CLIC

Circular models Leveraging Investments in Cultural heritage adaptive reuse

D2.5

Methodologies for impact assessment of cultural heritage adaptive reuse

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776758

2018 EUROPEAN YEAR OF CULTURAL HERITAGE #EuropeForCulture

HORIZON 2020
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776758
Call H2020-SC5-2017-OneStageB submitted for H2020-SC5-22-2017 / 07 Mar 2017

Deliverable 2.5

Methodologies for impact assessment of cultural heritage adaptive reuse

Version 1.0

Due date:	31/08/2021
Submission date:	30/10/2021
Deliverable leader:	IRISS CNR
Type	Report
Author list:	Antonia Gravagnuolo (IRISS CNR), Martina Bosone (IRISS CNR), Luigi Fusco Girard (IRISS CNR)
Contributors:	Pasquale De Toro (IRISS CNR), Silvia Iodice (IRISS CNR), Serena Micheletti (IRISS CNR), Francesca Buglione (IRISS CNR), Aliona Lupu (INI), Mariarosaria Angrisano (UNIPEGASO)

Dissemination Level

☒	**PU:**	Public
☐	**PP:**	Restricted to other programme participants (including the Commission Services)
☐	**RE:**	Restricted to a group specified by the consortium (including the Commission
☐	**CO:**	Confidential, only for members of the consortium (including the Commission Services)

Abstract

This deliverable presents the results of the work carried out under the Horizon 2020 CLIC project, specifically in the Work Package 2 “Creating evidence base of cultural heritage impacts”, Task 2.4 on “Development of the CLIC multidimensional impact indicator set for the assessment of adaptive reuse circular models”. The task was dedicated to the development of a structured methodology for the assessment of impacts of cultural heritage adaptive reuse projects, in the perspective of the circular economy and circular city model.

The objective of this report is to present the CLIC Methodology for the assessment of cultural heritage adaptive reuse impacts in the perspective of the circular economy, and provide a guidance for stakeholders and professionals on how evolutionary co-evaluation approach (Fusco Girard, “Draft CLIC Framework, 21/12/2020”) (Fusco Girard, 2021a) can be conducted to enhance adaptive reuse projects towards higher economic, social, environmental and cultural sustainability. The assessment methodology presented in this document is focused on ex-ante evaluation, which is applied in the planning and design phase of the adaptive reuse project, to support participatory decision-making enhancing choices on transformation and conservation of cultural heritage adopting the circular approach.

The CLIC methodology for impacts assessment, that includes the multidimensional indicator framework provided in D2.4, systematizes and unifies the overall evaluation approach and it is inspired at the OECD Better Life Index framework, with the possibility of including the subjective dimension in the evaluation through the assignment of weights to criteria and indicators, in synergy with the CLIC Decision Support System developed in D3.1 . This allows the dynamic interoperability with different stakeholders, gathering data on preferences, perceptions and priority allocation. Through the CLIC methodology and indicators set, it will be possible to compare different adaptive reuse alternatives in terms of actual and potential impact of cultural heritage and landscape regeneration, as well as benchmark cities and regions based on their performance in terms of heritage circularity.

Partners involved in the document

Participant No	Participant organisation name	Short Name	Check if involved
1 Coordinator	CONSIGLIO NAZIONALE DELLE RICERCHE	IRISS CNR	X
2	UPPSALA UNIVERSITET	UU	
3	HAUTE ÉCOLE ICHEC - ECAM - ISFSC	ICHEC	
5	TECHNISCHE UNIVERSITEIT EINDHOVEN	TU/e	
6	UNIVERSITY OF PORTSMOUTH HIGHER EDUCATION CORPORATION	UOP	X
7	UNIVERZA V NOVI GORICI	ETCAEH	
8	WIRTSCHAFTSUNIVERSITAT WIEN	WU	
9	UNIWERSYTET WARSZAWSKI	UNIWARSAW	
10	ICLEI EUROPEAN SECRETARIAT GMBH	ICLEI	
11	FACILITYLIVE OPCO SRL	FacilityLive	
12	VASTRA GOTALANDS LANS LANDSTING	VGR	
13	GRAD RIJEKA-GRADSKO VIJECE	RIJ	
14	COMUNE DI SALERNO	SA	X
15	STICHTING PAKHUIS DE ZWIJGER	PAK	
16	INIZIATIVA CUBE	INI	X
17	TECHNOLOGICAL UNIVERSITY DUBLIN	TU Dublin	

