the RETRACE Project in May 2017), which is jointly supported by the EC as well as the Slovenian government. In a similar way, one stakeholder, who represents the waste management utility from Ljubljana Snaga, participated in the field visit in which Van Gansewinkel (now Renewi plc) presented their business model change based on following the the C2C principles. In 2015, Snaga finished the construction of a new waste management facility, funded by the Cohesion Fund, signed the Zero Waste Policy and Ljubljana become EU Green Capital in 2016. In both cases of course though it is not possible to establish a direct link between the field visit and the further developments, part of the results could be attributed to the fact that the stakeholders were involved in the implementation of the Interreg IVC project.

At a project level, partners jointly prepared the guide on C2C, *Beyond Waste Management*. This volume, as well as the C2CN policy recommendations, describe how to head towards a C2C future. Four are the major pillars of these recommendations:

- create a common framework for an eco-effective society;
- stimulate demand;
- stimulate supply, where the project partners recognized among other elements, the need to ensure adequate funding for the transition towards C2C and suggested the EU to integrate the C2C principle into the Structural and Cohesion funds;
- innovation through partnerships, where the project partners encouraged the EU to play a leading role in stimulating the stakeholders cooperation towards eco-effective innovation.

1.4.3 Present Interreg Europe Approaches

The issue of resources efficiency became an important element of the EU policymaking with the adoption of the Sixth Environment Action Programme (6th EAP)[5] back in 2002. However, policymaking kept focusing predominantly on waste management and waste prevention. This was also reflected in the focus areas of the European Cohesion Policy and Programmes, including Interreg IVC that was supported in the 2007–2013 perspective.

Since then, the new insights on the scarcity of resources has emerged globally leading to changes at a EU policy level. Back in 2011 the European Commission, for example, released two documents that provided the framework for further work on the transition to resource efficiency. The first was the flagship initiative "A Resource-Efficient Europe" (COM(2011) 21), as one of the Commission's seven flagship initiatives under the Europe 2020 strategy. In that same year it was followed by the "Roadmap to a Resource Efficient Europe" (COM(2011) 571),[6] which outlined how European economy could decouple its growth by using these resources by 2050. In the same year, the EC also identified a list of 14 critical raw materials,[7] which was updated in 2014[8] by adding 6 new critical materials. These few references illustrate how the new European Cohesion policy has been preparing itself on the vulnerabilities of the EU economy due to inefficient resources use and is trying to provide space to support solutions leading towards higher resources efficiency.
It is difficult to assess if the C2CN Project has also had an impact on the EU policymaking process, but since the project was implemented as a capitalisation fast track project where the role of the EU officials was more prominent, we can assume that a certain impact of the project implementation was reflected in the adoption of the first circular economy package in 2014 as well as in the Cohesion policy, whose one of the Thematic objectives also refers to resource efficiency (EC. Glossary, 2017).

The new Interreg Europe Programme focuses on four general topics, among which is also the Environment and resources efficiency (in the Interreg IVC Programme, for example, one of the two priority areas was Environment an risk prevention).

At this stage, I believe, that it is premature to discuss how successful the projects on circular economy are under the 1st and 2nd call of the Interreg Europe Programme, since they are all in their initial phases of implementation. However, the analysis of the selected projects under the 1st and the 2nd call itself shows that circular economy is definitely gaining the maturity. Out of the 26 projects approved so far under the Environment and Resources Efficiency objective, seven focus on the circular economy,[9] three[10] focus on the area of resources efficiency, and two[11] on waste management. This is a significant step forward if compared to the Interreg IVC Programme that has supported five projects on waste management, out of which one project has focused on the C2C concept and another on recycling in the regions.

The following brief analysis of the currently approved projects focusing on circular economy shows the relative diversity regarding the topics they address:

- Industrial Symbiosis as one of the most important pillars in the circular economy;
- Small and Medium Enterprises inclusion in the circular economy with the final aim to improve effectiveness of the policy instruments addressed by the project partners in this area;
- Improve the knowledge related to circular economy focusing on the cycle of biological streams and bioeconomy;
- Work on the most relevant economic sectors in the regions, identifying opportunities to develop CE as well as barriers, hampering their development;
- Improve the adoption of EMAS among businesses as one of the drivers of circular economy;
- Promote Systemic Design as a method allowing local and regional policies to move towards a circular economy.

The analysis of the projects focusing on circular economy that are approved under the Interreg Europe Programme shows a broad partnership structure, since partners come from almost all EU Member States and partnering organisations are very different among each other. Most come, as expected, from the public sector, however there are also partners representing institutions supporting business, educational and research institutions. The variety of the collaborating institutions assures that the experiences achieved in the transfer process will have a stronger impact and enhance the knowledge on specific aspects of the circular economy aspects covered by the individual projects.

One key and most valuable activity entailed in the projects is the identification of the good practices aiming at transferring knowledge to partner regions although a systematic organisation of information about the good practices identified by the projects selected under the 1st call is not available, yet. Hence, it is not possible to evaluate thoroughly their scope, diversity and the extent to which they were transferred. Nevertheless, the work carried out so far in the context of the RETRACE Project shows that there are numerous initiatives and projects in the regions that deal with the transition to a circular economy. It is difficult to compare particular practices since not all countries or regions started the journey towards a circular economy before others. Thus, more advanced good practices should be considered as a model for the stakeholders in the other regions to develop new solutions for supporting the transition to a circular economy.

As already mentioned, we still need to consider what impulse these projects will give to the Managing Authorities and other responsible public actors to integrate the outcomes from the action plans into their decision making process. With regard to the influence on the disbursement/allocation of ESI funds,[12] we need to be aware that some results of the project will only be available after most funds available to the regions will already be allocated.

The Slovenian experience from the implementation of the project under the Interreg IVC Programme shows that it is very important to involve relevant stakeholders into the implementation project in order for them to learn, during the process, about how to integrate the lessons coming from the good practices applied in other regions. Likewise, it is important to involve stakeholders from all three spheres — public administration, business sector as well as non-governmental organisations — since each can see different applications for the same good practice. However, on the other hand the involvement of stakeholders represents a big challenge since a daily work routine often prevents people from engaging in new projects as well as the prospective of the fatigue connected a complex project.

This constitutes an objective barrier that prevents a more immediate impact on the policy instruments addressed.
Therefore, the main criteria to measure the success of the projects should be the extent to which the good practices identified through the projects funded under the Interreg Europe are being transferred and/or mainstreamed at a regional level. Such transfer of course does not occur by itself, since other activities do evolve in parallel and can support or hinder a successful transfer process. Hence, the challenge is defining the immediate impact, which is a consequence of the project implementation and other factors that determined the success of the transfer.

Likewise, it is important to identify potential supporting factors and strengthen them, as well as to single out the factors that can prevent a successful transfer. Additionally, an important factor that can enable a successful transfer of good practices seems to be the participation of research institutions, either as project partners or as important stakeholders.

Eventually, the main challenge is how to appropriately address decision makers as they are the ones who hold the keys that open the transfer or implementation doors. This is also true for decision makers at a local/regional, national as well as international level. Their willingness to listen and learn, as well as being available to explore the possibilities that the transfer of good practices can bring to their environment are the fundamental key for change. As a snowball rolling down a hill becomes huge, once the project recommendations and good practices start being adapted they can have a huge impact on regions.

The new concept of the two-phase implementation approach under the Interreg Europe Programme increases the probability that the results from the regional action plans prepared by the project partners and their stakeholders will be better integrated in the implementation of measures under the current financial perspective or in the documents that will be prepared for the financial perspective after 2020.

[1] RETRACE - A Systemic Approach for Regions Transitioning towards a Circular Economy and SYMBI - Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy.

[2] The project Cradle to Cradle Islands ran between 2009 and the Summer of 2012 and had 22 different partners from 6 countries located in the North Sea area.

[3] 1. Safety and health aspects of materials used; 2. Reusability of materials, e.g. through recycling and composting; 3. Use of 'current solar income' and, additionally, wind and geothermal energy; 4. Water use; 5. Social responsibility.

[4] The C2CN Interreg Project adopts a broader C2C concept, including efforts to close material loops, whether certified or not. Guidelines for practice in this project are articulated in the Limburg Principles, proposed as charter for the C2CN Interreg Project. These principles are: we are native to our place; our waste is our food; the sun is our income; our air, soil and water are healthy; we design enjoyment for all generations; we provide enjoyable mobility for all.

[5] Available http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32002D1600 (Accessed 7th August 2017)

[6] Available http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52011DC0571 (Accessed 7th August 2017)

[7] Eur Lex. (2011) Communication on Tackling the Challenges in Commodity Markets and on Raw materials. Available http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52011DC0025 (Accessed 23rd April 2017)

[8] Available http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014DC0297 (Accessed 7th August 2017)

[9] The projects approved under the 1st call are: Circular Economy for SMEs; A Systemic Approach for Regions Transitioning towards a Circular Economy; Transition Regions towards Industrial Symbiosis; Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy; The Projects approved under the 2nd call are: Regional circular economy models and best available technologies for biological streams; European regions toward Circular Economy; EMAS as a Nest to Help And Nurture the Circular Economy.

[10] The projects approved under the 2nd call are: supporting eco-innovation to reduce food waste and promote a better resource efficient economy; Green public procurement for resource-efficient regional growth; TreAting contamination through NanoremedIAtion.

[11] Project approved under the 1st call is: Interregional Environmental Integration of Waste Management in European Heritage Cities; Project approved under the 2nd call is: Consortium for a Coherent European Landfill Management Strategy.

[12] European structural and investment funds.

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1.5 Elements of Novelty: Designer as Policy-Maker

JOCELYN BAILEY

Design expertise is increasingly understood as relevant and useful in the development of government policy and strategy. Bason and Schneider (Bason, 2014) map the interactions between design and policymaking globally, proposing it as a rapidly developing international phenomenon. In Europe, design agencies have been working with different parts of government for many years now to improve services, and more recently to help develop policies (Sangiorgi, 2015; Cook, 2013). Labs have sprung up in many governments — including in the European Commission — experimenting with new and different approaches to policymaking that draw on design. With the RETRACE Project we see how Systemic Design expertise can be deployed in the development of sustainable European Action plans and policy roadmaps for industrial sectors. This chapter describes the evolution of design and government practice to a point where they now overlap, and discusses the promise, challenges and opportunities for Systemic Design in policymaking.

1.5.1 DESIGN'S TRAJECTORY TOWARDS POLICY

Design is a structured creative approach to innovation and change, shaping ideas to become practical propositions. It is relevant and useful when trying to establish something new — a new way of doing things, a new service or proposition, a new kind of outcome — because its methods and tactics help you learn about the future, and what might work. Although there are many models and accounts of design, most agree that it comprises a particular processual approach (loosely, following a course of alternating divergent and convergent thinking — research and synthesis, creation and critique), and a mindset/attitude to dealing with problems (learning by doing; visualising and materialising ideas; paying attention to different scales — from detail to strategy; thinking abductively).

Policymaking is a discrete (although somewhat ill-defined) activity in government, concerned with strategy and direction-setting. Distinct from the delivery of public services, which are one concrete way of enacting a policy intention (as are laws, regulations, "nudges", incentives, etc.), it's as "upstream" as you can get in government decision-making without intervening directly in politics. Because of that it has a tendency to be removed from real life — and for that plus various other perceived deficiencies, arguments have been made about how design can help governments create better policy.

There is a long history of design being applied to the creation of objects and artefacts. More recently however, some of those same processes used to design buildings and chairs have been applied to more intangible things (like services or experiences), and sometimes dispense with a particular "object" at all and are deployed in the service of an objective or goal (like behaviour change or sustainability). Within design research, there are various accounts of this development. Sanders and Stappers (table 1) demonstrate the shift towards designing for a particular 'purpose'.

A snapshot in time of traditional and emerging design practices	
The traditional design disciplines focus on the **designing of** "products".....	..... while the emerging design disciplines focus on **designing for** a purpose
visual communication design interior space design product design information design architecure planning	design experiencing design for emotion design for interacting design for sustainability design for serving design for transforming

Table 1: From Elizabeth B.-N. Sanders and Pieter Jan Stappers (2008). Co-creation and the new landscapes of design. *CoDesign*, vol. 4, no. 1, 2008.

Reflecting on the development and growth of design over time, Jones (2014) outlines four contemporary domains of design, encompassing traditional design practices as well as socially-oriented practices of increasing complexity:

1. Artifacts and communications: design as making, or traditional design practice;
2. Products and services: design for value creation (including service design, product innovation, multichannel, and user experience), design as integrating;
3. Organizational transformation (complex, bounded by business or strategy): change-oriented, design of work practices, strategies, and organizational structures;
4. Social transformation (complex, unbounded): design for complex societal situations, social systems, policy-making, and community design.

Alongside design's professional development in a commercial realm, there have been actors within the design community arguing against the "modernist project" of serving continual growth and consumer capitalism (for example Victor Papanek, Tony Fry, Ezio Manzini), and movements around design for good, social design, design for sustainability and social innovation have grown out of these radical departures, and different vision for design, of the mid-late 20th century. These have emphasised the participatory, social and democratic nature of design practice.

Taken together, the "social" turn and the "purpose" turn in design have led to an interest within the design community in more actively collaborating with governments and states to serve the public interest. This manifested itself in the early years of the 21st century as an application of service design to public service delivery, and co-design to support the co-production of services with communities. Reports from organisations within or close to government argued for an increasing role for design in the development of public services and policy (e.g. Design Commission 2012; Design Council 2013; European Commission 2013). Examples of such practice come from local, regional and central government (e.g. Hillgren et al., 2011; La Region 27, 2016; Public Collaboration Lab, 2016). The latest development has seen the sphere of policymaking start to be colonised by design. Arguments about design's usefulness in the context of policymaking and managing in government are grounded in the notion that policymakers frequently have to deal with 'complex' or 'wicked' problems:

> The concept of Wicked problems is shared by systems and design theory, as a complex situation that cannot be reduced and analyzed with the techniques of classical problem solving and decisionmaking. (Jones, 2014)

The current surge in interest in design in policymaking is not only attributable to design advocacy and the ambitions of designers. There has been a broader landscape of change in managerial and organisational practices — what Boltanski and Chiapello (2005) refer to as "the new spirit of capitalism" — within which design expertise has become more visible as a capability for public policy. Authors (Boltanski and Chiapello, 2005; Thrift, 2005; Lash and Urry, 1988) track the evolution in managerial practices in the mid/late 20th century towards greater "flexibility", "provisionality" and "anticipation". These characteristics of contemporary capitalism have not left the public sector untouched. In fact a notable feature of neoliberalisation is the steady marketization of all aspects of social life — which in turn has opened the door to design, as a mediator and manufacturer of desire and consent (Julier, 2017).

In the case of policymaking, there is dominant narrative at play at present, that highlights the failures of policymaking in the face of complex societal challenges (e.g. Clarke, 2014), and the need for change. Public servants, politicians and stakeholders seem to continually be seeking new approaches to policymaking. This has led to a range of developments over time, with administrations first shifting to more marketised ways of organizing associated with "New Public Management", then to distributed "networked governance" models (Dunleavy et al., 2005), and lately towards more experimental and open paradigms of public management.

Corsín Jimenez (2013: 381) argues that designerly practices such as prototyping, entangled in the mechanisms of capitalism, are a hallmark of the contemporary condition. He describes an "anthropology of prefiguration [...] built on collaboration, provisionality, recycling, experimentation and creativity." This, he argues, is a new mode of experimentalism. Instead of being a "closed system against which scientists sought a theory's justification" (385), it involves rearranging artefacts and "tinkering" with social relationships in an infinitely open/ended way. Such experimentalism is also evident in public administration, he argues: "In political organisation, the languages of openness and open/endedness, of provisionality and experimentation, are thus taking hold as models for cultural practice" (Corsín Jiménez, 2014: 382). For example toolkits aimed at practitioners in public services such as Nesta's "prototyping framework" emphasise the early testing of ideas when the cost of making changes is low. Advocacy for the use of Randomised Control Trials to test the efficacy of policies and interventions has spread across administrations. The growing emphasis on experimentation prefigures and carves out a space for the use of design in policy development, as a particular mode of enacting organisational flexibility, provisionality and anticipation. These trends have often taken material form in the shape of "nudge" teams and "Policy Labs" in government administrations.[2]

1.5.2 What is the Promise of Systemic Design for Policymaking?

This publication, and the RETRACE Project, are particularly concerned with a particular set of practices within the broader design field, known as Systemic Design. Although systems theory/thinking and design practices have a long history of interrelation, recently there has been a resurgence of interest in the productive confluence of systems thinking and theory, and design

practice. Where design fails in focusing too narrowly on single users and discrete interventions, systems thinking can help. And where systems thinking gets bogged down in theory, the practicality and human-centric focus of design practice can help.

There are various accounts of Systemic Design, developed by key academics and practitioners predominantly in Oslo, Turin and Toronto, and circulated through the Systemic Design Research Network.[1]

> Systemic design is distinguished from service or experience design in terms of scale, social complexity and integration — it is concerned with higher order systems that entail multiple subsystems. By integrating systems thinking and its methods, systemic design brings human-centred design to complex, multi-stakeholder service systems. It adapts from known design competencies — form and process reasoning, social and generative research methods, and sketching and visualization practices — to describe, map, propose and reconfigure complex services and systems." (Jones 2014)

In the case of RETRACE, the focus for Systemic Design is to understand complex industrial systems, and identify the opportunities to transform them into circular systems, where waste (outputs) from one constituent part become the inputs for another. In the "design for policy" landscape, the application of Systemic Design, and especially Systemic Design with a focus on sustainability in particular, is still emergent.

There is as yet limited research on design in the context of policymaking, but there is a reasonable degree of congruence between different accounts, which all discuss design within a logic of supporting or contributing to public sector effectiveness or innovation: improving the ability of governments and their policies to manage publics and issues, by bringing a qualitatively different approach to the process of policymaking.

Christian Bason, in his edited book *Design for Policy* (Bason, 2014), says that "the promise" of design for policy is that it offers a different way of understanding policy problems, due to its hybrid blend of research methods from other disciplines such as anthropology, systems thinking, and data science; it engenders collaboration, and creative collaboration between different parties; and through its artefacts and visualisations it can make policy tangible and graspable. Christiansen and Bunt (2014: 42) characterise the usefulness of design as creating innovation within the policy process by: reducing the distance between policy and implementation; generating new ideas; understanding better the "architecture" of a problem; and providing legitimacy for experimentation. Other authors make similar claims — that design's capacity to handle complexity and non-rational problem solving (Mintrom and Luetjens, 2016: 3), might enable policymakers to "muddle through in a step-by-step manner" (Hobday et al., 2012: 278).

Systemic Design offers a similar critique of traditional policymaking processes. Writing about his experiences of practicing Systemic Design in government in Canada, Alex Ryan (2016) likens the conditions of contemporary government to "white water rafting" (staying afloat and navigating turbulence), but feels that traditional governmental management practices are better suited for gliding through "smooth waters". He proposes Systemic Design as an alternative tactic (Table 2).

Kimbell (2016) similarly notes the opportunity for design expertise to be in "challenge mode" in relation to policy practice. Rather than always adding something to policymaking that is perceived as valuable, it problematises current practice.

Smooth- Water Approaches	Systemic Design
Scientific model of decision making	Designerly from of reflective practice
Assumes objectives can be clearly defined from the top down.	Assumes objectives are ambiguous and contested
Requires statiscally significant data, expert analysis, persistent monitoring and consistent evaluation	Requires thick description, stakeholder participation, prototyping in context, and selective retention
Logical, sequential , convergent , repeatable process	Messy, parallel , divergent, recoverable process
Privileges rigour: " Prove it!"	Privileges relevance: "Show me!"

Table 2: H ow Systemic Design differs from smooth-water approaches.

There are other kinds of argument for bringing a design sensibility to the practices of policymaking. Junginger, drawing on policy design scholars Howlett and Ramesh (2014), argues that policymaking is already a kind of designing, however it is not necessarily perceived as such. This means policymaking tends to be reactive rather than proactive, responding to problems rather than finding, challenging and framing them. Considine (2012) argues that a taking a design perspective in theorising policymaking allows you to foreground the expertise and capacity — the "implicit, heuristic skills" — of experienced practitioners. Most models of policymaking emphasise the process and structural imperatives over the capacities of individuals. By rebalancing the focus to recognise the cognitive processes and skills at work in policymaking — "goal emergence, pattern recognition, anticipation, emotions engagement, fabulation, playfulness, and risk protection" — we can create a more sophisticated account of the policy specialist as designer.

There are however critiques of design — and limitations to its "promise" — in the context of policymaking. Bailey and Lloyd (2016) find that the benefits are not so clear-cut, but are modulated by organisational ways of knowing and performing competence and intelligence. Rosenqvist argues design can only work towards making governance visible, if designers understand the nature and orders of governance. Bason (2014: 6), reflects:

> One could argue that the political, ideological and sometimes abstract nature of public policies make them unfit for design practices which are concerned with that which is attractive, functional and meaningful to people in practice. While the ability to give shape to abstract concepts and ideas is a core design skill, can designers come to terms with the sheer scale, interdependence and complexity of public problems? Can they contribute to the domains of law and governance?

Chen et al. (2016) make similar critiques of design's capacity to grapple with things at scale:

> Two grand modern structures of governance, the state and the market, often stand beside community networks and enter into the very constitution of social problems. Understanding these kinds of complicated linkages is the bread and butter of the social sciences, but designers are still ill equipped to deal with them. If this observation is correct, social design in its current stage may do well at the scale of a village or an informal organization, but its prospects of success are far smaller when it has to deal with the abstract structures of governance typical to late modernism.

So the convergence of design practices and policy settings has received mixed assessments. On the one hand, designerly methodologies are seen as having the potential to improve policy making to address public issues, to contribute to a more accurate understanding of policy processes, and to create more skilful policy professionals. On the other, design's traditional focus on experiences and creative generation neglects deep understanding of systemic contexts, and may feel at odds with prevailing organisational culture and practices.
Systemic Design provides a useful rebuttal to some of these critiques of design's inadequacy. By bringing a more sophisticated conceptualisation of systems, Systemic Design is better able to deal with complexity at the scale of government, and to understand the broader context around a particular policy or intervention. Further, Systemic Design provides a different potential starting point for the development of policy, through the process of problem finding by system mapping. Opportunities for intervention and innovation are allowed to emerge from a deep and detailed understanding of systemic contexts — which may in themselves present a new and different perspective on a territory — opening up new possibilities, rather than simply building on pre-existing conceptions of a particular problem to be solved.

1.5.3 Implications: Policymakers as Designers – or Designers as Policymakers?

If in theory we see value in the confluence of design and policy, how in practice might this be made to work?
Certainly, the most productive approach seems to be in recognising the value of bringing together different kinds of expertise in multidisciplinary teams. Policymakers do not need to retrain as designers, and designers do not need to become experts in the history of policy problems and navigating the bureaucratic environment in which policy is made. Rather collaborative practices in design and co-design can be well-used to "stitch together" different disciplines, bring ideas to the fore and "make things public".
There are various models in existence for creating these kinds of collaborative spaces and opportunities. Policymakers can directly commission and contract design professionals, if public procurement rules allow. Other public bodies may act as brokers (the Design Council in the UK for example has played this role for many years), connecting up teams in government with designers. Governments may choose to hire in designers directly, or to set up specialised policy innovation teams (such as the aforementioned "Policy Labs"). Perhaps the most active realm of collaboration is between the design research community and governments, where practice-led research becomes a vehicle for partnerships, policy development, and mutual learning. Strategic cross-cutting projects like RETRACE are opening up new ground by creating a space where designers can actively co-develop and propose new policy opportunities.

This new field of practice is of course not without its challenges.
In encouraging a very different conceptual model of policymaking — as to do with managing complex systems, rather than delivering a rational linear output-oriented process — Systemic Design will likely encounter resistance from some policy professionals, and public institutions, given that it presents a strong critique of current culture and practices. Its forms, methods, logics, pace, openness and complexity will be uncomfortable for policy practitioners used to much

more bounded ways of working and decision-making. Designerly approaches to knowing, learning, and decision-making are challenging to some fundamental organisational assumptions in governments, both pointing out some problematic aspects of the dominant intellectual cultures, and grappling with ways to make itself understood.

Second, policymaking typically happens "behind closed doors", in a protected space away from the view of publics. Design naturally seeks to bring external perspectives in, however this can be viewed as problematic for various reasons — not least the unfamiliarity of non-government actors with the realities of political decision-making, who may have unrealistic expectations about the change that is possible, or their ability to influence decision-making. This is as much a problem for the open policymaking agenda in general as for Systemic Design approaches — how to balance public accountability, and the desire to do good policymaking that understands a multitude of perspectives, with the problems that come with actually engaging with publics.

Third, design logics can be at odds with a political logic. Partly because of timing: policymakers often have to react very quickly to changing situations, a mode of working that has led to a set of formulaic practices and patterns. Opening that up is often not welcome. But there is also the more fundamental issue of democratic accountability. Policymaking practices exist within a political decision-making process, and the work of governments led by politicians is the playing out of politics: this often entails difficult conversations and disagreements which can't easily be effaced. The perceived advantages of some design methods include engendering collaborative working — but in an agonistic relationship such as that which exists between government actors who have differing views about an issue, collaboration is not necessarily what either party is seeking to achieve. It is evidently difficult for civil servants to tell an elected official that their problem definition and solution are "wrong", particularly when those characterisations of a problem may well have been part of a party's promise to voters. Taking a different design-driven starting point to problem definition risks contradicting and thereby short-circuiting the traditional democratic decision-making structure.

For all these reasons, Systemic Design approaches to policymaking — at least as they develop credibility and license to operate — are most likely to succeed under particular conditions:

- in a policy space where long term change is on the table, and decisions are unlikely to be reversed every time there is an election;
- in areas not colonised by party politics;
- on topics where there are not already deeply entrenched and adversarial publics whose collaboration and constructive participation will be problematic if not impossible;
- where there is some space to innovate and define the problem.

[1] Available http://systemic-design.net/sdrn/ (Accessed 7th August 2017)

[2] Available https://ec.europa.eu/jrc/en/event/conference/gathering-european-public-policy-labs (Accessed 23rd May 2017)

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1.6 Sustainable and Collaborative Innovation for the Territory

PAOLO TAMBORRINI

Innovation as manifold energy that must incessantly redefine itself and daily infrastructures, respect the planet and produce social effects.
The focus on the potentiality of territories based on the transformation of existing infrastructural, economic, human, cognitive and cultural resources, is the aim of contemporary innovation.
This essay focuses on the collaborative role that different players of a territory must have in order to launch and pursue innovation processes with the goal of environmental sustainability.

1.6.1 THE THEORETICAL CONTEXT

The first step in adopting a systemic approach to innovation is to identify the potentialities of a territory which puts at the centre of a project the transformation of existing resources (territorial heritage), infrastructural, economic aspects, humans characteristics, cognitive and cultural resources into a widespread system of relations.

Cradle to Cradle, Green Economy, Industrial Ecology, Industrial Symbiosis, Blue Economy and Biomimicry are the most important economic-productive theories which, over the past 45 years, though not with the same names, have been alternated, supported and sometimes confused with each other. Since July 2014 in Europe — but also globally — strategical political actions concerning the environment have been based on the principles of Circular Economy with the aim of producing — according to a zero waste economic model — with continuously reusable and recycled raw material within a closed loop. This political choice has been rapidly pushing companies towards a greater environmental awareness and to undertake concrete actions, with inevitable effects of media propaganda.
By 2030, a more efficient use of resources could reduce about 17% to 24% the demand for material inputs (Meyer, 2011), with savings for the European industry of around 630 billion euros a year (Europe Innova, 2012). Producing according to the Circular Economy principles would save considerable costs for materials and potentially raise the European GDP up to 3,9% through the creation of new markets and products (Ellen MacArthur Foundation, 2015). These would be important results both for the economy and the environment.
However, the innovation model that is being promoted is incremental rather than radical. Technological innovation is focusing on material recycling and the research on the partial or total replacement of tools and techniques in the production and distribution processes of materials and products.
The concept of territoriality remains in the background as well as design and production which takes into account social and cultural identities and the diversity of resources in a specific geographical area.

This is a kind of territoriality that we can find, for example, in the Industrial Symbiosis assumptions and in the Blue Economy model. Symbiosis assumptions are based on the resources exchanged between two or more specific industries located in a very close area. Therefore, Pauli's Blue Economy model relies on the imitation of natural systems, which attributes to the territory a central role in the development of local economies. Based on this rich panorama of cultural approaches, models and different methodologies, emerges the discipline of design. Starting from the theme of sustainability — equally complex — the discipline of design, with its different methods for products, processes and services, is currently considered one of the most active fields and is able to define radical innovations also regarding environmental sustainability. The design discipline with its intrinsic flexibility is enriched by systemic logic and innovative processes in order to develop a specific methodology called Systemic Design (www.systemicdesign.org). This methodology involves the design of relationships between the people, the activities and the resources of a territory, thus produces development and well-being for the individual and the community (Tamborrini, 2009). The Systemic Design process has a close connection with the context in which it operates. Hence, Systemic Design has the task and the responsibility to recognise and enhance the potential of the territories focusing on the transformation of infrastructural, economic, human, cognitive and cultural resources (territorial heritage), exploring innovation as a multi-faceted energy that has to constantly redefine daily infrastructures while respecting the planet and producing positive social effects.

1.6.2 The Value of Innovation

For many years, the word "innovation" has been associated — by those who pursued and enjoyed it — with frenetic research in material and technological disciplines. In a classic and accepted meaning, innovation is defined as the implementation of a new product or a substantially improved one, whether a material, a semi-finished product, a service, a process, a new marketing or business model.

Today, "to innovate" means, according to a common belief, to provide pragmatic and, above all, functional and efficient answers to specific requirements. There is no innovation without a necessity or a request to satisfy it: the constant dialogue and correlation with real needs are a strategic element able to define form, functionality, social effects and market of innovation as well as to determine its success or failure.

This vision and methodology shift is the consequence of the change of specific models which economic recession and environmental awareness have caused during the last twenty years worldwide.

However, the answer to a globalised vision, which is still very rooted, has triggered a series of cultural rethinking processes and brought attention to what surrounds us, gaining a new strategic importance with local territories and communities (Bistagnino, 2011).

The contamination between global and local features requires on the one hand, to continue to think globally while enhancing planetary dynamics among people, their cultures and markets, on the other hand, to preserve local differences of identity, products and services.

Territories which are extremely characterised by particular traditions and specific symbolic-identity elements, evolve while communities enrich themselves, new urban poles arise, and historic spaces are abandoned, as they constantly require new ways of interaction and com-

munication. These features constitute new challenges that can be addressed only by enabling a process of innovation and requalification through collaborative research and with the constant dialogue with the actors involved in the system (Pironti, Remondino, Pisano, 2011).

Sustainable innovation requires to settle its roots into a wider network of relationships within the context in which it operates with the aim to elaborate the territory's complexity and with the responsibility to give value to the emerging potential. The latter may not always be manifest but possibly transformed into new design opportunities which reinterpret and amplify relationships and strongpoints, while introducing values such as social equity, economic accessibility and systemic resource usage (Corbetta, P., 1999). Sustainability should be considered the key factor for new and innovative scenarios: a variable according to the process. Not a fixed ideal, but a dynamic process able to improve the system management thanks to better comprehension and knowledge (Nidumolu et al., 2009).
Based on these assumptions, innovation can be defined as a dynamic multi-faceted force constantly responding to new challenges of the territory. In this process, it is crucial to allow design assume the role of mediator (Celaschi, 2008), thus becoming an interface in a multidisciplinary team.

1.6.3 Tools to Make Sustainable Innovation

According to a Systemic Design-oriented approach acting triggers a continuous and constructive collaboration which is able to provide a complete view of the complexity of the investigated phenomenon, creating a common language for different knowledge meeting in the constant research for solutions to innovative challenges (*www.innovationdesignlab.it*).
Multidisciplinarity generates a kind of design able to constantly redefine its way while responding to new changes of cultural, social and economic paradigms. It follows that the fundamental question is no longer "How is it done?" but "Why are we doing this?" as it is not just a matter of exclusively measuring the economic response but also about quantifying factors such as the value of design, the effects and benefits generated by it on a social level.
The continuous development and dissemination of new information and communication tools as well as new services offered by the city, its mobility and commerce, have already determined radical changes. These changes are related to forms of work organisation, production and distribution of goods and services, of knowledge, but above all, of social relations. Information is no longer only the most important resource in social organisations, but it is the asset that also defines them globally. The consequences of the information society are visible to anyone.
Quantitative change has produced — and continues to produce — qualitative change. Data are no longer considered a static asset whose use ends when the purpose for which they were collected has been accomplished, hence a raw material, a vital input, used to create new forms of value as well as a source of innovation and new services (Gaiardo, Tamborrini, 2015).
The ability to collect, analysis and compare quantitive and qualitative information about the context has become strategic for the success of a project and its application.
Big data analysis is completely changing the economy, society and people's perception. Due to these reasons, a more oriented methodology to the analysis of this informative asset is essential in order to analyse complex phenomena and exponentially amplify design boundaries.

In a world where things are being consumed faster than ever, it is crucial to translate such information into something visual, making simple what is complex. Data visualisation becomes a fundamental medium to explore phenomena, encourage critical thinking, memorisation and the interpretation of information. In other words, it allows making a complex system more accessible through visual methods.
However, the transformation from data to information is not easy as it requires an ongoing process where data are collected, categorised and appropriately contextualised in a specific ecosystem.
The practice of innovation involves many aspects, from technical and economical to cultural ones. It requires a specific cultural approach, the employ of time and resources and a strong demand for coordination and collaboration.
The Systemic Design Methodology supports this process by becoming the fundamental driver for collaborative and aware design to support and promote innovative and sustainable projects, leading the territory to assume the role of a real platform for mutual exchange and knowledge.
To innovate in a sustainable way and become true domain experts, it is necessary to have a holistic view of the object of study. As a matter of fact, the research phase satisfies this need by collecting, interpreting and categorising data, information and knowledge with the aim of offering a broad, complete and detailed overview of the object, thus enabling a better understanding of it.
Different tools can be used to support an adequate quantitative and qualitative analysis and outline what can be defined as a holistic approach through instruments ranging from participatory survey methods — typical of the sociological research — to the remote access of databases.
At a pragmatic level, the holistic dimension is a cyclical and virtuous process able to fully describe the context of action, delineating a real state-of-the-art from its socio-economic and cultural resources to the identification of its strengths and weaknesses and its history. The relationship between these aspects, reinforced by the visualisation according to the guidelines of information design, can reveal patterns and insights useful to activate the design process.
To maximize the complexity of the subject that is being investigated, the designer must draw on different disciplines, from those closer to liberal arts education such as sociology and anthropology to those which share a more scientific background such as engineering, statistics and economics, in order to define, in the most objective way, the nature of the needs of the context, defining all those aspects whether natural, anthropic, social or economic. More specifically, various types of statistics, reports, critical analysis of case studies, articles and scientific papers in the field, newspapers, magazines and books that deal with the subject as well as online resources, are some of the useful tools that can provide a general overview and a first survey on the subject.
Today open data and accessible databases can be considered as a key element to promote greater transparency and actively engage communities throughout the design process, thus triggering innovation from the bottom.
Practical activity is real field work; direct observation allows to investigate all non-verbal aspects otherwise difficult to record. If, on the one hand, it allows a quantitative level which fills the gap over the previously analysed data, on the other hand, it offers the possibility to use all available senses, thus creating a perceptive-sensorial map that takes into account all those unique qualitative and experience-based aspects which include odours, sounds or the total absence of them, and show the 'metabolism' of the territory with its cities.

At the end of this phase, as a result and an input for the following step, a data report has to be drawn up in which all the collected data and information are appropriately organised, interpreted and visualised; this becomes a fundamental support for the designer who will then define the guidelines and start the concept phase.
Making ideas visible and accessible, and translating them into concrete facts through techniques and skills, drawing directly from individual and collective creative culture, becomes strategic in the process of sustainable innovation.
The collected information is an asset able to communicate the potential of a territory, to deliver new messages of sustainability and integration to a wider audience and all those involved in the design.
The design phase aims to generate the first solutions based on the results that emerged from the analysis and the interpretation of the information gathered in the data reports before defining the final concept and organising the following more pragmatic and operational developing phase.
Collaboration and sharing throughout the process are at the same time a method and a goal. If, on the one hand, collaboration helps sharing collective knowledge, on the other hand, it becomes a leverage for new good policies in the interest of entrepreneurial and sustainable innovation.

Such scenario is included in the RETRACE Project, which through the Systemic Design tool fosters a constant dialogue between the five Regions and their needs. The Systemic Design provide the strategic tools able to determine an accurate holistic diagnosis of each territories. The project aims to the visualisation of a wider network of relationships between geography, demography, culture, and economics, within each context in which it operates.[1] This methodology offers the possibility to elaborate a visual mapping on the complex elements of each territory and is responsible for giving value to the emerging potential assets which will foster the transition of the Regions into the Circular Economy.

The RETRACE Project shows how the Systemic Design Methodology is becoming a fundamental driver for collaborative and aware design and is changing the role of the designer in our society into a policymaker. This role, surrounded by an interdisciplinary team, leads the territory to assume the role of a real platform for mutual exchange and knowledge. This collaboration is increasingly becoming the most effective approach not only to global challenges but, above all, local ones: the driving strategy for a glocal culture.

1.6.4 New Collaborative Model

Open innovation, sharing economy and partnership between public and private sectors all adopt a collaborative model. At the base of Systemic Design projects launched and developed to achieve the common goal of sustainability, there is, in fact, a constant sharing of knowledge and skills. A collaboration focused on creating territorial networks is now a strong point in pursuing competitive business results, not only from an economic point of view but also regarding environmental sustainability and social inclusion (Mortati, 2013).
Today design is becoming increasingly important in the field of innovation, while adapting and transforming itself. It is becoming an indispensable feature in the design process of any product or service, shifting its focus from the mere design of the product to the whole process:

from data analysis to the implementation and final development, increasing the appearance of design complexity and exploring new business models (Brand, Rocchi, 2011).
Bottom-up organisation coexists with "social networking", creating new relationships between the different actors that are part of the context. Users constantly redefine their roles by moving from economic subjects to social ones, actively participating in an innovative and bottom-up design phase which is able to aggregate the community with companies, foundations and universities and to establish a network where everyone is actively involved in the creation of new values leading to a real change of paradigm.
The application of Systemic Design allows to generate real change: reaching the important and expected turning point of making sustainable and innovative products, services, behaviours and processes. Hence, the Systemic Design Methodology is a tool to achieve the goals of Circular Economy not only by making the use of resources more efficient but also by changing lifestyles, dematerialising, digitising, enriching traditional aspects and acting in a socially innovative way while meeting new needs and highlighting values such as responsibility, cooperation and sharing.

[1] See Chapter 4, The RETRACE Project's Methodology.

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2.
Systemic Design:
A Tool for An Emerging Sustainable Future

2.1 A Complementary View on Complex and Systemic Approaches

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In this chapter, we discuss what the theory of complexity can bring to the construction of territorial transitions towards circular economy.
We will first revisit the dynamism of territories within their cultural angle, highlighting the complexity of their metabolisms and the importance of a design with intent. Then, we will introduce in the key notions of the complexity theory, mainly based on Edgar Morin's philosophy, underlying new attitudes and modes of governance for research and projects' design; the notion of system, dialogy and emergence will be described. Eventually, we will propose notes on the RETRACE Project and the use of the Systemic Design methodology.

2.1.1 CO-CONSTRUCTION OF TERRITORIES

Territory as an Interface between Space, People and the Need for a New Metabolism

According to Raffestin (1986), a territory is a notion which refers to a human labor which has been exerted on a portion of space characterized by a complex combination of mechanical, physical, chemical and organic forces and actions. Territory does not have to be seen as a physical space but is intrinsically related to people who belong to a culture. Thus, the design of virtuous loops necessary to create circular economy directly depends on how people are connected to their territory, on how they know its space, its resources and its limits, the metabolism of the ecosystem, and how they are impacting it. Transitions toward zero waste economies impact on social representations and involve decolonizing and recreating new social imaginations (Castoriadis, C., 2010). The creation of new myths, new beliefs and new utopias around a new territorial vision generates meanings to people and participates in the construction of new social practices disseminated in all *strata* of the system. In a practical view, territories need to develop capacities to innovate and create activities around new values that involve changes in the way of interacting with each other and managing the territory.

Softening the Discourses on the Role of Infrastructures, Highlighting the Power of Cultural Vibrancy

Many studies and policies support the development of new infrastructures and consider them as the most important way to foster the inventiveness and dynamism of a territory. This idea needs to be counterbalanced: there are many examples to show that peripheral territories that could be heavily enclaved have been able to develop as richer capacities in terms of technical, economic and social inventiveness as other territories that are perfectly equipped with infrastructures. Indeed, the former may turn out to be monsters of inventiveness, while the latter may sometimes tend to fall asleep (Larrasquet et al., 2009).