Table of Contents

Deliverable D2.5

Methodologies for impact assessment of cultural heritage adaptive reuse

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Figures Summary

Tables Summary

1 Description of the Project

The overarching goal of CLIC trans-disciplinary research project is to identify evaluation tools to test, implement, validate and share innovative “circular” financing, business and governance models for systemic adaptive reuse of cultural heritage and landscape, demonstrating the economic, social, environmental convenience, in terms of long lasting economic, cultural and environmental wealth.

The characteristics of cultural heritage and landscape pose significant challenges for its governance. Cultural heritage is a “common good”, which enjoyment cannot be denied to citizens, although many buildings and landscape structures are privately owned. Furthermore, the large economic resources needed for recovery and maintenance of heritage goods are rarely available to the private owner, often charged of the additional cost of non-use due to limited degree of transformation allowed. The existing governance arrangements currently involve limited stakeholders concerning for the historic, aesthetic or religious sociocultural values, severely restricting the use of the heritage properties, and charge the central government of conservation costs. The approach of regulatory and planning tools throughout European countries has been to preserve cultural heritage by preventing transformation of buildings or areas having historic-cultural significance.

“The current monument-based, full protection, and government-financed approach that restricts the use of protected properties and relies almost entirely on public funds is incapable of tackling the vast urban heritage of most communities and of sustaining conservation efforts in the long term” (Rojas, 2016). To turn cultural heritage and landscape into a resource, instead of a cost for the community, the structures of authority, institutions and financial arrangements should be adjusted to ensure larger stakeholders’ involvement in decision-making, attract private investments and facilitate cooperation between community actors, public institutions, property owners, informal users and producers (Rojas, 2016). The risk is that without financing channels the decay of European heritage and landscape will increase, until its irreversible loss.

Flexible, transparent and inclusive tools to manage change are required to leverage the potential of cultural heritage for Europe, fostering adaptive reuse of cultural heritage / landscape. Tools for management of change should consider costs and benefits at the local level and for all stakeholders, including future generations, and should take into account the cultural, social, environmental and economic costs of disrepair through neglect, compared to the benefits obtained through diverse scenarios of transformation / integrated conservation.

Costs and values of cultural heritage adaptive reuse have to be compared in a multidimensional space: the relationship between costs and “complex values” influences the willingness to invest in the functional recovery of cultural heritage and landscape. Therefore, it is necessary to clarify what is intended for the value of cultural heritage. The higher the perceived value for potential actors, the higher the willingness to take the risk of investment. This “complex value” of cultural heritage depends on the intrinsic characteristics, but also from extrinsic (context) characters.

Investment costs are related to the materials, technologies and techniques to be used to preserve the cultural value of the heritage / landscape, and to maintenance / management / operating costs. The willingness to invest, the same value done, increases with the reduction of costs. Then, the social cost of abandonment – and eventual irreversible loss of heritage – must be included in the investment choice.

The investment gap in cultural heritage and landscape regeneration can be addressed through careful evaluation of costs, complex values and impacts of adaptive reuse, providing critical evidence

of the wealth of jobs, social, cultural, environmental and economic returns on the investment in cultural heritage.

1.1 CLIC Specific objectives

The scopes of CLIC project will be achieved through a set of specific, measurable, achievable, realistic and time-constrained (SMART) specific objectives:

Objective 1 - To synthesize existing knowledge on best practices of cultural heritage adaptive reuse making it accessible to researchers, policy makers, entrepreneurs and civil society organizations, also with direct dialogue with their promoters;

Objective 2 - To provide a holistic ex-post evaluation of the economic, social, cultural and environmental impacts of cultural heritage adaptive reuse, stressing on the importance of appropriate conservation and maintenance approaches able to highlight the integrity and authenticity of heritage;

Objective 3 - To provide EU-wide participated policy guidelines to overcome existing cultural, social, economic, institutional, legal, regulatory and administrative barriers and bottlenecks for cultural heritage systemic adaptive reuse;

Objective 4 - To develop and test innovative governance models and a set of evidence-based, participative, usable, scalable and replicable decision support evaluation tools to improve policy and management options/choices on cultural heritage systemic adaptive reuse, in the perspective of the circular economy;

Objective 5 - To analyse hybrid financing and business models that promote circularity through shared value creation, and assess their feasibility, bankability and robustness for cultural heritage adaptive reuse;

Objective 6 - To validate the CLIC circular financing, business and governance practical tools in 4 European cities / territories representative of different geographic, historic, cultural and political contexts;

Objective 7 - To contribute to operationalise the management change of the cultural landscape also in implementing the UNESCO Recommendation on Historic Urban Landscape;

Objective 8 - To re-connect fragmented landscapes, through functions, infrastructures, visual relations at macro and micro scale;

Objective 9 - To design and implement a stakeholders-oriented Knowledge and Information Hub to make tools and information accessible, useful and usable and test them with policy-makers, entrepreneurs, investment funds and civil society organizations;

Objective 10 - To contribute to the creation of new jobs and skills in the circular economy through cultural heritage adaptive reuse, boosting startups and sustainable hybrid businesses and empowering local communities and stakeholders through public-private-social cooperation models.

Objective 11 - To contribute to the monitoring and implementation of SDGs (especially Target 11.4) and the New Urban Agenda, creating operational synergies with global initiatives of UN-Habitat, UNESCO/ICOMOS and the World Urban Campaign.

All partners have wide experience in developing and testing CLIC proposed tools, ensuring the effective and time-constrained achievement of all the above-mentioned specific goals. The integration of sectorial knowledge, tools and methods will be achieved through a trans-disciplinary

approach promoting partners and stakeholders' cooperation, co-creation of knowledge and co-delivery of outcomes.

The expected impacts of the project are the following:

- Validation of integrated approaches and strategies for cultural heritage adaptive re-use, comprising innovative finance with high leverage capacity, business models and institutional and governance arrangements that foster multi-stakeholder involvement, citizens' and communities' engagement and empowerment;

- New investments and market opportunities in adaptive re-use of cultural heritage, also stimulating the creation of start-ups;

- An enabling context for the development and wide deployment of new technologies, techniques and expertise enhancing industrial competitiveness and contributing to economic growth, new skills and jobs;

- Innovative adaptive re-use models that are culturally, socially and economically inclusive;

- Contribution to implementing the Sustainable Development Goals (SDGs) (Goals 1, 15, 11 particularly) and the United Nations New Urban Agenda.

2 Introduction

This deliverable presents the results of the work carried out under the Horizon 2020 CLIC project, specifically in the Work Package 2 “Creating evidence base of cultural heritage impacts”, Task 2.4 on “Development of the CLIC multidimensional impact indicator set for the assessment of adaptive reuse circular models”. The task was dedicated to the development of a structured methodology for the assessment of impacts of cultural heritage adaptive reuse projects, in the perspective of the circular economy and circular city model. The assessment methodology presented in this document is focused on ex-ante evaluation, which is applied in the planning and design phase of the adaptive reuse project, to support participatory decision-making enhancing choices on transformation and conservation of cultural heritage adopting the circular approach.

Cultural heritage is a wide concept and embraces a set of multidimensional aspects, for this reason it is possible to analyse it from a variety of points of view. First of all, considering the multiple values of cultural heritage, it was necessary to identify a set of multidimensional indicators for the assessment process (performance, impact, monitoring indicators). The indicators represent a system of information able to quantify and synthesize this complex phenomenon with the aim of developing an indicator framework able to support the ex-ante and ex-post assessment. Deliverable D2.4 “Databases of indicators and data in pilot cities” provided the set of indicators suggested for circularity assessment of cultural heritage adaptive reuse projects.