Let us take the example of the creation of the Mondragon cooperative group (80.000 employees today) in the 1950s: Mondragon is situated in the heart of a highly enclosed valley in the Basque Country. It is through the commitment to training people, based on their cultural identity and their dedication to a local project development that cooperative entrepreneurship emerged and that the territory grew rapidly to become today one of the richest of Europe (in 2012, the corporation had a global sell volume around 15 billion euros and controls over 100 smaller co-ops).

This example shows that the creative and entrepreneurial spirit is directly linked with a desire to live together and build a collective future. The same idea could be illustrated in the recent years through the transformation of industrial wastelands, abandoned farms or rural valleys into new social innovation places: the Darwin ecosystem in Bordeaux, creative recycling centers like Recyclarte, the Aldudes Valley in the Basque region, etc., are examples of how cultural effervescence is influencing economy. Indeed, if a territory is culturally dynamic, it will be open to novelty. It will be able to launch itself and even to encourage the emergence of disruptive ideas. Shocking, deviating from conformism or breaking ideas enable the emergence of innovations. Cultural vibrancy is the basis for creativity and the development of new innovative avenues.

A Need for Co-Construction by Embracing Complexity and Overcoming Positivist Approaches

The activation of such social transformations depends on the organizational impulsion present on territories, with their background, the existing structures and involved stakeholders, as well as their modes of management. In fact, the roads to such transformations are difficult, narrow and blocked. They are often barred by the multitude of self-blocking locks that our society has established (all sorts of technical, organizational, social, ideological, political rigidities in place) (OCDE, 2012), (Real et al., 2015). Working in sharing the intentions and empowering people in the design of collective, sustainable and circular futures remains essential to let the effervescence appear.

Different epistemological approaches could be undertaken to engage territorial transitions.

Classical positivist approaches usually support mid-term and long-term socio-technical transformations as a problem to be solved by using causal and predictive models (Comte, 1842). Following these approaches, authorities usually base their decisions on deductive cause and effect logic: building a road infrastructure will increase trade, investing on research will boost innovations, etc. These logics might have been efficient in other territories and contexts but it does not mean that the results will be the same in the applied territory. The positivist paradigm simplifies the concept of 'causality' and rarely takes into account the interrelations and loops between designated causes.

Opposed to the positivist paradigm, the complexity paradigm considers that phenomena emerges from a myriad of causes that are interrelated (Morin, 2007). During the last century several approaches appeared within the complexity paradigm. On one hand, different techniques to reduce the complexity consider in a determinist way the interrelations between elements (Forrester, 1997). These techniques were supported by the development of computer capacity and the possibility to elaborate models that deal with massive quantities of interrelations between elements.

These models allow to simulate non-linear interactions but are often used to perform *post hoc* analysis or predictive simulations. These simulations, whatever the depth of their uncertainty analysis, will give legitimacy to the best solutions selected within the framework of the model. This approach tends to reduce the complexity of systems and create factual distances between scientists/experts, policy makers and citizens.

On the other hand, a different epistemological approach named constructivism, criticizes this way to deal with complexity and prefers associate these methods to the notion of "complication" (Le Moigne, 1990). For constructivists, such aggregates proposed by experts present the danger of a "scientific truth illusion" and encourage a "conformist thought" which imposes basic criterions usually used without questioning them. Indeed, we all know perfectly well that we are evolving in the most absolute uncertainty, made up of numerous interdependent factors. These factors that should be taken into consideration are millions, usually interacting in tight recursion, with modes of interaction being quasi-unknown and which are themselves unstable. Although constructivist approaches obviously do not dispense with the rigor of reflection, they open the door to relativism and, thus, to new and fruitful paths for human thoughts and actions in complex environments. Checkland (2000) criticizes the tendency where scientists, actors and managers consider systems as "ontologies" ("hard systems") and proposes an epistemological approach named "soft system" based on radical constructivism and giving its whole place to interpretation.

When designing collective actions for territory, stakeholders have to ensure that the process implemented produces collective intelligence, intelligibility and awareness of what is at stake today, solidarity and reflection on things to do or not to do in both strategical and operational actions. Fighting against complexity is a battle lost in advance. Designers and managers must assume that complexity is irreducible. They must develop "metacognitive" skills and new ways of thinking, conceptualizing and intervening in organizations and projects by understanding and assuming the depth of the epistemological change that this implies. They must undertake the "reform of thought" proposed by Edgar Morin through the theory of complexity.

2.1.2 Toward a Better Understanding of the Theory of Complexity: Key Notions

In this section, we try to explain the main principles that structure the "complex thinking" based mainly on Edgar Morin's work, largely integrating concepts by the "Soft Systemics" (fig. 1).

MENTAL REPRESENTATIONS, SOFT-SYSTEMS-THINKING AND COMPLEXITY are basic concepts. The accesses humans have to reality are only their senses. From these perceptions, humans build representations in their minds. Representations are the only access they have to reality. Claude Bernard, French physiologist (19th century), even been a positivist, he once said: "Systems are not in the nature, they are in people's minds". Such representations are therefore evidently idiosyncratic and depend on the values, convictions, habits, methods, and situation etc., of everyone. Thus, it is evident that representations that concern a supposed 'same' referent

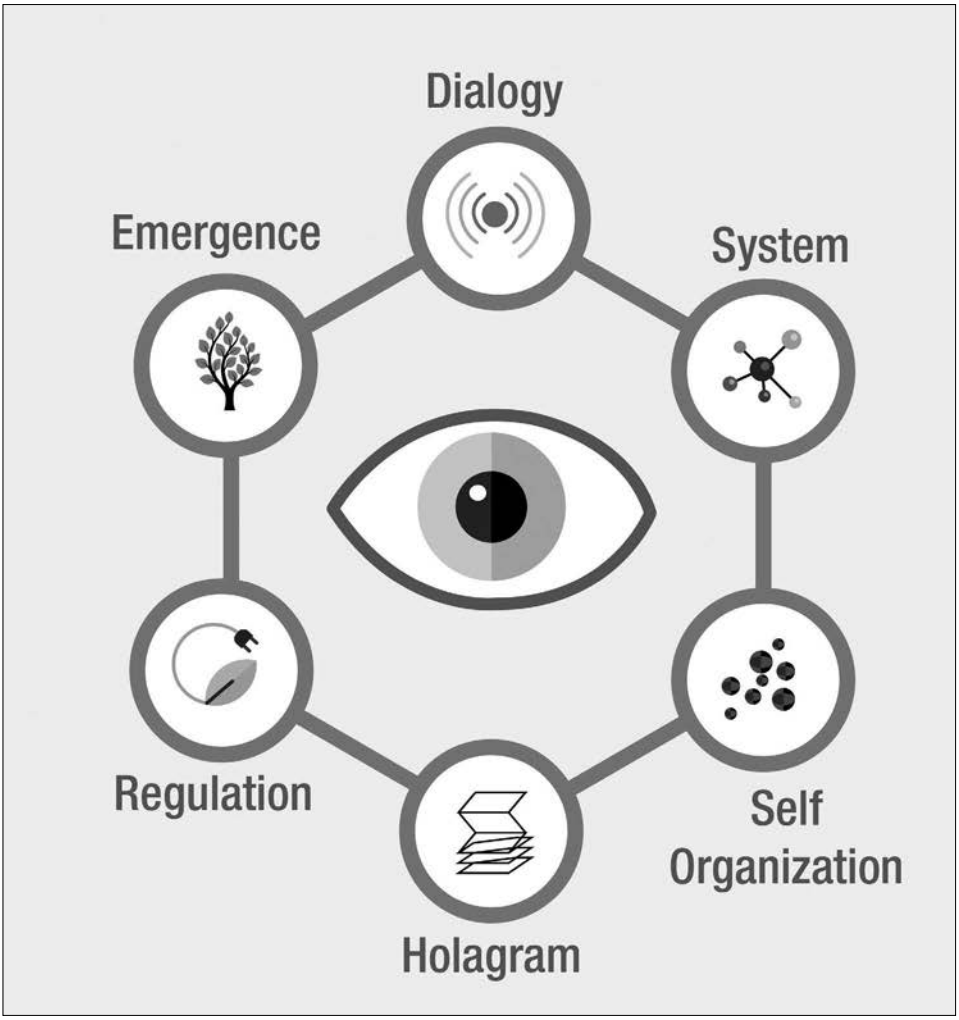

Fig. 1. Key principles of complex thinking.

are different from one individual to the others and even in the mind of the same individual at different moments. If the situation is considered as "complex", it means that nobody is cognitively able to enfold it up completely. Simon (1982) is introducing the concept of "bounded rationality" to describe the cognitive limits underpinned decision making processes. Another dimension is about the "cognitive processes" a person will trigger to build such representations: a person will do it constantly interacting with her environment (perceiving information, triggering complex cognitive processes, and then deciding what to do and acting. Objectivity is therefore a problematic concept. In such a constructivist logic, systems concepts and systems-thinking can only be considered as epistemological tools, proposing good generic patterns for improving intelligibility in complex situations or problems (not building the scientific truth). They are particularly useful tools for group work. An interesting application of such principles could be found in the ways a community may act to collectively define commons (Ostrom, 1990).

It should be interesting to find out how the evolutions of mental representations under the effect of collective design-thinking oriented methods may lead such a community to social (shared) agreement on the status of a material or immaterial "good" as a "common" that will have to be cooperatively managed in the future.

SYSTEM-THINKING provides cognitive tools that allow considering things in their interrelations, how they impact one on each other and how they generate proper effects emerging from these interactions. System-thinking produces mental representations by using systems as epistemological tools A system must have a boundary (what is in, what is out its environment), but generally systems are qualified as "open systems", which means that they exchange (using different modes) with their environment (Capra, 1996). Prigogine's finding of "dissipative structures" are good examples of how complex systems can emerge and be in equilibrium exchanging energy and matter with their environment. Inside this boundary, the system is made of elements and relationships (its structure or organization). Also a system may be characterized by its functionalities, goals or finalities, by its history, the way it is evolving and its ability to self-manage itself, as well as autopoietic systems which continue to produce interrelations within the system (Maturana and Varela, 2012).

The principle of EMERGENCE consists in having in mind that system-thinking always tries to anticipate or recognize the new properties that emerge from the fact that we are dealing with a system, i.e. with interconnected elements. In other words, "the whole is more than the sum of its parts". For instance, specialists in different disciplines working together will be able to find new ideas due to interconnections they are able to generate by their common work. This idea is one of the most important bases of the theory of innovation.

SELF OR HETERO-REGULATION may be defined as taking into account complementarities and interactions in order to avoid drifts and allow provisional homeostatic *equilibria*. Self-regulation emerges from the effect of internal forces, inside the boundary of the system, and hetero-regulation is the fact of external forces (this explains the importance of an accurate definition of the boundary of a system in function of the intention we have). Both regulation modes may work interacting together. For instance, in a territory, managing differently short term tasks and long term considerations is a way to give its place to regulation. But both notions (short term and long term) must also be related, because if we do not do that, we are missing a good part of the relationships we should have to take into account in order to build "not too poor" representations of the situation So we have to deal with this double idea of separation and interaction. To understand better, we have to introduce the concept of dialogy.

The concept of a DIALOGY is challenging the binary view of things stating that two contradictory propositions (*p*; *non-p*) cannot be true at the same time ($p \wedge non\text{-}p = P$). With the concept of dialogy, Edgar Morin proposes to overtake this principle arguing that in real complex situations such two contradictory propositions generally act at the same time and that they are influencing each other. Which means that every basic term (*p* and *non-p*) cannot be considered as a constant: it is impacted by the other, which at the same time changes due to the impact of its opposite. It is a fundamental principle of the "complex thinking" that Edgar Morin proposes.

A relevant example in our case is the opposition / relation between short term and long term visions. The French philosopher and sociologist says that they must be conceptualized separately, in order to manage space to regulation for instance, but at the same time, that they cannot be conceptualized independently, we always have to take their interrelationships into account. As far as our example is concerned, the idea is that any long term situation is necessarily the result of a succession of short terms and, on the other hand, any short term decision should be taken considering long term thoughts.

The ECO-SELF-RE-ORGANIZATION concept is about the fact that in complex situations, resulted actions of the system, are mainly issued from the relationships of the elements of the system that are impacting the proper organization of the system itself. In the frame of ecosystems, it means that transformations may appear due to free or even hazardous shocks between elements of these ecosystems that are able to self- and re-organize the considered system. Another way to express this property is to use the expression: "order emerging out of disorder" (Venkataraman et al., 1989). Some re-organizations may produce a self-maintained tendency. An example of this principle is how citizenship initiatives may change the referent system: for instance, the development of design thinking places (co-working, fab-labs, social design, innovation...) may reorganize the functioning mode of a small city-center (eco-self-re-organization), and how this new organization will go ahead by itself (auto-catalysis). The point is that it is impossible to specify in advance such behaviors.

The principle called ECOLOGY OF ACTION is also related to this understanding of complex dynamics as shocks between partially-myopic actions-reactions, between the elements of these ecosystems. Management puts a big stress on decision-making, but ignores what happens when the decision is taken, about its application. As soon as a decision is taken by a person in charge, this decision enters in this game of actions-reactions (some people will obey and try to do well, others will contest or skirt it, others will reinterpret it, others will wait and let time go, etc.).

The HOLOGRAMMATIC PRINCIPLE states that a system cannot develop a given behavior if its elements are not in tune with it. The whole system's behavior is engrammed in its elements and the elements' behavior, by the way of internal relationships, generates the system's behavior (Morin, 2014). Another way to state this idea is: the whole is made of its parts and the whole is in each part (like DNA in human cells). An evident example is the ecological transition in a territory. It will be easier if the inhabitants are convinced and act in tune with the main goal. If it is not the case, the battle is certainly lost in advance. The zero waste thinking can be a strategy for a territory, creating materials loops, etc. but it should also be a way of thinking and acting of each inhabitant (reducing consumption and taking into account the existing dynamics in the territory). Nevertheless, our different principles also state that building hologrammaticity must be understood as a process, the question being to reinforce this self-catalytic interaction between individual and collective levels. This is another complex point treated by the theories of institution (Lourau, 1970) and structuration (Giddens, 1986).

2.1.3 Which Impacts on Systemic Design and the RETRACE Project Methodology?

This last part discusses some precaution principles coming from the complex and system thinking that could be applied to Systemic Design methodology and more particularly to the RETRACE Project.

1) From One to Multiple Territories: Being Aware of the Borders While Connecting Them by Actions
Systemic Design needs to be applied to territories that are understandable and accessible for humans. Each time the process is engaged, designers must engage an analysis of the good perimeter for action. The RETRACE Project system perimeter are regions. They are complex systems and are also susceptible to be modeled as a large variety of subsystems such as cities, intercommunities, neighborhoods, as well as household, industrial and agricultural processes. Regions are also intermediate nodes that act for and are impacted by European and national policies. With decentralization, they tend to have more autonomous competences for managing innovation, environment and waste, which position them as a good frame to impulse circular economy. However, in some countries, such as in France, the perimeter of regions has been recently redesigned involving a huge growth of the territorial perimeter. This could provoke more difficulties in implementing collective actions. Thus, the regional actions will have to be re-appropriated by smaller systems which have to be defined. It could be existing boundaries (city, department...) or new perimeters defined around the notion of basin of life. Note that a basin of life, in relation with the collective dimension we have just evoked, could be modeled for each individual (or even for groups) according to the way he/she lives, behaves and is integrated to networks in daily life.

System Designers need to be aware of the different systemic levels, discussing about the perimeter of their actions while systematically looking for bridging the borders and creating synergies between them.

2) Using Models as Intermediary Objects of Design
When designing and developing collective actions, models must be used with parsimony and chosen to increase understanding of the system, its metabolism and futures actions.

Two types of models can be used related to two epistemological approaches dealing with complexity that have been explained here above. On one hand, a systemic approach willing to model a territory based on quantitative data. This systems view can deal with non-linear representations but defines in a deterministic way the interrelations between the elements of a territory (materials flow, economic indicators, social effects...). Examples of these models include tools like system dynamics that quantitatively models flows and uses clausal loop strategies. On the other hand, models issued from the constructivist epistemology are accessible and adapted for each stakeholder vocabulary. These models are not predictive models nor explanatory models. They are seen as intermediary objects of design that will endeavor the translation of ideas (Akrich et al., 1988). In this line, tools like infographics, gigamaps, rich pictures (Checkland, 2000) or videos will be used in the RETRACE Project to integrate both emotional and technical aspects all along the advancement of the project.

3) Moving the Dialogic Forces from Top-Down toward Bottom-Up Approaches: Creating Conditions for Emergence

The top-down operating mode implies offering much more space to bottom-up initiatives. The territory and human community being at the center of Systemic Design frameworks, fundamental social innovation can only have its roots here. Therefore, territorial governance cannot generate innovation on its own but must prepare the territory and its actors, facilitate possible synergies and meetings, support the development of projects and professionalize the coaching and support actions. In other words, governance should not seek to be itself the creator of innovation. It must create the conditions conducive to the emergence of innovative experiences (modes of financing, evaluation of experiences, etc.) that require a suitable and fertile framework on which innovation can be expressed (promoting creativity, diversity, networking, etc.).

4) Encouraging Partners and Stakeholders to Adopt Refreshed Metacognitive Skills When Supporting and Co-Designing Circular Ssystems

In the project, each partner is considered as a systemic designer/thinker of its region. Each one has to be aware of the limits of his/her current actions and must be able to know the gap to reach in order to answer to the ambition of the project. He/She needs to navigate through dialogic thinking, manipulate models, and manage a team by fostering the emergence of collective thought by participating in local networks dynamics.

The actions in each region shall not be disconnected from existing territorial actions and need to be integrated in a coherent way within the proximity of stakeholders. On one hand, efforts could be done to go deeper in the knowledge of the history of the territory, its evolution, structure, dynamic and regulation modes and build a strong understanding of the recent actions undertaken toward energy transition and circular economy. On the other hand, systemic designers must act as accelerators and change catalyzers by integrating stimulation mechanisms who will impulse new dynamics, detect initiatives, foster creativity and support the development of projects.

By adopting the posture of action-researchers (Lewin, 1951), systemic designers have the opportunities to access to the intimacy of collective actions. Their attitudes will oscillate between participative observations and actions in order to improve their knowledge and relevance to propose, and even to take part in concrete actions. In the RETRACE Project, the partners of each region will be engaged in different networks and local projects, behaving as bees searching for flowers to forage.

5) Monitoring the Evolution of Value Creation and Territorial Development

Values behind the transformation realized within territories are multiple and cannot be easily managed or measured as they involve either classic economic aspects like job creation or ROI, or other qualitative dimensions (the degree of livability, social aspects and environmental impacts) over different space-time scales.

Attention has to be paid to methodologies used to follow and assess the value creation in such context: How to assess the actions realized in different time scales? How no-monetary value-forms will be taken into account? Who participates to the definition, monitoring and assessment of projects? Which mode of governance could be followed?

OVERCOME THE QUANTITATIVE REFLEX: Managers often enclose their reasoning in quantitative logics, using a determined lexical field (use of term like maximize, minimize...). One advice: try to be able to tame this "obligation to quantify", to take distances, to better know its limits and its dangers and to question when it is useful to use quantitative tools and why. Make its whole place to qualitative evaluation (to be designed).

USE PARTICIPATIVE MANAGEMENT TOOLS TO REDEFINE THE COMMONS AND DECENTRALIZE DECISION: several tools (OECD, 2010) exist to facilitate the involvement of people in taking part to the definition and assessment of projects and decisions. Here some examples: self-assessment grids, vote by consent, non-verbal communication, interactive user feedback systems...

In our view, adopting these precaution principles during the maturation of projects is essential to prevent reductionist behaviors and embracing complexity in case of system transitions. Embedded in Systemic Design philosophy, the RETRACE Project looks for innovating in term of governance as they bring together several types of stakeholders in each region and find multi-scale ways to identify policy gaps and design regional action plans (inter-regional exchanges, regional stakeholder meeting, good practice analysis with both bottom-up and top-down initiatives).

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2.2 Systemic Design: A Historical Perspective

Pier Paolo Peruccio

This essay seeks to bring into focus the historical roots of Systemic Design, a design practice which borrows the metabolic dynamics of the natural world and grafts them into the industrial one with an attention to the material and energy flows in order to eliminate production waste. This contribution therefore investigates the relationship that has historically existed between systems thinking and design culture in a non-reductionist dimension; in other words, within an epistemological reflection on the real world and its structure, or "the scaffolding of the world", as Tomàs Maldonado put it (Maldonado, 1987, 7).

The split that occurred at the beginning of the 20th century between, on the one hand, reductionist epistemology — orientated towards the fragmentation of knowledge and the unconditional use of the Cartesian matrix of analytical paradigm — and, on the other, systemic thinking — holistic and connected to organicism, with a focus on ongoing phenomena (processes) and the context in which such events occur — resulted in a profound change in our perception of natural phenomena and the relationship between environmental surroundings and individual and social spheres.

Indeed, an epochal leap occurred in the history of science at the beginning of the 20th century which translated into the definition of a new investigation method for understanding living systems. Living organisms, as Fritjof Capra wrote, "do not perceive things in terms of isolated elements but as integrated structures (patterns), organised wholes endowed with meaning, with qualities that are absent in their parts" (Capra, 2005, 43). Psychologists of form (Gestalt), in particular, refuse to break down experience, a cornerstone of their philosophy, into its basic components. They proclaim the supremacy of global structure over individual parts in a model which may be summarised in a phrase coined by the Austrian philosopher Christian von Ehrenfels: "The whole is greater than the sum of its parts."

2.2.1 Passengers Versus Crew Members

In the second half of the 20th century, there was a clear perception that the environmental issue, systemic by itself, could not be resolved through a reductionist method of investigation; instead, it was essential to adopt a systems thinking-based approach, in other words to think in terms of relationships, through the study of systems, subsystems and the relationships that exist between them.

Indeed, the Earth then began to be understood as a set of continually changing behavioural configurations, as underlined by the first report commissioned by the Club of Rome, entitled *The Limits to Growth* (Meadows et al., 1972).

One of the metaphors most effective in explaining the impact of anthropic flows on the environment was the one used at the end of the 1960s, depicting Planet Earth as a spaceship. In two key essays in the United States environmental movement, the economist Kenneth Boulding, first, followed by the architect Richard Buckminster Fuller, introduced the concept of our ecosystem's fragility and the need for humankind to act in a manner compatible with the ecological constraints of the world in which we live (Boulding, 1966; Buckminster, 1969). This concept was also taken up by Stewart Brand through the iconic image of the Earth, one of the first shots released by the NASA Agency, published on the cover of the first issue of the magazine

The Whole Earth Catalog in the autumn of 1968. As the British historian Robert Poole wrote, the image of the whole Earth became "a photographic manifesto for global justice"; a photograph which has had an enormous impact on the way in which we have viewed our planet ever since. The American astronaut William Anders recalled Christmas Eve 1968, when the Apollo 8 crew was in orbit around the moon: "We'd spent all our time on Earth training about how to study the moon, how to go to the moon; it was very lunar orientated. And yet when I looked up and saw the Earth coming up on this very stark, beat up lunar horizon, an Earth that was the only colour that we could see, a very fragile looking Earth, a very delicate looking Earth, I was immediately almost overcome by the thought that here we came all this way to the moon, and yet the most significant thing we're seeing is our home planet, the Earth" (Poole, 2008, 2). The image of this "Spaceship Earth" raises at least two reflections. The first is that we are all on a mode of transport that appears fragile, vulnerable and of finite dimensions as our eye can clearly perceive, with a limited quantity of resources available. The second is that, on this spaceship, we must behave not as passengers, being transported from one place to another in a detached manner, but as crew members, taking care of their spacecraft. There are 7,5 billion potential crew members, and a change of perspective is needed and, above all, an awareness that we must, today, comport ourselves as people conscious of our own existence and mission.

In other words, we have entered the fourth era of Modern Humanity, defined as "The Shift Age" by the American futurist David Houle (Houle, 2007). If *tools* were the pillar of the Agricultural Age, *machines* supported the Industrial Age and *technologies* drove the Information Age, it is now *consciousness* that is accelerating this final epochal change. "Thinking as crew members of this Spaceship Earth is one of the fundamental manifestations of our change of consciousness that will then lead to a collective change in our behaviour towards this Spaceship Earth. [...] What our future will be and how it will unfold is dependent upon our changes in thought, action, behaviour, and awareness, coupled with the speed of our transition, without relapse, to TSE consciousness" (Houle, Rumage, 2015, 5).

As highlighted by many authors, from Jean-Paul Fitoussi to Edgar Morin, and by the recent crises of civilisation, society and democracy, with the addition of economic crisis which amplifies the effects of the earlier crises, this is directly related to the crisis of our cultural and therefore education systems. In other words, we are witnessing a systematic crisis which is affecting our value system, and vice versa. For the entire 20th century, a vertical disciplinary reflection model (*silo* thinking) was favoured, thus preventing disciplines from breaking down the barriers to truly interdisciplinary learning. Today, we operate within a highly connected and interdependent system which requires thinking capable of perceiving the multi-disciplinary nature of current scenarios.

2.2.2 Systems Everywhere

Systems thinking is a contextual action, since it views the object of analysis as a network of relationships within a broader network; it is "process thinking" across many disciplines, from Biology to Chemistry, Economics, Philosophy, Psychology, Mathematics, Architecture and Design. Its origins are not recent, being connected to the word "system", whose meaning has altered and become enriched over the centuries, from Heraclitus to the 20th century with its investigations of modern physics, exploration of the atomic and sub-atomic world and direct connections

to holistic phenomena culturally akin to some Eastern religions and ancient philosophies. Since its origins, Western thinking has been dominated by an organicistic and monistic concept which is strikingly visible in Heraclitus;[1] indeed, Greek philosophy harmonises the physical dimension with the metaphysical one, synthesising the spiritual world and the material universe in a single whole (Capra, Luisi, 2014).

"System" is certainly a fashionable term today, as it already was in the 1960s, as noted by Ludwig Von Bertalanffy in his book, *General System Theory,* referring, in particular, to its pervasiveness in all sectors of science as well as in thinking, jargon and mass media (Von Bertalanffy, 1969, 25). Being inter- and trans-disciplinary, its lexicon was absorbed without substantial alternation by numerous disciplinary contexts and, in the field of Design, among others, there was widespread and sometimes very careless use of terms such as resilience, autopoiesis and homeostasis. However, it was relationships, in particular, that took on a fundamental role in systemic thinking, as a pivot generating a change of paradigm capable of altering the relationships between the numerous players in the process in a non-reductionist perspective.

The well-known saying, "the whole is greater than the sum of its parts", sometimes repeated like a mantra, definitively shifts the focus to an entire system which, by nature, has properties that the individual constituents lack, even if added together. Indeed, a system may be considered a plurality of elements whose organisation provides results that exceed those permitted by each individual part. In the 1920s, the word "organisation" became an integral part of the definition of "system" thanks to the Swiss linguist Ferdinand de Saussure, who gave the following definition of "system" in his posthumous work, *Course in General Linguistics* (*Cours de linguistique générale)*: "an organised whole, made of interdependent components which can only be defined in relation to one another depending on their place inside this whole" (De Saussure, 1970, 27).

For Donella H. Meadows, author of *The Limits to Growth*, on the other hand, a system, in order to be defined as such, must meet three essential requirements: the simultaneous presence of the elements of the *system*, the *interconnections* between these elements, and a specified *objective*. One of the most effective metaphors she uses to explain this philosophy is that of the digestive system, which includes elements such as teeth, enzymes, stomach and intestine, interconnected by the flow of food in a system whose objective is to transform food into nutritional elements and transfer these substances to the bloodstream, finally eliminating that which the body cannot assimilate. Similarly, "A football team is a system with elements such as players, coach, field and ball. Its interconnections are the rules of the game, the coach's strategy, the players' communications, and the laws of physics that govern the motions of ball and players. The purpose of the team is to win games, or have fun, or get exercise, or make millions of dollars, or all of the above. A school is a system. So is a city, and a factory, and a corporation [...] An animal is a system. A tree is a system and a forest is a larger system that encompasses subsystems of trees and animals. The earth is a system. So is the solar system; so is a galaxy. Systems can be embedded in systems, which are embedded in yet other systems" (Meadows, 2008, 11–12). When, on the other hand, we have a sum of parts which are unconnected, and therefore without mutual relationships, the concept is that of a set (and not a system). In this case, the properties of the set are not altered if elements are removed or added. Sand dumped on a road, for example, cannot be configured as a system: you can add or remove sand, as Meadows points out, and it still remains merely sand

on the road. In the case of a system, on the other hand, the parts are interconnected and operate as a "whole": when the number of elements of the system is changes, so does its configuration, possibly causing malfunction.

A system, however, is not a real object but a simulacrum; a device used to simulate reality, which "only exists in our minds. It is an arbitrary concept and even its limits are arbitrarily set by the observer in relation to his pursuit of knowledge" (Bologna, 2008, 118). Moreover, the above-mentioned Club of Rome Report, which went to press in 1972, was based substantially on a simulation of the world system through a reading of five critical factors (population, food production, industrialisation, pollution and exploitation of natural resources) using the Cambridge MIT's computers and the System Dynamics Group's methodology. The report therefore deals with analysis of the present but, most importantly, construction of models and the role of mathematics in governing processes. It embraces the future studies trend, which was very fashionable from the post-Second World War period in the United States, France, Germany, Britain and also Italy, in part. These were studies deriving principally from research in the military and strategic field, particularly technological forecasting, in order to identify a technology's development and distribution times in advance in a given social or military context (Peruccio, 2014).

The theory of systems, the theory of complexity and cybernetics were already well-known disciplines when the book was published, and there was already a perception that all phenomena were interrelated. "A country cannot live at an excessive level today", said Aurelio Peccei — a prominent figure in Turin's anti-fascist movement, co-founder of the Club of Rome and promotor of the book — in one of the many interviews he gave in the 1960s and 1970s (Giobbio, 1971).[2] The modern world is one of interdependence, and there can be no interdependence when the order of magnitude is too diverse, he concluded, criticising the North American growth model. *The Limits to Growth* is a book quoted everywhere, by architects, geographers, economists, sociologists and, naturally, environmentalists but also by politicians and scientists. It is also widely used as a university course text despite heavy criticism of the report's weak scientific contribution. Victor Margolin, in an article entitled "Global Expansion or Global Equilibrium? Design and the World Situation", which appeared in *Design Issues* in the summer of 1996, also discussed it in great depth, considering it an interesting example of Complex Systems Design, the fourth order of design as described by Richard Buchanan in 1992 (Margolin, 1996; Buchanan, 1992).

2.2.3 Designing Complexity: When Systems Thinking Meets Design

Design is, today, part of the entire value-added chain of a product or service, from definition of the needs to communication strategies, and has progressively expanded its action to include systems and experiences. Design, due to its multi-disciplinary nature, occupies a barycentric position in relation to the great traditional disciplinary reservoirs (Humanities, Technologies, Arts and Management) from which it draws in order to give concrete answers to the design question (Celaschi, 2008). The task of the contemporary designer is to confront and find innovative solutions for humankind, and this is achieved by opening the doors to dialogue with other disciplines with the aim of enhancing communities and territories.

This approach, mindful of the repercussions on the system as a whole, both upstream and downstream of the design action, is known as Systemic Design, and contributes to reducing the impact of anthropic flows on the natural resources (Bistagnino, 2011). It fits into the framework of the Circular Economy, in a position diametrically opposed to that of a linear economic model based on the take/make/dispose triad. Not only it introduces a different material and energy flow design, in which outputs become the inputs of another production system, but it also brings about more radical changes in terms of culture, social relationships and civilisation. It is therefore a virtuous practice with the potential to impact positively on the territory in terms of employment, environmental sustainability, waste reduction and greater participation by the players in the process and, more generally, in civil society. Unlike product-focused design, which addresses an indistinct and global target market, Systemic Design operates at local level by analysing the requirements of a precise target group and seeking to actively involve it. Today designers are asked to strategically design a scenario that not only focuses on product innovation as an end in itself but involves developing broader issues which require the input and expertise of other fields of learning: a large number of variables come into play, and it becomes necessary to adopt an interdisciplinary approach. Worldwide there are some interesting examples of didactic and research activities focusing on this methodological approach dealing with non-traditional economic and industrial models.[3] "When we talk about production, we do refer not only to industrial production but also — on a par and with the same importance — to agricultural production", Bistagnino reminds (Bistagnino, 2011, 20). Within the same territorial context, we need to ensure that agriculture, industry, and the community at large blend harmoniously with the natural system (Capra, 1996, 2002): this is the key to a production model of sustainable growth.

The direct relationship between design and systems thinking was confirmed when, in the 1950s, the high level of complexity, and therefore of difficulty, achieved by design was understood in many quarters.

With a large number of variables coming into play, it became necessary to adopt an interdisciplinary approach, a process which was consolidated in the decades that followed and strove to overcome the interdisciplinary barriers, in contrast to the mono-disciplinary and specialising orientation typical of the first half of the century. There was thus a growing need to formulate a body of methodology for use by designers and architects, to be understood as identification of laws making it possible to describe, interpret and select the requirements produced by the complexity of the moment. The design process behaves like a living organism, configured, in other words, as a process for metabolising and managing inputs (information on the context) and producing corresponding outputs (information for optimal resolution of the problem).

Designers have the task of structuring, through synthesis of form, an organisation of the process through which it is possible to achieve the design objective under complex conditions resulting from the multiplicity of variables and interactions. To design complexity is therefore to achieve a precise objective through concrete structuring of a form capable of organising a multiplicity of factors, processes and interactions on multiple levels originating from a context generated by the three spheres strictly connected: biosphere, sociosphere and technosphere.

The issue of rationalising the design process, in other words defining a systematic methodology capable of building rational behaviours and rendering designs replicable, has previously been widely dealt with in another article on the book *Notes on the Synthesis of Form* by Christopher

Alexander (Alexander, 1964; Peruccio, 2014). In particular, as highlighted on that occasion, architecture and design met systemic culture at the ULM School (*Hoschule für Gestaltung*) thanks to figures such as Tomàs Maldonado and Abraham Moles and the introduction at that School of new disciplines such as cybernetics, systems theory, information theory, semiotics and ergonomics. At that time, a reduction method was developed which did not betray the nature of complexity: the ULM's educational activities on visual topics, the well-known patterns of Tomàs Maldonado and William Huff, took on, for example, the character of semantic enigmas capable of sending Cartesian matrix thinking models into crisis. It was necessary, then as it is now, to free ourselves from the "paradigm of simplification" (Morin, 1993), which conceives the world as disjointed units, and also to re-orientate our educational models towards the cultural aspects of learning how to live, to paraphrase Jean-Jacques Rousseau: "to teach how to live is not simply to teach how to read, write and calculate, nor merely to teach basic useful knowledge of history, geography, social sciences and natural sciences. It is not to focus on quantitative knowledge, nor to favour specialised vocational training: it is to introduce a basic culture that includes consciousness of consciousness" (Morin, 2015, 13). And this "consciousness of consciousness" also relates to values shared by the community, codes of conduct, lifestyles, the concept of freedom, the ability to listen, the communication of local know-how and the development of critical skills, all of which are values that schools must transmit in order to spark virtuous processes of change towards sustainable development. To pursue a path of this kind, in fact, required a change in value system towards a "new education" which, according to Aurelio Peccei, needed to be "anticipatory" and, at the same time, "participatory". It needed, in other words, to prepare the generations of a better future through citizen participation in the formulation, assessment and revision stages of orientation programmes for society (Peccei, 1981).[4]

[1] The similarities between the symbolism of the Heraclitus fragments and parts of Indian wisdom books are, for some historians, proof of a direct connection between Greek and Eastern, Persian and, in particular, Indian culture.

[2] Peccei had a privileged point of view, as Executive of both Fiat and Olivetti, Chairman of the consultancy venture Italconsult and prominent figure in Italy's relations with Latin America and the Soviet Union. He was also a member of the Italian "Futuribili" group led by Pietro Ferraro, culturally aligned with the French approach to future studies.

[3] The MSc in Systemic Design at Politecnico d Torino is one of the most innovative educational programmes at international level. In close collaboration with Kyoto Club, Club of Rome, ZERI/Blue Economy and other institutions, it prepares designers capable of configuring and managing the complete industrial product design activity, with the aim of achieving "zero emissions". Regarding the institutions we mention, among the others, the SYDERE (Systemic Design Research and Education) Center based in Lyon at the ECAM campus. This institution is a competence centre designed by Politecnico di Torino and Ecam Lyon to generate a break-through in Systemic Design research and education: the mission is to promote and develop a Systemic Design approach that contributes to obtain sustainable products and services. It acts as a multidisciplinary platform gathering experts from different fields to generate interdisciplinary research and education outputs. www.sydere.polito.it

[4] Peccei, Aurelio. *Educare alla conoscenza del pianeta*, opening speech for the World Congress on Educational Sciences, 1981. In Fondazione Aurelio Peccei (a cura di), *Lezioni per il Ventunesimo secolo. Scritti di Aurelio Peccei*. Roma: Presidenza del Consiglio dei Ministri – Dipartimento per l'informazione e l'editoria, 1993, 176.

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2.3 Systemic Design: Methodology and Principles

LUIGI BISTAGNINO

The intention of this chapter is to explain the methodology and the principles of Systemic Design discipline (SD) and the reason why it was adopted as a reference for RETRACE Project. Born from Design practise as an approach that shifts the attention from the product to the production process behind, its main goal is to prevent waste, but not just that. The major result is the creation of relationships, among both production processes and actors involved. The application of the SD approach has demonstrated its potentialities as a method to manage complex system and to tackle key issues concerning environmental, social and economic sustainability.

2.3.1 CURRENT SITUATION

Our actions daily endorse, without our realizing it, a cultural and behavioural paradigm that our society shares and strengthens with the behaviours and decisions of everyone at all levels. Each one of us participates in strengthening the existing cultural model without asking any questions and without even pondering on whether what is done is right or wrong and whether the consequences of the actions may damage others directly or indirectly. This way of acting, has a strong impact both on others and on ourselves.

The first and perhaps the most important consideration is that we are accustomed to behaviours and choices that aim to solve only our own individual needs by becoming more and more locked up in a self-reported personal sphere (Bistagnino, 2008).

Our consciousness of being part of a common environment is completely lost. Everyone, both in the small and in the big, defines his/her own rules and tries to prevaricate his/her neighbour. There are no more common goals to try to achieve in a collective shared effort: society is getting more and more broken up and the accumulation and ostentation of money emerges with virulence. Considering that we measure also the importance of life by the value of what we own, it is inevitable that "having" becomes the heart of the values displayed in our cultural, social and economic systems, prioritising possession and looking at the product as a pivotal element upon which all considerations are made.

"Society culture environment, economy are the result of our daily actions".

There is a need for a conscience of what is happening in order to initiate actions of a strong rethink to rebuild ourselves, from within, and to redefine the cultural paradigm to be put in place. A new people's awareness is needed to fully understand the relationships that individual daily actions cause in order to relapse on others and the environment and to spread the reflection that we are part of a whole to which we all contribute and from which we all draw.

At first glance the problem so stated seems to be very easy to solve: by just following new responsible guidelines we could put everything in order: a bit like washing and cleaning a messy environment. However, everything keeps in order, but over time we are slowly distracted and fall little by little into the previous disorder.

Some of the actions, we had before, simply take over and delete with their self-reference the positive relationships of the whole, thus leading to the negative transformation of the surrounding area.
Today we are immersed in a cultural paradigm of consumerism that in its swirling stream drags and swallows every action. It is necessary to raise awareness of the material flows that generate the various agricultural and productive processes, and the relationships that are triggered by the different actors.

To face this situation in amore conscious and radical way, it is necessary to take a picture of the current situation and start thinking about it. This documentation is what the systemic approach indicates as a holistic survey.[1]
It is the indication of the quality and quantity that each anthropic process involves. This survey considers all the relationships that take place in the territorial context in which the activities are located; all those that are part of the individual actions that settle. Furthermore it is important to elect the relationships among them and outside the local context, with implication at regional, national, continental and worldwide levels.
For a simple and intuitive understanding that strongly shows the perception of the present set, it is necessary to proceed in small steps with graphic schemas visualizing the activity analysed with

- The generated relations.
- The incoming (input) and outgoing (output) resources.
- The various actions of which an activity is made with its inputs and outputs.
- The territorial know-how with its cultural and social aspects.
- The territory with its climatic, cultural, environmental, social and productive characteristics.

The Generated Relations
Whoever manages an activity, in general, is very busy in coordinating the complexity of the operations required for daily business and seeks to make the necessary resources available as easily as possible. He/she is absorbed by current activities and his/her attention does not go beyond it. It is necessary to try and look around and see which relationships really are interlaced with the territory and with the various suppliers of the necessary materials and services, but above all to understand what system is being generated. To do this we have to start from one business and connect all those that are connected to it before and after reaching with a line: before, going back to the origin of the inputs, and after the final consumer.
This easy operation will lead to broadening the vision from a local context to that of all those who are actually involved Thus, it is possible to understand all the positive and negative consequences that this business is generating and to which it is co-responsible for (fig. 1).