The multidimensional indicators about impacts of cultural heritage conservation/regeneration were initially classified on the base of the 4 pillars of sustainability: cultural, economic, social, environmental. The development of the theoretical framework[1] lead to the identification of three dimensions of circularity: the regenerative / autopoietic capacity, the symbiotic capacity, and the regenerative capacity[2]. These three dimensions include indicators expressing sustainability dimensions, integrated in a systemic perspective, overcoming the “pillars” approach. The related criteria and indicators are both quantitative and qualitative and they are referred to different scales (micro, meso and micro scales). Indicators in each dimension were deduced from the analysis of best practices and from national and international sources. They represent a grid able to ensure that the assessment reflects all values and dimensions to be considered. They are a basis of information and, at the same time, allow developing a common language about impacts and benefits of cultural heritage/landscape conservation.

However, indicators alone do not allow accounting for the impact, especially in the ex-ante phase in which few information are available on the actual impacts that will occur in the future. A structured methodology was developed and experimented during the CLIC research, collaborating with the cities involved. In this report, the experience of Salerno in Italy, one of the four CLIC pilots, was particularly relevant and represented a test-bed for the validation of the methodology. Moreover, spatial indicators and alternatives have a particular importance for cultural heritage, because the decision-making problem in the field of cultural heritage will involve alternatives characterized by a clear spatial dimension.

The CLIC methodology for impacts assessment, that includes the multidimensional indicator framework provided in D2.4, systematizes and unifies the overall evaluation approach and it is inspired at the OECD Better Life Index framework, with the possibility of including the subjective

[1] Led by prof. Luigi Fusco Girard, CLIC Scientific Coordinator

[2] The CLIC circularity framework is detailed in D2.7 “CLIC framework of circular human-centred adaptive reuse of cultural heritage”

dimension in the evaluation through the assignment of weights to criteria and indicators, in synergy with the CLIC Decision Support System developed in D3.1[3]. This allows the dynamic interoperability with different stakeholders, gathering data on preferences, perceptions and priority allocation. Through the CLIC methodology and indicators set, it will be possible to compare different adaptive reuse alternatives in terms of actual and potential impact of cultural heritage and landscape regeneration, as well as benchmark cities and regions based on their performance in terms of heritage circularity[4].

2.1 Objective

The objective of this report is to present the CLIC Methodology for the assessment of cultural heritage adaptive reuse impacts in the perspective of the circular economy, and provide a guidance for stakeholders and professionals on how evolutionary co-evaluation approach (Fusco Girard, "Draft CLIC Framework, 21/12/2020") (Fusco Girard, 2021a) can be conducted to enhance adaptive reuse projects towards higher economic, social, environmental and cultural sustainability.

2.2 Document structure

The document is structured as follows:

The methodology adopted in this study is based on the initial careful review of existing methods for impacts assessment in cultural heritage and non-cultural sectors, to identify well-established and shared approaches applicable to cultural heritage adaptive reuse (Section 3). Then, the CLIC theoretical framework based on the implementation of the circular economy approach in the adaptive reuse of cultural heritage was developed to identify goals and objectives, and coherent criteria and indicators in all sustainability dimensions (Section 4). An evolutionary co-evaluation approach (Fusco Girard, "Draft CLIC Framework, 21/12/2020") (Fusco Girard, 2021a) was introduced in line with the systemic circular approach, taking into account the changes in preferences and objectives that occur during the evaluation process. Indeed, the evaluation is not meant here as a "tool-driven" process, but as a "human-driven" process, supporting stakeholders' engagement, open spaces for discussion and confrontation, co-evaluation of preferences, synergies and conflicts, establishing a cyclical process towards the identification of the most "satisfying solution" (Simon, 1959) based on circularity criteria. Thus, Section 4 presents the approach adopted and the steps of the CLIC Methodology, as a synthesis of a long process conducted in CLIC pilots. Finally, Section 5 presents the conclusions of the study and proposes a set of recommendations to policy makers to enhance decisions towards "circular" and "human-centred" adaptive reuse of cultural heritage.

[3] See CLIC D3.1 "Decision Support System" at the link https://clicproject.eu/files/D3-1.pdf
[4] See D1.3 "Survey on best practices of cultural heritage adaptive reuse"

3 Background

For a long time UNESCO, ICOMOS and other international bodies focused on cultural heritage conservation advocated for the importance of including cultural heritage at the heart of sustainable development practices.

Firstly, many documents highlighted the role of culture for sustainable development: the 1982 World Conference on cultural policies (*MONDIACULT*), the UNESCO *Framework for Cultural Statistics* (UNESCO, 1986, 2009), the *World Decade for Cultural Development* (1988–1997), represent some of the efforts to disseminate the concept of cultural development at international level and to raise awareness by the international community of the relevance of cultural policies. The report *Our Creative Diversity* (UNESCO, 1996), developed by 1996 by the UN/UNESCO World Commission on Culture and Development, expresses a new point of view, trying to understand and to include in international documents the evolutive aspects with regards to the concepts of development and culture and the connection between them.

The first step in favour of the recognition of the key role of cultural diversity for sustainable development was activated by an alliance of international, national and regional actors for the establishment of a new international binding legal instrument within UNESCO. After a negotiation started in 2003, in 2005 UNESCO adopted the *Convention on the Protection and Promotion of the Diversity of Cultural Expressions* and it entered into force in 2007. This was the first international legally-binding instrument that recognized great importance to cultural cooperation, coherence and coordination between different development policies and actions (economic, social, environmental, cultural) (Hanania, 2014, pp. 297–301; Richieri Hanania, 2016).

In the same year, the UNESCO Institute for Statistics, the lead agency in the UN system for global statistics on culture, agreed to update the 1986 **Framework for Cultural Statistics** (UNESCO, 1986). This framework offered a new comparative lens to view culture, through revising the intellectual framework and existing indicators used by member states (C. Taylor et al., 2007).

Since the elaboration of the Framework in 1986, many important changes have taken place in cultural practices and policies throughout the world. Thus, by 2005, the research demanded that any new Framework needed to address the changes in the way people create and consume culture, to include digital technologies and the development of ‘interrelated notions of “creative” industries (UNESCO, 2013). After four years of a global consultation process (involving many scholars, statisticians and experts in the field of cultural statistics and policy, including representatives from many Ministries of Culture, National Statistical Offices and international partner agencies, in 2009, UNESCO proposed a new Framework for Cultural Statistics (FCS).

Another input was proposed by the UNESCO document on **“Creating Global Statistics for Culture”** (Morrone, 2006) that introduced the *Culture Cycle* concept, already used by a number of UNESCO Member States. This concept expresses in a cyclical model the complexity of relationships and inter-connections between the different cultural processes, including the feedback processes by which activities (consumption) inspire the creation of new cultural products and artefacts.

The next step towards the definition of indicators for the culture sector was the **Culture for Development Indicators** (CDIS) project that in 2014, starting from the theoretical framework of UNESCO’s 2005 Convention, proposed a research methodology that used empirical data to highlight the culture’s multidimensional role as both a driver and enabler of sustainable development

processes. Indeed, already several Resolutions adopted by the UN General Assembly[5] recognized that culture not only directly contributes to the generation of economic, social and cultural value (driver role) but it also establishes links with other sectors, such as inclusive social and economic development, environmental sustainability, and peace and security (enabler role). It has also represented an advocacy initiative, providing an evidence-based and informed approach to the introduction of culture into national and international development strategies as well as to cultural policy formulation. In this holistic perspective, the acknowledgment of the multiple roles of culture in development as a source of economic and social progress is characterized by significant cross-sectoral interrelationships between variables and processes. The framework is explicitly based on the principles of culturally sustainable development, including those related to the long-term management of cultural assets, and the requirements for equity and inclusion in access to cultural life and the safeguarding and enshrinement of fundamental cultural rights.