The Incoming (Input) and Outgoing (Output) Resources
At this level, by focusing on one business, all the resources necessary for the productive development are detected in order to identify the input and the outputs. These include both the products and all the emissions and material resulting from the production process.
The indication of where the inputs come from and where the outputs are going gives a clear reference to connect to the previous scheme of the generated relations (fig. 2).

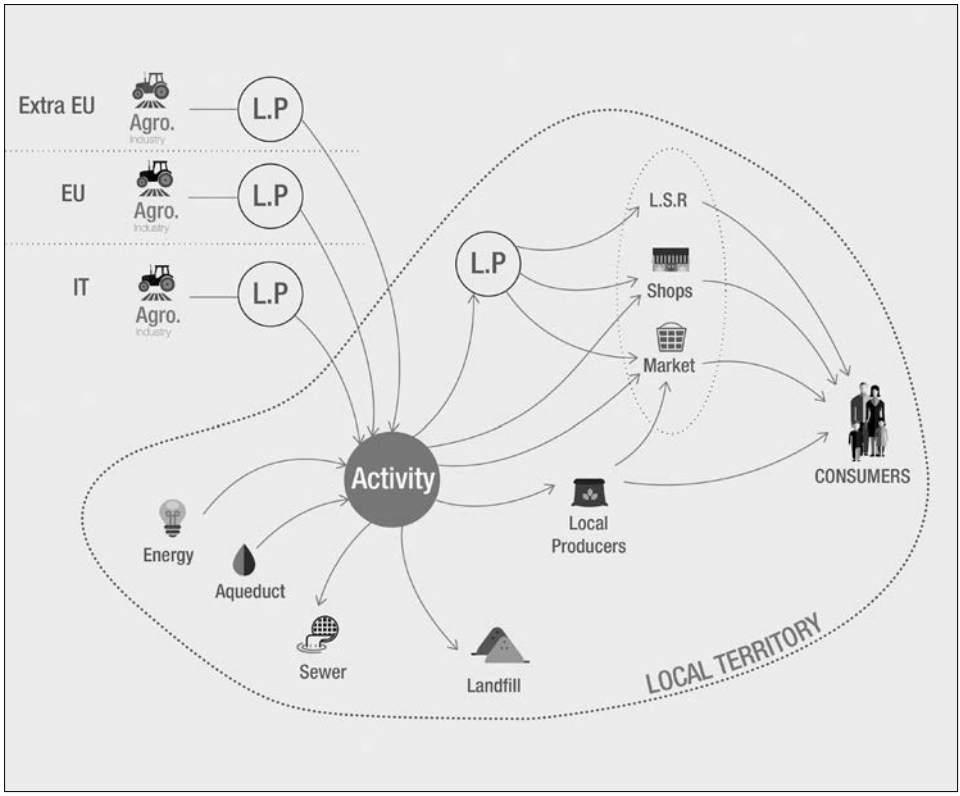

Fig. 1. Schema of the relationships that an activity generates and also the reference territory from which they come. Resources may come from Logistic Platforms (P.L.) linked to suppliers of Agro Industries (Agro. Ind.) located in different places in Italy (IT) Europe (EU) or even overseas (Extra EU). Products can be distributed to the Large Scale Retail (L. S. R.) such as supermarkets or to local stores and markets (Market). Obviously looking at these relationships it is very clear which are the relationships with the local territory.

Actions that Make Up an Activity with One's Own Input and Output

Production activities consist of several actions that in their temporal and functional sequence constitute the whole production.

The display in their succession allows to indicate, for each of these, all the inputs and the outputs, which were previously indicated overall. Splitting up actions also allows us to identify the ones that use most inputs or generate outputs, and link them to the other activities from which we take or send them.

The result is an overall perception of the activity with the various resource flows divided into individual actions, and which can now also be seen in their over time development.

The time variation is fundamental in order to recover, especially in the case of food-related activities, the awareness of the seasons during the year and of the possibility of having or not mature products, consistent with the seasons, in the territory in which we are (fig. 3).

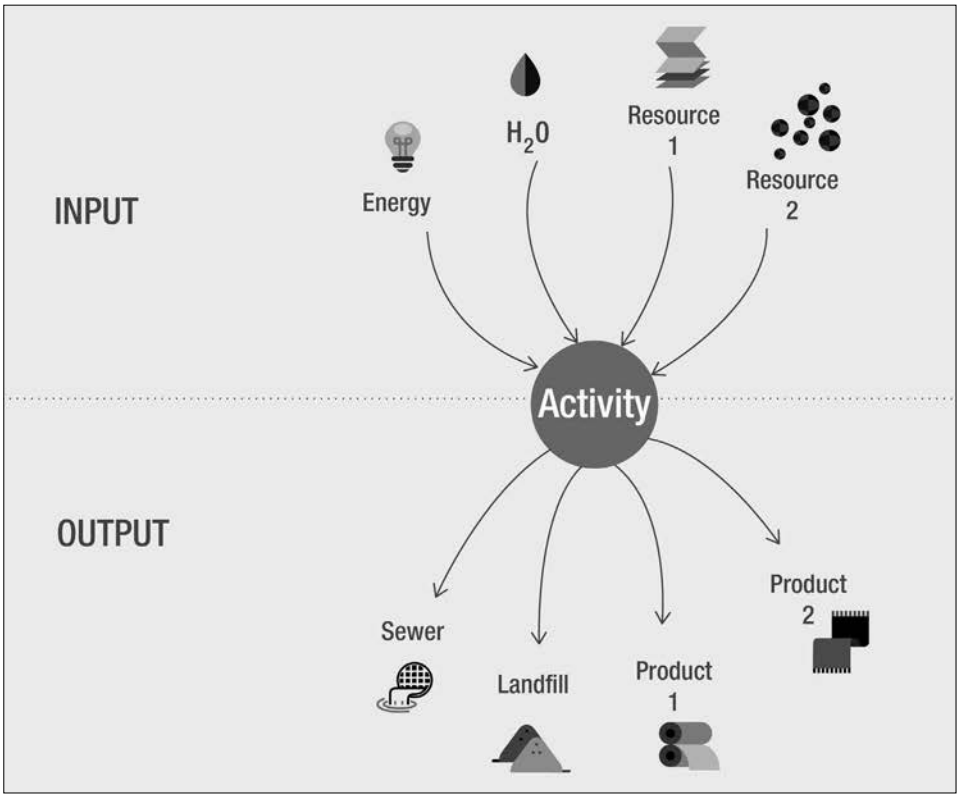

Fig. 2. Schema of the incoming (input) and outgoing (output) resources that an activity uses.

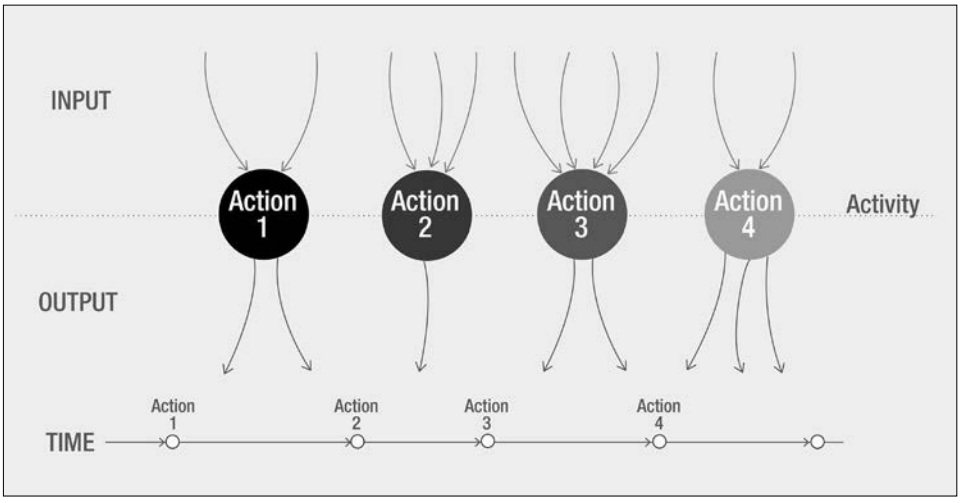

Fig. 3. Schema of actions that make up an activity; the inputs and outputs reference to individual actions allows you to understand its intrinsic qualities and also the weight each has over the others. The time line instead, asynchronous with the scheme, emphasizes when individual actions are made and also their seasonal reference.

Territory with its Characteristics

The previous analyzes with the related schemes naturally lead to understanding how the territory, in which all activities take place, has a fundamental knowledge relevance. It is therefore useful to represent, in a poster with picture and photographs, its landscape and climatic characteristics in order to be in a perceptual relation with the place where it operates and also to deepen all other tangible and intangible components that distinguish it:

- culture with traditions, festivities, folklore, fairs, events and architecture;
- environmental resources relating to flora and fauna;
- typical products and, connected to them, also the typical dishes;
- craft and industrial activities;
- tourism with attractions, seasonal or not, and sports that are practiced.

The close link between the different levels of depth gives a clear indication of how the activity really is carried out with the overall involvement of all the actors and also to be able to reflect consciously on the positives but also of the negativities found. This reflection should be seen not only in the negative way but, above all, in the positive way because they are the leverages for change. They thus become the starting point for the evolution of activity: this is how the Systemic Design begins.

2.3.2 The 5 Principles of Systemic Design

Nature, the most efficient system, defines the lines of a model that is in favour of a critical reading of the processes and the redefinition of the latter as open systems. There is no waste and every excess is metabolized by the system as a dynamic flow through the 5 kingdoms (vegetables, animals, fungi, algae and bacteria):

- all that is waste or toxic for a kingdom may be considered as a source of food and raw materials for another;
- diversified and highly localized systems are durable and efficient;
- the interaction between species within a self-generating system, permits to create and separate the matter at room pressure and temperature and stabilize toxic and potentially harmful elements.

In this way, it is possible to realize an integration between manufacturing culture and design research that brings out connections and coherences, now hidden between productive and reproductive processes and nature towards efficient and sustainable scenarios. The principles that are valid and applicable to the anthropic systems are (Bistagnino, 2011):

The Outputs (Wastes) became Inputs (Resources) to Another One

This innovative relationship, which sees as resources the quality and quantity of the waste products, is the base of a new economic model: it uses the continuous flow of matter and energy and generates new products, new jobs and new economy.

On the contrary, to the linear view in which the waste is a problem, in the systemic approach it is raw material for other processes.

Relations Generate the System Itself
As well as in a net, the different knots are connected to each other and give strength to the whole complex, so that the relations between the various parts constitute the system itself, and allow its identification. Each element or knot is strategic only if it is related to another one, which may be internal and external to the system, creating new relationships and new dynamics of development in order to have a net economy.

Self-Generating (Autopoietic) Systems Sustain and Reproduce Themselves
Biological systems are characterized by the principles of mutual learning, self-regulation and dynamic ability to change in relation to the results obtained by co-evolving the entire system as a whole: they are able to sustain and reproduce themselves, they also know exactly what they need and in what amounts, in order to maintain the internal balances and the external relations. Our manufacturing facilities should be guided by these operations, trying to regulate each other and, then, co-evolve together.

Act Locally in the Context in which It Operates
This guideline points out the need to exploit local, social, cultural and material resources. By wisely using the resources of the territory you feed the local development; you effectively fight the delocalization of production and the contribution of external resources and you promote the preservation in situ of the heritage of material culture.

Man Connected to Own Environmental, Social, Cultural and Ethic Context
The Systemic Design shifts the attention to a "human" dimension that informs, in a sensible and responsible way, a system of places, communities, practices and processes. This is possible by intervening in the processes with a view toward sustainability from a supplementary relationship between community and territory, between natural and artificial, between man and ecosystem. The design of products, services or processes can no longer consider its own specific sphere and be restricted to a linear flow of information, know-how and production; but it also has to cover several applicable scopes and establish relationships with those that allow an integrated and systemic development, not only of the processes but also of the society, the culture and the territory. This design will require multicultural and design approaches, inclusive of a complex system of active skills or skills to be activated on the territory[2].

The identified design solutions will have two temporal scales of application:
- the first is short-term and consists of punctual interventions starting with perceivable results in the immediate future;
- the second is long-term, and is the sum of all interventions that enable the final dynamic activation and realization of the open system.

2.3.3 The Systemic Design Projects
The restart is exactly from the analysed activity of the holistic survey that is now known deeply in all its flows and impacts and the application of the 5 Systemic Design principles. It is therefore to evolve negativity into positivity, obtaining as a whole a positive relationship between the

actors, and it will be possible to understand, in detail, how important it is that the outputs of a system become the inputs of another one (Bistagnino, 2011).
If up to now we have focused only on quantity and quality of raw materials and to their specific features, it will be equally important for our future to focus our attention toward not only on what can enter a system, but also to what can exit from it.
This vision creates a wider and more complex project, which embrace the whole production chain, where the issues related to production waste are placed on the same level as supplies and raw materials uses. In the first place we will need to develop the output quality as well as the quantity, as they will be generating the real future uses. The output qualities should mainly be deepened, and not only the quantities, because those may turn into input for another process. This means that different productions may be correlated, so that the specific output qualities of a given process may turn into input for another one.
If we turned the output from a problem into a resource, with an interesting economic value, we would be also interested in considering them as an active part of a process in trying to enhance their intrinsic qualities and being inclined to change all the working processes that downgrade them. We would pay deeper attention to keep their appealing properties unchanged, in order not to lose their economic trading value, achieving at the same time a formidable result, that being a Zero Emissions productive culture.

A new act is in place that has the naturalness of conceiving relationships as useful collaborative reciprocal constraints that bind us to a group and to a context: it goes from a quantitative view to a qualitative one.
This positivity combines the different units, transforming them into a coherent system in which everyone's strength becomes the strength of the other. Individuals linked to a collective action play a small action that, as a whole is exponentially transformed into a great achievement. Each one depends on their neighbours' behaviour, but at the same time maintains a degree of autonomy that will make them capable of positively influencing the environment and collaborating on changes on an inclusive level of the whole.
The behaviour of the whole is similar to that of a flock of birds, a shoal of fish, or a swarm of insects, in which each component acts in its own local environment; but its actions affect the direction and the form of the whole to adapt to the external conditions that come out of the way.

The new relationship between the subjects becomes concrete in the new qualitative management of the resources in which the outputs of one are the inputs of another in a continuous flow. This mutual exchange consolidates relationships between the various parties by combining them into positive zero-emission systems that develop and grow locally (Barbero et al., 2017).

This new consciousness has a natural generating influence; it activates a collective action that creates a new social, cultural, ethical, productive and economic system and spreads throughout the local area by evolving the existing macro linear system into the systemic one.

The general implications are consequent and truly touch on all the existing activities, starting from the positive social relationships that will consolidate the relationships between people, from the strengthening of the material culture that will have implications for the production system,

to the territory that will naturally enhance local resources and bring health and well-being, to the sharp decline in logistics that will turn into micro shifts, to the economy that will become a solid and resilient local micro-economy by generating new jobs and will positively connect all the subjects involved.

A new ethic will be spontaneously embedded in all relational relationships that form the general context. It is not a dream world, it is just what happens in nature where each individual is a vital part of the overall system.
What has hitherto been outlined refers mainly to the agricultural or food production system because if we acquire the awareness of the negative qualities inherent in the foods we ingest to feed our body, we will also have the consciousness to modify and evolve all the other productions of commonly used products that generally determine the macro system in which we live. The objects we use daily are very complex, but this complexity is formed by a functionally related system of individual components. Each of these alone seems silent, anonymous and static, but at the moment when it creates links with others, it gradually loses its singularity and in the new set, it takes part in creating the image of the new product, while retaining its specific features.
Just like our individual cells that have their own individuality (form, DNA, etc.), but that together are no longer perceived individually because they contribute to forming our overall image and functionality, while retaining their constituent features.
The basic elements from which a product is born are the components that, in their relational context, form it.
Starting from this simple and obvious consideration, it can help to improve the whole system by making a positive impact on all involved actors (from production of component to manufacturer to distributor, maintainer, and user) and to evolve all processes from the design phase to the end of life.

[1] RETRACE follows this methodology and in paragraph 4.1.1 there is a detailed description of the Holistic Diagnosis settled in the 5 regions involved in the project is showed.
[2] For an exhaustive methodological explanation, please refer to the description of the guidelines of Systemic Design drawn from: L. Bistagnino (2011). *Systemic Design. Designing the Productive and Environmental Sustainability*. Bra (CN), Italy: Slow Food Editore. Available https://www.ebook.it/miscellanea/120911-systemic_design-9788884992710.html (Accessed 20th May 2017)

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2.4 Systemic Design as Effective Methodology for the Transition to Circular Economy

SILVIA BARBERO

The goal of this chapter is to clarify the connections between circular economy and the Systemic Design approach, which helps to define a methodology for reaching the common goal of local sustainable development that all policymakers aim to achieve.
Firstly, a parallel vision of circular economy characteristics and Systemic Design principles is presented in order to underline their common traits and understand their strong differences. This allows to define a methodology that can be pursued by local actors, including policymakers, for the transition towards a more sustainable and circular economy.
Lastly, special attention is given to the role of local actors in this transition and how the Systemic Design methodology can enhance territorial relationships towards circular economies.

2.4.1 THE RELATION BETWEEN SYSTEMIC DESIGN AND CIRCULAR ECONOMY PRINCIPLES

The aim of this essay is to investigate the relation between the characteristics of Circular Economy (CE) and the principles of Systemic Design (SD) in order to converge to the common goal of a sustainable development of our regions. The most important aspect is also the definition of a specific and valuable way to reach this goal. What are the steps that local actors can adopt to design a new sustainable scenario for their regions?

As broadly confirmed, the sustainable development requests the balance of the 3 Ps: people, planet and profit (Elkington, 1998) for inter-generational and intra-generational equity (WCED, 1987) through a holistic perspective (Hjorth and Bagheri, 2006). In recent years, the concept of CE seems to embody the sustainable development in our linear and inefficient economies (Murray et al., 2015). The five fundamental characteristics of CE (Ellen MacArthur Foundation, 2015) help the transition from a linear to a more sustainable economy not only at economy level, but also for its impact on the environment and society.

The objective of the circular economy is to replicate the quasi-cyclical of the natural ecosystems (Bourg et al., 2006). In this sense, industrial ecology and circular economy can be equal, as the industrial ecology discloses the urgent need for transition from productive linear systems to non-linear processes (Frosh & Gallopolous, 1989), even if we should be conscious that the non-linearity of productive systems is not necessary the same as their circularity.

The five main characteristics of CE[1] can help to understand the aspects of this new economy, as explicated in the Ellen MacArthur Foundation report "Towards a Circular Economy: Business Rationale for an Accelerated Transition" (2015):

WASTE IS DESIGNED OUT: waste does not exist when the biological and technical components or materials are designed by intention to fit within a biological or technical materials cycle. Biological materials are non-toxic and can easily be returned to the soil by composting or anaerobic digestion. Technical materials (polymers, alloys, and other man-made materials) are designed to be recovered, refreshed and upgraded, minimising the energy input required and maximising the retention of value (in terms of both economics and resources). Resource efficiency means keeping the added value through the prudent use of raw materials and energy throughout the value chain (Yuan et al., 2006), and using products as long as possible (Bilitewski, 2012).

DIVERSITY BUILDS STRENGTH: diverse systems with many connections and scales are more resilient in the face of external shocks than systems built simply for efficiency. Across many types of systems, diversity is a key driver of versatility and resilience. In living systems, for example, biodiversity is essential to surviving environmental changes. Similarly, economies need a balance of various scales of businesses to thrive in the long term. The larger enterprises bring volume and efficiency, while the smaller ones offer alternative models when crises occur (Goerner et al, 2009). Modularity, versatility, and adaptivity are prized features that need to be prioritised in a fast-evolving world.

RENEWABLE ENERGY SOURCES POWER THE ECONOMY: renewable energy decrease the resource dependence and increase the systems resilience (to oil shocks, for example). This will be further enabled by the reduced threshold energy levels required in a restorative CE. For example, the agricultural production system runs on current solar income but significant amounts of fossil fuels are used in fertilisers, farm machinery, processing and through the supply chain. More integrated food and farming systems would reduce the need for fossil-fuel based inputs and capture more of the energy value of by-products and manures.

THINK IN SYSTEMS: many real-world elements, such as businesses, people or plants, are part of complex systems where different parts are strongly linked to each other, leading to some surprising consequences. The ability to understand how parts influence one another within a whole, and the relationship of the whole to the parts, is crucial. Elements are considered in relation to their environmental and social contexts. While a machine is also a system, it is clearly narrowly bounded and assumed to be deterministic. Systems thinking usually refers to the overwhelming majority of real-world systems: these are non-linear, feedback-rich, and interdependent. In such systems, imprecise starting conditions combined with feedback lead to often surprising consequences, and to outcomes that are frequently not proportional to the input. Such systems cannot be managed in the conventional, 'linear' sense, requiring instead more flexibility and more frequent adaptation to changing circumstances.

PRICES REFLECTS REAL COSTS: prices can act as messages, so need to reflect full costs in order to be effective (Webster, 2015). The full costs of negative externalities should be revealed and taken into account, and perverse subsidies should be removed. A lack of transparency on externalities acts as a barrier to the transition to a CE.

This is according to an economical point of view. However, as a designer I would like to investigate which is the most effective methodology for the transition to a CE. Recent studies on the evolution of design for sustainability strategies show an evolution from a narrow technical, product- and process-centric focus towards large-scale system level changes (Adams et al., 2016). The methodologies involved in this evolution go from product level (i.e. cradle-to-cradle design, biomimicry design), to product-service system level (i.e. Product-Service System design), spatio-social level (i.e. Design for Social Innovation), socio-technical system innovation level (i.e. Design for System Innovations and Transitions) with an increasing potential toward beneficial sustainable effects (Ceschin and Gaziulusoy, 2016). I would add to this last level also the Systemic Design (SD) methodology developed at the beginning of this century at Politecnico di Torino and ZERI Foundation, thanks to the collaboration between design disciplines with Luigi Bistagnino's expertise and economical disciplines with Gunter Pauli's experiences. This methodology allows to design the flow of material and energy from one element of the system to another, transforming outputs of one process into input for another one (Bistagnino, 2011), potentially resulting in new, locally-based, value chains (Barbero, 2012).

The five principles of SD[2] can help to understand that the goal is to reach a more sustainable economy and society, like the CE, furthermore we can find a defined methodology to design new systems and reach it. As the Bistagnino's book *Systemic Design* (2011) extensively explains, the five SD principles are:

1. *Output becomes input*. The wastes of a system become the resources of another one, which generate a continuous flows of material, energy and information tending to zero emissions. This is the basic principle that helps anthropic processes to imitate nature.
2. *Relations generate the system*. The different elements of a system are connected with each other by the exchange of material, energy and information, generating the strengths of the system itself. The relationships developed within the generated system are open and inclusive.
3. *The system is self-generating*. The autopoietic open systems are self-supported and reproduced to evolve according to the changes occurring in the context. Like biological systems, the system is self-regulating and dynamically stable to change with the co-evolution of the system as a whole.
4. *Actions are local*. The operational context is prioritised by wisely using local resources. The cultural material heritage is preserved and any system can be replicated in another place. The scalability and replicability of systems is considered as an *unicum* (Barbero and Bicocca, 2017).
5. *The human being is at the centre of the project*. The relationship between man and context is the heart of the project, though not in an anthropocentric way. The human component should be considered in the design process in order to guarantee the respect of local culture and know-how.

I would like to underline the strong similarities between CE characteristics and the SD principles: first of the all, the principle related to the waste as a new matter to be seen in a more creative way is the base for both. We can state that this principle is the fundamental one to find the way towards a sustainable development.

We can also notice the common intention of the second characteristic of CE about the resilience of connections with the second and third principles of SD about the relations and the autopoiesis of the system. In both cases, relations among different elements of the systems can change dynamically according to the context in order to maintain the system alive. However, one aspect differs: in CE the generation of close loop is a must; in SD the relations generate open systems, more similar to a network than a circle. In the first case the closed loops refer to the biological nutrients and the recirculation of durable materials in the anthropic process means control the input of material to maximise recycling and recovery and to minimise the waste to landfill. In the second case the openness of the system derives from the Nature imitation, where the output od one Natural Reign is never metabolised by the same Reign, so the flow of material and energy from one Reign to another, and another one again, in order to guarantee the total elimination of waste.

The others characteristics and principles are less corresponding even if we can find some parallelism, for example the priority given by the CE on renewable energy is not explicit in SD principles even if the fourth principle of acting locally can lead to the same conclusion. To enforce this statement, I can quote some studies where the SD is applied to the energy sector and the outcome remains the same (Barbero and Pereno, 2013).

The CE characteristics enforce their attention to economy aspects also with the last principle related to the definition of prices. On the other side, the SD principles stress more the social aspects favouring the human factor, especially according to the last principle. We can say that they are two sides of the same coin. The two approaches of SD and CE are complementary and functional to the goals of the RETRACE Project, i.e. supporting the transition of regions and regional policies towards CE.

2.4.2 The Systemic Design Methodology towards a Circular Economy

In the SD approach, besides the general principles and goals, we also have a clear methodology that can be followed, as a designer of new systems, in order to pursue theories and principles. The knowledge process is always explored through theory and practice, analysis and synthesis, and takes into account the methodological and practical approaches deriving from the current debate on CE (Nigrei, 2016).

The SD methodology consists of five main steps, applied also in the RETRACE Project, which follows an iterative path and where any additional move is checked and reviewed based on the feedback received:

1. *Quality and quantity analysis (Holistic Diagnosis)*[3] Desk and field research are combined together to investigate the current situation of the context in which the project will be created. This is the most important phase in order to ensure the solidity and effectiveness of the project that can only originate from a careful analysis of the backdrop. The main effort is concentrated in gathering all useful information concerning the economic, social and environmental aspects to obtain a thorough analysis. Once the data have been collected with many different tools, the connections and influences between them are analysed to properly assess the issues that

need to be tackled. Holistic Diagnosis, truly enables to identify the unexpressed potentialities of a territory looking at it from a different perspective that does not only consider the economic aspect of profitability, but takes also into account the material culture, the local history, the traditional know-how, the local resources and the features of the environment to understand which connections can be created between processes in order to ensure a sustainable long-term development.

2. *Best practices selection in different context*[4] Next to the definition of Holistic Diagnosis, a research on the best practices addressed by the project is performed. This activity aims to identify good practices from which it is possible to learn and transfer relevant elements.
3. *Identification of problems*[5] From the framework outlined in the Holistic Diagnosis it is possible to identify the main issues that need to be addressed and the connections among them. Problems are regarded as leverages for change from which the project can be defined and initiated.
4. *Creation of solutions*[6] This step refers to the real design phase, i.e when a solution to the identified problem is provided. The solution originates from the knowledge acquired through the previous steps by applying a design thinking approach. The suggested solution undergoes a process of verification and validation before being implemented to foresee possible outcomes. The connections generated in this new system can offer new possibilities (for example: enhancement of outputs, savings on waste management, creation of new products from waste) for the actors involved, creating value at a local level.
5. *Implementation*[7] After the solution has been validated through preliminary studies and simulations, the project can be implemented. A continuous cycle of feedbacks from step 5 to step 1 allows to modify the project according to changes occurring in the framework.

In the last fifteen years this methodology has been tested and validated thanks to many different projects with different applications all around the world. Through these experiences the methodology has become stronger and increasingly successful. Many projects that applied the SD methodology were Italian and involved in the agro-food sector, such as the EN.FA.SI. project co-funded by Regione Piemonte under the POR-FESR 2007-2013 programme and developed with local enterprises (Agroinnova, Arese Franco, Molino Borgo San Dalmazzo). The aim of the EN.FA.SI project is the valorisation of all the wastes related to the farming and the food processing of a local type of bean (Fagiolo Cuneo) (Fiore & Tamborrini, 2014). The metal-mechanical sector was also tested with the multinational company NN Europe, that designs and manufactures high-precision metal and plastic components and assemblies for a variety of markets on a global basis. The project's goal is to avoid chemicals in the cleaning process of ball bearing production in order to have a wasted liquid that can be easily metabolised by the Natural Reign (Campagnaro, 2009). In the construction sector some projects are done in strict relation with the agro-food sector. It is important to underline that one project cannot be bounded to only one productive category because the intention is to merge and connect as many productive systems as possible. Other important application tests are done with territorial development projects in many different regions of the world, like for example in Mexico, in the Ahuacuotzingo region with the Red Mexicana de Mujeres, Cavideco, and Sudemur. The project's goal is to appraise local resources (material and human ones) to help developing the entire village and region (Barbero and Bicocca, 2015). Eventually, application to immaterial project like for example the definition of policy

roadmaps, prove one more time the effectiveness of the SD methodology for designing new ways towards local sustainable development.

As a matter of fact, the convergence of intents between SD and CE principles and characteristics towards a sustainable scenario clearly helps establishing the priorities in local development. As described in this paragraph, the SD methodology contributes to defining these goals. CE requires a scientific methodology in order to guarantee valuable results and a holistic vision over this complex system.

2.4.3 Systemic Design Enhances Territorial Relationships Generated through CE

The SD methodology should be developed and applied by multidisciplinary teams of local actors, since the information requested is a lot and the field of intervention is very broad. Furthermore, it is crucial to have local actors involved from the beginning of the entire process of development in order for the project to achieve success. In this context, the designer assumes the role of "designer mediator", whose "aim is to build or consolidate the team and the mediated integration between different types of knowledge and different specialism" (Celaschi et al., 2013). The systemic designers should design the throughputs that transform the output in input in a continuous metabolization within the complex system, mainly in step 4 (creation of solutions); moreover, they should manage the hard dialogue from the different actors in all the methodological steps. The basic ecosystem is the local community with its active participation mainly in the implementation phase (step 5). In order to be successful, for the project it is crucial to involve the local community from the early stages to achieve a successful implementation phase and obtain long term results.

The dialogue among different actors is difficult not due to the differences in languages but based on cultural barriers. Hence, systemic designers have the responsibility to build a trustful environment to foster relations among all the involved actors. In order to build up trust, I would like to mention another crucial player: the "connective actor" (Bicocca, 2016), who can be a single person or an organization that is already active and well-known and therefore knows the people who need to be involved and how to establish a dialogue among all actors.

The design of new local systems towards CE is a genuine dialogue among actors, in which feedbacks are mostly welcomed and can change many times during the different phases of the evolution process (Lee et al., 2005).

Eventually, the SD methodology fosters and encourages collaboration among a large number of local actors not only in terms of matter and energy exchange, but also in terms of knowledge and sharing expectations.

[1] For further details on Circular Economy, chapter 1.2 by Emanuele Bompan gives a comprehensive overview on this topic.

[2] For further details on SD, chapter 2.3 by Luigi Bistagnino gives a comprehensive overview on this topic.

[3] For further explanations on how the Holistic Diagnosis is applied in the RETRACE Project, see paragraph 4.1.1. by Carolina Giraldo Nohra and Chiara Battistoni who give a detailed description of the data collected by all partners and stakeholders.

[4] Specification on how the best practices are selected in the RETRACE Project and shared among partners and stakeholders is described in paragraph 4.1.2. by Agnese Pallaro.

[5] Policy gaps in the RETRACE Project correspond to this methodological step and are described in the Holistic Diagnosis Report.

[6] In the RETRACE Project this step corresponds to the definition of the Five Regional Action Plans (RAPs) and their corresponding Policy Briefs. A detailed description of this step applied to the RETRACE Project can be found in paragraph 4.1.3 by Ander Muñoz Urbizu.

[7] Implementation is a key element of the RETRACE Project, which has dedicated half of the duration of the project (two years) to it. The second phase of the project starts 1st April, 2018 and will end 31st March, 2020 when all the actions mentioned in the RAPs will be verified.

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3.
The RETRACE Project

3.1 Overview of the RETRACE Project

RAMONA TANASĂ

This chapter gives an overview of the RETRACE Project, describing the main objective, goals, activities and the expected outcomes at regional and European level. The RETRACE Project aims to improve regional policies by facilitating the transition towards a circular economy focusing in Systemic Design approach by the means of capitalizing experiences on a process combining three different approaches. The adoption of a Holistic Diagnosis Approach should allow the involved regions to assess the regional framework conditions to identify policy gaps, to better target the nature and scope of good practices in area of interest and to identify potential opportunities upon which to build supportive policies. Moreover, the project's expected outcomes are highlighted based on two implementation phases and the related activities, that will last for 48 months.

3.1.1 THE GOALS OF RETRACE PROJECT

The RETRACE Project is financed under the first call for proposals of the Interreg Europe ETC Programme, 4.2 Specific Objective – *Improving Resource Efficient Economy Policies*.

This programme aims at improving the implementation of regional development programmes and policies, mostly of the investment, growth and employment programmes and when appropriate, the ETC objective programmes by promoting experience exchange and policy learning among regional actors. The programme has a budget of 359 million euros and funds interregional cooperation projects aimed at research and innovation, SME competitiveness, low-carbon economy and environment and resource efficiency and policy learning platforms. Policy Learning Platforms are intended to open up the programme's knowledge for the benefit of all the project partners and the whole community of regional policy stakeholders on the same policy area as the interregional cooperation projects. The platforms are a hub of interaction, information and services for continuous learning bringing together communities of like-minded policy makers, practitioners and experts dealing with regional development policies in Europe. The aim of the learning and collaboration is to improve structural funds and other regional development policies in these four areas. Within each thematic platform, you can find people, projects, events and information related to your topic of interest. Each platform features:

- A KNOWLEDGE AND EDUCATION CENTRE for relevant policy recommendations, thematic studies, reports, evaluations, EU policy news, databases of good practices, etc.
- NETWORKING AND PARTNERING OPPORTUNITIES including organisation of relevant activities and events, database of practitioners and owners of good practices, etc.
- EXPERT HELPDESK FOR POLICY ADVICE, UPON REQUEST for targeted advice and guidance to improve public policies design and implementation.
- EXPERT SUPPORT FOR POLICY LEARNING, UPON REQUEST including peer reviews, benchmarking exercises, thematic workshops, capacity building events, learning activities, etc.

The platforms serve both the project partners and the whole community of regional policy stakeholders to meet and learn from each other. Other institutional stakeholders whose policy mandates are relevant for the topics addressed by the platforms, e.g. the European Commission, the Committee of Regions, the European Environment Agency, the OECD, and other EU programmes, may also use the platforms.

The RETRACE Project has a budget of EUR 1.514.352 (EUR 1.241.994,50 ERDF).

RETRACE addresses the EU challenge of transitioning towards a circular e conomy following the priorities set up by the:

- "Flagship Initiative for a Resource Efficient Europe" for a shift towards a resource efficient, low-carbon economy to achieve sustainable growth as enshrined in Europe 2020 Strategy (EC, 2011).
- EC Communication "Towards a Circular Economy: A Zero Waste Programme for Europe" (EC, 2014).

RETRACE partners deem that the adoption of more systemic approaches at territory/regional level can play a leverage effect in such transition. Specifically, the Systemic Design approach seeks to create complex industrial systems. It aims at implementing sustainable productive systems in which material and energy flows are designed so that waste (output) from one productive process becomes input to other processes, preventing waste from being released into the environment.

RETRACE's main goal is to promote the adoption of Systemic Design as a method allowing regional and local policies in their transitions towards a circular economy, focusing thus both on a territorial/regional policy perspective and on systemic approaches for a circular economy.

A transition to a circular economy shifts the focus to reusing, repairing, refurbishing and recycling existing materials and products. The benefits of adopting such model go well beyond the environment protection and resources saving, as it is considered that the transition to a circular economy model should lead to systemic and innovation intensive processes, leading to new business opportunities and models. Thus, circular economy and innovation are closely linked. Such transition must be mainly led by companies and industries, and can be primarily fostered by more strict regulatory frameworks and by more exigent and conscious consumers. Nonetheless, it is also considered that regional authorities might also play a key role on such shift. This is precisely the scope of RETRACE, as the partners consider that the regional perspective has been one of the least explored of the shift towards a circular economy model.

RETRACE follows the logic that regions can play a key role in this shift, as they:

- Have a high concentration of biological and technical nutrients: between incoming and outgoing flows of materials, a process of accumulation takes place at regional level. Regional industrial, commercial and distribution value chains offer a scale of supply large enough to create valuable collection and recovery opportunities.
- Provide the perfect innovation ecosystem for innovation needed for a circular economy model.

Regional Innovation Strategies for Smart Specialization (RIS3) can lead the whole of the R&I infrastructure, human capital and policy support measures into more decided investments in this field.
- Offer greater proximity between stakeholders, be they citizens/consumers, industrial/services clusters, R&I stakeholders, public authorities, incubators, etc., allowing Quadruple Helix approaches[1] for the development of new business models.

RETRACE fits under Interreg Europe ETC Programme, Priority Axis 4, 4.2 Specific Objective – *Improving Resource Efficient Economy Policies*. In this field, different policy responses have been adopted such as measures providing eco-innovation and eco-conception support to SMEs, development of clean-tech solutions and advanced manufacturing initiatives, but seldom have regions embraced integrated and systemic approaches taking into consideration the whole of the territory's natural assets and their economic and industrial activity.
As the adoption of systemic approaches at territory/regional level would play a leverage effect, by creating complex industrial systems, RETRACE partners expect to implement regional policy instruments able to ease sustainable productive systems waste from one productive process becomes input to other processes, preventing waste from being released. The adoption of systemic approaches can additionally lead to the development of new emerging industries and/or the adaptation of traditional ones, contributing so, to the objectives of Europe's new industrial policy (EC Comm. "For a European Industrial Renaissance").

The partners involved in the project are:
- Politecnico di Torino, Italy (North-West)
- Piedmont Region – Directorate for Regional System Competitiveness, Italy (North-West)
- Azaro Foundation, Spain (North-East)
- BEAZ, Spain (North-East)
- Higher School of Advanced Industrial Technology ESTIA, France (South-West)
- Association for Environment and Safety in Aquitaine APESA, France (South-West)
- Government Office for Development and European Cohesion Policy, Slovenia (Central)
- North-East Regional Development Agency, Romania (North-East)

RETRACE looks to improve regional policies facilitating the transition towards a circular economy focusing on a Systemic Design approach by the means of capitalizing experiences on a process combining 3 approaches:
- Exchange & Learning on policies in two ways:
  - The adoption of regional Systemic Design approaches at policy level — the Systemic Design approach seeks to create complex industrial systems by implementing sustainable productive systems in which material and energy flows are designed so that waste from one productive process becomes input to other processes, preventing waste from being released into the environment.
  - The increase of the capacities for transitioning by stakeholders.
- Strategic Design thinking process leading to Regional Action Plans (RAPs), with the engagement of stakeholders and concerned regional authorities;
- Action, by the implementation of the RAPs.

RETRACE contributes to the Programme's priority specific objective aiming at improving "the implementation of regional development policies and programmes, especially, programmes for Investment for Growth and Jobs and, where relevant, ETC programmes, aimed at increasing resource efficiency, green growth and eco-innovation and environmental performance management" (EU, 2014).

RETRACE's improving the policies and capacities of EU regions in the adoption of systemic approaches leading, ultimately, to the further identification of synergistic opportunities and models and to an increase of the absorption capacity of companies in their implementation.

The Specific Objectives of the project are:

- provide methodological tools for regions to adopt Systemic Design approaches at territory and cross-sectorial level;
- exchange and disseminate good practices in the field of circular economy, which would inspire new ways to face common problems and asses innovative policy instruments;
- lead design thinking processes with all relevant stakeholders, organised around Stakeholders Groups in order to help in the definition of Action Plans with specific circular proposals;
- implement and evaluate the impact of this new Action Plans;
- contribute to the regional smart specialization strategies of partner regions, thanks to the increased dialogue among local stakeholders and the identification of new business opportunities and models;
- raise awareness among politicians and policymakers of the tangible benefits for a transition towards a circular economy;
- deliver Policy Road Map, making visible the benefits of adopting systemic approaches and circular economy vision.
- disseminate project results at the widest level, looking for synergies with other Interreg Europe related projects and existing networks and initiatives in the circular economy field;
- contribute with good practices, policy briefs and recommendations to the Interreg Europe Policy Learning Platform on Environment and Resource Efficiency.
- Improve the knowledge on Systemic Design methodology and circular economy field reaching a wider audience.

3.1.2 Main Results of The RETRACE Project

RETRACE looks to improve regional policies facilitating the transition towards a Circular Economy (CE) through the adoption of Systemic Design (SD) approaches by the means of capitalizing experiences in referred fields. The process relies on the contribution of 5 stakeholders groups, composed by authorities, including target OP's MAs, policymakers, industrial clusters, public services providers, etc., engaged all along the project. The main results expected are:

- Policies, programmes and objectives of 5 ERDF/ESF OPs 2014/2020 influenced by RETRACE by the end of the project, with an estimated impact of 2 million euros.
- 30 exchanged good practices influencing/impacting on target policies.

5 RIS3 influenced in terms of identification of new smart specialization niche areas, priority of Key Enabling Technologies and new business opportunities RETRACE also envisages the *durability of results* that will be addressed at two levels:

REGIONAL LEVEL:

- Engagement of key stakeholders ensures the ownership of the measures adopted by RAPs;
- Engagement of key industrial, consumers, public services managers, innovation and economic development agencies;
- Policy Briefs adapted to the language and interests of politicians and policymakers.

EUROPEAN LEVEL:

- The pool of knowledge of RETRACE available online and publications and briefs, accessible in the Interreg Europe Policy Learning Platform;
- Resulting learning and recommendations will be embodied in the "Policy Road Map for a Systemic Approach on Circular Economy";
- European Commission's services and directorates (DG Research, DG Agri, DG Environment, DG Grow, and DG Regio Officers) are envisaged for dissemination of the project's main outcomes.

Furthermore, some specific outcomes of RETRACE are tangible, sharable and monitorable:

I. *Five Regional Holistic Diagnoses* that would assess the potential connections and synergies of the territorial natural/environmental assets of the five targeted regions, the systemic links of three priority industrial sectors in those regions and a self-assessment on policy gaps. The main aim of the Holistic Diagnosis is to assess the regional framework conditions in order to identify policy gaps and potential opportunities upon which to build supportive policies. A deeper explanation of the Holistic Diagnosis methodology is provided in chapter 4.1.1. Potential connections will be assessed at two different levels:
   1. Territory, referring to water management, urban waste, energy and environment;
   2. Economy/Industrial sectors, where each regional partner will select three sectors to assess the potential synergies at the systemic level with other sectors or processes at regional/interregional level.

   The Holistic Diagnosis should allow each region to better target the nature and scope of good practices of interest to the region.

   Resulting Holistic Diagnosis reports delivered by each partner will include a self-assessment on the gaps of available policies and programmes on the fields of: 1) Setup of regional systemic watch systems; 2) Setup of Systemic Design approaches on priority industrial sectors; 3) Raising awareness on Systemic Design approach; 4) Support to the adoption of eco-innovation, eco-design and remanufacturing practices; and 5) Education and Training on the skills needed for the transition towards a circular economy. This will allow each partner to better target the nature and scope of good practices of interest to the region, to be specifically assessed for their transfer on the Action Plan.

II. *Five Stakeholders Groups* that meet every semester in the first phase of the project and take part on the Holistic Diagnosis stage, they participate to field visits, contribute in the strategic thinking process and are in charge with implementing measures included in the

Regional Action Plans developed in collaboration with RETRACE regional partners.

III. *Seven Interregional events organised to exchange experience*: five Field Visits and Peer Review workshops to the five partner regions and two Field Visits of sixteen good practices identified outside the partnership of interest to the partnership in Scotland (UK) and The Netherlands, including a peer review workshop.

IV. *More than thirty Good Practices identified* in seven different policy areas, corresponding to the seven field visits.

V. *5 Regional/National Action Plans where* all partners match policy gaps with exchanged Good Practices to identify the most promising cases to their interests. RAPs envisage improving the targeted Operational Programmes, upon agreement with Managing Authorities. All partners will draft complete Action Plans following the Interreg Europe Programme template, which will be complemented by two annexes:
   - RIS3 Annex, assessing the potential impact of the Holistic Diagnosis and Good Practices exchange into new potential priority areas of partner RIS3, both in terms of industry and Key Enabling Technologies of partner regions.
   - Monitoring Plans of Action Plans' implementation includes the Terms of Reference (ToR) for Action Plans impact assessment, measuring the progress and final impact of the Action Plans in terms of improvement of targeted OPs, changes in culture, governance and capacities of regional/national authorities and stakeholders, and the planning of interviews and Focus Groups with local stakeholders that will be carried out in the final phase of the project.

VI. *Five Policy Briefs* targeting politicians and policymakers with tangible benefits and potential impact of circular economy, adapted to the knowledge and interests of these target groups, with a summary of proposed RAPs.

VII. *Three publications* produced and disseminated to different target groups:
   - *RETRACE Systemic Design Method Guide for policy making: a circular Europe on the way* aimed at regional policymakers and policy managers, where an easy and step-by-step method for regions and territories to conduct Holistic Diagnosis for the application of systemic approaches will be proposed. This is the present referred publication.
   - *RETRACE Good Practices Guide on Systemic Approaches on Circular Economy* aimed at policy managers, companies, industries, NGOs, society, where Good Practices will be reported following an agreed fact sheet, including also transfer guidelines.
   - *Policy Road Map for a Systemic Approach on Circular Economy* aimed at politicians and policymakers, that includes general policy recommendations that are making visible the potential benefits and necessary steps for adopting integrated policies for a transition into circular economy.

3.1.3 RETRACE Project Timing

The RETRACE Project implementation started 1st APRIL 2016 and closing date follows 48 MONTHS later on 31st MARCH 2020.

The Project's Work Plan is divided into two main phases subdivided in four semesters each as follows:

D.1 PHASE 1: Interregional Learning

(04/2016 — 03/2018) is split into four semesters as follows:

- SEMESTER 1 (04/2016 — 09/2016) is devoted to the setup of coordination and management system, constitution of Steering Group (SG) and holding the kickoff meeting. The main outcomes expected in terms of *Exchange of Experience* are: Brief on Systemic Design and Circular Economy: 20 staff trained; 5 Stakeholders Groups created and 1st meeting held: 50 people; Piedmont and Aquitaine Field Visits held: 26 partners and stakeholders attending each; and Piedmont and Aquitaine Good Practices and Peer Review Reports. In terms of Communication & Dissemination the outcomes are related to: Communication & Dissemination Strategy & 5 Communication Plans; Communication Officer appointed; 5 Dissemination Events held: 182 attendants; Project Poster available; Project website under Interreg Europe platform and social media profiles; and Press releases for every Field Visits. As related to PROJECT MANAGEMENT, the main outcomes were: Steering Group constitution and Rules of Procedure; Kickoff Meeting: agenda, minutes and attendance sheet; Project Coordinator and Financial Manager appointed; Work Plans for Semesters 1 & 2 agreed.
- SEMESTER 2 (10/2016 – 03/2017) During this semester the Holistic Diagnosis was completed, the reporting of good practices followed agreed timetable and Field Visits to Basque Country (Spain) and the Netherlands will take place. The expected outcomes in terms of Exchange of Experience are: 5 Holistic Diagnosis Reports validated by Stakeholders Groups, 2nd Stakeholders Groups meetings held in 5 regions, Basque Country and The Netherlands Field Visits held: 30 people each, Basque Country and The Netherlands Good Practices and Peer Review Reports. As for Communication & Dissemination the resulted outcomes are: RETRACE brochure, RETRACE 1st newsletter distributed: 250 contacts, Press releases for every Field Visits. In terms of Project Management the deliverables are: 2nd SG meeting: agenda, minutes and attendance sheet, Monitoring Report of Semester 1 agreed, Work Plan for Semester 2 updated and Work Plan for Semester 3, 1st Progress Report submitted to Interreg Europe.
- SEMESTER 3 (04/2017 — 09/2017) The main outputs during this semester, as related to Exchange of Experience are: 3rd Stakeholders Groups meetings held in 5 regions, North-East Region, Slovenia and Scotland Field Visits held: 30 people each, North-East Region, Slovenia and Scotland Good Practices Reports. As for Communication & Dissemination the results are the following: "SYSTEMIC DESIGN FOR POLICY MAKINGA Circular Europe on the Way" publication, RETRACE 2nd newsletter distributed: 250 contacts, press releases in occasion of Field Visits. Project Management outcomes are: 3rd SG meeting: agenda, minutes and attendance sheet, Monitoring Report of Semester 2 agreed, Work Plan for Semester 3 updated and Work Plan for Semester 4, 2nd Progress Report submitted to Interreg Europe.
- SEMESTER 4 (10/2017 — 03/2018) This semester will conclude on the agreement of 5 Actions Plans as a result of the Exchange of Experience and strategic thinking processes. The expected outcomes of this semester are the following. As related to *Exchange of Experience*: 4th Stakeholders Groups meetings held in 5 regions, 5 Action Plans, including 2 additional annexes, 5 Policy Briefs. Related to Communication & Dissemination the expected outcomes are: RETRACE "Good Practices Guide", RETRACE "Policy Road Map", 5

regional Dissemination Events: 210 attendants, 1 interregional Dissemination Event: 100 attendants, including 20 politicians, RETRACE video & infographics with Phase 1 results, RETRACE 3rd newsletter distributed: 250 contacts, press releases in occasion of dissemination events. As related to PROJECT MONITORING the following results are expected: 4th SG meeting: agenda, minutes and attendance sheet, Monitoring Report of Semester 3 agreed, Work Plan for Semester 4 updated and Work Plan for Semesters 5 & 6, 3rd Progress Report submitted to Interreg Europe, and Request for Change for Phase 2 submitted to Interreg Europe.

D.2 PHASE 2: Detailed Work Plan Per Period

(04/2018 – 03/2020) split into four semesters as:

- SEMESTER 5 (04/2018 – 09/2018) Each region starts the implementation of its action plan and the relevant stakeholders for the implementation are mobilized. The main output of this phase will be the website updates.
- SEMESTER 6 (10/2018 – 03/2019) Each partner will monitor the action plan implementation by contacting the stakeholders and beneficiaries of the different actions and will meet to learn from each other by exchanging on the success and difficulties met in the implementation of their action plan. The expected outcomes of the phase are: 1 project meeting, Website updates and 1 annual progress report.
- SEMESTER 7 (04/2019 – 09/2019) During this period, each partner will continue to monitor the action plan implementation and will be in regular contacts with the stakeholders and beneficiaries of the different actions. The main outcomes of this phase will be the organization of 1 high-level political dissemination event and keeping the Website updated.
- SEMESTER 8 (10/2019 – 03/2020) Each partner will finalize the monitoring of the action plan implementation, will discuss the results of this implementation with the relevant regional stakeholders and beneficiaries and will meet to exchange and draw conclusions on the two years of action plan implementation. The main outcomes will be 1 project meeting, Website updates, 1 annual progress report and 1 final project report.

[1] The concept of Quadruple Helix was developed by maintaining the interaction of the spheres of the Triple Helix (university, industry, and government) and by formalizing the role of civil society (e.g. Yawson, 2009). Academia and firms provide the necessary conditions for an integrated innovation ecosystem. Governments provide the regulatory framework and the financial support for the definition and implementation of innovation strategies and policies. Civil society not only uses and applies knowledge, and demands for innovation in the form of goods and services, but also becomes an active part of the innovation system (Cavallini et al., 2016).

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3.2 Involved Actors

CYRIL BALDACCHINO AND BENJAMIN TYL

This chapter focuses on the partners and stakeholders involved in the RETRACE Project and their role. Furthermore, it aims to give an overview of the interdisciplinary team of the RETRACE Project and how this will reflect on the final outcome.

3.2.1 PARTNERS: THEIR ROLE

The RETRACE Project includes eight partners from five different Regions in Europe.

LEAD PARTNER (LP) IS THE POLITECNICO DI TORINO in Italy (http://www.polito.it/). The Politecnico di Torino (POLITO) is an Italian preeminent academic institution for studies in engineering and architecture and one of the most prestigious international public institutes ranked among the first 25 European Universities of Engineering, Technology and Computer Science.

The POLITO DAD (Department of Architecture and Design) research is deeply rooted in sustainable development, Systemic Design approach, output-input management, local context, cultural and local production, as witnessed by the ongoing exchange of know-how and the importance of applied researches conducted with external partners. It promotes research activities aimed to:

- create open and circular productive systems;
- analyse local territory and resources in order to define sustainable development guidelines;
- analyse of users' needs through design thinking methodologies;
- interaction design for different users and experiences.

POLITO applies the Systemic Design approach, which encourages the interaction between people's activities and resources. This approach creates synergies between local producers, reducing waste and creating new high value-added products, as well as promoting a new rural business models, hence sustainable production and economic development.

As Lead Partner of the RETRACE Project, POLITO is in charge of the project coordination and ensures the deliverables for all the work packages and partners. Its mission is also to contribute defining the issues that need to be addressed and the methodology that must be applied in order to create smart strategies. It helps the regions to define the local Holistic Diagnosis and the Regional Action Plans. During the field visits, the LP will be discussing with the local partners about which best practices need to be selected. Furthermore, it is the Editor-in-Chief of all publications and the curator of the events that RETRACE will be developing in the next 4 years.

The team members at Polito are:
Silvia Barbero, *Scientific Project Coordinator*;
Antonietta Cerrato, *Financial Manager*;
Agnese Pallaro, *Communication Manager*;
Carolina Giraldo Nohra, Luigi Bistagnino, Miriam Bicocca, Chiara Battistoni, Pier Paolo Peruccio, Paolo Tamborrini, Giada Rivella and Amina Pereno.

SECOND PARTNER (PP2) IS A MANAGING AUTHORITY (MA): THE PIEDMONT REGION (http://www.regione.piemonte.it/) and specifically, the Directorate for Regional System Competitiveness. The Piedmont Region brings to the project specific competences in the management of Structural Funds (ERDF) and European projects, along with its expertise in supporting green growth as well as the competitiveness and the innovation potential of Piedmont region.
Through RETRACE, Piedmont will benefit from the knowledge and capacity building of regional structures and offices, and from a more effective and renewed understanding of systemic approaches in order to mainstream such approaches into Operational Programmes (OPs) measures. The Directorate for Regional Competitiveness is the MA of Piedmont's OPs and plays a key role in the definition and implementation of all the measures. More precisely, the Sustainable Energy Development Unit is in charge of managing all measures, grants and programmes related to energy efficiency, renewable energy and environmental issues, and of ensuring a perfect match between the circular economy approach and the Low Carbon economy theme, within the proposals of OP's improvement.

The team members of the Piedmont region are:
Vincenzo Zezza, *Responsible for Technical-Scientific Contents*;
Tiziana Dell'Olmo, *Financial Manager*;
Daniela Vismara, *Communication Manager*;
and Rossana Borello.

THE THIRD PARTNER (PP3) IS THE AZARO FOUNDATION (www.azarofundazioa.com) from Spain (Basque Country). The Azaro Foundation is a research and entrepreneurship centre linked to the socioeconomic development of the Lea Artibai area (a group of 12 municipalities). It has developed the local RIS3 focusing on Health and the Environment. In 2013 it started a collaboration with Gunter Pauli, creator of the term "Blue Economy", which focuses on a systemic approach and is currently promoting the Blue Lab in Lea Artibai, for the transition of local industries and businesses to a circular economy approach.
The Azaro Foundation operates at a local level in close cooperation with stakeholders from the R&I and the circular economy ecosystem in the Basque region, acting as a regional reference point in this field. It has close links with Beaz (PP4), the MA, the Basque Government and the Environmental Agency, Ihobe. MA and PP4 actively participate in the Blue Economy conferences and Holistic Diagnosis efforts in Lea Artibai, and believe that this approach can be replied in other areas. The Azaro Foundation will have a strong impact on the Basque Country Regional Action Plan based on specific proposals that will be tackled at local and regional level. Azaro is also the Global Project Communication Plan Manager of the project.

The team members involved at Azaro are:
Maria Txakartegi, *Communication Manager* (April–December 2016);
Esti Plaza Elordi, *Administration, Financial, Technical-Scientific and Communication Manager* (January 2017–2020).

THE FOURTH PARTNER (PP4) IS BEAZ from Spain (https://beaz.bizkaia.eus/index.php?lang=es-es). BEAZ belongs to the Biscay Provincial Council. It is an agency that promotes the competitiveness of industrial fabric, while encouraging the creation of new business activities and supporting companies in their innovation and growth challenges. Eco-efficiency and Eco-design is one of the strategic areas that affect competitiveness and the creation of new businesses; BEAZ supports business innovation projects in these fields. BEAZ, as a regional entity dependent on the Biscay Provincial Council, manages grant programmes and is active in assessing the impact of public policies and proposing areas for improvement that the Council translates into new aid programmes for businesses and entrepreneurs.
In RETRACE, the role of BEAZ is to bring to the project a provincial perspective, providing down-to-earth examples on progressive waste management policies and several good practices that are taking place in Bilbao and other industrial areas. It will also bring, jointly with PP3, the circular economy programmes and strategies promoted by the Basque Government. PP4 will impact on the Basque Country Regional Action Plan with specific proposals to tackle at regional and provincial level.

The team members involved at BEAZ are:
Ander Muñoz, *Project Content, Financial and Communication Manager*.

THE FIFTH PARTNER (PP5) IS THE HIGHER SCHOOL OF ADVANCED INDUSTRIAL TECHNOLOGY ESTIA from Bidart, France (http://www.estia.fr/). Estia is a High Education Centre, which brings together Education, Research, Business and Entrepreneurship communities. It has been providing education and training in the fields of Eco-design and Systemic Design with a Master "en ingénierie systémique". ESTIA Research has been working for several years on the area of eco-innovation, eco-usage and user behavior. In the area of the entrepreneurship, ESTIA has also coached several startups in the field of circular economy. ESTIA has close links with the Aquitaine Regional Council, so several projects in the last years has enabled the Aquitaine Region to access new approaches and methods developed by ESTIA. One example of this collaboration is the current project, which encompasses numerous actions on regional action plans, education, research and development. In RETRACE, ESTIA will conduct, in collaboration with APESA, the Holistic Diagnosis on the Aquitaine Region, the selection of priority industrial sectors and the application of Systemic Design approaches.

The team members of at Estia are:
Iban Lizarralde, *Technical-Scientific Manager;*
Mikele Larronde, *Financial, Administration and Communication Manager*;
and Marion Real.

THE SIXTH PARTNER (PP6) IS APESA, Association for Environment and Safety in Aquitaine from France (https://www.apesa.fr/). APESA is the reference technology centre for all topics related to ecological transition. Member of "Aquitaine Green Growth", it has taken part in the definition of the regional Energy Transition and the Circular Economy Strategies and delivered the report "Economie circulaire en pratique: une illustration par l'exemple en Aquitaine". PP6 also organises the "College on High Studies on Sustainable Development", providing training on ecodesign and circular economy to regional civil servants.
APESA has been actively engaged in the definition of the regional Circular Economy Strategy, takes part in the strategy's Steering Committee and has researched and reported several regional good practices and policies. It can provide a relevant pool of good practices and will benefit from the cooperation by reporting to the Steering Committee the results achieved through the Circular Economy Strategy and ensuring the adoption of the RETRACE's Aquitaine Regional Action Plan. APESA and ESTIA organise the Aquitaine stakeholders group and ensure the adoption of the RETRACE Project by the Aquitaine public actors.

The members of the team involved at APESA are:
Cyril Baldacchino, *Technical-Scientific Manager*;
Christine Ferrer, *Administration and Financial Manager*;
Benjamin Tyl, *Communication Manager*.

THE SEVENTH PARTNER IS A MANAGING AUTHORITY: THE SLOVENIAN GOVERNMENT OFFICE FOR DEVELOPMENT AND EUROPEAN COHESION POLICY (http://www.svrk.gov.si/en/). PP7 is the MA of the Operational Programme, therefore it can influence the content of the Operational Programme. It also coordinates the efforts of other ministries, which are key players in this field, such as the Ministry of Education, Science and Sport, the Ministry for Economic Development and Technology, and the Ministry for Environment and Spatial Planning, and the support of the Slovenian Stakeholders Group.
As a managing authority in the RETRACE Project, the Government office has a crucial role in all planned activities (Holistic Diagnosis, good practices, stakeholders involvement, policy recommendations, implementation of the RAP, etc.).

The team members at the Slovenian government office are:
Marjana Dermelj, *Technical-Scientific Manager;*
Tatjana Guštin, *Administration and Financial Manager*;
Katarina Podobnikar, *Communication Manager*.
and Anica Kokalj.

THE EIGHTH PARTNER OF THE RETRACE PROJECT IS THE ROMANIAN NORTH-EAST REGIONAL DEVELOPMENT AGENCY (www.adrnordest.ro). The Agency is the Intermediary Body of OPs for the North East region. It can re-program or update current OPs. It also has close links with the MA from the Regional OPs and with other regional development agencies in Romania and IBs of Regional OPs, ensuring the transferring of results from RETRACE to the target policy instrument. It also has close links with the MA of OPs Large Infrastructure, the Ministry of European Funds, as well as a strong impact on the management of public resources

like for example, water. The role of PP8 is to contribute from the point of view of an Intermediary Body, with the power to steer programming or modifications on the OPs with the support of national MA. It can also contribute experiences on circular economy from the region, like those reported on C2CN as well as new ones that have been implemented. A close cooperation with the North-East Regional Development Board ensures the participation of stakeholders in the project. NERDA's main role is to apply the Holistic Diagnosis in NE Romania and work on the Regional Action Plan elaboration and implementation.

The team members at NERDA are:
Ramona Tanasă, *Technical-Scientific Manager*;
Magdalena Vicol, *Administration and Financial Manager*;
Andra Nicoleta Costin, *Communication Manager*;
Bogdan Chelariu, Gabriela Macoveiu, Corneliu Popa, and Simona Popa.

There are some technical entities and several managing authorities involved as partners in the project. Whereas technical bodies such as POLITO, ESTIA, APESA, Azaro, etc. bring their expertise on circular economy, the role of the managing authorities is quite different.

The European Commission's new Circular Economy Package establishes a long-term approach to promote waste prevention, increase recycling and reuse, and reduce landfilling and incineration. It also sets out measures to help businesses, citizens and public authorities benefit from the transition to a stronger and greener economy. The various cohesion policy programs adopted in 2014 and 2015 specify the funding opportunities for all Member States and regions until 2020. Member States run the programs, via the Managing Authorities, which have to provide information on the program, select projects and monitor implementation.

The aim of RETRACE is to promote Systemic Design as a method allowing local and regional policies to move towards a circular economy, according to which waste from one productive process becomes input in another, preventing waste being released into the environment. For each region involved in the project, the managing authority is part of RETRACE as partner or stakeholder. In this way, all the actors of the project are in direct contact with their local managing authority in order to make information available and influence future public policies. The best practices detected in each territory and analysed by the experts of the project will lead to policy recommendations and a roadmap for the adoption of the method and the good practices by other EU regions.

3.2.2 Stakeholders: Their Key Role

Local stakeholders are key components of territorial policies towards circular economy. One main objective of the project is to engage key stakeholders in each territory, including target policymakers, managers, companies and industries.
Therefore, a wide range of stakeholders has been involved in the RETRACE Project in order to facilitate the collection of data for the Holistic Diagnosis, and to implement the methodology and the action plan in each territory.

A stakeholder can be any person or organisation potentially, directly or indirectly, affected by the operations of the organisation and vice versa (Freeman, 1984). Stakeholders can be: local authorities, economic agencies, technological centres, companies, NGOs, etc. A wide variety of stakeholders has been involved in the RETRACE Project:

- Universities, which represent academic stakeholders, the research and technical knowledge in systemic approaches, circular economy and sustainable development applied both to the territory and the industry.
- Public agencies, which represent the links between authorities and companies. They transfer knowledge in the circular economy and the systemic approach to companies and industries, ensuring an effective transfer of knowledge with practical purposes, such as for the creation of new green products and services.
- Incubators, which are critical stakeholders able to develop startups oriented towards circular economy.
- Foundations and NGOs, which focus on environmental or circular issues, with close links with other grassroots organisations and society.
- Companies, which represent the business sector and are the main stakeholders with regard to the adoption of circular economy approaches in industries.
- Professional associations and clusters, which are a relevant for the adoption of circular economy practices. They represent a broad extent of the private economic sector, including companies and industries, both large and SMEs.
- Museums, which participate in raising awareness on environmental and circular economy issues.

Five regional Stakeholders Groups, of about 15 stakeholders each, have been constituted during the first two months of the project, covering the main sectors in each territory. The following table presents the first groups of stakeholders for each region:

Piedmont (IT)	
Stakeholder	*Statute*
i3p	Incubator
2i3T	Incubator
Enne3	Incubator
Smart Products	Cluster
Energy and Clean Tech	Cluster
Green Chemistry	Cluster
Polo Agroalimentare	Cluster
Turin Chamber of Commerce	Public authority
Systemic Approach Foundation	Foundation
Consulta Regionale Europea	Public authority
A come Ambiente	Museum
Polo Tessile Po.in.tex	Cluster
ANFIA	Professional association
Cittadellarte-Fondazione Pistoletto	Foundation
Triciclo	Company
Amiat - Gruppo Iren	Company

Basque Country (ES)	
Stakeholder	*Statute*
Bizkaiko Foru Aldundia	Public authority
Bic Bizkaia	Incubator
Innobasque	Public authority
Bilbao Ekintza	Public authority
Aclima	Cluster
Ihobe	Public authority
Orkestra - basque Institute of Competitiviness	Public authority
AZTI - Research Centre	Research center
Tecnalia	Research center
Bizkaiko Foru Aldundia	Public authority
Bic Bizkaia	Incubator

Nouvelle Aquitaine (FR)	
Stakeholder	*Statute*
Regional Council of Aquitaine. Department of Environment and Department	Public authority
Communauté de Communes de Maremne Adour Cote Sud	Public authority
Bil Ta Garbi	Public authority
Agri Sud Ouest competence pole on agriwaste.	Cluster
Xylofutur competence pole on lumber/Bordeaux Science Agro	Cluster
Le Relais	Company
ECOCIRRA	Project
ETICOOP	Company
Basque country development concil	Public authority
ONF	Public authority
IENER	Company
Api'Up	Company
CCI - Bayonne Pays Basque	Public authority

Slovenia (SI)	
Stakeholder	*Statute*
Ministry for Science, Education and Sports	Public authority
Ministry of Economic Development and Technology	Public authority
Ministry for Environment and Spatial Planning	Public authority
University of Ljubljana	University
Universtiy of Maribor	University
University of Primorska	University
Chamber of Commerce and Industry of Slovenia	Public authority
Chamber of Crafts and small business of Slovenia	Industrial association
Association of Municipalities	NGO
Plan B za Slovenijo	NGO
Chamber for Agriculture and Forestry	Public authority
Museum for Architecture and Design	Museum

ROMANIA (RO)	
Stakeholder	*Statute*
Ministry of Regional Development and Public Administration	Public authority
Technical University Gheorghe Asachi from Iasi	University
Stefan Cel Mare University of Suceava	University
North East Regional Directorate for Statistics	Public authority
Local Agency for Energy Efficiency and Environment Vaslui	Public authority
County Agency for Environment Protection in Bacau	Public authority
Vasile Alecsandri University of Bacau	University
Municipalities of Moinesti, Botosani and Suceava	Public authority
SC Rossal ROMAN	Public authority
ADR Nord-Est - IB for ROP 2014-2020	Public actor

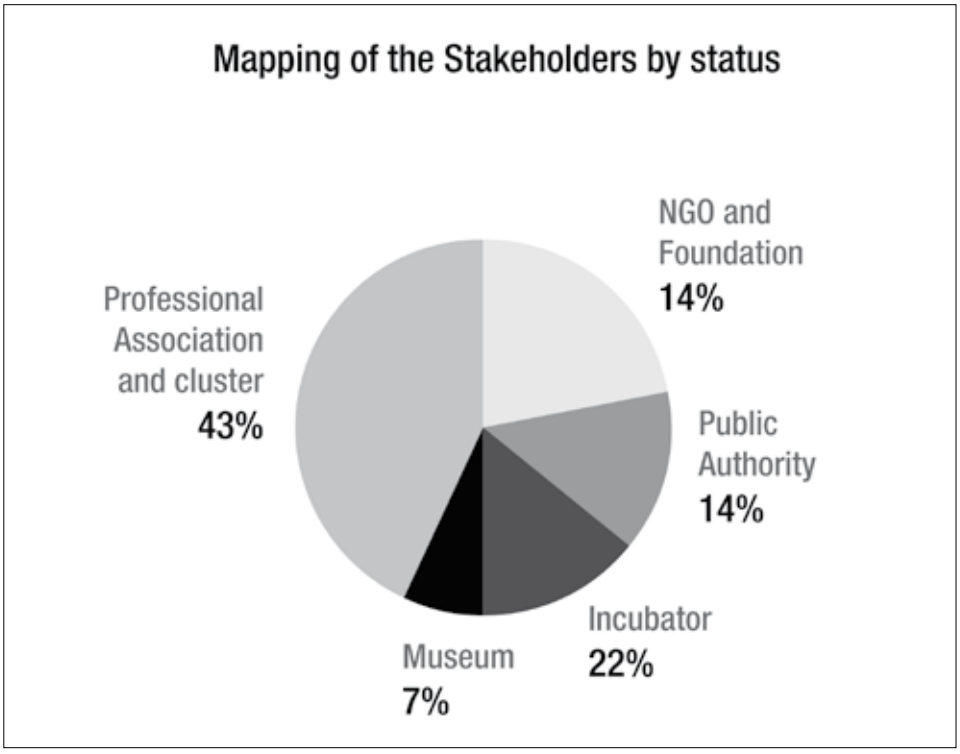

Fig. 1: status diversity of stakeholder.

Stakeholders are engaged through the whole project. Their main role is to give regular feedbacks on the results, as well as to be in charge of the implementation of the Action Plan in each territory. Therefore, they are part of the strategic thinking process and take part in the different territorial dissemination events.

There main activities are:

- Learn from good practices of other territories.
- Participate in Stakeholders Group meetings.
- Cooperate to the Holistic Diagnosis in each territory.
- Cooperate in the implementation phase of the project.
- Take part in national dissemination events and the final dissemination event.

A first activity of the stakeholder is to take part in the different field visits organised in seven territories.[1] An average of two stakeholders from each Regional Stakeholders Group took part in each of the seven field visits where they learned good practices from other regions and also participated in the networking events with other stakeholders.
During the project, six local group meetings have been organized with the objective of analyzing the different results of the project as well as developing a common view for the regional action plan. Therefore, these meetings allow to assess the nature and scope of the improvements of new programmes, which can be deployed in Regional Action Plans.
In particular, during these meeting, all stakeholders update the matrix resulting from the Holistic Diagnosis, match identified policy and programme gaps with exchanged good practices in order to identify the ones that may have the greatest impact on their region.

Stakeholders from the different stakeholders regional groups are also expected to take part in the various regional and interregional dissemination events.
The first regional dissemination event is organised, in each region, within the 1st semester to engage stakeholders, promote and disseminate the project and raise awareness on circular economy. A second regional dissemination event, attended by stakeholders, is held, in each region, in the 4th semester, to present the publications *Policy Briefs* and *Actions Plans*.
At the same time, two interregional events are organized to favour a wide dissemination of the project. The first interregional dissemination event in Brussels aims to present the results of the project's first phase with Five Regional Action Plans and the related publication *Policy Briefs*. Eventually, and the final interregional dissemination event will be held in Slovenia and aims at promoting the project achievements as well as disseminating the results of the action plans implementation.

[1] In Piedmont (IT) - April 2016; in Nouvelle-Aquitaine (FR) – September 2016; in Biscaye (ES) – November 2016; in The Netherlands (NL) – February 2017; in Slovenia (SI) – May 2017; in Romania (RO) – June 2017; in Scotland (UK) – September 2017.

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4.
The Methodology of the RETRACE Project

4.1 Exchange of Experiences

This chapter aims to explain the methodology and performance of the Exchange of Experience activities. For this purpose it has been divided in the following three segments:

- *The RETRACE Holistic Diagnosis. This part illustrates the role of Systemic Design as a tool for performing the Holistic Diagnosis in the context of each partner, achieving results that will allow to develop policy roadmaps.*
- *Good Practices and Field Visits. This section describes the research methodology based on the identification and selection of the Good Practices that have been applied during the project and how they have been developed during the field visits.*
- *Action Plan and Policy Brief. This segment defines the principal characteristics that must be considered when elaborating an Action Plan and a Policy Brief, giving a wide overview of the full methodology applied in the RETRACE Project.*

4.1.1 The RETRACE Holistic Diagnosis

Chiara Battistoni and Carolina Giraldo Nohra

Placed at the foreground of the Systemic Design Approach methodology, the Holistic Diagnosis is a tool that evaluates the context of a project through different levels of analysis (economic, socio-cultural and environmental) to define the current state-of-the-art. Applied to the RETRACE Project, it was performed during the three main steps of the analysis. The intention of this chapter is to explain the meaning of this specific tool, show its application in the RETRACE Project and elaborate considerations on its value in the creation of better policy roadmaps.

Systemic Design as a Tool for Holistic Diagnosis

The RETRACE research methodology is based on the Systemic Design approach[1], which in its first phase has at the foreground the Holistic Diagnosis (HD) tool (Bistagnino, 2011). Defined as a process of analysis that aims to determine the context of a system and its state-of-the-art. This allows to highlight the connections between system components and provide as an output an accessible support for the interpretation of data (Gaiardo, 2016).

This tool is executed through different means of investigation at economic, socio-cultural and environmental level. It is developed by different phases, which enable the collection of qualitative and quantitative data, followed by the analysis of interactions between them (fig. 1).

The HD is performed through three phases (Barbero, 2016): desk and field research are dedicated to the collection of quantitative and qualitative information through different methods while the last phase is dedicated to the analysis of the collected data.

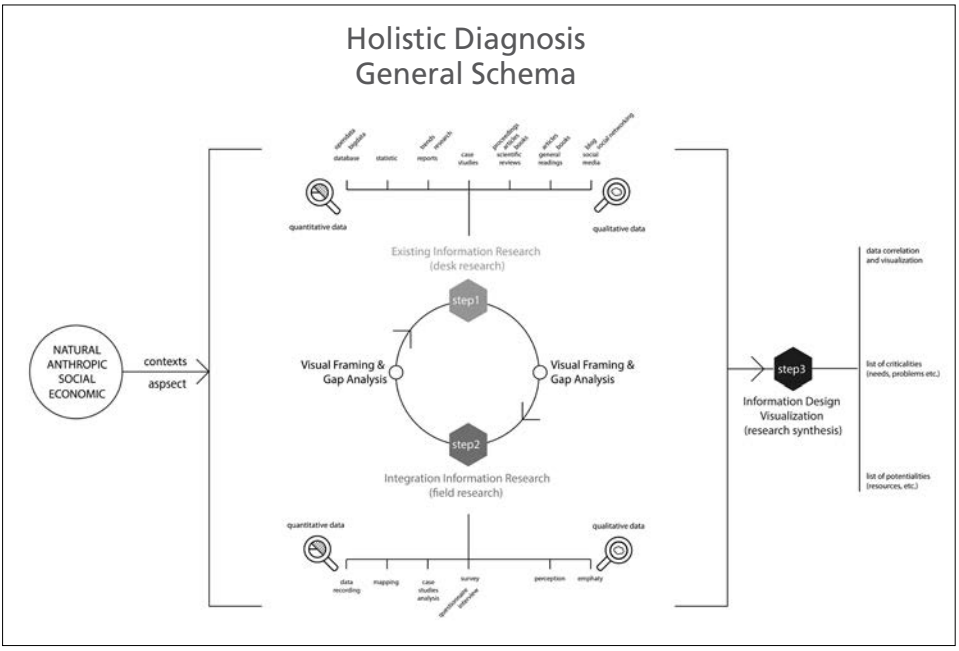

Fig. 1. General schema of Holistic Diagnosis. (Gaiardo, 2016). Courtesy of the author.

1. Desk Research. In this case the collection of information about the state-of-the-art is done through different sources: from existing literature, official databases and informal sources such as social media.
2. Field Research. Complementary to the previous phase, this analysis is done through direct experience in the field of reference, ranging from direct data recording to collection of perceptions (pictures, etc.).
3. Research Synthesis. In this phase Information Design Visualization is used to ease the understanding of the collected data exposing controversial aspects, potentialities and data correlation. Thus, it is possible to start a project development and at the same time to communicate the research results to a second party (Barbero, 2016).

At this stage, the designers' intervention becomes a key element, which enriches the process through problem-solving and communication skills. Such tools are used for processing information. So the results become accessible to a wider public and do not only serve the specialists; they become an open source for the development of interdisciplinary projects. Nonetheless, during the data collecting process the designer meets with different specialists in order to certify their correct interpretation. Therefore, the HD is a process that requires an approach from different areas of knowledge to be able to manage complex data.

The HD is featured as a tool that can be adapted to different projects according to the nature of the project based on the methodology that offers the possibility of adding different elements to create an outline for each context.

The scope of a Systemic Design project is to analyse the diagnosis of production processes mainly focusing on the flows of energy and matter, defining the inputs and the outputs while determining relations inside the context of reference (territory).

Applied to the RETRACE Project, the HD phases has three main phases of analysis: the first phase starts with an analysis of the territorial context; the second phase continues to analyse current policies regarding regional policy axes related to CE and SD; the third and last phase focuses on the principal economic sectors where all the above mentioned aspects meet.

To recapitulate, the HD is divided in three steps:
1. Analysis of the regional framework;
2. Analysis of current policies;
3. Analysis of the principal economic and industrial sectors.

The Holistic Diagnosis: First Step

The first step of the HD relates to the analysis of the territorial framework from different points of view: from geographical aspects to demography, culture and economy. In the RETRACE Project, the geographical context of reference that is being considered is the entire region involved in the project: the Piedmont Region in Italy, Bizkaia in Spain, the North-east region in Romania, Nouvelle Aquitaine in France and the entire country of Slovenia.[2]

The research starts by considering the geographical location with a special focus on the following topics:
- *geographical location (borders, extensions...);*
- *morphological composition and features (percentage of mountains, hills, plains, rivers, coast, sea...);*
- *soil use (hectares dedicated to industry and commercial area, to agriculture and woods);*
- *agricultural area, indicating hectares dedicated to different types of crops (total agricultural area T.A.A, useful agricultural area U.A.A., etc.) and a focus on agricultural farms (quantity, average dimensions, type of management, type of cultivations);*
- *Breeding area with the number of heads and a focus on farms (quantity, average head, type of management, type of breeds).*

The data that are studied come from agricultural and geographical censuses, and are based on morphological features and natural resources (with a focus on quantity). After processing this information, the result is a clear overview of where to operate within the territory. It also highlights how the land is mostly being used and which activities are being executed. This study aims to have a perspective on the dimensions of artificial and agricultural land, on man's intervention on the natural environment and how he has managed it over the years.

Afterwards, the HD analysis continues with demography, thus the attention shifts to the territory's population. This research is developed with two different criteria: first, the collection of general information on the inhabitants and subsequently, a focus on employment, education and migration.

The collected data are related to:

- population features (numbers of inhabitants, density of population and its distribution on the territory, average age, nativity and mortality rate, number of men and women, average age when children leave their parent's home);
- family (numbers of unit, average number of people in a family, type of family, number of adopted children);
- marital status (number of marriages and divorces, type of marriage);
- focus on employment (rate of employment and unemployment, average income per year and per type of job);
- focus on education (schooling rate, vocation of studies and number of education levels and units);
- focus on temporary and definitive migration (rate of migration and destination countries, rate of immigration and countries of origin).

The analysis of demographic data comes from demographic censuses, which allow a better understanding of the territory and life quality. This interpretation reaches a further level of analysis based on the reading of specific data; for example, life expectancy and average income can help to determine the size of the population or schooling rate with the number of educational units can affect future job opportunities among the population. Other data can be interpreted based on higher education levels and study vocation which in most cases reflect the needs of the industry. Another element is the regional population density, which can be analysed and helps to understand the distribution in urban centres.

These indicators are mostly revealing regarding the workforce offer of a region. A clear visualization of the information facilitates finding relationships. For example, the level of employment and unemployment related to the rate of emigration and immigration can reveal the quality and the quantity of the existing job market related to the economical situation of a territory.

The analysis of the economical aspects aims to give an overview of the current industrial situation of a territory. After analysing the main economical sectors and their corresponding turnovers (services, constructions, farming...), the focus is addressed to the manufacturing sector, which is analysed according to:

- total number of units and number of units for principal typologies;
- internal organization (cooperatives, one-man companies...);
- size (micro, small, medium or large) and number of employees of each type;
- focus on the area of innovation with the number of units and principal enterprises.

This general study of the industrial fabric presents indexes of the regional main production processes. Such results are used as measuring instruments, which give a view of the weak and strong sectors. As a matter of fact, the data about the number of people employed illustrates the wellbeing of society. In this context, is important to highlight the increasing role of micro enterprises as a growing working force. The analysis shifts then to areas of innovation, which are represented by the industrial sectors where current policies are already operating.

Eventually, there are the cultural aspects, which are key to understand some specific phenomena in each region. The study focuses on the following aspects:

- general cultural aspects: languages, religions, influences (from other countries), principal traditions, folklore/music (instruments and dances);
- notable residents (one from literature, music or art and the other from business, politics or religion);
- culture related to food (traditions, most popular dishes and recipes, principal food resources and their location on a map);
- architecture (principal landmarks and their location, style and urban pattern) and crafts (principal products and craft districts with their location).