Our contribution aims to focus on a specific sector of culture, represented by the cultural heritage, exploring its contribution for sustainable development through a multicriteria impacts assessment.

Landscape and cultural heritage are therefore considered fundamental resources for sustainable local development (European Commission, 2020b; Hosagrahar et al., 2016; United Nations, 2015a, 2015c, 2017), whose valorisation can attract investments and economic development and generate important social, cultural and environmental benefits (European Commission, 2014b, 2015b).

Many experiences have shown how the conservation, regeneration and enhancement of cultural heritage can produce significant multidimensional impacts (Angrisano et al., 2016; Fusco Girard et al., 2015; Antonia Gravagnuolo et al., 2017; Historic England, 2016a, 2016b; Ost, 2012; UNESCO, 2016). Nevertheless, the need to balance the needs of transformation and development of the territory with the preservation of historical and cultural values poses a series of challenges. The overcoming of these difficulties lies in the construction of evaluation tools suitable for the management of transformations in contexts of historical, cultural and landscape value (Fusco Girard & Gravagnuolo, 2017).

Recent research on the assessment of the impacts of regeneration of cultural heritage has partly focused on the definition of multidimensional categories and indicators, able to capture the direct, indirect and induced effects of investments in cultural heritage (Angrisano et al., 2016; Fusco Girard et al., 2015; Antonia Gravagnuolo et al., 2017; P. L. Sacco & Teti, 2017), partly on the detection and analysis of data through the monitoring and ex-post evaluation of specific projects (Amion Consulting & Locum Consulting, 2010; Brien et al., 2010; Department for Culture Media and Sport, 2015; Evans & Shaw, 2004; Fund, 2013; Historic England, 2014, 2016b, 2016a; P. Taylor et al., 2015).

In both cases, the construction of an indicator-based Information System (IS) represents a fundamental phase of development of the evaluation model. A defined IS has not been developed for the application of the HUL approach, but several recent studies have proposed and tested indicators for the assessment of the economic, social, cultural and environmental impacts of conservation and valorization of cultural heritage[6].

The production of new knowledge on the multidimensional benefits of heritage and landscape regeneration and the promotion of a culture of responsibility for the achievement of Sustainable

[5] Resolution A/RES/65/166 of 2010 “Culture and Development”, Resolution A/RES/66/208 of 2011 “Culture and Development”, Resolution A/RES/68/223 of 2013 “Culture and sustainable development”, and Resolution A/RES/69/230 of 2014 “Culture and sustainable development”.

[6] See Deliverable 2.4 “Databases of indicators / data in pilot cities”.

Development are here proposed as necessary conditions to implement a "full circle" economy in Europe.

3.1 The role of culture and cultural heritage for sustainable development

The adaptive reuse of abandoned and underused cultural heritage and landscapes can be a key driver of economic growth, social wellbeing and environmental preservation, contributing to sustainable development of cities and regions (CHCfE Consortium, 2015; European Commission, 2014b, 2015b; European Parliament, 2017b). However, the assessment of the impacts of cultural heritage conservation, adaptive reuse and regeneration is still rarely conducted, therefore the actual contribution of cultural heritage to sustainable development remains under-estimated or not estimated at all. Methodologies and approaches for the assessment of the impacts of cultural heritage conservation and adaptive reuse have been identified in recent research, considering the multiple interrelated dimensions of sustainability: economic, social, environmental, and finally the cultural dimension, highlighted as the fourth pillar of sustainable development (CHCfE Consortium, 2015). Another body of studies places the cultural dimension in a more central place as the foundation of sustainable development (Dessein et al., 2015). Although comprehensive approaches to the assessment of multidimensional impacts of cultural heritage conservation have been developed (CHCfE Consortium, 2015; Fusco Girard et al., 2015), many studies focus on the sectorial economic impacts (Davies & Clayton, 2010; de la Torre & Mason, 1998; Historic England, 2016b), other studies highlight the benefits of heritage conservation for society (Bertacchini, 2016; Historic England, 2016a), but less attention has been devoted to the complex interrelationships between culture, economy, society and the environment. The highly specialized and sectorial knowledge on impact assessments produced in the fields of heritage preservation, economics, social science, and ecological economy, has reached well-validated and reliable methodologies in each respective scientific field. However, on the operational perspective, working in silos hinders the possibilities of inter-disciplinary knowledge exchange and dialogue, preventing scientists from developing complex multi-dimensional impact assessment frameworks for cultural heritage conservation. Moreover, the adaptive reuse of cultural heritage, which necessarily foresees certain levels of transformation to allow adaptation to new functions (Bullen & Love, 2011; Douglas, 2006), is mainly approached from a pure "conservative" perspective, underestimating the potential positive impacts that minimum levels of transformation can generate on local economies, social cohesion, wellbeing, and environmental preservation, opening the field to the innovative uses of heritage resources.