The research on cultural aspects shows the influence of the civilizations, which have inhabited the territory and how they have shaped demographical and economical aspects. For this reason, the analysis starts from the study of foreign influences, languages and major religions that are present in the context.
By considering these aspects it is possible to understand the population configurations (for example, the French influence in past centuries over the Piedmont region, or the strong feeling of belonging to the Basque community, or the strong Austro-Hungarian legacy in Slovenia, or the Communist past in Romania).
Another relevant aspect is the presence of notable residents, who strongly influenced a specific geographical area or promoted certain sectors such as culture, economy, politics, religion or science. These influencers are key to understand current developments in several areas such as universities, industries and governments.

An important matter concerning material culture is the architectural legacy, which translates the history of a territory into the urban fabric, reflecting diverse economic periods and showing the importance of contemporary urban centres. In the same way, this can be seen in the landmarks and craft districts spread along the territory. Moreover, the material culture related to the evolution of crafts which is a testimony of the knowledge of techniques and different materials that have been developed over the centuries by the population.

The same approach can be applied to food culture: particular dishes can tell a story about food resources that are available and the influences of past civilizations. Likewise, climate is an important factor regarding food, which influences variety and availability of resources (prevalence of cold dishes in warm period; dishes that need more time to cook in cold periods). The presence of typical dishes can be also related to particular events like festivals or holiday.

The analysis of cultural aspects and their representations can reveal existing differences within areas of a same regions. Most of these differences are related to the geographical location (proximity to another country) or the morphological aspects (mountain area, hills area, plain area). It is possible to find other important differences in rural areas as well as in urban centres concerning demography and economical performance. For this reason, HD step 1 studies the three major urban centres of each territory. The main aim of this is to understand their evolution over the years and current configuration. The analysis has focused on:

- principal historical events;
- inhabitants and their features (total number, percentage of men, women and immigrants);
- geographical location and principal landmarks;
- principal cultural events and religions;
- focus on economic sectors (number of employees, number of companies and principal typologies);
- principal services (infrastructures and number of universities).

The following results show how from a holistic point of view the system interactions of a context can create enough materials for the development of new strategies fostering circularity.

MANAGEMENT

The RETRACE research was carried out by each region involved and required the collaboration between regional partners and local stakeholders. The raw data were collected at first stage in an Excel file which contained a database of different available sources. Afterwards, the data were processed by the designers of the Lead Partner (LP) team, who translated the information in different visual maps to facilitate an efficient visualization of the data. Some were interpreted with graphs others with images of reference. In order to put underline the relation with the territory features and the differences between geographical areas, some information was visualized directly on a geographical map, like the density of population or the distribution of food resources. This phase allowed to control the data one more time, thanks to the collaboration of the partners, and to reach a comparable level of completeness between all partners.

The Holistic Diagnosis: Second Step

For the second step of the HD, the main aim is the analysis of current policies. To achieve this, the LP required from each partner to focus on a deeper description of their own policy instrument. For this purpose, it was relevant to describe the main features of the policy instruments in relation to their objectives, characteristics, and priorities. Moreover, it was important to define the impact on performance indicators within the territory achieved by the measures of the policy concerned. This was important in order to highlight the strengths and weaknesses.

These facts lead to an accurate description of the state-of-the-art addressed by the policy instruments on each territory while highlighting the results that these policy instruments have already generated. Afterwards, each partner was able to envision the potential improvements of their own policy instrument through the proposal of new projects, improved governance or structural changes.

As a matter of fact, RETRACE has as main pillars the Systemic Design (SD) Approach and Circular Economy (CE) vision, guiding the analysis towards policy instruments that address traditional sectors on environmental sustainability such as: water management, urban waste, energy and environment. However, it is important to take into account that each context presents different industrial realities and territorial development. This consideration also draws attention to other policy instruments that can address other industrial sectors (e.g. elements related to production processes) which also foster the SD and CE.

The result of these indicators is to show the state-of-the-art of local policies regarding sustainability and circular economy orientated to each territory.

After the depiction of this policy scenario, it was relevant to review the previous step 1 in order for so each partner was able to confront analyse which aspects from his/her territorial situation could be improved. The overlapping of steps 1 and 2 revealed how some elements from the Holistic Diagnosis of the territory are not being considered as the current policy instruments in each region. This lead to envision the first approach of potential policy gaps of each territory. The aim of this step was to provide partners with a more detailed definition of the issues that needed to be addressed and to suggest possible improvements.

ANALYSIS OF CURRENT POLICIES

1. *Considering the Policy Instrument addressed in the RETRACE Project proposal, answer the following questions in a more detailed way than in the project proposal (in relation to circular economy):*
   - *Describe the mains features of this policy instrument (e.g. objective, characteristics, priority or measure concerned).*
   - *Describe the reason(s) why it should be improved.*
   - *How do you envisage the improvement of this policy instrument (e.g. through new projects supported, through improved governance, through structural change)?*
   - *In relation to the policy instrument addressed and after the more detailed analysis of the policy instrument, are you able to define a suitable performance indicator for the policy? (You can suggest an additional indicator different from what you mentioned in the proposal.)*
   - *What is the state of art addressed by this policy instrument in the territory? Which results has this policy instrument already generated?*
   - *What needs to be improved in the territorial situation described in Step 1?*
2. *Are water management, urban waste, energy and environment addressed in the Policy instrument identified in RETRACE Project proposal?*
   If yes:
   - *In which way does the Policy Instrument consider these topics?*
   - *Does it consider or address circular economy in relation to the aforementioned topics?*
3. *Are any other topics related to circular economy (and/or able to influence it) included in the Policy instrument identified in the RETRACE Project proposal? (e.g. elements related to production processes)*
   If yes:
   - *In which way does the Policy Instrument consider these topics?*
   - *In which way these topics can influence the circular economy?*

The Holistic Diagnosis: Third Step

In the third step of the HD, the main aim is to link the previous steps by overlapping the policy instruments and the context information. For this purpose, each region selected 3 productive industrial sectors from the highlighted ones in Step 1. This will assess potential synergies at a systemic level among other sectors or processes at a regional and interregional scale.

After identifying three industrial sectors and relating them to the policy instruments described in Step 2, each partner described their own regional policy axes relevant in these sectors. At this stage, it was important to consider that most partners pointed their Smart Specialization Strategy as their main policy instrument.

As a result, this point analysed the measures of the policy axes and how much they consider circular economy aspects. This first phase displayed the state-of-the-art on each industrial sector in relation to the regional policy instruments, revealing particular existing strengths and weaknesses.

Afterwards, for each sector (i.e. agri-food) was identified a specific sub-sector (i.e. cow breeding) particularly relevant for the region taken in consideration. The aim of this phase was to focus on particular industries, which the analysis wanted to have an impact on. To reach a more precise result it was required to carry out a deeper study of the data of each sector, regarding quantitative information related to the number of companies and employees. Such information shows the economic impact that the subsector has on the region and, in terms of policymaking, this is an indicator to consider as a measuring instrument.

This step provided further insights into the resources of each country by analysing quantitative and qualitative details. Moreover, following the SD methodology, it was relevant to analyse the type, the quality and the quantities of the inputs needed and of the outputs produced within the value chain of each sub-sector. The main aim of this was to highlight specific critical issues related to the quality or the management of the output and the input analysed, mostly dealing with sustainability. After reaching this stage on regards to the current situation of the subsectors and recalling the strengths and weaknesses of the regional policies axes identified in Step 2, it was possible to start identifying specific policy gaps.

Inside these priority industrial sectors it was important to highlight the policy gaps which raise awareness regarding the implementation of SD approaches and CE vision and those that could support the adoption of eco-innovation, eco-design and re-manufacturing practices, as well as identifying other policy gaps in relation to education and training on the skills needed for the transition towards a circular economy. This will allow each partner region to better target the nature and scope of good practices useful to the region, to be specifically assessed for their transfer of the Action Plan.

ANALYSIS OF ECONOMIC / INDUSTRIAL SECTORS

1. *Identify three economical, industrial sectors relevant for your region from HD1.*
2. *Identify the axes of regional policies that deal with these sectors from HD2 (all axes or just some of them).*
3. *Analyse the measures of these axes: do they consider or address CE?*
4. *For each sector identified (i.e. agri-food), identify a specific sub-sector (i.e. cow breeding) particularly relevant for your region.*

5. *For each subsector identify:*
   - *the number of companies;*
   - *the number of employees;*
   - *the type, quality and quantity of input needed;*
   - *the type, quality and quantity of output produced.*
6. *Highlight specific critical issues related to the output or input analysed.*
7. *Identify policy gaps, analysing the strengths and weaknesses of these axes and comparing the data collected on the sub-sector with the policies identified in HD2.*

Holistic Diagnosis Outcome Review

The results of the HD steps are reported in the ensuing chapter HD report, where all information from the three Steps is presented in a synthetic way, showing the effective results of the tool. A section for each country partner has been created and provides an overview of the state-of-the-art of the territory and of the policy instrument related to it.

These documents are the basis for the definition of the Regional Action Plans, which will be defined in the following semester (in Fall 2017). The HD is a tool that helps the creation of better policy roadmaps giving the policymaker and other stakeholders the instruments for a more efficient decision-making. These results allow a closer approach to the real needs of the territory. Such approach is inspired by design according to which the starting point is the context or individuals needs. The SD methodology gives the designer the role of mediator among the different actors involved in the process.

As RETRACE's main goal is to facilitate the transitions of regions towards a CE, HD is the first tool that enables the application of a systemic approach. This represents a different way to tackle environmental and economic challenges. Through the HD analysis it is possible to reach a wider perspective of each territory involved in the project. This method of analysis achieves a deeper understanding based on an interdisciplinary point of view that reflects a holistic approach.

It is important to add that the analysis of the regional framework in Step 1 of the HD is part of the traditional method of the systemic approach. The application of the HD tool to the RETRACE Project has enlarged the analysis of the state-of-the-art, not only to geographical, economical and cultural aspects but also to regional policies; and this represents a novelty.
The studies followed the same methods suggested by SD, underlying their strengths and weaknesses. The traditional HD methodology was also applied to the analysis of the industrial and economic sectors focusing on the input and the output involved in the productive processes, in order to highlight once more strengths and weaknesses.

This tool is intended to help policymakers to promote better governance and decision-making. This is a first step towards the adoption of SD as a method focusing on a territorial and regional policy perspective as well as on systemic approaches for a CE. Above all, it will allow to achieve a sustainable future.

4.1.2 Good Practices and Field Visits

Agnese Pallaro

This paragraph provides insights into the methodology developed by RETRACE's LP for the identification, analysis and selection of the Good Practices (GPs) to be exchanged and for the structure according to which Field Visits (FVs) are organized.

> As a 'capitalisation' programme, Interreg Europe is primarily targeted at local and regional public authorities and focuses on the identification, analysis, dissemination and transfer of good practices and policy experiences, with a view to improving the effectiveness of regional and local policies.
> (Interreg Europe Programme Guide, p. 9)

In line with the objectives of the Interreg Europe Programme, the identification of GPs and the organization of FVs are two of the core activities of RETRACE, on which the success of the project depend. These activities take a large part of the energy and efforts of the first period of project: indeed, seven FVs were organized in the first three semesters, leading to the identification of about more than forty GPs.

Identifying the Best Good Practices

The goal of the exchange of experience is not only to identify GPs of projects and policies related to CE and SD, but rather to understand how these GPs could be put into place in order to transfer this knowledge to other partner countries. It is not a coincidence that the process of identification of GPs and the definition of HD are parallel. Indeed, the GPs identified in the seven countries, should provide suggestions on how to improve the policy instruments addressed in the Application Form and to face the problems identified through the HD. At the end of the third semester, when all GPs will be identified, a matrix to match the lessons learned from good practices and the issues emerged from the HD will be created.

In order to ensure the choice of the most meaningful case studies, a three-step process of identification of GPs has been especially designed for the RETRACE Project.

STEP 1. The partner that hosts the FV identifies fifteen GPs and, for each of them, fills in the Good Practices Format[3]. This contains twenty questions that range from general information about the GP to specific description of its content and of the policy behind the good practice.

Three categories of questions can be identified:

- TECHNICAL DETAILS (5 questions). This set of questions aims to gather technical information on the Good Practice, rather than information on the content, so as to be able to store the required references, to compare GPs or to use information to create statistics. Partners are asked to explain the territorial influence of the GP, the amount of financial resources used, the institutions involved, the location of the GP, the origin of the GP form an Interreg Europe project, the contact details.
- CONTENT DETAILS (11 questions). This set of questions forms the greatest part o the Format

and aims to collect information on the content of the GP, starting from the background that generated it, the objective it aims to achieve, the activities implemented, the implementation process followed and the sectors related to the GP. Instead of simply asking to describe the GP, it was preferred to guide partners through the description, forcing them to look for additional and meaningful information to be able to answer. The last four questions of this section require partners to actively think about the GP they are suggesting. If in the previous case they were asked to collect existing information, here they should perform a sort of evaluation of the GP, specifying how it can be improved, why it is considered as good, how it is possible to exploit the good practice, and why this GP could be potentially interesting for other regions to learn from it.

- POLICY DETAILS (4 questions). As the aim of the RETRACE Project is to promote the creation of CE oriented policies, the focus of the GP identification must be maintained on policies as well. Besides describing the actual project implemented, partners are asked to describe the policy behind it that enabled it to be put into practice. Questions related to the type of innovation (i.e. technical, environmental, social, economic) offered by the GP, the aspects the policy improved compared to other existing policies, the aspects that the policy supported the most (i.e. cooperation, process innovation, creation of jobs) and through which support. As these pieces of information are often not easy to find from remote, the FV becomes a crucial moment when it is possible to integrate missing information gathering them directly from the representatives of the GP.

The Format is completed three months before the Field Visit; once it is ready, the partner discusses with the LP these choices in order to select the eight best GPs to be presented during the FV. The selection criteria are:

- the relation of the GP to the topics of CE and SD. The content of the GP should go beyond the mere activities of reuse and recycle as an end in themselves and establish relations with the local social, environmental and production context;
- the relation between the GP and the local territory. In this sense, the GP should represent the region proposing it, i.e. by addressing a relevant sector or a traditional activity;
- the relevance of the GP for other partners. GPs that address topics that can be of interest to the partners are preferred over others that refer to a specific characteristic of the hosting country, i.e. if a GP involves the sea and only one partner country faces it, it may not be considered useful for the project.

FORMAT - METHOD TO IDENTIFY GOOD PRACTICES
GOOD PRACTICE N°-

TECHNICAL DETAILS

1. *Identify the Good Practice*
   Describe the territorial influence of the policy, the number of activities/companies interested, the time scale of the good practice. Describe the amount of funding/financial resources used and/or the human resources required to set up and to run the practice.
2. *Main Institutions Involved*
   List the names of the main institutions involved.

3. *Location of the Good Practice*
   Country, NUTS 1, NUTS 2, NUTS 3
4. *Does this practice come from an Interreg Europe Project?*
   Yes or No
5. *Contact details*
   Name, organization and email address of the contact person of the GP.

CONTENT DETAILS

6. *What is the background of the Good Practice?*
   Describe the problem addressed and the context of the GP: what is the problem addressed and the context which triggered the introduction of the practice?
7. *What is the objective of the proposed Good Practice?*
   Describe the objective, the target group and the needs the GP aims to satisfy.
   Write a list of 6 specific objectives.
8. *What is the content of the Good Practice?*
   Describe the activities implemented.
9. *What is the implementation process?*
   Describe the process followed for practical implementation: how does the practice reach its objectives and how it is implemented?
10. *Which is the aspect of the good practice related to CE and SD?*
    Describe the specific practice of reuse/recycle linked to output-input concept.
11. *To which sectors does this Good Practice refer?*
12. *What are the main results achieved by the Good Practice?*
    Describe beneficiaries and stakeholders, the success factor and the lesson learnt.
13. *How is it possible to improve this Good Practice?*
    Describe the main difficulties encountered, the lessons learned and further development or improvements foreseen.
14. *Why is this practice considered as good?*
    Please provide factual evidence that demonstrates its success or failure (e.g. measurable outputs/results).
15. *How is it possible to exploit the Good Practice?*
    Describe the media used and the degree of transferability.
16. *Why do you consider this practice (or some aspects of it) as being potentially interesting for other regions to learn from?*
    This answer can be provided e.g. through information on key success factors for a transfer or on factors that can hamper a transfer. Information on transfer(s) that already took place can also be provided (if possible, specify the country, the region – NUTS 2 – and organisation to which the practice was transferred)

POLICY DETAILS

17. *Which innovation does the policy related to the Good Practice offer?*
18. *Technical, environmental, social, economic innovation: explain why these improvements are innovative.*
19. *Which aspect does this policy improve compared to other existing policies?*
    Describe the most successful improvements introduced or realized.

20. *Which aspects did this policy support the most?*
    I.e. Cooperation, specific technical innovation, process innovation, measurement of environmental impacts, creation of jobs.
21. *Through which supports?*
    Non-repayable financing, subsidized financing, support in terms of competences, etc.

STEP 2. The partner hosting the FV prepares a document containing the Format filled in for all the eight good practices and shares it with the other partners one month before the FV. This way, partners have the necessary information on the GPs they will see or visit during the FV and they will be able to use the Format as a tool to involve stakeholders in the FV.

STEP 3. During the actual FV, at least one speaker per each GP takes part in the meeting and presents its own good practice. Thanks to the material they received in advance, partners have enough knowledge to be able to ask appropriate questions. This is a crucial moment to collect more information on the case study and improve the description of the GP provided through the Format. At the end of the FV, partners gather in the Peer Review Workshop to discuss the good practices and select the best six GPs to be included in the publication *RETRACE Good Practices Guide on Systemic Approaches on Circular Economy* [4]. This further selection process is made of two phases: the first one (see Format below) consists in an open discussion among partners to identify strengths and weaknesses of each GP in relation to social, economic and environmental aspects (people, profit and planet); the second part (see Format below) is filled in individually by each partner who is asked to explain which GPs are more interesting to be transferred to his/her region and to suggest similar GPs already active in his/her country.
The second step is preparatory to the filling of the Matrix matching policy gaps and GPs as a basis for the development of Regional Action Plans. Two weeks after the FV, the selection process is completed with the identification of the six best GPs.

FORMAT / PEER REVIEW WORKSHOP / STEP 1

GP 1 – name	
STRENGTHS	*WEAKNESSES*
PEOPLE	*PEOPLE*
PROFIT	*PROFIT*
PLANET	*PLANET*

FORMAT › PEER REVIEW WORKSHOP › STEP 2

List of the GPs presented:

GP 1: name
GP 2: name
GP 3: name
GP 4: name
GP 5: name
GP 6: name
GP 7: name
GP 8: name

Please answer the following questions concerning the GPs presented during Field Visit no.—.

Which good practices are closer to the situation of your region and why?
Do you know any similar good practice in your region or in any other region?
Which good practices did you find more interesting to be transferred to your region and why?

This process is followed in each of the seven field visits with the only exception of FV 1 (Turin, 19th April 2016). Since it was organized shortly after the beginning of the project (1st April 2017), the selection process started with the identification of eight GPs to be presented during the FV; this number was then widened to fifteen after the FV.

Besides the three steps of the selection process, a further guarantee of the quality of the GPs selected is provided by the collection of a higher than necessary number of GPs: indeed, in each of the seven FVs, six GPs are selected, leading to a total amount of forty-two GPs, whereas only thirty are needed for the publication *RETRACE Good Practices Guide*. Thanks to this, once all GPs have been identified, partners will work together to make a further selection, leaving out the less meaningful case studies.

Research on Site: Development of Field Visits

The choice of the destination of the FV is an additional tool to increase the quality of the GPs selected. Besides the five partner countries, two more nations were included in the planning of field visits: The Netherlands and Scotland. Both countries are considered as particularly virtuous concerning the topic of CE.

One might wonder why it is necessary to actually visit a region to listen to presentations and not simply exchange good practices via internet. The main reason is that, besides offering the possibility to collect further information on the topic directly from the representative of the GP, FVs also enable to see partner regions and the context in which the GPs are located, which provides an additional level of understanding of a good practice. Moreover, these events promote the networking activity among stakeholders, partners and representative of local good practices and offer an occasion for partners to spend time together and work as a team.

A FV, which involves both partners and stakeholders, lasts one day and a half and is structured according to the following scheme:

INTRODUCTION. The full day of activity starts in the morning with a welcoming introduction by hosting partners and LP. Sometimes, institutional greetings of local politicians follow as the participation of local policy makers is warmly encouraged.
ACHIEVEMENTS. The LP presents the goals achieved so far by the project with respect to: a) exchange of experience; b) communication and dissemination; c) project management. Future tasks to perform are also discussed, together with the semester plan, as planned in the Application Form.
PRESENTATIONS OF GOOD PRACTICES. Each Good Practice is presented by a representative of the company or organization involved in the GP. The speeches usually last thirty minutes, including the time for questions and answers, and are supported by Power Point presentations. Speakers are encouraged to bring with them physical samples, prototypes, projects related to the good practice.
FIELD VISIT. For at least one good practice, partners go on an actual Field Visit to see the production plant related to the GP. This is an extremely stimulating moment for partners that can get a more direct experience of the good practice.
CONCLUSIONS. At the end of the second day, the LP sums up the key dates related to the upcoming months of work and reminds partners the tasks that need to be performed.
PEER REVIEW WORKSHOP. Partners gather for the Peer Review Workshop in order to discuss and evaluate the GPs that have been presented during the FV. This usually takes about one hour and a half.
DINNER TOGETHER. A dinner for all partners is organized at the beginning of each FV, usually on the first evening before the field visit. This is a particularly important bonding moment to welcome partners and share logistics information about the following days.

Once a semester in phase 1 of RETRACE and once a year in phase 2, the FV is coupled to the Steering Group Meeting, a one-day meeting that involves only project partners. The purpose of this meeting is to coordinate partners' activities with respect to project content and financial management, exchange of experience, communication and dissemination activities. On one side, results achieved are evaluated and compared to the expected ones; on the other side, further steps are discussed and the Work Plan for the following semester is agreed. Besides these regular activities, the Steering Group Meeting offers the occasion to discuss specific topics and to continue the educational process of partners concerning CE and SD.
The identification of GPs and the organization of the FVs are the most effort demanding activities of RETRACE. They also represent two of the most delicate elements that influence the results of the project. For these reasons, a thorough methodology was defined, in order to guide partners step by step in the process and ensure a high quality of the result.

4.1.3 Action Plan and Policy Brief

ANDER MUÑOZ URBIZU

This chapter describes the main aspects that need to be taken into account when developing an Action Plan and a Policy Brief, and tries to provide a full methodology to facilitate the work that needs to be done.

All the regions involved in the RETRACE Project may find the guidelines useful, since these documents are part of the expected results of the RETRACE Project.

Steps for the Elaboration of an Action Plan

In the first place, we must understand what an action plan is, its dimensions and scope, so that we are able to link it with the development of the RETRACE Project.

An action plan is the way in which the vision of one organization is concretized in a practical way towards the consecution of a project (Bungay,2010), that is, the mechanism that assures the fulfillment of the mission and vision of a company, organization or project. It describes what strategies the group will use to achieve its objectives (Martin, and Osterling, 2014). An action plan consists of a number of action steps or changes to be made towards a specific goal.

Each step or change of the action plan must include the following information:

- What actions or changes will occur?
- Who will carry out these changes?
- When will they take place, and for how long?
- What resources (money, equipment, etc.) are needed to make these changes?
- Communication (Who should know what?)

Criteria for Developing an Action Plan

A coherent action plan will have to address a number of issues that will allow it to be appropriately defined (Creating an Action Plan, 2012). In this sense, the following features are fundamental:

- Full: Are all action steps or changes to be developed in all the relevant parties involved in the project?
- Clear: Is it clear who will do what and when?
- Current: Does the action plan reflect the current work? Does it anticipate the new opportunities and barriers that may arise?

It is critical to consider all the steps necessary to ensure the success of projects, between which is obviously the development of an action plan. In this respect, the whole enterprise, entity or organization in the action plan, or at least the agents related to the project, must be involved in order to give credibility to the organization, given that an action plan validates at all levels that the organization is well structures and dedicated to achieving the objectives.

At the same time, it is critical that every stakeholder understands what it is and what is not possible to do and does not overlook any details of the project, in order to save time, energy and resources throughout the development of the plan.

Ideally, an action plan should be developed within the first year of a project. It is developed after having determined the vision, mission, objectives, and strategies of the working group.

In any case, it should be created in mind that an action plan will always be a living element, or at least during the period covered by the implementation of the project and its follow-up (Fournier,, 2017). Moreover, as the project progresses and changes, periodic corrections or modifications must be made to adapt the plan to the new reality.

The Main Steps for the Elaboration of an Action Plan

REVIEW AND ANALYSIS OF THE FINAL SCOPE OF THE PROJECT. In the case of the RETRACE Project, this involves the development of an action plan for the implementation of good practices that cover areas for improvement of policies and programs, selected in line with the diagnosis made in each territory.

The team involved in the project must analyse its particular situation with the HD and in relation to the good practices analysed and their applicability in the territory. To do this, although this activity is outside the Action Plan (it is prior to it), it is convenient to respond to issues such as:

- With what strategic lines does RIS3 align my territory?
- What are the strengths and weaknesses of my territory?
- What are the good practices seen in other regions that have more applicability depending on the business ecosystem of my territory?
- What resources (economic, human, business, etc.) do we have available to develop better practices and policies?
- What time horizon do we manage to implement policies? And to obtain new successful good practices?
- What information and resources do we need to carry out the project?
- What are the barriers that we can encounter?

MISSION AND VISION. In project terms, mission and vision (they have totally another conception when referring to organizations and companies) could be defined as follows:

- Mission. What we want to achieve in the territory through the development of policies focused on the economy.
- Vision. What is the ideal scenario that we want to reach with the action plan and the actions that this entails.
- Actions aimed at the development of internal policies for the territory, the development of good practices and the development of future local projects.

Logically, this detailed action plan will cover the former type of actions along with the derivatives generated in other plans.

However, it should not be forgotten that the RETRACE Project and the action plan derived from it, can and should act as a catalyst for opportunities, which may arise in the future, in the range of action of each organization that participated in it.

In any case, with regard to the development of the action plan, the mission and vision must converge in such a way that the final result that is visualized is coherent for both types of actions.

SETTING OBJECTIVES. As in any other project, the objectives of the action plan should be established, both at a general level and at a higher level of detail.

To do this, it is be necessary to take into account, on the one hand, the profile of the organization, since the project involves entities of different nature, among others, universities, development agencies and public and governmental institutions. Logically, these agents do not have the same type of responsibilities, fields of action and strategic objectives.

Therefore, the objectives must implicitly carry the vision of each organization that participates in the development of the plan, including stakeholders.
In addition, the particularities of each territory in which the action plan is developed should be taken into account. As mentioned in point 1, the information obtained with the Holistic Diagnosis, as well as other additional sources of information available to the entities, should be used in order to have a clear picture on the possible and feasible scope of the project in each territory.
At this point, beyond the general reflection on objectives, the specific objectives of the action plan must also be established. In addition, these objectives should be prioritized, in order to structure the development of the project, depending on the relative priority that is established for each of them. Again, this prioritization should be done after each work team (partners, managing authorities and stakeholders) has discussed which criteria should be adopted.
These could be, among others, probability of success, feasibility of implementation in the territory, resources that are needed to carry it forward and the alignment with current territory policies.
These specific objectives should establish the final points of the action plan, again, as mentioned, aligned with the priorities of each territory.
These new milestones should clearly define how the partners will work towards more general objectives. Therefore, they must comply with the concept of S.M.A.R.T. objectives:

- specific — they address the matter specifically;
- measurable — they can be measured to determine whether they have been achieved;
- achievable — they are within the means and capacity of the group;
- realistic — they should be practical and can be accomplished within a reasonable time frame;
- time-bound — the time period for reaching should be clearly specified.

DEFINITION OF INTERMEDIATE MILESTONES AND TASKS. Once the objectives (general and specific) of the action plan are clarified, the next step will be the establishment of intermediate milestones and specific tasks.
Intermediate milestones will facilitate the monitoring of the project (the development of the action plan), as well as serve as an incentive while working on it. These milestones should be distributed from the beginning of the project to the completion of each of the specific objectives defined in the previous points. In addition, it should be interesting to answer questions such as: what exactly do we want to achieve in this milestone? How will we know that we have succeeded (indicators)? Who will be responsible for each of the milestones?
With respect to the tasks, they must be defined for each of the objectives and will always be associated to some of the intermediate milestones. The concept of task is the one of greater level of detail, so they should serve to define specific activities to be carried out to fulfill the objectives of the action plan.
Once defined, tasks will also be prioritized, in this case depending on the dependencies between them, that is, according to the order in which they must be executed. In the case of specific activities, they must follow a logical order for their correct implementation.

TIMING. A temporary line must be established according to which are distributed the general and specific objectives of the project, as well as the intermediate milestones and the related task for each of them.

In order to do this, different tools and methodologies may be used, one of the most common being the Gantt Chart.[5] The Gantt Chart is a graphical tool whose objective is to expose the expected time of dedication for different tasks or activities over a given total amount of time. Depending on the details of each of the Action Plans, a classic Gantt Diagram or any variation may be used, ensuring that it fits with the approach proposed by each work team.
Keep in mind that it is not a matter of distributing tasks, milestones, etc., so that they fit the desired planning of the project. Instead, this distribution must be realistic and feasible, so that the development of the action plan does not suffer preventable delays. Therefore, it will be convenient to analyse the economic and human resources that can be devoted to each task, in each phase and in each timeframe of progress of the project.
Finally, it is necessary to point out that the schedules are always subject to unexpected changes that are usually impossible to detect in the planning phase. In any case, it is important not to make mistakes in the planning phase that can modify even more the timing, which due to the nature of the projects will already be subject to changes.[6]

RESOURCE MANAGEMENT. Although this is a process that will be managed once objectives, milestones and tasks will be defined, any activity carried out during the action plan will be associated to a professional responsible for its correct development.
This person will be in charge of ensuring that the activity is carried out on time without exceeding planned costs and resources. Otherwise, the same person will have to negotiate and manage the variations that must be made.
On the other hand, it should also be clear who will be responsible for the development of the project at a global level and a project manager and coordination level.

MONITORING. Finally, the monitoring mechanisms of the project will be defined as necessary. It is very convenient to have these mechanisms, since they allow, among others:

- to know the current state of implementation of the action plan;
- to detect deviations and corresponding corrective measures;
- to manage the risks that may occur;
- to share with all involved entities the complete picture of the project state.
- For an effective follow-up, different formulas may be used, being the most common ones from minor to greater complexity are: periodic follow-up meetings, methodologies (such as SCRUM or PMI Methodology),[7] computer tools that facilitate the correct monitoring of projects.

The Regional Action Plan in RETRACE

Regarding the RETRACE Project, each region will elaborate a Regional Action Plan providing details on how the results of the cooperation will be implemented in order to improve the policy instrument that is adopted in each region.
This document should specify the nature of the actions that need to be implemented, their timeframe, the players involved, the costs (if any) and funding sources (if any).
The process for the development of the Regional Action Plan starts with the Holistic Diagnoses Report of each region and the policy gaps detected during the project.

In the second phase, all partners should update the matrix that matches these policy gaps with the GPs exchanged during the FVs, in order to identify the ones that most suit their interests. Finally, the Regional Action Plan will be developed jointly with the project Managing Authorities and the stakeholders. For the elaboration of the document, a common template will be provided, containing:

- general information about the project;
- policy context (impact and policy instrument addressed);
- details of the actions envisaged. For each action the following information should be provided: background, action description, players involved, timeframe, costs and funding sources.

Design of a Circular Economy Policy Brief

After the definition of a detailed Action Plan, the Policy Brief can be defined as a document that summarizes the policy options for a particular issue, providing also some recommendations. It is aimed at government organizations and policymakers responsible for formulating new policies. The typical policy brief format is a document between 1 and 7 pages (3.000 words maximum), with an attractive design and some photographs and graphics that help the reader to understand the main content.

Among the objectives of a policy brief there is to provide enough background for the reader to understand what is circular economy. The policy brief should also try to convince the reader (the policymaker) about the convenience of addressing the circular economy topic urgently, providing information and evidence to support the most interesting alternatives (based on the learning derived from the RETRACE Project).

It is important to note that the document should be short and detailed, focusing on a particular problem without going into to many details. The reader does not need to know all the details of the methodologies; instead, the focus should be on the problem and the possible solutions. Regarding this, the policy brief should be based on firm evidence coming from years of research and multiple sources (ideally from different backgrounds). It is a crucial to understand the main focus of the document: to provide enough information for the reader to understand the problem and come to a decision (University of North Carolina, 2016).

Finally, the document should draw general conclusions, though it was originally based on context-specific findings.

Goals of a Policy Brief

The main goals of a good policy brief are:

- convince policymakers that a specific issue, in this case the promotion of circular economy projects and politics, must be addressed;
- provide information about the best alternatives to solve the problem or achieve the main goal;
- describe why the proposed solution is the only or the best alternative in order to solve the issue that has been identified. In this sense, the policy brief should describe the advantages of circular economy in the development of new business models that can enrich the territory's ecosystem;
- provide enough background for the reader to understand the problem, so that the policymaker can take the right decision.

Structure of a Policy Brief

The following is a proposal of how to structure a policy brief (Neumann, and Reed, 2015):

TITLE. The title should be short and to the point, trying to grab the reader's attention, focusing on the need for a change in our economies, in order to develop a more circular model.

SUMMARY. It is possible to include a short policy message, which contains an extract of the most important points of the policy brief. The focus should always be on pointing out what are the most interesting elements for policymakers in order to catch their attention from the beginning.

RECOMMENDATIONS. These could be presented both on the first page (as part of the summary or next to it) or at the end, as a separate section. In any case, recommendations should be clearly stated and correctly highlighted so that reader can find them easily. It is also convenient to keep them short (4-6 recommendations are enough). Finally, recommendations should be feasible and realistic, from a technical, social and economical point of view.

INTRODUCTION. It aims to be the element that grabs the reader's attention and introduces the topic that will be developed in the body of the document. It should address questions such as the nature of the problem, the context and the effects it has on the territory.

BODY. The main text should be structured in a logical manner, without the reader having to make an effort to understand the message. Thus, it is a good idea to keep paragraphs short and focused on the subject, as well as to frequently use headings, subheadings and highlighted text when necessary.

POLICY IMPLICATIONS. A good brief of the policy implications is critical since the reader is a policymaker. Some questions should be answered in this section, such as: which are the effects of revised policies on existing ones and on the whole territory? Which are the main advantages (and disadvantages) that the circular economy will bring? What are the main risks? How much will it cost to implement the new policy?

CONCLUSIONS. This section could be avoided (with the summary and the recommendations). However, it could be a good way of closing the document.

There are some other elements that may appear in a policy brief, which help to achieve a complete, attractive and useful document.

SIDEBARS. Boxes and sidebars can be used to present information that does not fit well in the main text sections, for example, definitions or explanations, lists and examples.

GRAPHICS. Such as flow, bar charts, line graphs or maps. They should be very clear and easy to understand, since readers tend to look at them before reading the text. In addition to this, a graphic can be an important design element because of its visual nature.

PHOTOGRAPHS. In line with graphics, photographs are very interesting elements to grab the reader's attention. Of course, photographs should be engaging and appropriate to the topic.

TABLES. These elements can be used to present both numbers and textual information. However, it is important to keep the data simple, since complicated information may confuse the reader.

CASES. It could be interesting (at least regarding the RETRACE Project) to include one or more examples about how these politics have led to new business opportunities in other territories, so it becomes clearer for the reader the convenience of paying attention to the SD Methodology.

Finally, some other additional elements of information should be included:
AUTHORS. It is possible to include the names of the authors of the policy brief, even if some prefer to name only the organizations. Depending on the final decision, information about the authors should include their names, positions, organization's name and email address.
ACKNOWLEDGEMENTS AND PUBLICATION DETAILS. Relevant information should be provided, such as, partners and stakeholders taking part in the policy brief, contact addresses, information on the copyright, possible disclaimers.
REFERENCES. Finally, it is convenient to include a list of the main sources where the reader can find further information on the topic (especially websites and scientific publications).
Once policy briefs are prepared, the final step is to find the proper ways to distribute them among key audiences. This can be achieved through many different and complementary ways (Policy Brief Week, 2014).
One of the most common instruments is to print and distribute hardcopies also by hand (for example at dissemination events) or by email to policymakers. It is also possible to make a soft distribution on the web, via websites, social media, email or professional sites.
These options could be combined with some other material, such as videos, press releases, brochures, etc. It could be a good idea to enrich the policy brief with some of the materials developed during the RETRACE Project.

Policy Brief in RETRACE

Regarding the RETRACE Project, jointly with the Regional Action Plans, all partners will elaborate regional Policy Briefs targeting politicians and policymakers with tangible benefits on CE.
These documents provide a summary of Regional Action Plans for politicians and policymakers. These Policy Briefs may be distributed in Regional Dissemination Events and through the Interreg Policy Learning Platform.

[1] For further details,on Systenic Design approach, read the Chapter 2 "Systemic Design: A Tool For An Emerging Sustainable Future".
[2] The complete outcomes of the HD 1st step for each region is available in the Annexes at the end of this book.
[3] The complete format is proposed in the next pages.
[4] This book will be published in early 2018.
[5] The one we used in RETRACE together among all partners.
[6] To avoid unpleasant delays during the RETRACE Project the LP uses a balance score card in order to constantly monitor the goals reached. Furthermore, a preventive risk assessment table is prepared with the specific actions that need to be taken in case of problems or delays.
[7] Project management methodologies include the application of knowledge, skills, tools and techniques to a broad range of activities in order to meet the requirements of a specific project.

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4.2 Communication and Dissemination

This chapter aims to describe the communication and dissemination strategy of the RETRACE Project, its goals as well as the target groups and the accomplished activities of each objective and the expected results.

4.2.1 Communication and Dissemination Strategy and Goals

Estibaliz Plaza Elordi

The RETRACE Communication Strategy, is designed to fulfill different goals:

- To raise awareness among regional politicians and policy makers, as well as between industrial and business sector, and society, in the tangible benefits for a transition towards a Circular Economy (CE).
- To deliver a Policy Road Map, making visible the benefits of adopting systemic approaches in their transition towards a CE and providing a pathway with necessary steps needed to be undertaken with that purpose, including policy recommendations for the update of regional/national RIS3 strategies
- To disseminate project results (Systemic Approach Method, Good Practices, Policy Briefs and Road map which also are the 3 main publications delivered by the Project) at the widest level, looking for synergies with other Interreg Europe related projects and existing networks and initiatives in the CE field.
- To contribute with good practices, policy briefs and recommendations to the Interreg Europe Policy Learning Platform on Environment and Resource Efficiency.

The communication strategy is led by Azaro Fundazioa (PP3) but all partners have been engaged on the definition and implementation of the strategy, tailored to the messages and expectations of identified target groups in the framework of a Stakeholders Analysis part of the Communication Strategy.

The Communication Officer (from Azaro Fundazioa) is carrying out the following tasks:

- elaboration of Communication Strategy and monitoring of target indicators;
- responsible for website and social media coordinating the efforts from all partners;
- elaboration of brochure, project poster and delivery of newsletters;
- monitoring and coordination of participation of partners at dissemination events;
- delivery of guidelines and support for the communication of dissemination events;
- collaboration with the Lead Partner to do the contact with JTS Communication Officer in order to fulfill any request.

To disseminate and communicate the RETRACE Project goals and to raise the task indicated in the last paragraph, the consortium is working to raise the largest audience possible.

Objectives of the communication strategy are defined with reference to specific target groups and activities.

1. Raise awareness on Systemic Design (SD) approaches for a CE as a paradigm change and source of new business and innovation opportunities.
2. Promote ownership of results and process within regional policy makers, policy managers and public /private initiatives managers.
3. Exploit and promote the adoption of recommendations and learning by other EU regions, and to push up systemic approaches for a CE in the EU policy agenda.
4. Contribute to the thematic policy learning process and exchange promoted by Interreg Europe Target Group: Interreg Europe Environment and Resource Efficiency Policy Learning Platform managers.

Objective 1: Raise awareness on SD approaches for a CE as a paradigm change and source of new business and innovation opportunities.
TARGET GROUP: Selection of representatives of public and private local stakeholders.
ACTIVITIES

- During Semester 1 the organization of the 1st Regional Dissemination Event in each region (5 in total) will be held in order to engage stakeholders, to promote and disseminate the project while raising awareness on CE.
- 6 Local Stakeholders Group meetings, one in each region (30 in total). On the first meeting we will present the goals of their involvement in RETRACE, the activities they will be involved in such us Field Visits and the definition of Action Plans.[1]
- During Semester 4 a second regional Dissemination Event will be held in each region (5 in total) to present the publications about Policy Briefs and Actions Plans.
- Stakeholders are also expected to take part in the 7 Field Visits to learn about good practices from other regions.
- 20 stakeholders from the 5 Local Stakeholders groups are also expected to take part in the two Interregional Events. The first Interregional Event to be held in Brussels in March 2018 will aim to present the results of the first phase of the project. The final Interregional Dissemination Event will be held in Slovenia during Semester 7 and will aim to promote project achievements as well as to disseminate the results of the action plans implementation.
- Social media (mainly Facebook, Twitter and YouTube) will be employed to provide information regarding the project.

Objective 2: Promote ownership of results and process within regional policymakers, policy managers and public and private initiatives managers.
TARGET GROUP: Local/Regional Policymakers in charge of the ERDF ROP and related environmental and CE and re-industrialisation policies.
ACTIVITIES

- Production of a RETRACE video and brochure containing information on the project (background, goal, methodology, participating regions and partners), information related

to Interreg Europe program, explanation on the benefits of SD towards CE Approaches.

- As part of the Local Stakeholders group Local/Regional Policymakers take part in the 6 local Stakeholders Group Meetings held in each region, where updated project information and consecution of intermediate and final objectives and results will be provided.
- Several deliverables to be handed out to this target group will be produced to promote ownership of results and process, such us 5 "Policy Briefs", 1 "Policy Roadmap" and 1 "Good Practices Guide".
- 2 Regional Dissemination Events in each participating region (10 in total) will be organized: one during Semester 1 and one during Semester 4.

Objective 3: Exploit and promote adoption of recommendations and learning by other EU regions, promoting systemic approaches for a Circular in the EU policy agenda.

TARGET GROUP: Outreach to EU regions policymakers and policy managers in charge of environmental and CE and reindustrialisation policies through existing general networks (ERRIN), specific networks on Environment (European Environmental Bureau, Surfrider Foundation Europe, Zero Waste Europe and Friends of the Earth Europe), networks on CE (Circular Economy Europe, European Network of Environmental Professionals, European Network of Ecodesign Centers ENEC, Network of Experts in Sustainable Consumption and Production), think tanks such as the Ellen MacArthur Foundation, industrial associations (European Round Table of Industrialists (ERT), Reuse and Recycling EU Social Enterprises network (RREUSE), Business Environment Network), and other EU funded projects such as ZeroWaster (FP7), ReNEW (IVB NWE) and thematically related Interreg Europe projects.

ACTIVITIES

- Several deliverables will be produced, such us 5 "Policy Briefs", 1 "Policy Roadmap", 1 "Good Practices Guide" and 1 "Method" that will be shared with this specific target group.
- Attendance to the European Circular Economy Conference organised by Europe Forum as well as the meetings held by identified stakeholders in previous section.
- The RETRACE Project and its results will be disseminated at events organized by other EU stakeholders and other related thematic EU projects.
- 2 Interregional Events. Event during S4 (Brussels) will include: 1 open conference targeting EU regions representatives, development agencies and stakeholders involved on the promotion of CE; 1 event (not open to the public) targeting partner region's politicians and policymakers, EU policy makers and MEPs to disseminate regional Policy Briefs and Policy Road Map. Event during S7 (Slovenia) will target executives and policy makers from the regions and other relevant institutions to promote project achievements and disseminate the results of the action plans implementation.

Objective 4: Contribute to the thematic policy learning process and exchange promoted by Interreg Europe.

TARGET GROUP: Interreg Europe Environment and Resource Efficiency Policy Learning Platform managers.

ACTIVITIES

- Participation to thematic workshops organized by Policy Learning Platform, with other thematically related Interreg Europe projects.

- Contribution with news/articles/briefs/ requested by the Platform.
- Several deliverables will be produced, such us 5 "Policy Briefs", 1 "Policy Roadmap", 1 "Good Practices Guide" and 1 "Method" that will be shared with this target group.
- The Interregional Dissemination Event organised in Brussels during Semester 4 to which Interreg Europe Environment and Resource Efficiency Policy Learning Platform managers will be invited. This event will aim to present the results of the first phase of the project and a Policy Panel to the target group.
- Social media (Twitter, Facebook and YouTube) used to provide information regarding the project.

The results expected from this strategy are:

- 200 articles/appearances in press and media and one video of the RETRACE Project with 1.000 views;[2]
- At least 7 videos related to the 7 Field Visits with more than 3.000 views in total;
- 1.240 participants in Dissemination Events. During the project we plan on celebrating 10 Regional Dissemination Events whose objective is to have 40 people attending each event. 2 Interregional Dissemination Events with 100 people attending each event. RETRACE active presentations by 8 partners in 2 external events each, with 40 people attending each event.

4.2.2 Policy Learning Platform on Environment and Resource Efficiency

MARION REAL AND MIKELE LARRONDE

Policy Learning Platforms are a new feature of Interreg Europe to raise awareness about the programme to the benefit of all project partners and the whole community of regional policy stakeholders. There is one policy learning platform per policy area covered by Interreg Europe:

- Research and innovation;
- SME competitiveness;
- Low-carbon economy;
- Environment and resource efficiency.

The platforms are a hub of interaction, information and services for continuous learning bringing together communities of like-minded policymakers, practitioners and experts dealing with regional development policies in Europe. The aim of the learning process and collaboration is to improve structural funds and other regional development policies in these four areas. Within each thematic platform there are people, projects, events and information related to different topics.

Each platform features:

- A Knowledge and Education Centre for relevant policy recommendations, thematic studies, reports, evaluations, EU policy news, databases of good practices, etc.
- Networking and partnering opportunities including organisation of relevant activities and events, database of practitioners and owners of good practices, etc.

- An Expert Helpdesk for policy advice upon request for targeted advice and guidance to improve public policies design and implementation.
- An Expert support for policy learning upon request including peer reviews, benchmarking exercises, thematic workshops, capacity building events, learning activities, etc.

The platforms serve both the project partners and the whole community of regional policy stakeholders to meet and learn from each other. Other institutional stakeholders whose policy mandates are relevant for the topics addressed by the platforms, e.g. the European Commission, the Committee of Regions, the European Environment Agency, the OECD, and other EU programmes, may also use the platforms.

RETRACE is focused on Environment and Resource Efficiency.

Environment and resource efficiency policies provide opportunities for regional growth and job creation and can boost the attractiveness of a region to businesses, citizens and tourists. Regions need to protect ecosystems and vulnerable landscapes and prevent biodiversity loss in their territories to prevent (further) degradation of these natural assets. The sustainable management and exploitation of the natural environment can also foster sustainable regional development based on so-called ecosystem services.

A similar logic applies to the preservation and exploitation of regional cultural heritage. Preservation and exploitation strategies can incorporate ICT applications to, for instance, raise public awareness and ownership of cultural heritage or by introducing applications on e-culture.

Enhancing resource efficiency at regional level involves using limited resources sustainably, whilst also avoiding negative impacts for the environment. Efficiency also allows to create greater value from less input, bringing down unit costs for manufacturers and buyers. Regions can play a key role in improving resource use through interacting with consumers and producers, as well as through their own role as energy consumer.

Although various national and supra-national initiatives are in place to support this transition, regions do play a key role. Interreg Europe can help regions to find practices to answer regional challenges, such as preparing sustainable exploitation models for natural and cultural heritage assets, developing and integrating green infrastructure, encouraging SMEs to assess and address resource use issues, or, reducing waste volumes in SMEs and households.

This platform offers participants and other stakeholders a range of ideas and inspiration on how to better protect natural and cultural heritage and use Earth's limited resources in a sustainable manner and thus contribute to meeting environmental and socio-economic objectives. The support is provided through a set of workshops, networking events, examples of good practices and a helpdesk of experts.

[1] For further details on stakeholder activities see paragraph 3.2.2.

[2] The oficial YouTube cannel of the Project is: https://www.youtube.com/channel/UCTwEQ0M4G9V1DX4JEany_RA

Conclusion

SILVIA BARBERO

This book recommends a methodology which helps defining a clear path towards a circular economy is mainly addressed to policymakers. However, it can be useful to all those actors involved in this new process who recognize the importance of a bottom-up approach. The methodological steps are distinctly defined in order to create a sort of toolkit easy to use in real circumstances, as demonstrated through the RETRACE Project.

It is a guide to action, which provides the tools and the motivation to start a journey towards a circular economy while analysing its fundamental concepts beyond any *cliché* for a deeper understanding of its implication and the goals the European Commission aims to pursue.

The transition towards circular economy is based on technical, social and organisational innovations which involve the whole value chain connecting production and consumption (European Commission, 2014). The key elements of this transition include a change of the cultural paradigm, organizational and social innovation, new financial instruments and a bottom-up process in decision making.

The cultural aspects are related to a Constructivist learning paradigm (Piaget, 1950), according to which the learner plays an active role in building the interpretations of experience and sharing common cultural experiences, and disciplines do not have defined borders. The skills and knowledge requested in this transition phase should be trans-disciplinary and capacity-building oriented.

The required innovation is multi-level in order to guarantee a different organisational model that includes integrated solutions and business models, and a different social paradigm with new production and consumption models involving citizens.

The introduction of fiscal and financial incentives would be able to grant tax relief or financial contributions to those subjects that move towards an increasingly environmental sustainability of production and processes.

Eventually, the involvement of a high number of stakeholders is indispensable to address bottom-up processes in making challenging decisions.

The experiences described in this book show how circular economy opportunities can cope with regulatory, technical, cultural and financial barriers and how policymakers can play a crucial role in helping businesses overcome these obstacles.

Regulatory barriers include the definitions of waste that hinder trade and transport of products for remanufacturing, the tight division in sectors, etc.. The linear and sectorial approach in current government departments is a huge barrier, because the circularity of resources requires cross-department collaborations and the involvement of industry. Other legal problems are related to different authorization procedures (as for example in the case of ending waste, or managing waste), as the absence of national rules raise disparities among regions. At the same time, when regulation is complex or fragmented, it could also hamper it (Simon Boas et al., 2015).

Technical barriers are related to the innovations that allow giving a higher quality to waste (for example, the quality of recycled materials, requires R&I actions), and the ability to scale them up to an industrial level. In other cases, the value chains are not complete, especially regarding the supply of agricultural by-products; the question of how to guarantee constant quality and quantity of supply is another key issue, which is related to seasonality and other variables (Schulte, 2012).

On a cultural level, we need to support a new eco-design paradigm that considers the whole product lifecycle (durability, maintenance, recyclability), and an increase in the awareness of potential users of secondary materials, especially in certain sectors. Other social factors are the lack of experience of companies and policymakers in detecting circular economy opportunities as well as some market failures, or the lack of accurate information (for example, consumers should be informed about the possibility to repair, disassemble and reuse products), and the unaccounted externalities (such as the carbon emissions of companies).

Fiscal and financial barriers include measuring economic performances that do not pursue the network with other entities and social and environmental benefits. There are many circular economy opportunities which are profitable right now. However, a great number of international organisations, such as the European Commission, the Organisation for Economic Co-operation and Development, the International Monetary Fund, and the International Labour Organization, have declared and demonstrated that further opportunities could be activated by shifting fiscal incentives from resources towards labour (Witjes and Lozano, 2016).

All these aspects should also be considered based on international competitiveness, administrative issues, tax revenue stability and distributional effects. Thus, it is crucial to establish a cross-policy approach and an inter-institutional dialogue beyond the single political instrument. Each state member of the European Union requires EU-level policy interventions that integrate national policies; for example, the value chains of many products could be extended across the borders.

Policymakers have the duty to increase the governance and awareness of all the actors involved in the process as well as to define and use fare policy as an incentive. The already-mentioned transition towards a more circular economy brings about the benefits of an innovative, resilient and productive economy.

Applying the Systemic Design Methodology to define policies for a sustainable future is a consolidated practice. The RETRACE experience demonstrates that, for an effective transition to a circular economy, which is not exclusively focused on recycling and focused on the product and on the reduction of waste, the application of a holistic approach as the Systemic Design guarantees, is essential. It is imperative that policies at all levels (local, regional, national and international), which intend to regulate such complex systems, should take into consideration many variable at the same time. Complex systems define a class of problems that are often described as NON-LINEAR (the whole is greater than the sum of its parts), ADAPTIVE (both the system and its constituent parts adjust over time to the changes in the environment, within the system, and within the components), SELF-ORGANIZING (components self organize without central direction), and EMERGENT (it is hard to anticipate the system outcome of interventions carried out at the component level) (Hadzikadic, 2015). Indeed, this means that it is not only about closing the circles of production, but also finding alternative destinations of waste to landfills. The goal is to shift the focus from the product to the territory. To conclude, design goes a step further in delineating new policies that aim at designing a whole territory.

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Annexes

Italy

PIEDMONT

geography

TOTAL AREA: **2.538.700 ha**
2010

Mountains **43,3%**

Hills **30,3%**

Flat area **26,4%**

T.A.A (Total Agricultural Area): **1.299.007 ha** **51%**
2010

Woods area **181.850 ha** **14%**

Not used area **78.000 ha** **6%**

Arboriculture **26.000 ha** **2%**

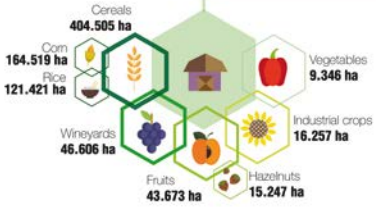
Agriculture area (U.A.A.) **1.013.157 ha** **78%**

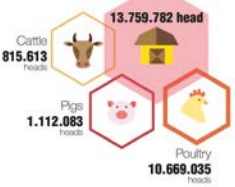
Area for pasture **371.350 ha**

Artificial area: **183.082 ha** **7%**

n° 67.148 Crop Farms
15,14 ha average (U.A.A)
97% family managed

n° 19.724 Breeding Farms
n° 52 head average
97% family managed





Italy

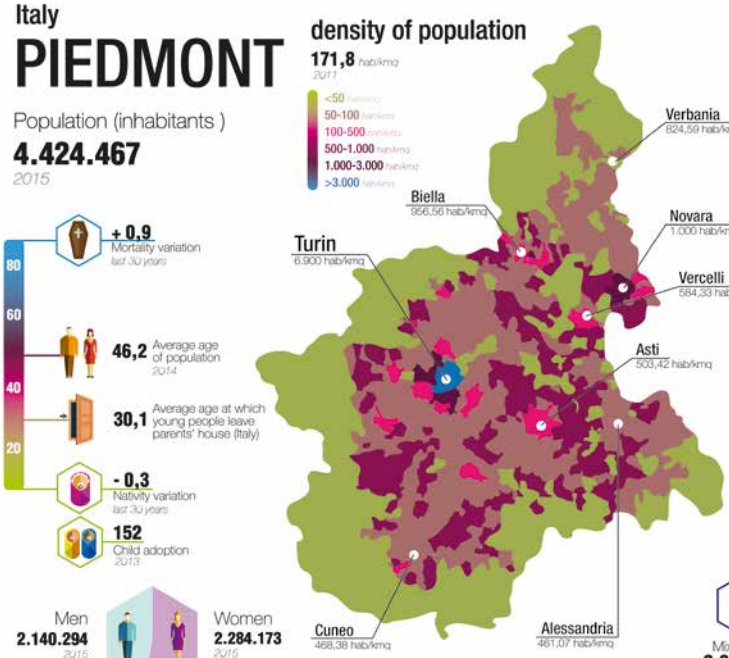
PIEDMONT

demography

Population (inhabitants)
4.424.467
2015

density of population

171,8 hab/kmq
2011



+ 0,9 Mortality variation
last 30 years

46,2 Average age of population
2014

30,1 Average age at which young people leave parents' house (Italy)

- 0,3 Nativity variation
last 30 years

152 Child adoption
2013

Men **2.140.294** 2015

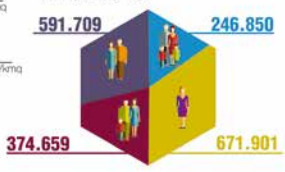
Women **2.284.173** 2015

family composition

2,2 Average number of people in a family
2013

TOTAL FAMILY UNITS **1.953.360**
2011

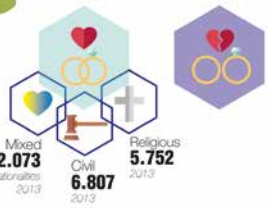
MAIN CATEGORIES



marriage

Marriages **12.599** 2013

Divorces and separation **12.152** 2012



Italy

PIEDMONT

demography

employment

1.347.299 employees 2013

Variation of total employment rate
Working age 20-64
2004 66,9
2015 68,1

Variation of total unemployment rate
Working age
2004 5,3
2015 10,2

Average income per year
23.616 € 2011

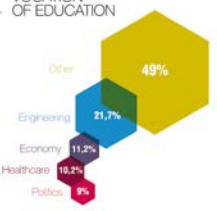
Average income per age - ITALY
2015 (median equivalized net)

-18	14.102 €
18-24	14.290 €
18-64	16.434 €
25-49	16.108 €
25-54	16.349 €
55-64	18.017 €
65 +	15.738 €
75 +	14.982 €

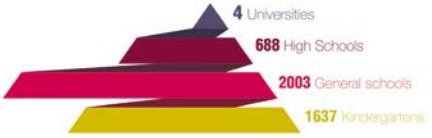
education

SCHOOLING RATE
41%
2013

VOCATION OF EDUCATION



NUMBER OF EDUCATION LEVELS & UNITS



migration

Rate of Emigration
+ 4,4 %
last 30 years

Rate of Immigration
+ 5 %
last 30 years

118.593 Temporary immigrants 2016
162.062 Definitive immigrants 2016

Italy

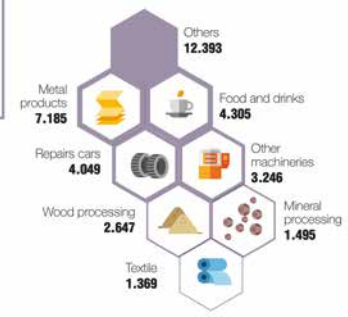
PIEDMONT

economy

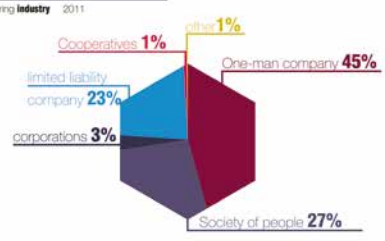
MANUFACTURING INDUSTRY 36.689 UNIT

MAIN ECONOMIC / INDUSTRIAL SECTORS

Services 77.284,7 M €
Manufacturing industry 25.400,8 M €
Construction 5.740,8 M €
Farming 1969,8 M €



INTERNAL ORGANIZATION OF INDUSTRY
Manufacturing industry 2011



NUMBER OF INDUSTRIES
MANUFACTURING SECTORS 2011

NUMBER OF EMPLOYEES
MANUFACTURING SECTORS 2011

EMPLOYEES			
1-15	Micro	34.177	114.904
15-49	Small	2.678	71.161
50-249	Medium	1.013	99.237
+250	Large	156	105.659

Italy

PIEDMONT

culture

influences

Roman · Occitan · Walser · Napoleon

traditions by season

- spring: - picnic in the park - Easter
- summer: holidays at the sea or in the mountain
- autumn: food and wine events
- winter: - go to skiing - Carnival - Christmas - New Year's Eve

languages

Italian
Piemontèis

religion

other 6%
atheist 10%
islam 28%
Christian 56%

sport

Soccer 23%
Billiards 20%
Other 15%
Fitness 13%
Tennis 11%
Volleyball 9%
Basket 6%
Ski 2%

notable residents

industrial- politician- religious

Luigi Einaudi — Statesman — 1874-1961
Massimo D'Azeglio — Statesman — 1798-1866
Luigi Lavazza — Founder of Lavazza — 1859-1949
Camillo Benso — Count of Cavour — 1810-1861
Vittorio Emauele II — King — 1820-1878
Gianni Agnelli — Chairman of FIAT — 1921-2003
Michele Ferrero — Founder of Ferrero — 1925-2015
Don Bosco — Priest — 1815-1888
Pietro Micca — Soldier — 1674-1706
Adriano Olivetti — Founder of Olivetti — 1901-1960

folklore

instruments

ghironda · organetto · flute · violin · bagpipe · armonica · clarinetto

dances

Courento · Gigo · Monferrina · Brando

authors - musician- artist

Cesare Pavese — Writer — 1908-1950
Beppe Fenoglio — Writer — 1922-1963
Rita Levi Montalcini — Scientist — 1909-2012
Gianni Rodari — Writer — 1920-1980
Primo Levi — Writer — 1919-1987
Carlo Mollino — Architect — 1905-1973
Umberto Eco — Writer — 1932-2016
Ludovico Einaudi — Musician — 1955-

Italy

PIEDMONT

culture gastronomy

food resources

- ottofile corn, buckwheat, rice
- kiwi, apples, plums, cherries, pears
- pepper, ginger, cabbage, garlic, beetroot, onion, pumpkin
- beans, legumes, peas
- wineyards
- alpine herbs, white truffles, chestnuts, hazelnuts, mushrooms
- eggs, cow and goat milk, dairy products, honey
- veal, pork, poultry, goats, horse, frogs

traditions

MERENDA SINOIRA (afternoon snack): bread, salami, cheese, fruit, wine

recipes

- bagnacaoda: warm dip with garlic, anchovies, olive oil, butter.
- grissini: breadstick
- gianduiotti: chocolate
- brasato: meat cooked in red wine
- polenta: boiled corn meal
- fried mixed: meat/ vegetable
- cheese: seasoned, coming from cow or goat milk

Italy

PIEDMONT

architecture

styles/ urban patterns

Roman
Structure of Torino

Medieval Gothic
Churches

Liberty
Villas in Torino

Rationalism Modernism
Industry fascism

Contemporary
skyscrapers

museums

Cinema musem Turin
Egyptian museum Turin
Barolo Museum in Barolo
Museo Archeologico Vercelli
Contemporary art museum in Rivoli

Landmarks

culture

crafts

craft districts

Italy

PIEDMONT

Torino 1st main city

foundation by Romans Taurasia
III century B.C.

1st capital of Italy in **1861-1865**

1280
part of Savoy County

Middle Ages
center of Longobardo Duchy

romanic colony by Augusto Augusta Taurinorum in **I century B.C.**

890.529
2015

population

Women **466.848**
Men **423.681**
Immigrants rate **81,5**

economic sectors

2013

87.990
Companies

Extraction **2.647**
Energy and water **380**
Transport **2.647**
Manufacturing **5.541**
Construction **7.861**
Commerce **21.104**
Other Services **49.810**

urban centres

326.214
employees

Mole Antonelliana
Arcades
river Po and parks
the holy shroud
Porta Susa
Superga Basilica

cultural events

Terra Madre/ Salone del Gusto
Slow Food September

main infrastructures

5 Train stations
1 Metro Line
Caselle airport
GTT bus lines
Bike-sharing

universities

2
University of Torino
Politecnico di Torino

churches

catholics

Italy

PIEDMONT
Novara

founded by Celti in **89 B.C.**

2nd city of Piedmont for population

domain by: Romans; Longobard; Visconti; Sforza; Habsburg Empire; Savoia; Austrian

Located between Vercelli and Milano

104.380 2015
population

Women **54.221**

Men **50.159**

Immigrants rate **87.4**

economic sectors 2013

8.668 Companies

Extraction **5**
Energy and water **48**
Transport **269**
Manufacturing **499**
Construction **766**
Other Services **5.085**

urban centres

32.053 employees

medieval historic center

Basilica S. Gaudenzio

Novara Carnival February

cultural events

city wall

Gramsci square

L'Arengo del Broletto

Duomo

main infrastructures

3 train stations

bus lines

universities

1 university pole Perrone

churches catholics

Italy

PIEDMONT
Alessandria

Founded in **XII century**

long siege by imperial forces

battle of Marengo

strategic position: at the center of triangle Torino-Milano-Genova

domain by: Romans; Visconti, Milano duchy; French; Austrian; Savoia

93.943 2015
population

Women **49.043**

Men **44.900**

Immigrants rate **86.7**

economic sectors 2013

7.910 Companies

Extraction **2**
Energy and water **34**
Transport **245**
Manufacturing **524**
Construction **889**
Commerce **2.221**
Other Services **3.995**

urban centres

29.385 employees

medieval historic center

cittadella militare

Salone del Biscotto October

cultural events

City hall

Napoleon's plane tree

Synagogue

Cathedral

main infrastructures

1 train station

bus lines

universities

2
Piemonte orientale
Politecnico di Torino

churches catholics

Italy

PIEDMONT
Asti

Founded by Romans

1935 detached from Alessandria province

domain by: Romans; Longobard; Napoli; Orleans; Savoia

in the middle of wine hills, heart of Piedmont

population
76.202
(2015)

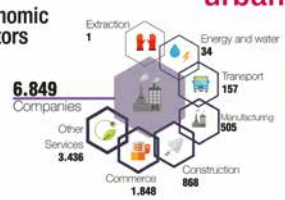
Women **39.887**

Men **36.315**

Immigrants rate **103.7**

urban centres

economic sectors



6.849 Companies

22.810 employees

cultural events

Main infrastructures

1train station

bus lines

churches
catholics

Italy

PIEDMONT
Cuneo

come from carolingia city Auriate

Partisan center

was capital of 'piemonte provenzale'

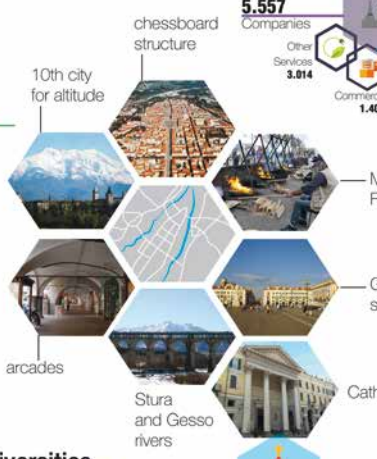
domain by: Angioini; Romans; Visconti; Savoia; French-spanish

56.081
2015
population

Women **29.273**

Men **26.808**

Immigrants rate **91.8**

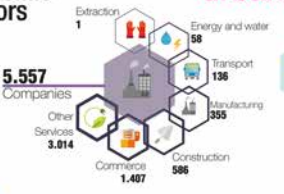


universities

1 Università di Torino

urban centres

economic sectors
2013



5.557 Companies

24.220 employees

cultural events

main infrastructures

international airport Levaldigi

1 train station

bus lines

churches
catholics

Italy

PIEDMONT
Vercelli

founded by Celts, Wehr-Celt

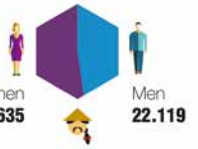
stop on the way of via francigena

european capital of rice

domain by: Romans; longobard; Visconti; Savoia; Spanish

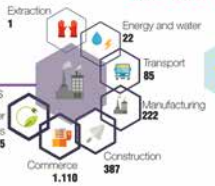
46.754 2015

population



Immigrants rate **72,2**

economic sectors 2013



3.902 Companies

12.277 employees

urban centres

medieval historic center

Cavour square

Visconte castle

synagogue

Basilica Sant'Andrea

churches catholics

La Panissa vercellese Sagra d'la Panissa

cultural events

museum Arca

main infrastructures

1 train station

bus lines

universities

1 Piemonte orientale

Italy

PIEDMONT
Biella

Foundation **826**

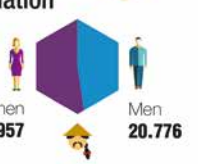
important place for the industrial revolution after the war with Piaggio

First modern wool factory

domain by: Romans; Longobards, French; Savoia

44.733 2015

population



Immigrants rate **52,6**

economic sectors 2013

5.536 Companies

18.759 employees

urban centres

at the foot of Alpes

the road of the wool

Santuario Oropa

Baptistery

Cathedral

churches catholics

Biella Festival Autori October

cultural events

funicular

main infrastructures

1 train station

bus lines

turistic airport Biella-Cerrione

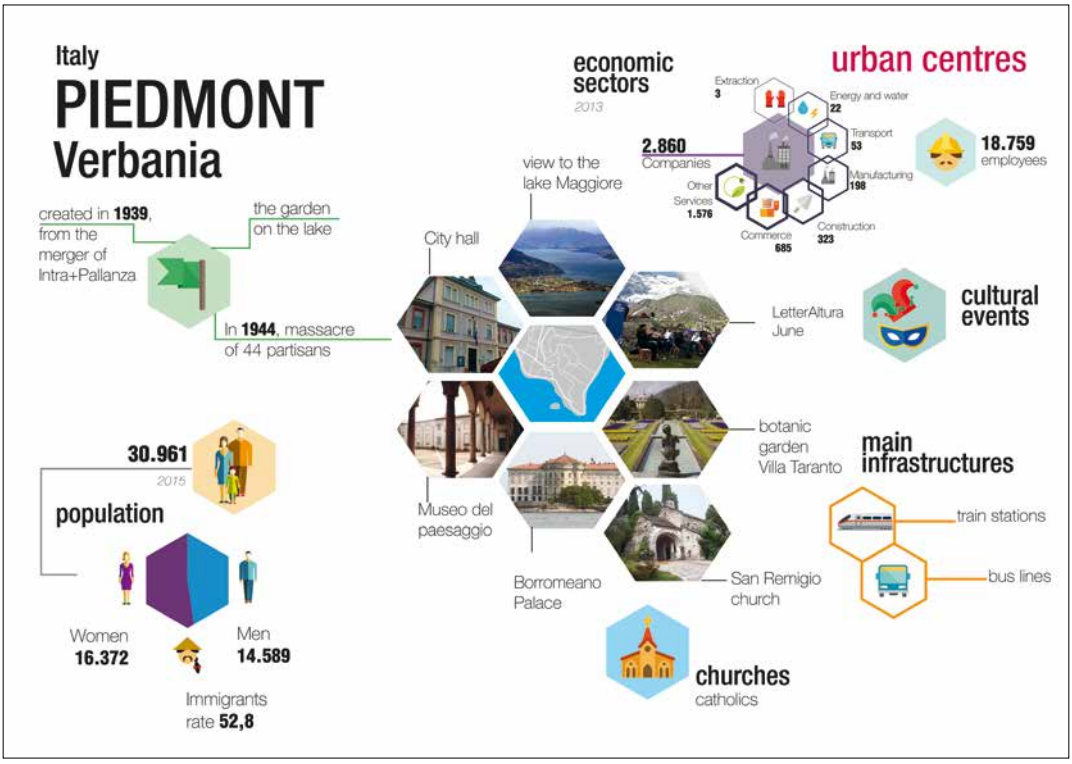
universities

1 campus

University of Turin

Politecnico di Torino

Università del Piemonte Orientale



PIEDMONT Italy

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consultation date: from september 2016 to december 2016

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economy

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urban centers

database Asia from Instat, national institute of statistics (http://www.istat.it/it/piemonte)
data received from chamber of commerce

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Spain - Basque Country

BISCAY

geography

TOTAL AREA: 221.232 ha

Woods area **158.988 ha** **72%**

Water **1.286 ha** **0,6%**

Agriculture area (U.A.A.) **42.936 ha** **14.4%**

Not used area **24.884 ha**

Area for pasture **40.443 ha**

Mountains **40%** Hills **40%** Flat area **20%**

n° 7.049 Crop Farms
3,94 ha average
62% one man company

n° 8.503 Breeding Farms
107 head average
62% one man company

8%
Artificial area
18.022 ha

Industrial and commercial area **4.984 ha**

Residential area **8.167 ha**

Infrastucture **10.406 ha**

Vegetables **771 ha**

Fruits **373 ha**

Legumes **140 ha**

Wineyards **370 ha**

Cattle **49.288** heads

Sheeps **64.990** heads

Poultry **781.880** heads

Spain - Basque Country

BISCAY

demography

Population (inhabitants)

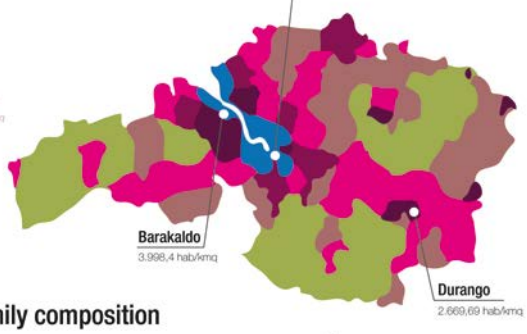
1.141.442

2015

density of population

515,36 hab/kmq
2015

<30 hab/kmq
30-100 hab/kmq
100-500 hab/kmq
500-1.000 hab/kmq
1.000-5.000 hab/kmq
>5.000 hab/kmq



80
60
40
20

+34,25 % Mortality rate variation *in the last 50 years*

45,4 Average age of population

28 Average age at which young people leave parents' house

-55,37% Nativity rate variation *in the last 50 years*

62 Child adoption *2013*

Men **549.984** 2015

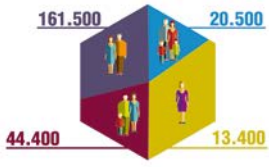
Women **591.458** 2015

family composition

-5,9 Average number of people in a family *variation in the last 50*

TOTAL FAMILY UNITS **551.600**

MAIN CATEGORIES



marriage

Marriages **3.616** 2015

Divorces **1.764** 2013

other religion **3** 2015

Civil **2.872** 2015

Religious **741** 2015

Spain - Basque Country

BISCAY

demography

463.009 employees 2015

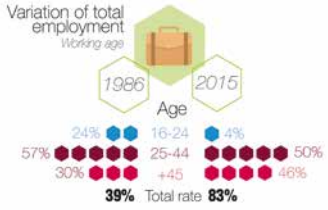
Average income / Month per job type

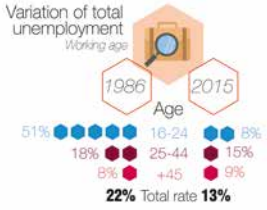
- 2.720€ Industry/Energy
- 2.433€ Other services
- 2.420€ Banking
- 2.015€ Construction
- 1.793€ Trade, Transport, Communication
- 1.300€ Agriculture

Average income per Age 2013

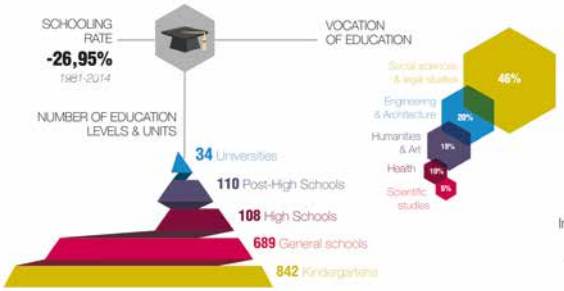
- 12.522€
- 15.365€
- 16.142€
- 18.124€
- 20.595€
- 23.950€
- 25.897€
- 24.959€
- 21.875€
- 17.651€
- 11.677€
- 3.468€
- 534€

employment

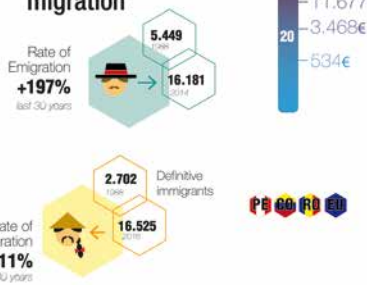




education



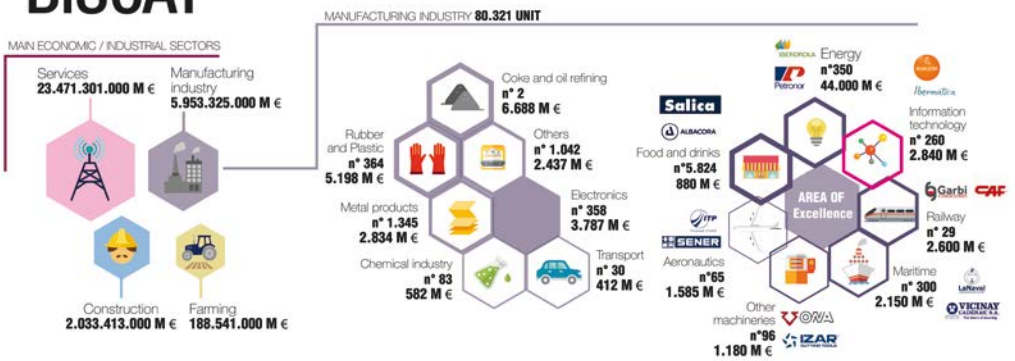
migration

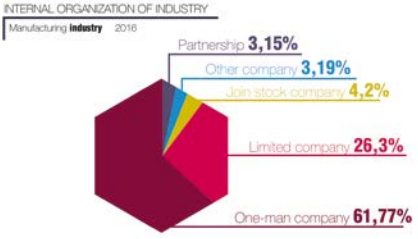


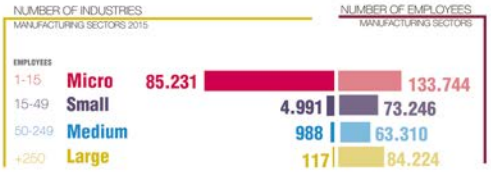
Spain - Basque Country

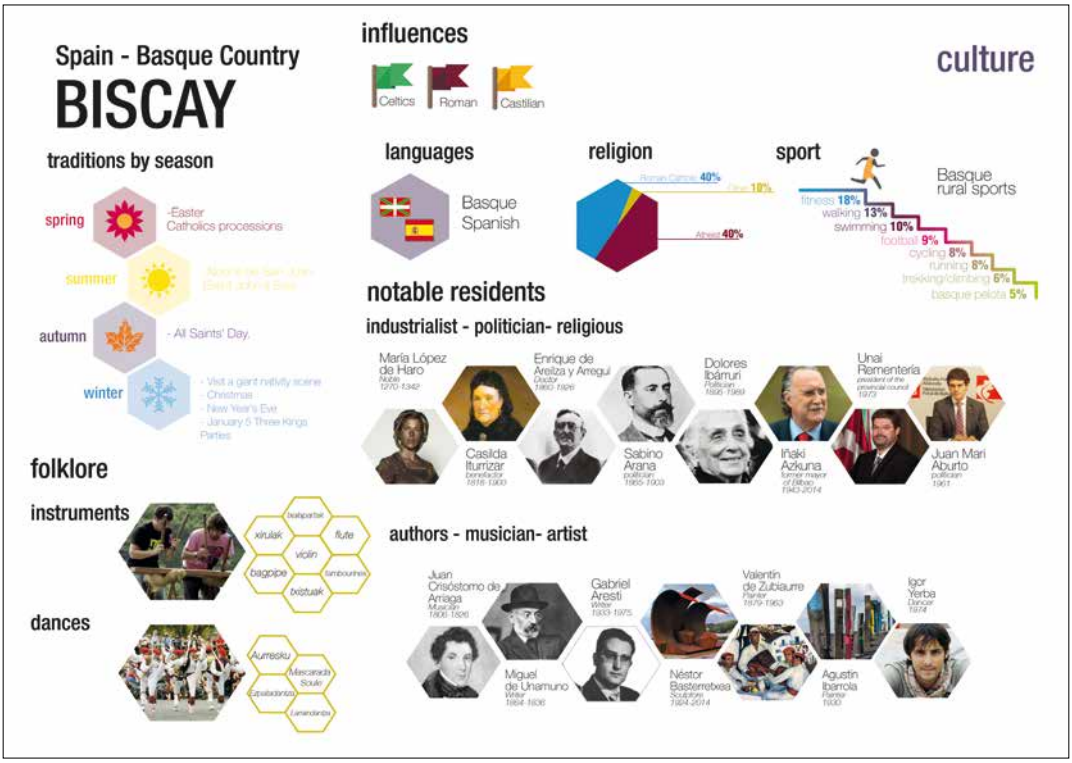
BISCAY

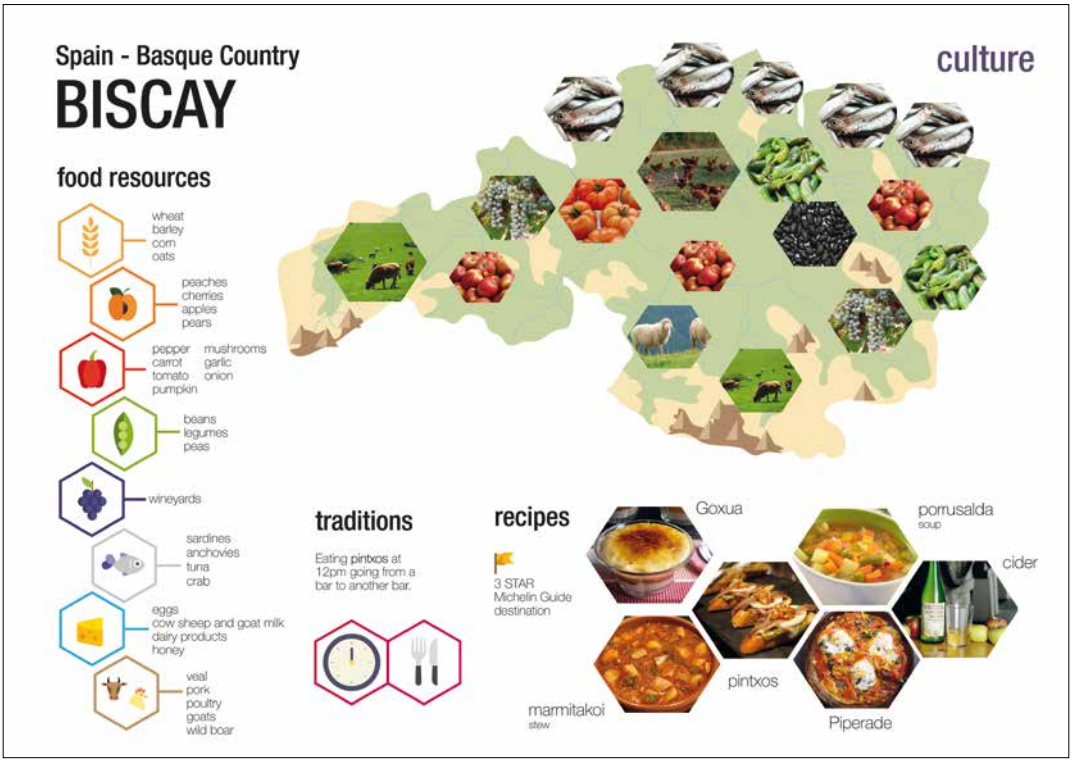
economy








Spain - Basque Country
BISCAY
culture
influences
Celtics
Roman
Castilian
traditions by season
spring
-Easter
Catholics processions
summer
autumn
- All Saints' Day.
winter
- Visit a giant nativity scene
- Christmas
- New Year's Eve
- January 5 Three Kings Parties
languages
Basque
Spanish
religion
Roman Catholic 40%
Other 10%
Atheist 40%
sport
Basque
rural sports
fitness 18%
walking 13%
swimming 10%
football 9%
cycling 8%
running 8%
trekking/climbing 6%
basque pelota 5%
notable residents
industrialist - politician- religious
María López de Haro
Noble
1270-1342
Casilda Iturrizar
benefactor
1818-1900
Enrique de Areilza y Arregui
Doctor
1860-1926
Sabino Arana
politician
1865-1903
Dolores Ibárruri
Politician
1895-1989
Iñaki Azkuna
former mayor of Bilbao
1943-2014
Unai Rementería
president of the provincial council
1973
Juan Mari Aburto
politician
1961
folklore
instruments
bialaparlak
xirulak
flute
violin
bagpipe
tambourines
bistuak
dances
Aurresku
Mascarada Soule
Espaladantza
Lamandantza
authors - musician- artist
Juan Crisóstomo de Arriaga
Musician
1806-1826
Miguel de Unamuno
Writer
1864-1936
Gabriel Aresti
Writer
1933-1975
Néstor Basterretxea
Sculptor
1924-2014
Valentín de Zubiaurre
Painter
1879-1963
Agustín Ibarrola
Painter
1930
Igor Yerba
Dancer
1974