3.1.1 The European Green Deal[7]

By referring to the European Green Deal, the CLIC approach re-interpret and re-shape the human-centred adaptive reuse of cultural heritage in the social and cultural dimension, stressing the role of the two key components for human-centred development. First, cooperative capacity, able to stimulate synergies and symbioses through circular relationships, and the integration capacity, which transforms cultural assets into ecosystems of economic, social, and cultural values. Second, financial sustainability, as these ecosystems should become self-sustaining ecosystems—

[7] This section derives from the paper *The "intrinsic value" of cultural heritage as driver for circular human-centered adaptive reuse,* published by Luigi Fusco Girard and Marilena Vecco in the Special Issue "The Valorization of the Cultural Heritage and Landscape as the Entrance Point for the Circular City Strategy" of *Sustainability* Journal, launched in relation to the results of CLIC project. More info and other published papers are available at: https://www.mdpi.com/journal/sustainability/special_issues/Circular_City

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

characterized by a circular organization/structures—able to sustain themselves, without or reducing external support from public, private, or third sector institutions (Fusco Girard, 2021b).

The European Green Deal (European Commission, 2019a) assumes the circular economy model to be essential for facing the challenges and competition in the globalised economy, introducing a series of indications that are configured as evaluation criteria: waste minimisation, reuse, recycling, regeneration of materials, use of renewable energy sources, promotion of second-hand markets, enhancement of green areas, etc.

The European Green Deal aims to ensure a fair and inclusive transition for a sustainable European economy and climate and environmental challenges. It represents an integral part of the Commission's strategy to implement the United Nations' 2030 Agenda and the Sustainable Development Goals (United Nations, 2015c), and the other recent European priorities (European Commission, 2020a, 2021b). In this perspective, the integration of the United Nations' Sustainable Development Goals in the new proposed strategies is necessary to give a central role to sustainability and the well-being of citizens in economic policy. It happens to guarantee the implementation of sustainable development goals in policy making and action at all levels.

CLIC interpretation of functional or adaptive reuse moves towards the transformation of a site "lacking vitality/life" and devoid of use into a living organism. Considering the centrality that the ecological dimension today assumes or should assume, as demonstrated by the pandemic crisis, adaptive reuse must become a producer of primarily ecological or environmental values. The site must be transformed into an ecosystem that can also contribute to the vitality of the local context, involving other subjects and activities especially in its management, and possibly generating other ecosystems.

New activities in the reuse of cultural assets produce goods and services for external bodies, but they also re-produce their own production processes, regenerating themselves through the production of new knowledge and innovations. An adaptive management approach is required, able to continuously react to internal and external forces, learning from experiences and thus becoming resilient.

This cultural asset ecosystem should be able to capture the energy it requires from sun, wind, and geothermal sources and to implement a new metabolism that mimics that of nature. Cooperation and competition strategies are integrated in this model (Zelený & Hufford, 1992), which can regenerate itself from the bottom up. More and more, digital technologies facilitate the above behaviors. This is in contrast to the traditional recovery strategy of cultural heritage, which is generally indifferent to green needs. For example, the direct/indirect employment capacity in the redevelopment phase is often emphasized in comparison to other investments.