Spain - Basque Country
BISCAY
culture
food resources
wheat
barley
corn
oats
peaches
cherries
apples
pears
pepper
carrot
tomato
pumpkin
mushrooms
garlic
onion
beans
legumes
peas
wineyards
sardines
anchovies
tuna
crab
eggs
cow sheep and goat milk
dairy products
honey
veal
pork
poultry
goats
wild boar
traditions
Eating pintxos at 12pm going from a bar to another bar.
recipes
3 STAR Michelin Guide destination
Goxua
porrusalda
soup
cider
pintxos
marmitakoi
stew
Piperade

Spain - Basque Country

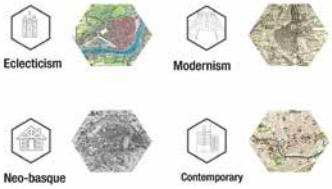
BISCAY

architecture

museums

Guggenheim Museum Bilbao
Bilbao Fine Arts Museum
the Basque Museum
Bilbao River Maritime Museum
Archaeological Museum of Bizkaia

styles/ urban patterns



culture

crafts

craft districts

Spain - Basque Country

BISCAY

Bilbao 1st main city

Foundation
1300

Architecture ranging from gothic to contemporary

Deindustrialization
1990s

Pritzker of urbanism

GDP per capita
€26.225 in 2000

Stop on the way to Santiago de Compostela

Annexed municipalities
1876

Economy restructuring
1980's

345.141
population

Women
182.577

Men
162.564

Immigrants
24.837

universities

3
Universidad del País Vasco
Universidad de Deusto

churches

catholics

urban centres

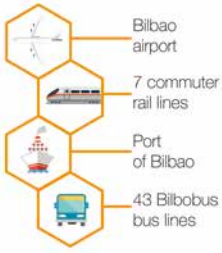
economic sectors

32.871
Companies

108.165
employees

cultural events

main infrastructures



Spain - Basque Country

BISCAY

Barakaldo 2nd city

Foundation **1051**

Industrial recession **1980's**

from industrial to core services town

Iron Works Business major economic activity **XIX/XX** century

Developed as an endpoint of a mining railway

98.403 population

Women **51.100**

Men **47.303**

Immigrants **7.826**

urban centres

economic sectors

6.902 Companies

Energy **50**

Industry **159**

Construction **968**

Other Services **3.962**

28.567 employees

Botanical Garden

City hall

Carmenes de Baracaldo

Municipal Market

BEC

San Vicente Towers

San Jose Church

cultural events

main infrastructures

4 Underground stations
2 Train stations

Ferry Service

Bus (Bizkaibus)

churches catholics

Spain - Basque Country

BISCAY

Durango 3rd city

Foundation **1300**

Economy restructuring **1970's**

Architecture
Gothic
Neapolitan classic
Baroque
Contemporary

Heavy Industry **XIX/XX** century

28.899 population

Women **14.769**

Men **14.130**

Immigrants **2.043**

urban centres

economic sectors

1.951 Companies

Energy **5**

Industry **68**

Other Services **511**

Transport **776**

7.798 employees

Santa Ana's doors

City hall

The festivities of saint of Durango

Train Station

Zabala Palace

Basilica Santa Maria of Uribarri

Lariz Tower

cultural events

main infrastructures

Train (Euskotren)

Bus (Bizkaibus)

churches catholics

BISCAY Spain - Basque Country

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consultation date: from september 2016 to december 2016

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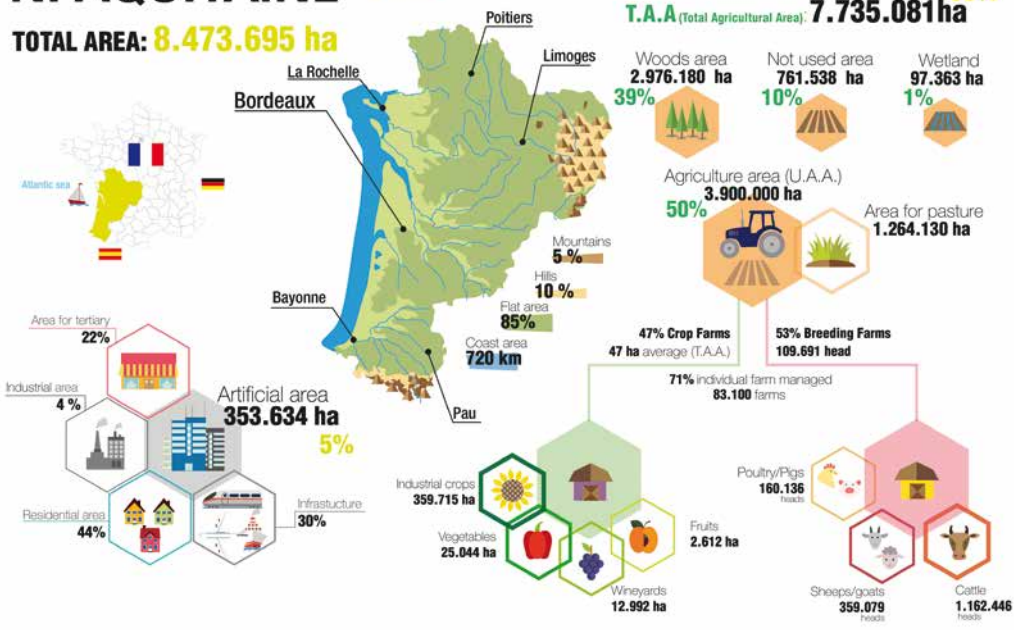
France

N. AQUITAINE

RÉGION NOUVELLE AQUITAINE

geography

TOTAL AREA: 8.473.695 ha



France

N. AQUITAINE

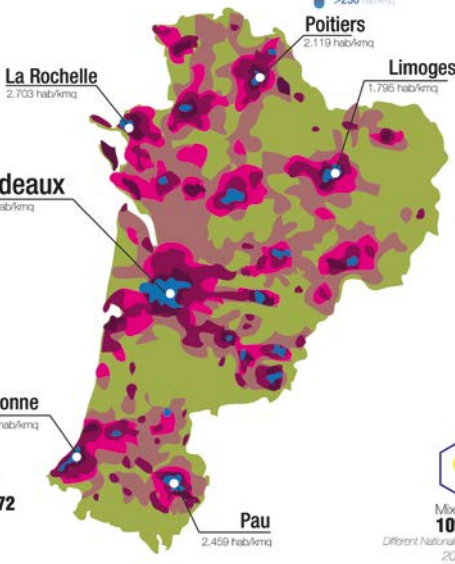
demography

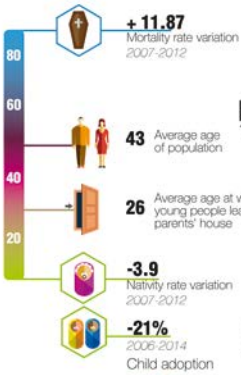
Population (inhabitants)

5.844.176

2013

density of population **70** hab/kmq





+ 11.87 Mortality rate variation 2007-2012

43 Average age of population

26 Average age at which young people leave parents' house

-3.9 Nativity rate variation 2007-2012

-21% 2006-2014 Child adoption

Men **2.805.204** 2013

Women **3.038.972** 2013

family composition

2,1 Average number of people in a family

MAIN CATEGORIES

TOTAL FAMILY UNITS **2.637.685**

marriage

Union **37.416** 2014

Divorces **11.039** 2014

Mixed **10%** Different Nationalities 2014

Marriage **21.014** 2014

Civil solidarity Pact **16.402** 2014

France

N. AQUITAINE

demography

2.345.400 employees 2015

employment

Variation of total employment *Working age*: 2007 63,6% / 2012 63,5%

Variation of total unemployment *Working age*: 2007 8,8% / 2015 9,9%

Average income per month: 1.835 €

Average income per Age: 80 – 2.145 € / 60 – 1.800 € / 40 – 1.330 € / 20

education

SCHOOLING RATE **90%**

VOCATION OF EDUCATION

Humanities 28% / Sciences 24% / Health 16% / Economics 14% / Engineering 4,2%

NUMBER OF EDUCATION LEVELS & UNITS

6 Universities

57 Higher education Centers

1029 Highschools

5169 Primary school

migration

Rate of Emigration **+0,6%**: +13.000 hab/year Ile de France / -1.000 hab/year Midi Pyrenées

Rate of Immigration **+ 5,6%**: 334.476 Definitive immigrants

EU 52.7% / MA 10.1% / TK 2,7%

France

N. AQUITAINE

economy

MANUFACTURING INDUSTRY **36.898 UNIT**

MAIN ECONOMIC / INDUSTRIAL SECTORS

Commercial **69.323,5 M €** / Non-market **37.993 M €** / Manufacturing industry **20.272 M €**

Services

Construction **9.498 M €** / Farming **4.820 M €**

Aeronautics & Defense **32.400** employees

AgroFood **53.000** employees

Wood processing **29.000** employees

Metal products **25.000** employees

Transport **29.000** employees

Textile & Outdoor **12.000** employees

Wood Agri-Agro **n° 506 members**

Aeronautic Transport **n° 1.132 members**

Green Growth **n° 368 members**

Biotechnology / Health **n° 100 members**

NETWORK OF EXCELLENCE

Craft Material **n° 276 members**

Optique photonique **n° 244 members**

INTERNAL ORGANIZATION OF INDUSTRY

Manufacturing **industry** 2016

Group of economic interest 0,1% / Cooperatives 22,9% / One-man company 40,4% / Commercial 36,6%

SOCIAL ECONOMY

Foundations 1% / Mutual 3% / Cooperatives 15% / Association 81%

NUMBER OF INDUSTRIES

Manufacturing **industry** 2013

EMPLOYEES

1-10 **Micro** 32.537

11-49 **Small** 3.356

50-99 **Medium** 1.005

+100 **Large**

NUMBER OF EMPLOYEES

Manufacturing **industry** 2013

35.220 / 69.927 / 36.595 / 123.495

France

N. AQUITAINE

culture

influences

Roman · Spanish · Basque

traditions by season

- spring: · Easter · Ham party
- summer: · Saint Jhon of summer · Feria Bayonne, Dax · Music festival (Gaillacois)
- autumn: · Harvest · Indian Summer
- winter: · Christmas · New Year's Eve · Comic festival in Angoulême

languages

French
Basque
Occitan

religion

Christian · Atheist · Judaism · Protestant · Islam · Buddhism

sport

Number of CLUBS: Surf 15 · Rugby 9 · Boxing 6 · Hand ball 5 · Soccer 2

1.4 M ATHLETES

notable residents

industrialist- politician- religious

Montesquieu, Philosopher, 1689-1755
Aliénor d'Aquitaine, Queen of France, England, mother of Richard the Lionheart, 1122 - 1204
Henri IV, King of France, 1553 – 1610
Eugénie de Montijo, Last empress consort of France, 1826- 1920
René Cassin, Jurist, Peace Nobel Prize, 1887- 1976
François Mitterrand, President of France, 1916- 1996
Michel Crépeau, Mayor of La Rochelle, 1930 – 1999
Alain Juppé, Mayor of Bordeaux, 1945
Christophe De Margerie, Industrial (TBM), 1951 – 2014

folklore

instruments

psalterium · hurdy-gurdy · flute · fife · violin · bagpipe · armonica · bowling · nine

dances

Courento · Gigo · Monfermino · Brando

authors - musician- artist

François Mauriac, Writer, 1885-1970
Jean Nouvel, Architect, 1945
André Lhote, Painter, 1885-1962
Pierre-Auguste Renoir, Painter, 1841-1949
Joséphine Baker, Entertainer, 1906-1975
Serge Blanco, Rugbyman and industrial, 1958 -
Jacques-Yves Cousteau, Explorer, scientist, 1910-1997
Maurice Ravel, Composer, 1875 – 1937

FRANCE

N. AQUITAINE

culture gastronomy

food resources

- wheat, corn
- kiwi, plums, cherries, apples, strawberries
- pepper, onion, tomato, garlic, mushroom, asparagus
- beans
- wineyards
- sardines, oyster, tuna
- milk, cheese
- cow, pork, poultry, goats, duck

traditions

Eat Tapas and watch Rugby

recipes

Wine/Cheese

goose confit with mushrooms
main dishes

foie gras

cannelé
sweet

FRANCE

N. AQUITAINE

architecture

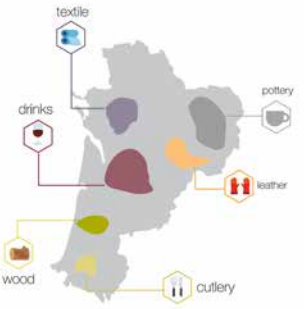
styles/ urban patterns

Landmarks

culture

crafts

craft districts



113 museums

Museé de la mer
Cité del'Océan
Museé du chocolat

France

N. AQUITAINE

Bordeaux 1st main city

Foundation
300 B.C

Capital of Lumières
XVIII

Napoleonic Wars
XVIII

French capital
1940-1945

Opening of the aviation sector
1950

Port of the Moon
List of world heritage UNESCO
2007

urban centres

economic sectors

64.976 Companies

319.331 employees

cultural events

Bordeaux Wine Festival
June

Grand Teather

Stadium

main infrastructures

Mérignac airport

2 stations
3 line tram

Port of Bordeaux

78 bus lines

Bike-sharing
161 stations

population

243.626

Women
131.550

Men
112.060

Immigrants
19.440

universities

3

churches

catholics

France

N. AQUITAINE

Bayonne 2nd city

Foundation
950

Middle Ages part of the Duchy of Vasconia

Center of Basque cultures activitist

Conquered by Vikings
844

Ruled By British
1169 -1199

47.492
population

Women
24.723

Men
21.132

Immigrants
3.581

universities
8

urban centres

economic sectors

132.499
Companies

Agriculture **5.836**
Tourism **8.475**
Building **10.891**
Industry **12.823**
Commerce **20.100**
Service **74.374**

117.082
employees

Château Neuf
City hall
Fête de Bayonne July
Train Station
La Citadelle
Bayonne Cathedral

cultural events

churches
catholics

main infrastructures

Bayonne Anglet-Biarritz airport
1 stations train
Port of Bayonne
Chronoplus bus lines

France

N. AQUITAINE

Limoges 3rd city

Foundation
10 B.C

3rd century invasions of Germanic tribes

11th century artistic centre

19th-century Limoges porcelain

General Confederation of Labour was created in **1895**

135.098
population

Women
72.952

Men
56.471

Immigrants
5675

universities
1

urban centres

economic sectors

6.778
Companies

Industry **448**
Building **516**
Transport **4.569**
Public Administration **1.245**

118.096
employees

Saint Étienne's Bridge
City hall
Limoges Carnival February
Train Station
Central Market
Saint Étienne's Cathedral

cultural events

churches
catholics

main infrastructures

Limoges Bellegarde airport
Train Station of Limoges Benedictins
bus lines

France

N. AQUITAINE

Poitiers 4th city

Foundation
1 B.C

Garrison town
XIX century

Major university centre

Industrial decentralisation
1970s

Hundred Years' War, Battle of Poitiers
1356

87.427
population

Women
47.210

Men
33.485

Immigrants
6.731

universities
1
biggest university town in France

urban centres

economic sectors
4.151 Companies

Industry **182**
Building **246**
Public Administration **809**
Transport **2.914**

103.740 employees

Futuroscope Park

City hall

Film Festival December

Baptistère Sain-Jean

Palace of Poitiers

Church Notre-Dame la Grande

churches
catholics

cultural events

main infrastructures
Poiter Airport
TGV Atlantique
bus lines

France

N. AQUITAINE

La Rochelle 5th city

Foundation
X century

Renaissance Protestant Orientated

Templars largest base

Siege of La Rochelle
1627–1628

Ruled By British
1360 -1372

Largest French harbour on the Atlantic coast, until the 15th century

Submarine base
WWII

74.344
population

Women
40.145

Men
33.454

Immigrants
745

universities
8

urban centres

economic sectors
6.089 Companies

Industry **346**
Building **422**
Public Administration **987**
Transport **4.334**

80.833 employees

Old Harbour

City hall

Les Francofolies July

Train Station

Harbour Towers

Saint Louis Cathedral

churches
catholics

cultural events

main infrastructures
airport La Rochelle Ile de Re
Bike-sharing
1 train station
3 Ports Atlantic
bus lines

France

N. AQUITAINE

Pau 6th city

Foundation
12 B.C

Capital of Béarn
1464

Winter resort town
1920

Seat of the Kings of Navarre
1512

The first balloon/pane flights
1844-1909

urban centres

economic sectors

5.014 Companies

Industry **207**
Building **340**
Public Administration **1.085**
Transport **3.382**

80.833 employees

cultural events

77.575 population

Women **41.890**
Men **35.684**
Immigrants **5674**

universities

1

churches catholics

main infrastructures

Airport of Pau-Pyrénées
TGV Intercity trains
Urban transport IDELIS network

N. AQUITAINE France

bibliography /webography

consultation date: from september 2016 to december 2016

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Map: relaboration of the map retrieved from: http://www.pigma.org/

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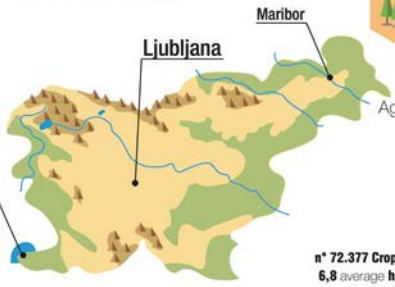
SLOVENIA

geography

TOTAL AREA: 2.073.000 ha

T.A.A (Total Agricultural Area): **491.414 ha** 24%

Mountains **11%** | Flat area **16%** | Hills **75%**



Woods area **1.182.016 ha**

Not used area **17.726 ha**

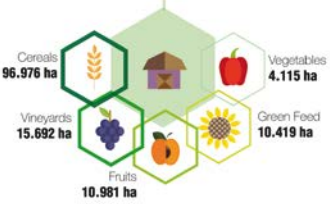
Not fertile land **15.060 ha**

Agriculture area (U.A.A.) **476.682 ha**

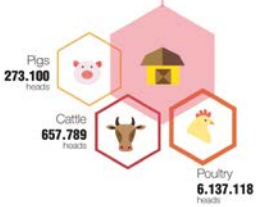
Area for pasture **274.251 ha**

Artificial area: **720.000 ha** 35%

n° 72.377 Crop Farms
6,8 average **ha** (SAT)
family management



n° 55.814 Breeding Farms
130 head average
n.d. management



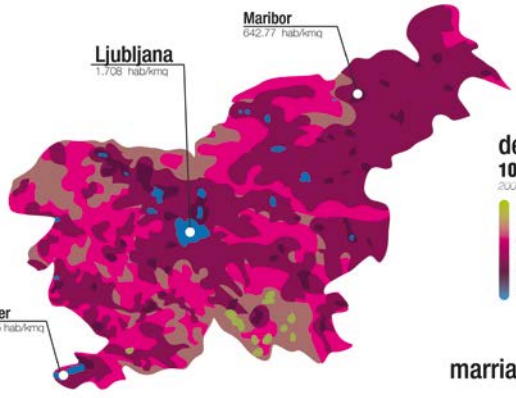
SLOVENIA

demography

Population (inhabitants)

2.064.241

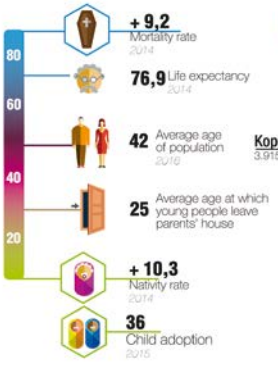
2016



density of population

101,6 *hab/kmq*
2000

0 hab/kmq
1-5 hab/kmq
6-25 hab/kmq
26-250 hab/kmq
251-1.000 hab/kmq
>1.000 hab/kmq



+ 9,2 Mortality rate *2014*

76,9 Life expectancy *2014*

42 Average age of population *2016*

25 Average age at which young people leave parents' house

+ 10,3 Nativity rate *2014*

36 Child adoption *2015*

Men **1.023.872**

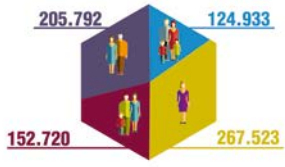
Women **1.040.369**

family composition

2,47 Average number of people in a family

TOTAL FAMILY UNITS **820.541**

MAIN CATEGORIES



marriage

Marriages **6.571** *2014*

Divorces **2.469** *2014*

Civil **6.571** *2013*

Religious **2.664** *2013*

SLOVENIA

demography

employment

Total employment
Working age

2008 **996.000**
2015 **917.000**

Total unemployment
Working age

2008 **46.000**
2015 **99.000**

Average income per month

1.687 €
2016

Average income per Age

60 – 2.332€
50 – 1.653€
40 – 1.617€
30 – 1.446€
20 – 1.143€

education

SCHOOLING RATE
2012
East Slovenia **17,5%**
West Slovenia **23,5%**

VOCATION OF EDUCATION

Business & Law **36%**
Engineering **14%**
Sciences **11%**
Education **10%**
Services **10%**
Humanities **8%**
Health **7%**

NUMBER OF EDUCATION LEVELS & UNITS
2015-2016

4 Universities
3 public and one privat university
82 High Schools
452 General schools
979 Kindergartens

migration

Rate of Emigration **14.336**
2014

9.646 *1974* Definitive emigrants
13.852 *2014*

Rate of Immigration **13.846**
2014

5.281 *1974* Definitive immigrants
14.336 *2014*

80s Ex-Yugoslavia
90s Ex-Yugoslavia
00s Ex-Yugoslavia, Asia, Latin America

SLOVENIA

economy

MAIN ECONOMIC / INDUSTRIAL SECTORS

Other (Services) **41.492,4 M €**
Manufacturing industry **23.748,6 M€**
Construction **5.554,4 M €**
Farming **1.726,5 M €**

MANUFACTURING INDUSTRY **36.534 UNIT** 2014

Food and drinks **n° 4.342**
Repair Cars **n° 4.207**
Wood processing **n° 3.945**
Other **n° 1.613**
Machineries and equipment **n° 1.326**
Textile **n° 648**
Other machineries **n° 468**
Mineral processing **n° 176**
Metal products **n° 175**

Metal products **1.070,7 M €**
Pharmaceutical **899,9 M €**
Electrical **713,3 M €**
Automotive **675,5 M €**
Machineries and equipment **503,7 M €**
Rubber and plastic **541,9 M €**
AREA OF INNOVATION

INTERNAL ORGANIZATION OF INDUSTRY
Manufacturing **industry** 2016

1% legal person of public law
41,8% One-man company
Other Natural Person **6%**
Society **11,6%**
Non profit organization **4,4%**
35,2% Commercial companies and cooperatives

NUMBER OF INDUSTRIES
Manufacturing **industry** 2014

EMPLOYEES		
0-9	Micro	182.454
10-49	Small	7.081
50-249	Medium	2.002
+250	Large	326

NUMBER OF EMPLOYEES
Manufacturing **industry** 2014

240.123	
138.355	
193.571	
255.351	

SLOVENIA

culture

influences

Celtics · Roman · Slavs · Austria · Yugoslavia

traditions by season

spring
- cherry feast – Goriška Brda
- carnival
- Palm Sunday
- Easter

summer
- The sheep feast in Jezersko
- 100 women go to Triglav
- Beer and flowers in Laško
- Lent festival in Maribor
- summer music festivals

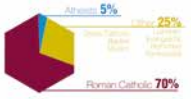
autumn
- The march from Litija
- St. Martin feast in Martinovanje
- The Cow's Ball in Bohinj
- Grape harvest

winter
- prepare a crib
- koledniki
- Christmas
- New Year's Eve

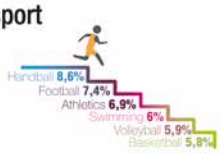
languages

Slovenian
Italian
Hungarian

religion



sport



notable residents

industrial- politician- religious

folklore

instruments

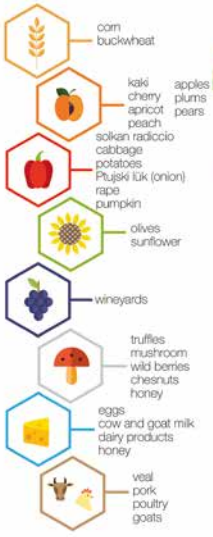
dances

authors - musician- artist

SLOVENIA

culture gastronomy

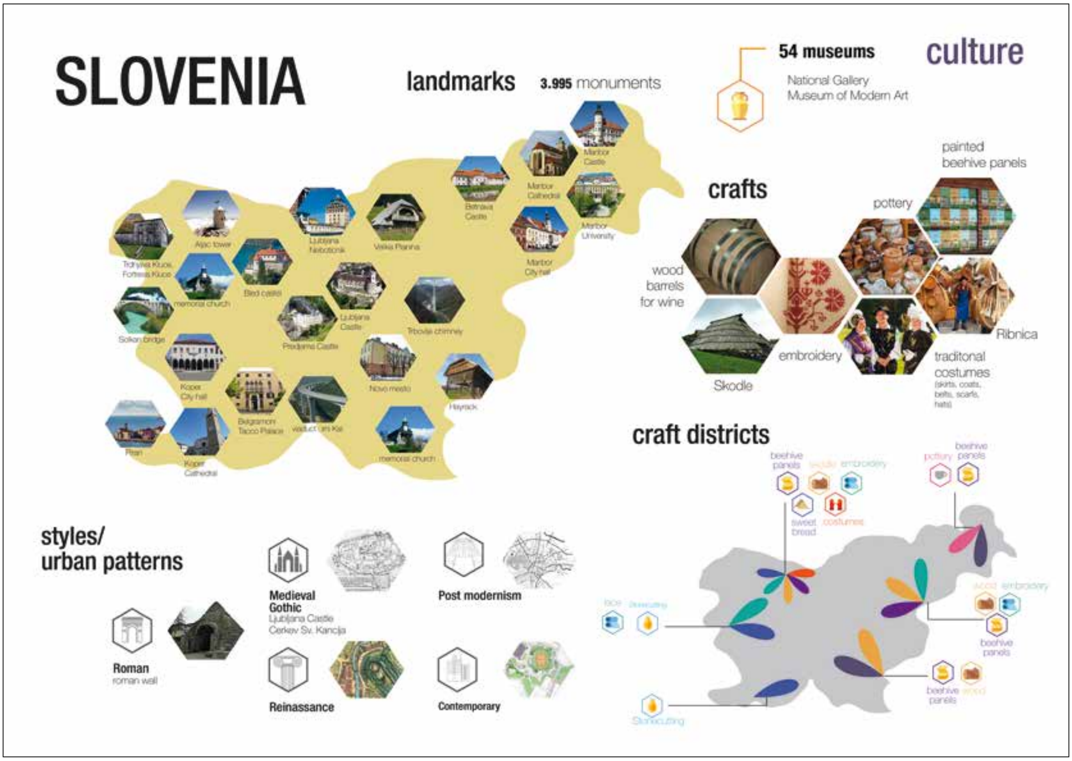
food resources

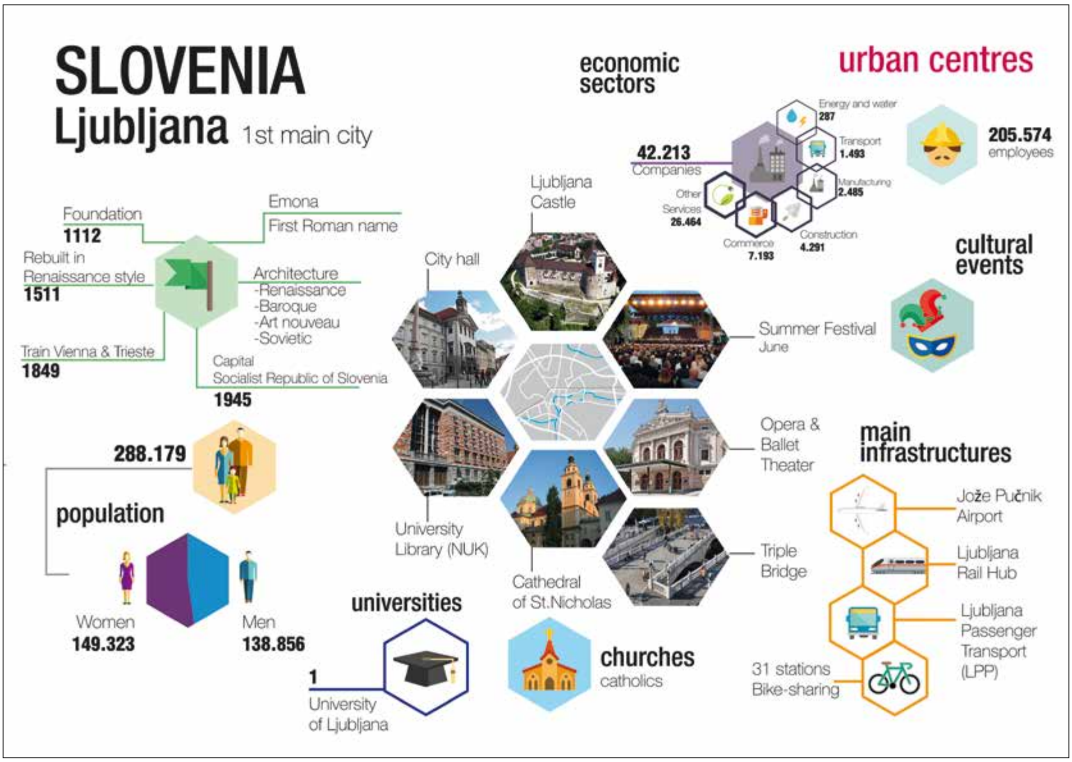


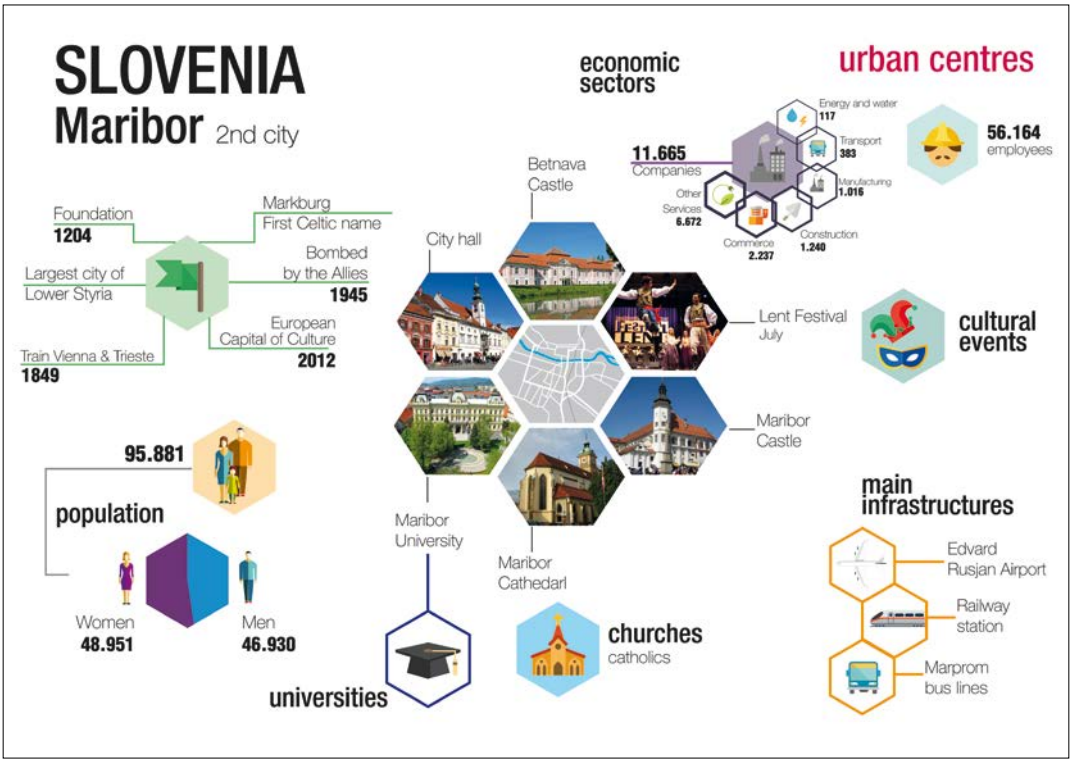
traditions

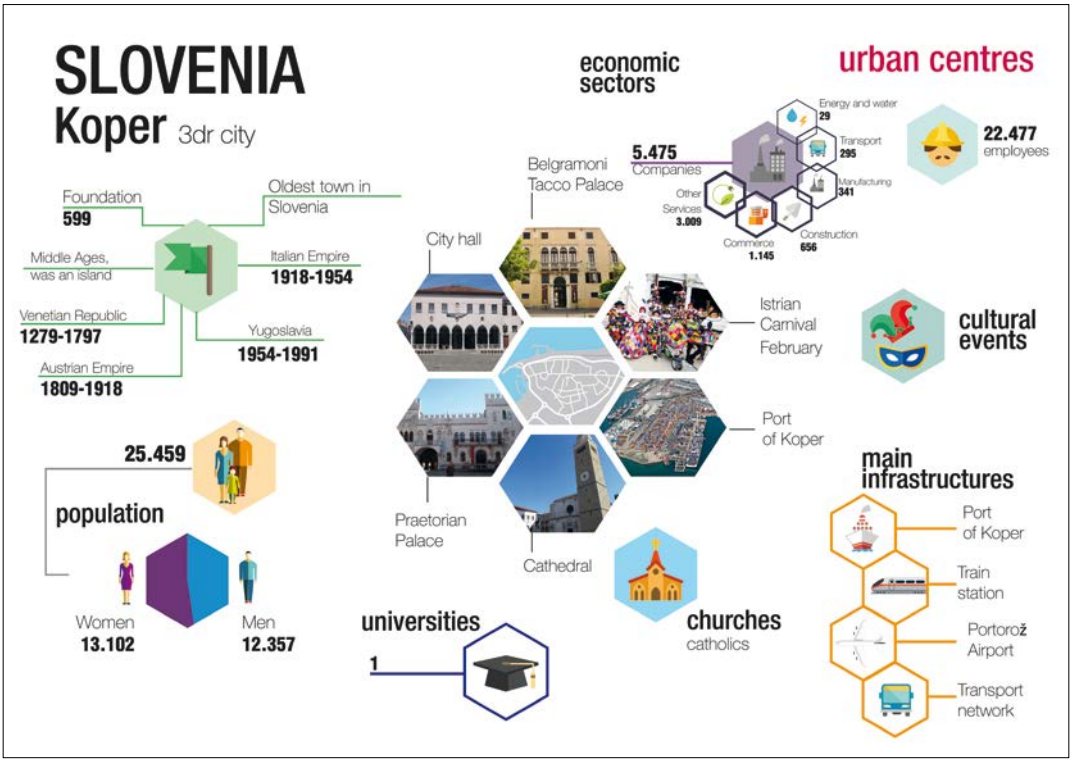
Traditional slovene breakfast

recipes


SLOVENIA
landmarks
3.995 monuments
54 museums
National Gallery
Museum of Modern Art
culture
crafts
painted
beehive panels
pottery
wood
barrels
for wine
embroidery
Skodle
Ribnica
traditonal
costumes
craft districts
styles/
urban patterns
Medieval
Gothic
Post modernism
Roman
Reinassance
Contemporary


SLOVENIA
Ljubljana 1st main city
economic
sectors
urban centres
42.213
Companies
205.574
employees
Foundation
1112
Emona
First Roman name
Rebuilt in
Renaissance style
1511
Architecture
-Renaissance
-Baroque
-Art nouveau
-Sovietic
Train Vienna & Trieste
1849
Capital
Socialist Republic of Slovenia
1945
Ljubljana
Castle
City hall
Summer Festival
June
cultural
events
288.179
population
Women
149.323
Men
138.856
University
Library (NUK)
Opera &
Ballet
Theater
main
infrastructures
Jože Pučnik
Airport
Ljubljana
Rail Hub
Triple
Bridge
Cathedral
of St.Nicholas
universities
1
University
of Ljubljana
churches
catholics
Ljubljana
Passenger
Transport
(LPP)
31 stations
Bike-sharing


SLOVENIA
Maribor 2nd city
economic sectors
urban centres
Energy and water 117
Transport 383
Manufacturing 1.016
Construction 1.240
Commerce 2.237
Other Services 6.672
11.665 Companies
56.164 employees
Foundation 1204
Markburg First Celtic name
Largest city of Lower Styria
Bombed by the Allies 1945
European Capital of Culture 2012
Train Vienna & Trieste 1849
Betnava Castle
City hall
Lent Festival July
cultural events
Maribor Castle
95.881
population
Women 48.951
Men 46.930
Maribor University
Maribor Cathedarl
main infrastructures
Edvard Rusjan Airport
Railway station
Marprom bus lines
churches catholics
universities


SLOVENIA
Koper 3dr city
economic sectors
urban centres
Energy and water 29
Transport 295
Manufacturing 341
Construction 656
Commerce 1.145
Other Services 3.009
5.475 Companies
22.477 employees
Foundation 599
Oldest town in Slovenia
Middle Ages, was an island
Italian Empire 1918-1954
Venetian Republic 1279-1797
Yugoslavia 1954-1991
Austrian Empire 1809-1918
Belgramoni Tacco Palace
City hall
Istrian Carnival February
cultural events
Port of Koper
25.459
population
Women 13.102
Men 12.357
Praetorian Palace
Cathedral
main infrastructures
Port of Koper
Train station
Portorož Airport
Transport network
universities
1
churches catholics

SLOVENIA

bibliography /webography

consultation date: from september 2016 to december 2016

geography

data from database SORS

www.wikipedia.com

demography

data from database SORS

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www.mddsz.gov.si
www.mizs.gov.si
www.wikipedia.com

map: interpretation of the map retrieved from ciesin center http://sedac.ciesin.columbia.edu/gpw/

economy

data from register of company

www.stat.si
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www.mgrt.gov.si
http://pxweb.stat

culture

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www.rokodelstvo.si
www.jurjevanje.si
http://spinnet.eu
www.zfss.si
www.etnofolk.eu

urban centers

http://www.ljubljana.info
http://maribor-pohorje.si
https://www.stat.si
www.slovenia.info
www.wikipedia.com
http://pxweb.stat.si

Romania

NORTH-EAST

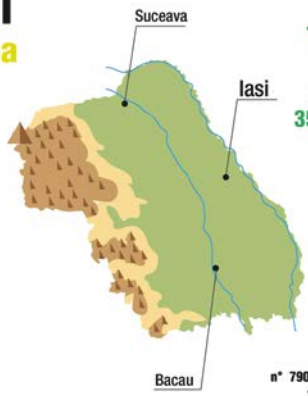
TOTAL AREA: 3.685.000 ha

geography

Mountains **28 %**

Hills **12%**

Flat area **60%**



T.A.A (Total Agricultural Area): **3.518.306 ha** 95%

Woods area **1.231.943 ha** 35%

Not used area **34.021 ha** 1%

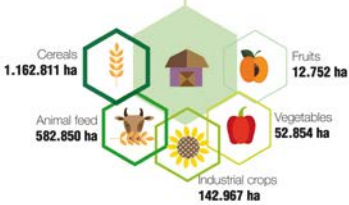
Fallowed land **127.567 ha** 4%

Agriculture area (U.A.A.) **2.124.775 ha** 60%

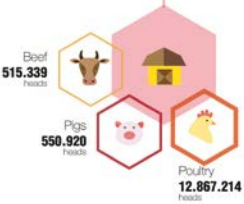
Area for pasture **491.639 ha**

Artificial area: **158.260 ha** 5%

n° 790.901 Crop Farms
2,69 ha average
99% family managed



n° 496.507 Breeding Farms
31,39 head average
99% family managed



Romania

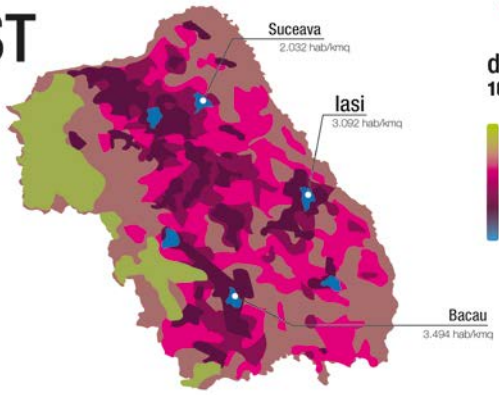
NORTH-EAST

Population (inhabitants)

3.302.217

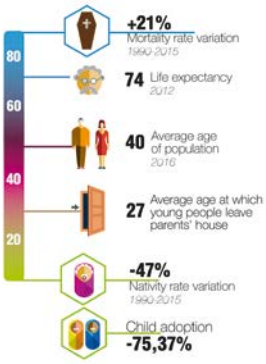
2011

demography



density of population

100,5 hab/kmq

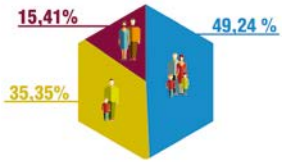


Men **1.622.817**

Women **1.679.400**

family composition

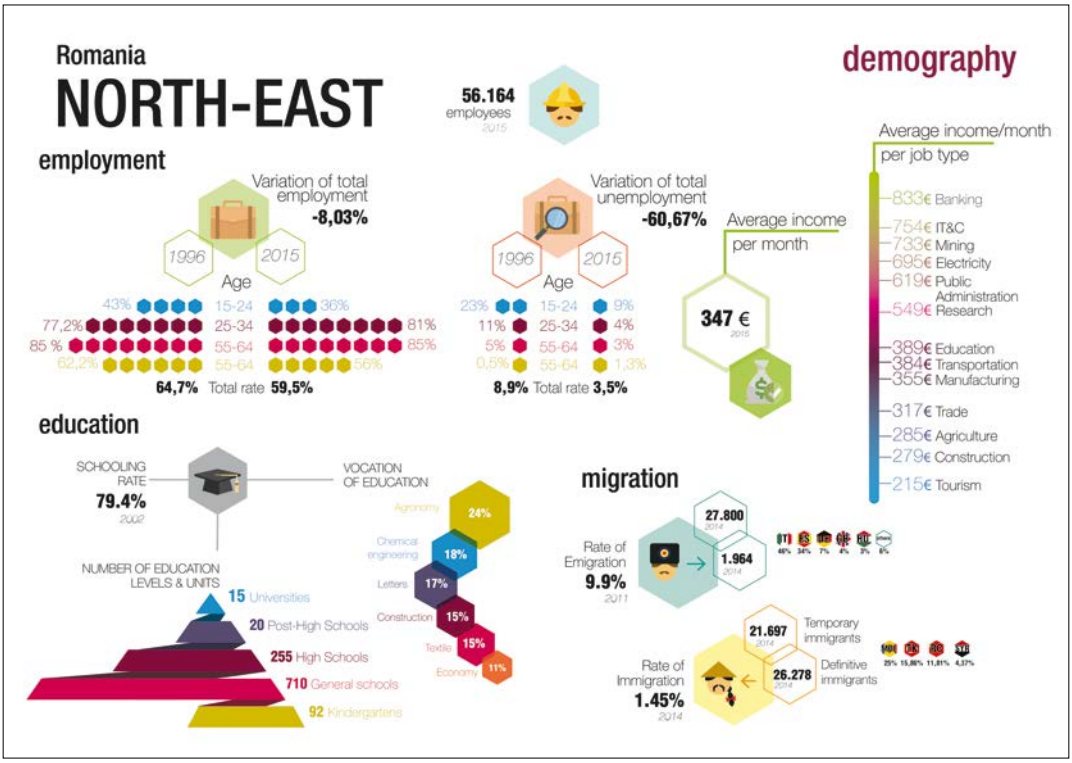
3,61 Average number of people in a family
2008-2015

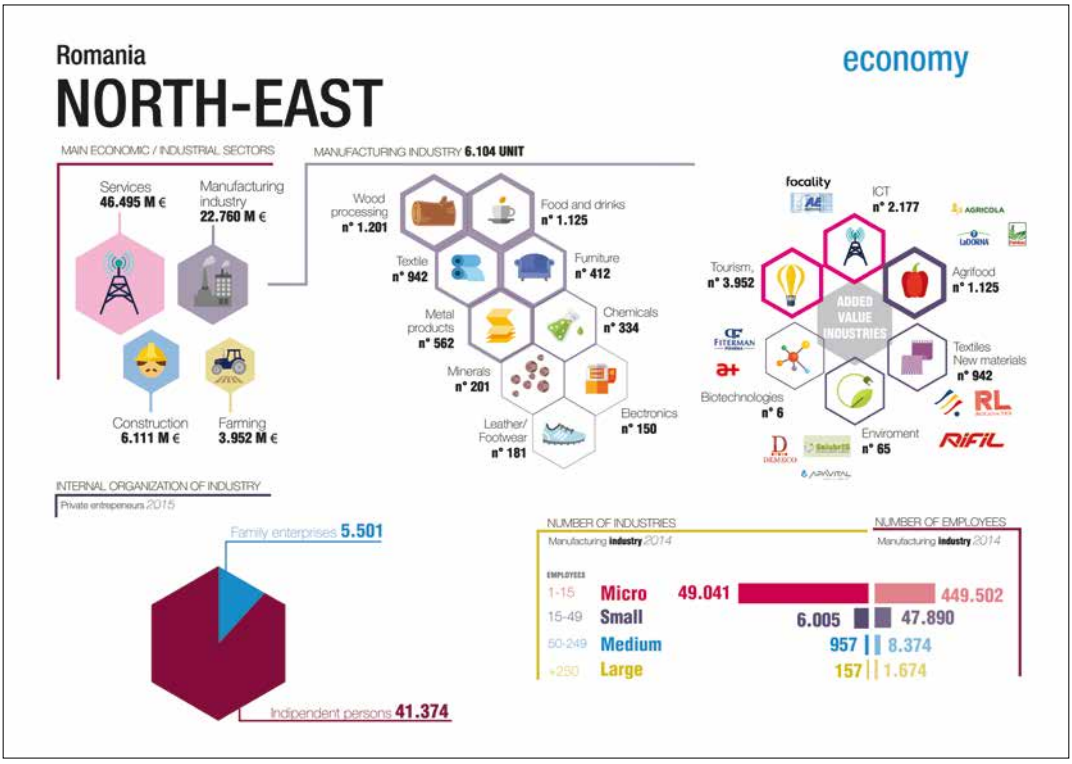


marriage

Marriages **20.754** *2015*

Divorces **5.215** *2015*


Romania
NORTH-EAST
demography
56.164
employees
2015
employment
Variation of total employment
-8,03%
1996
2015
Age
43%
15-24
36%
77,2%
25-34
81%
85 %
55-64
85%
62,2%
55-64
56%
64,7% Total rate 59,5%
Variation of total unemployment
-60,67%
1996
2015
Age
23%
15-24
9%
11%
25-34
4%
5%
55-64
3%
0,5%
55-64
1,3%
8,9% Total rate 3,5%
Average income per month
347 €
2015
Average income/month per job type
833€ Banking
754€ IT&C
733€ Mining
695€ Electricity
619€ Public Administration
549€ Research
389€ Education
384€ Transportation
355€ Manufacturing
317€ Trade
285€ Agriculture
279€ Construction
215€ Tourism
education
SCHOOLING RATE
79.4%
2002
VOCATION OF EDUCATION
Agronomy 24%
Chemical engineering 18%
Letters 17%
Construction 15%
Textile 15%
Economy 11%
NUMBER OF EDUCATION LEVELS & UNITS
15 Universities
20 Post-High Schools
255 High Schools
710 General schools
92 Kindergartens
migration
Rate of Emigration
9.9%
2011
27.800
2014
1.964
2014
Rate of Immigration
1.45%
2014
21.697
2014
Temporary immigrants
26.278
2014
Definitive immigrants


Romania
NORTH-EAST
economy
MAIN ECONOMIC / INDUSTRIAL SECTORS
Services
46.495 M €
Manufacturing industry
22.760 M €
Construction
6.111 M €
Farming
3.952 M €
MANUFACTURING INDUSTRY 6.104 UNIT
Wood processing
n° 1.201
Food and drinks
n° 1.125
Textile
n° 942
Furniture
n° 412
Metal products
n° 562
Chemicals
n° 334
Minerals
n° 201
Electronics
n° 150
Leather/ Footwear
n° 181
focality
ICT
n° 2.177
Tourism,
n° 3.952
Agrifood
n° 1.125
ADDED VALUE INDUSTRIES
Textiles New materials
n° 942
Biotechnologies
n° 6
Enviroment
n° 65
INTERNAL ORGANIZATION OF INDUSTRY
Private entrepeneurs 2015
Family enterprises 5.501
Indipendent persons 41.374
NUMBER OF INDUSTRIES
Manufacturing industry 2014
NUMBER OF EMPLOYEES
Manufacturing industry 2014
EMPLOYEES
1-15 Micro 49.041 449.502
15-49 Small 6.005 47.890
50-249 Medium 957 8.374
>250 Large 157 1.674

Romania

NORTH-EAST

culture

influences

Roman · Greek · Slavs · Byzantine · Turkish · Soviet Union

traditions by season

spring
- 1st of March celebration beginning of spring
- Orthodox Easter

summer
- 24th of June: SANZIENELE, Universal Day Romanian Blouses

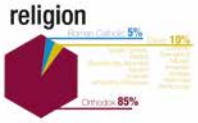
autumn
- St. Andrew's (protector of Romania)

winter
- December 1st Romania's National Day
- Christmas
- New Year's Eve

languages

Romanian

religion



sport

Soccer
Handball
Volleyball
Basketball

notable residents

industrialist - politician- religious

folklore

instruments

dances

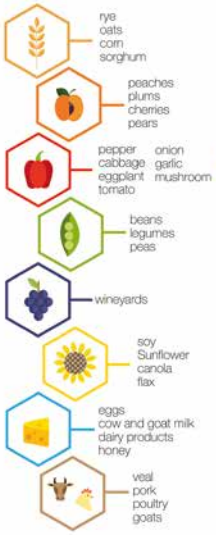
authors-musician-artist

Romania

NORTH-EAST

culture gastronomy

food resources



recipes

traditions

Welcome guests with bread and salt, a symbol of hospitality and respect.

Romania

NORTH-EAST

culture

124 museums

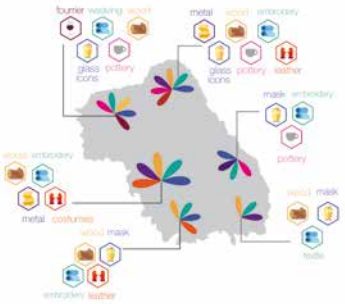
Palatul Culturii
Cucuteni Museum
Unirii Palace
Cetatea de Scaunfrom

crafts

styles/ urban patterns

landmarks

craft districts



Romania

NORTH-EAST

urban centres

Iași 1st main city

Foundation **1230**

The Cultural Capital of Romania

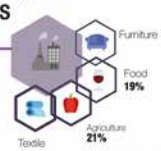
Oldest city In Romania

Destroyed
1513 by Tatars
1553 by Otomans
1686 by Russian
1945 by URSS

Rebuilt in **1950**

economic sectors

17.572 Companies



108.165 employees

cultural events

St. Parascheva pilgrimage
14th October

290.422 population

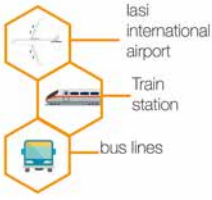
universities

6

churches

Romanian Orthodox

main infrastructures



Romania

NORTH-EAST

Bacau 2nd city

urban centres

Foundation **1230**

Industrial center biggest aeronautic services factory

Architecuture -Interwar period - socialist

Industrialized **1945**

Economy Decrease **1990**

economic sectors

14.175 Companies

Vehicle

Chemicals

Textile

Agrofood **20%**

City Hall

City center

Zilele Bacaului October

cultural events

George Bacovia Theatre

University George Bacovia

Cancicov Park

Ortodox Cathedral Bacau

main infrastructures

Bacau international airport

Train station

bus lines

144.307 population

Women **74.751**

Men **69.556**

Immigrants **7.752**

universities

2

churches Romanian Orthodox

Romania

NORTH-EAST

Suceava 3rd city

urban centres

Capital of Moldova **1565**

Reindustrialized in **1950**

Part of Austrian Empire **1775**

Back to Romania **1918**

Architecture

Austrian-Hungarian

Classic neo byzantin

Humdrum

economic sectors

13.872 Companies

Textile

Food **22%**

Manufacturing **43%**

36.698 employees

Palace of Justice

Station Burdujeni

Zilele Sucevei June

cultural events

Princely Court

Stefan cel Mare

Saint John New Monastery

Catedrala Naşterea Domnului

main infrastructures

Edvard Rusjan Airport

Train station

Marprom bus lines

92.121 population

Women **48.870**

Men **43.870**

Immigrants **5.018**

churches Romanian Orthodox

NORTH-EAST Romania

bibliography /webography

consultation date: from september 2016 to december 2016

geography

data from PRD 2014-2020
data from INSSE Tempo Database

www.wikipedia.it

demography

data from INSSE Tempo Database
data from EU SILC data

Map: rielaboration of the map retrieved from North-East Regional Development Agency

economy

data from PRD 2014-2020
data from INSSE Tempo Database
data received from Chamber of trade and industry

culture

data from PRD 2014-2020
data from INSSE Tempo Database

G. Ionescu, (1937). *Istoria Arhitecturii Romanesti. Din cele mai vechi timpuri pana la 1900.*
V. Florea. (2007).*Istoria artei românesti, Bucuresti-Chisinău.* Litera International ed.
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urban centers

data from PRD 2014-2020
data from INSSE Tempo Database
data received from Chamber of trade and industry

http://iasi-7coline.blogspot.ro/
www.wikipedia.it
www.aeroport.ro
city hall web site
bacaulactiv.ro
www.aeroportsuceava.ro

Glossary

Bioeconomy, Biobased Economy

The part of economy that refers to the conversion of renewable biological resources into products through new efficient biotechnologies is called Bioeconomy. Intensive scientific and research activities have allowed the development of economic activities focused on the creation of vital products such as food and feed, but also bio-based products and bioenergy, starting from the products of land and sea (e.g. crops, forests, fish, animals and micro-organisms).
The term was first mentioned by Juan Enriquez and Rodrigo Martinez (Life Sciences Chief Strategist at IDEO) at the Genomics Seminar in the 1997 AAAS meeting and afterwards an excerpt of the paper was published in *Science Magazine*.
Bioeconomy was considered as a point of interest by Europe and on 13 February 2012 the Europe's Bioeconomy Strategy was launched and adopted under the lead of DG Research and Innovation and co-signed by several other Commission departments (Agriculture and Rural Development, Environment, Maritime Affairs, and Industry and Entrepreneurship). The strategy would like to answer to environmental global challenges such as increasing populations, depletion of natural resources and climate change and the white paper on "Bioeconomy" sets vision 2030 along with policy recommendations.

See: *http://biotechsupportbase.com/2014/02/06/bio-economy/*
See: *https://ec.europa.eu/research/bioeconomy/index.cfm*

Blue Economy

In the European context the Blue Economy can refer to two different conceptions. One is the economy derived from the blue growth, the long term strategy for the marine and maritime sectors by the European Union. The other is the open-source movement lead by Gunter Pauli, a Belgian businessman and former Ecover CEO, who is the action part of ZERI (Zero Emissions research and initiatives). In this publication we refer to the second notion.
Born as a report to the Club of Rome, the book *Blue Economy* by Gunter Pauli firstly presented in November 2009 describes "100 innovations that can create 100 million jobs within the next 10 years." The author demonstrates, taking inspiration from nature, that it is possible to create innovative business models which coexist in harmony according to nature's evolutionary path. The manifesto declares that local systems of production and consumption are able to generate multiple products and services and build social capital based on their own resources.

See: *http://www.theblueeconomy.org/*
See: *http://www.zeri.org/ZERI/About_ZERI.html*
See: *https://ec.europa.eu/maritimeaffairs/policy/blue_growth_en*
See: *https://www.ellenmacarthurfoundation.org/circular-economy/schools-of-thought/blue-economy*

By-Product

Defined in the Cambridge Dictionary as "something that is produced as a result of making something else," in the context of production it is the "output from a joint production process that is minor in quantity and/or Net Realizable Value when compared with the main products" (Wouters, 2012: 535). Its Net Realizable Value usually is not inventoried but "is recognized as 'other income' or as a reduction of joint production processing costs when the by-product is produced" (WTO, 2004).

In December 2005, the European Commission defined the distinction between waste and by-products as part of the Thematic Strategy on the prevention and recycling of waste: "by-product is a production residue that is not a waste" (European Commission, 2007).

See: *http://dictionary.cambridge.org/it/dizionario/inglese/by-product*
See: *http://ec.europa.eu/environment/waste/framework/by_products.htm*
See: *https://en.wikipedia.org/wiki/By-product*
European Commission (2007). Communication from the Commission to the Council and the European Parliament on the Interpretative Communication on Waste and By-Products. Available http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52007DC0059 (Accessed 18th May 2017)
World Trade Organization (2004). United States. Final Dumping Determination on Softwood Lumber from Canada, WT/DS264/AB/R.
Wouters, M., Selto, F.H.; Hilton, R.W.; Maher, M.W. (2012). *Cost Management: Strategies for Business Decisions*. New York City, New York, US: McGraw-Hill.

Cascade Effect

As defined by the Oxford Dictionary, a cascade effect is defined as "a process whereby something, typically information or knowledge, is successively passed on and a succession of devices or stages in a process, each of which triggers or initiates the next." The term is applied to many different contexts, mainly medicine and ecology.

See: *https://en.oxforddictionaries.com/definition/us/cascade*
See: *http://www.encyclopedia.com/science/dictionaries-thesauruses-pictures-and-press-releases/cascade-effect*

Circular Economy

According to the definition provided by the Ellen MacArthur Foundation, Circular Economy is "restorative and regenerative by design. In a circular economy, there are two kinds of material cycles: biological, capable of being reintegrated into the biosphere, and technical, destined to be re-valorized without entering the biosphere. As envisioned by the originators, a circular economy is a continuous positive development cycle that preserves and enhances natural capital, optimises resource yields, and minimises system risks by managing finite stocks and renewable flows. It works effectively at every scale." In a Circular Economy, the use of resources (input) is optimised and the production of by-products or waste (output) is minimised through different kinds of actions that include design for long lasting products, maintenance, reuse, recycling, repair, remanufacturing and refurbishing. This approach is opposed to the linear economy, guided by the "take, make, dispose" production model.

See: *http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=6*
See: *https://www.ellenmacarthurfoundation.org/circular-economy*
See: *https://en.wikipedia.org/wiki/Circular_economy*

Clean Technology

Clean Technology is a broad term which refers to processes, products and services that, compared to traditional technologies, are characterized by: a lower environmental impact, superior performances and a more responsible and productive use of resources.

European Commission - Business Innovation Observatory (2014). *Clean Technologies. Closed-loop waste management*. Available http://ec.europa.eu/DocsRoom/documents/13396/attachments/2/translations/en/renditions/native (Accessed 18th May 2017)

Cradle to Cradle

The term (also cradle-to-cradle, C2C and cradle-2-cradle) is an evolution of the notion "cradle-to-grave".

Moving from the concept of a linear model for products that consider them from the resources extraction (cradle) to the disposal moment (grave), C2C implies concepts of sustainability, recover, reuse, considering the products from their birth to their re-birth. It started from a design context (cradle-to-cradle design) developing from the biological metabolism a model of "technical metabolism flow of industrial materials." It states that: "product components can be designed for continuous recovery and reutilization as biological and technical nutrients." "The cradle-to-cradle framework moves beyond the traditional goal of reducing the negative impacts of commerce (eco-efficiency), to a new paradigm of increasing its positive impacts (eco-effectiveness)."
The manifesto of this concept is dated 2002: *Cradle-to-Cradle: Remaking the Way We Make Things* by William McDonough and Michael Braungart. Today the terms Cradle to Cradle® and C2C® are registered trademarks of MBDC - McDonough Braungart Design Chemistry, LLC.

McDonough, W., and Braungart, M. (2002). *Cradle to cradle: Remaking the Way We Make Things*. New York City, New York, US: North Point Press.

See: *https://en.wikipedia.org/wiki/Cradle-to-cradle_design*

See: *https://en.wikipedia.org/wiki/Cradle_to_Cradle:_Remaking_the_Way_We_Make_Things*

See: *http://www.c2cproducts.com*

Design by Components

Methodology that focuses on the design of complex products such as large and small household appliances, electrical and electronic equipment, communication tools, work tools...) since the redefinition of its essential internal components. The proposals thus developed, in addition to optimizing the assembly of components, giving rise to innovative expressiveness over the usual image of these products. This methodology allow to give a longer life to the products, facilitating the maintenance and the use of the product.

Bistagnino, L. (2008). *The Outside Shell Seen from the Inside*. Milano, Italy: CEA.

Design for Disassembly

Design for Disassembly (DfD) is a design strategy that aims to reduce the environmental impacts of products, by considering — already in the design phase — the needs to disassemble a product (either for maintenance or for end-of-life treatment) as well as simplifying the dismantling operations and the separation of components and materials.

See: *http://www.core77.com/posts/15799/afterlife-an-essential-guide-to-design-for-disassembly-by-alex-diener-15799*

Ecodesign

Ecodesign is a broad term, defined by the European Union, as the "integration of environmental aspects into product design with the aim of improving the environmental performance of the product throughout its whole life cycle." Focused on reducing the environmental impacts of products, Ecodesign involves different design strategies, such as Design for Disassembly, Design by Components, Systemic Design, Design for Recycling, Design for Environment.

European Union (2009). Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products. Available http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0125&from=EN (Accessed 18th May 2017)

Green Economy

Green Economy is an economy aimed at taking into account the environmental impacts of economic activities, minimising them. According to UNEP a green economy is low carbon, socially inclusive and resource efficient. As a result, human well-being is improved and environmental risks are reduced.

UNEP. (2011). Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers. Available www.unep.org/greeneconomy (Accessed 18th May 2017)

Happy Degrowth

Latouche, defines degrowth as "a political slogan with theoretical implications", whose function is to open up conceptual and practical opportunities for escaping the impasse and mentality of the current economy. This requires avoiding the trap of getting tangled in economic proposals and an economic idiom when envisioning the transition to a degrowth society, i.e. avoiding the "economism" that characterizes industrial society and which is at the heart of the ideology of development (Latouche, 2010).

Latouche, S. (2010). Regrowth (editorial). *Journal of Cleaner Production*, no. 18, 519–522.

Latouche, S. (2010). La Gauche, peut-elle sortir de l'économisme?, *La Décroissance*, no. 70, 5.

Industrial Ecology

Industrial Ecology is the study of material and energy flows through industrial systems. Focusing on connections between operators within the 'industrial ecosystem', this approach aims at creating closed-loop processes in which waste serves as an input, thus eliminating the notion of an undesirable by-product. Industrial ecology adopts a systemic point of view, designing production processes in accordance with local ecological constraints whilst looking at their global impact from the outset, and attempting to shape them so they perform as close to living systems as possible.

See: *https://www.ellenmacarthurfoundation.org/circular-economy/schools-of-thought/industrial-ecology*

Frosh, R.A., Gallopoulos, N.E. (1989). Strategies for Manufacturing. *Scientific American*, vol. 3, no. 189, 94-102.

Industrial Symbiosis

Industrial Symbiosis represents one of the subsets of Industrial Ecology. Industrial Symbiosis traditionally separates entities in a collective approach to competitive advantage involving physical exchanges of materials, energy, water and by-products (Chertow, 2000). Different industries collaborate among them for mutual economic and environmental benefit, even if partners should be independent ("across the fence"). Someone's waste is one's raw material, in a way that is economically and environmentally profitable. The Industrial Symbiosis is the development of industries in a system to reach improved performance. This is because exchanges enabled through collaborative synergistic connections have the potential to improve resource use efficiencies, thus contributing to the reduction of resource throughput and pollutant generation.

Chertow, M.R. (2000). Industrial Symbiosis: Literature and Taxonomy. *Annual Review of Energy and Environment*, vol. 25, 313-337.

Policy Design

Policies are revealed through texts, practices, and symbols, and discourse that define and deliver values including goods and services as well as regulations, income, status, and other positively or negatively valued attributes. Policy design refers to the content and substance of public policy; blueprints, architecture, discourses, and aesthetics of policy in both is instrumental and symbolic forms.

As an area of study Policy Design engendered a large literature in the 1980s and 1990s with prominent figures in the US, Canada, Europe and Australia. After the early 1990s, however, this literature tailed off and although some writings on policy design have continued to flourish in specific fields such as economics, energy and environmental studies, in the fields of public administration and public policy more generally the idea of 'design' was often replaced by the study of institutional forms and decentralized governance arrangements.

Schneider, A.L., and Ingram, H. (1997). *Policy Design for Democracy*. Kansas City, Missouri, US: University of Kansas Press.

See: *http://archives.ippapublicpolicy.org/Policy~Design~Principles~and*

Policy Instrument

A policy instrument is a means for public intervention. It refers to any policy, strategy, or law developed by public authorities and applied on the ground in order to improve a specific territorial situation. In most cases, financial resources are associated with a policy instrument. However, an instrument can also sometimes refer to a legislative framework with no specific funding.

Interreg Europe (2016). Interreg Europe Programme Manual. Available https://www.interregeurope.eu/fileadmin/user_upload/documents/Call_related_documents/Interreg_Europe_Programme_manual.pdf (Accessed 18th May 2017)

Recycle

As defined by the United States Environmental Protection Agency (EPA), "recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products."
It is a good alternative to "conventional" waste disposal that can valorise material and help lower greenhouse gas emission, in terms of CO_2. The act of recycling prevent the large number of waste of potentially useful materials and reduce the consumption of new raw materials. This is reflected in the reduction of energy usage, air pollution (mainly from incineration), and water pollution (mainly from landfilling).

See: *https://en.wikipedia.org/wiki/Recycling*

See: *https://www.epa.gov/recycle/recycling-basics*

Repair

According to the definition provided by the article of *Product Design in a Circular Economy*, "repair is the correction of specific faults in an obsolete product or in a product that is not working such as at first, bringing the product back to working condition, whereby any warranty on the repaired product generally is less than those of newly manufactured equivalents any may not cover the whole product, but only the component that has been replaced" (Hollander, 2017).

Den Hollander, M.C., Bakker, C.A. and Hultink, E.J. (2017), Product Design in a Circular Economy: Development of a Typology of Key Concepts and Terms. *Journal of Industrial Ecology*, vol. 21, 517–25. doi:10.1111/jiec.12610

Reuse

Reuse is the act or practice of using something a second time. This action helps saving time, money, energy and resources, activating the reprocessing of previously used items. The purpose of reuse can be duple: to maintain the original function of the object (conventional reuse) or to accomplish a different one (creative reuse or repurposing). It is totally different from recycling, which is the despondency of used items to make raw materials for the production of new products.

See: *https://en.wikipedia.org/wiki/Reuse*

Service Design

The asset of planning and organizing people, infrastructure, communication and material components of a service, in order to refine its quality and the interaction between the service provider and its customers is called Service Design.

This category of design may function as a way to provide changes to an existing service or to create a new service entirely. Service design uses methods and tools derived from different disciplines ranging from ethnography to information and management science to interaction design. The purpose of this methodology is to promote best practices for designing services in accordance with both the needs of customers and the competencies and capabilities of service providers. It can be Product-Oriented, Result-Oriented or Use-Oriented.

See: *https://en.wikipedia.org/wiki/Service_design*

Vezzoli, C., Kohtala, C., and Srinivasan A. (2014). *Product-Service System Design for Sustainability*. Oxford, UK: Greenleaf Publishing Limited.

Systemic Design

Systemic Design is a recent initiative in design that integrates systems thinking and human-centered design, with the intention of helping designers cope with complex design projects. The recent challenges to design coming from the increased complexity caused by globalization, migration, sustainability render traditional design methods insufficient. Designers need better ways to design responsibly and to avoid unintended side-effects. Systemic Design intends to develop methodologies and approaches that help to integrate systems thinking with design towards sustainability at environmental, social and economic level. It is a pluralistic initiative where many different approaches are encouraged to thrive and where dialogue and organic development of new practices is central.
In this publication we refer to the methodology defined by Professor Luigi Bistagnino, which is built around the key principle that the material and energy output of a system (waste) can become input for another one (resource), taking inspiration from nature (Bistagnino, 2011). These relationships generate an autopoietic system of interconnected processes where waste is reduced and that tends to produce zero emissions. This system is strictly connected to the local territory in which the process operates and is built around the needs of the people related to it.

See: *https://en.wikipedia.org/wiki/Systemic_design*

Bistagnino, L. (2011). *Systemic Design. Designing the productive and environmental sustainability*. Bra: Slow Food Editore.

Upcycle

Upcycling is the process of transforming by-products, waste and useless materials, and unwanted products into new materials or products characterized by better quality or better environmental value. This process is also known as "creative reuse". Upcycling is the opposite of downcycling, that transforms materials and products into new ones of lesser quality.

See: *https://en.wikipedia.org/wiki/Upcycling*

Authors' Biographies

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Jocelyn Bailey is a designer with particular expertise in social design and policy. She is a senior consultant at service design agency Uscreates, where she works with a range of government and public sector clients on strategic design projects. She is also pursuing a PhD through the Arts & Humanities Research Council's 'Design Star' Doctoral Training Programme. Based at the University of Brighton, her research examines and critiques the growing trend of design being used as a strategic and policy tool by governments, to support the development of practice in this field. In 2014 she was a Visiting Scholar at the V&A, working on a project for the AHRC, mapping social design research and practice. Previously, Jocelyn led the manufacturing, design and innovation team at Westminster think tank Policy Connect. She trained as an architect at Cambridge University, and has an MA in History of Art from Birkbeck College (University of London).

CYRIL BALDACCHINO
Engineer Cyril Baldacchino is an eco-innovation project manager at APESA, where he manages the team and eco-design projects. He holds a master degree in Information System Management, a diploma of IAE Pau / Engineering School of ESTIA and a master degree in Business Management from University of Bordeaux/Engineering School ESTIA. He has been working in the field of innovation and eco-design since 2004 while supervising various eco-design projects in different sectors (e.g. furniture, sport, biomass) with companies and several R&D projects, as the PREBIOM project concerning comparative life cycle assessment of different biomass valorisation routes within the Aquitaine region.

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Silvia Barbero, PhD is an Assistant Professor at Politecnico di Torino (Department of Architecture and Design). She is lecturer of Product Environmental Requirements at the Design and Visual Communication degree and of Systemic Design at the Systemic Design Master degree at Politecnico di Torino. She is also responsible for the stage & job design curriculum and member of the H2020@polito Committee in Advanced Manufacturing and Processing. Her research mainly focuses on Systemic Design applied to agro-food and energy systems. She is scientific coordinator of the RETRACE Project (Interreg Europe – I Call) on the development of local and regional policies moving towards a circular economy, preventing waste being released into the environment. She has been coordinator also of regional project, and team leader of international project.
She is the author of some books on sustainable design, furthermore she wrote more than 100 papers in peer-reviewed journals, book chapters and reviewed international conference proceedings.

CHIARA BATTISTONI
Chiara Battistoni is a systemic designer currently pursuing a PhD in Management Production and Design at Politecnico di Torino, working with the Systemic Design Research Group in the Department of Architecture and Design. Since her bachelor degree in Industrial Design and a Master in Ecodesign, she has been actively interested in Sustainable Environmental Design. Her research focuses on the territorial potentialities reached thanks to the Systemic Design Approach which she started investigating since her master thesis and through collaborative projects as a research fellow.

LUIGI BISTAGNINO

Architect and designer, he lives and works in Torino, Italy. Founder of the research group on Systemic Design at the Politecnico di Torino aimed at developing products and processes in order to obtain zero emission. He was full Professor of Industrial Design and president of Industrial Design Courses at Politecnico di Torino, now he founded the Systemic Approach Foundation. He has contributed with numerous essays and articles to many important national and international reviews.

He designed objects currently in production and won national and international design prizes such as "Il Compasso d'Oro ADI".

Coordinator and member of many national and European researches. Among his main publications: *Systemic Design* (2011); *The Outside Shell Seen from the Inside* (2008); *Design Piemonte* (2007); *Design with a Future* (2003).

EMANUELE BOMPAN

Emanuele Bompan is a journalist and communicator with an international experience and author of numeruos reports on energy, climate change, environment, US politics. He published the book *Che cosa è l'economia circolare* (2016), about the rise of circular economy.

He was awarded the Middlebury Environmental Journalism Fellowship and, four times, The Innovation in Development Reporting Grant. In 2015 he was awarded 1st prize of "Reporter per la Terra". In 2016 he received the DNI Google Award with the newspaper *La Stampa*. He has interviewed prime ministers, industry leaders, environmental gurus, intellectuals, all around the world. He has contributed to the following newspapers and magazines: *Reuters, El Paìs, Die Welt, Al Jazeera, Materia Rinnovabile, Vanity Fair, Donna Moderna, La Stampa, Sole24Ore, Left, Capital, BioEcogeo, Terra, l'Unità, il Fatto Quotidiano, Max, CityFactor, Equilibri.*

DANIEL CALLEJA CRESPO

Mr. Calleja is Director General for DG Environment, European Commission and former Director General of DG Internal Market, Industry, Entrepreneurship and SMEs (February 2012 to August 2015).

Prior to that, he worked in the cabinets of several Commissioners, including the President of the European Commission, advising on Transport and Competition matters, State Aids and the application of Community Law. Between 1999 and 2004 he was Head of Cabinet for both Commissioner Oreja and Vice-president Mrs. Loyola de Palacio, in charge of Transport and Energy. Daniel Calleja started his career in the Commission as Member of the Legal Service.

TIZIANA DELL'OLMO

Tiziana Dell'Olmo is working for the regional government of Piemonte since 2001. As regional coordinator of Interreg Programmes she developed a broad expertise in regional and European programming and development policies. In her current position within the University, Research and Innovation Unit, she supports the implementation of regional innovation policies and the strengthening of regional innovation system at national, European and international level.

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Marjana Dermelj works in the Government Office for Development and European Cohesion Policy, Development Policies Division, at Slovenian Ministry, where she covers environmental issues. Prior to her work as a civil servant, Marjana worked in the non governmental sector (Umanotera, The Slovenian Foundation for Sustainable Development), where she ran several campaigns and eventually managed the fair trade shop 3MUHE. She holds a bachelor degree in Chemistry and successfully accomplished two post-graduate studies related to environmental policy and management.

Carolina Giraldo Nohra
Research Fellow on the RETRACE Project at the Politecnico di Torino, her work focuses on the Systemic Design methodology and the circular economy research, coordinating the Exchange of Experience activities across all partners. Prior to that, she worked on Systemic Design research in Latin American context at A Good Foundation in Amsterdam and also in the field of urban sustainability in South Africa with Future Cape Town, a leading African organisation. Since her Master in Ecodesign at Politecnico di Torino, she has been actively interested in sustainable development.

Jean-Michel Larrasquet
Emeritus Professor in Business Sciences, he has contributed numerous articles and books on change and innovation applying the approaches of Soft Systemics (Checkland), the Network Theory (Latour) and the Complexity Theory (Morin). He currently applies these theoretical approaches to operational contexts, dealing with responsible entrepreneurship and responsible territorial development. He is also Responsible for a think tank working on societal questions in the Basque Country.

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Iban Lizarralde is specialized in systemic and engineering design and works on the management of innovation through different approaches. Familiar with eco-innovation and creativity tools, he also researches in the field of new sustainable business models and conviviality approaches. He is the project manager of RETRACE for the French partner ESTIA.

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Pier Paolo Peruccio is Associate Professor at Politecnico di Torino, Deputy Dean of the Design Courses, and Representative for International Affairs. He holds a PhD degree in History of Architecture and Urbanism and is lecturer of "History of Visual Communication and Design" at the Design and Visual Communication bachelor's degree, and of "Theory and History of Systemic Design" at the Systemic Design master degree at Politecnico di Torino. He is coordinator of the research "Innovation in Design Education: The Establishment of Innovation in terms of Content and Pedagogical Methods, Design Courses at the École Catholique d'Arts et Métiers de Lyon (Ecam)" that aims at activating in France a degree programme in collaboration with ECAM.
His research is mainly on the history of environmental sustainability related to the field of design. He carried out many research projects in public and private archives, such as the Rockefeller Archive Center at Tarrytown (USA), the MIT at Cambridge (USA) and the Archivio Storico Olivetti in Ivrea.

ESTIBALIZ PLAZA ELORDI

Estibaliz Plaza Elordi holds a degree in Business Administration and Management from the Deusto University. She is currently the Head of the Entrepreneurship Area of Azaro Fundazioa, where she has been working for more than 12 years. Her job is to advise entrepreneurs and companies in the definition and acceleration of business and innovation projects in order to maintain and generate employment in the Region of Lea-Artibai.

MARION REAL

With a strong background in user-centered design, ergonomics & human factor, Marion Real recently conducted a PhD in the field of eco-innovation. She takes part actively in the RETRACE Project applying the Systemic Design methodology in the Nouvelle Aquitaine region. Additionally, she has a strong interest in the recovery of clothing and the design of supply-chains built around natural fibers, recycled clothes and local products. In this same area of competence, she is developing an action research on cosmopolitan fashion localism for fashion.

RAMONA TANASĂ

Member of the External Cooperation Office in Nord-East Regional Development Agency in Romania, Ramona Tanasă begun her activity in the North-East RDA as Communication Officer for the North-East EUROPE DIRECT Centre, gaining expertise in desk research on European policies, programmes and initiatives and laying the base for identifying cooperation opportunities, information management and European policies and mainstream topics knowledge and awareness. Previously, she was working in banks, in entrepreneurial and economic education and knowledge, as well as in marketing and sales sectors.

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Paolo Tamborrini is Associate Professor and Dean of the Design Courses at Politecnico di Torino. His research focuses on sustainable innovation and interaction design. He contributes to the following newspapers and magazines: *Il Giornale dell'Architettura*, *Domus* and *Il Sole 24 Ore* and is Managing Editor of the online publication *Graphicus*. He has published more than 100 scientific articles, proceedings and is the author of *Design Sostenibile, oggetti, sistemi e comportamenti* (2009).

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Dr. Benjamin Tyl is an eco-innovation research engineer. In 2011, he obtained a PhD degree for his work on eco-innovation, and more specifically on the contribution of creativity in the eco-ideation processes. Benjamin is an active member of the French EcoSD (Eco-design of Sustainable Systems) network, and member of the Design Society. He is currently working at the technological center APESA, where his role is to support the research activity and to develop research projects with both private companies and public laboratories. His main research interests are eco-innovation and eco-ideation but also the local value creation approach in design. Benjamin Tyl was coordinator of two research projects in eco-innovation with both academics and industrials (PSA, Steelcase, Parkeon, etc.), funded by the French National Network in Eco-design (EcoSD). He is currently the scientific leader of a research project on eco-innovation, funded by the French National Research Agency (ANR). Moreover, Benjamin is co-founder of a citizen company (I-ENER) that aims to develop a sustainable and territorial energy project.

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This volume aims at clarifying the role of Circular Economy according to a sustainable development and how policymakers can target it effectively in their activities. It is a guide to Systemic Design as a key methodology to establish sustainable regional action plans towards a Circular Economy.
As the result of an intense dialogue between people who present different perspectives and seek for a common language in the current complexity of policymaking and designing, this is the first of a three book series published across a four-year period (2016–2020) as part of the RETRACE Project funded by the Interreg Europe Programme.

Preface by Erwin Siweris

With contributions by
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