But the organization as well as the management of a reused cultural asset is a critical issue. It should be interpreted in a way similar to the nature of an organizational structure. The example of trees is very clear: they rely on energy from the sun and are characterized by a perfect metabolism. Thus, the analogy with trees allows us to imagine a functional reuse that contributes as much as possible to lowering pollutant and climate-changing concentrations, purifying the air, generating oxygen, reducing carbon dioxide, dust, noise, combustion residues, mitigating heat islands and thus helping to improve the local microclimate as well as providing fibers, fruits and wood, and managing water with care (Fusco Girard, 2019a, 2020).

This interpretation of the functional reuse of cultural heritage in the perspective of CE is framed by the lens of bio-ecology (Geddes, 1915). Functional reuse then becomes an opportunity for the realization of a living system, characterized by a specific metabolism that imitates that of nature as

much as possible. Adaptive reuse is placed in a systemic perspective that connects in a mutual relationship the built and natural environment and manufactured and natural capital with human and social capital. This means that attention is paid to a coherent landscape integration, the permeability of the land, the capacity to use natural lighting, and to increase the environmental performance of the physical asset (Fusco Girard, 2019a).

Reuse, especially in its management phase, can be defined as the promotion of a complex, dynamic, and adaptive system. This must be continuously rebuilt with an innovative management effort, taking into account the high density of interdependencies between the economic, social, and ecological subsystems and the positive sum strategies that can be triggered.

Such management is achieved through choices that are particularly complex because they require the recognition of the multiple dimensions in which the value of cultural heritage is expressed. It possesses values of use and values that are independent of direct use. But it also possesses "intrinsic anthropocentric and non-anthropocentric values" that complement (and counterbalance) the former. It is necessary to recognize each of these in the choices related to reuse.

The above implies interdisciplinary/trans-disciplinary models for decision-making, with an approach that can include many kinds of knowledge, from social to economical to ecological etc., in its evaluation. On the other hand, the reference to the ecological foundation of the economy and to human-centred strategy leads to changes in current evaluation practices, with the resulting need to identify new evaluation approaches, criteria, and indicators.

The "reintegration" of the economy into ecology (Zelený & Hufford, 1992) as well as the centrality of the ecological dimension that characterizes the European Green Deal is wholly coherent with the World Health Organization Manifesto for facing the post-Covid19 challenge (Fusco Girard & Nocca, 2020; WHO - World Health Organization, 2020). It makes explicit the impacts of climate change and pollution of the territory system primarily on health and thus on people's perception of well-being. Health is in fact a value with reference to which there is a general consensus (regardless of culture and geography).

The CLIC approach underlines the "comprehensive" productivity of adaptive reuse at the micro and meso scale as a human, cultural, and social-shaped vision that can support the green and digital transition. Indeed it is strictly linked with the Green New Deal suggestion about the recovery of the notion of values enlightened in Ecological Economics, and in particular the notion of "primary" or "glue" value (de Groot et al., 2012; Ehrlich & Roughgarden, 1987; Turner, 1993). In ecological economics (Costanza, 1992; Costanza et al., 1997; Faber et al., 1995), a complex notion of value has emerged of economic, social, and environmental values. It combines value in itself (which is value independent from use) with instrumental values. Specifically, in the CE context, the introduction of the notion of "intrinsic value" is part of implementation of the CE model. The "intrinsic" value does not change with the objective, quantitative, or numerical assessment of a resource. It is not concerned with subjective or perceptive assessments in opposition to objective evaluations. In this perspective, subjective is linked to ordinal assessment by people and objective is linked to expert knowledge, to the numerical assessment of experts. The notion of intrinsic value is linked to bio-eco systems behaviors, to their self-regenerative capacity, and thus to their capacity to sustain the life of other subjects.

It can play a specific role in the circular economy model achievement as this "new economy" model is attentive to conservation of existing ecological values in the production of new created tangible and intangible values. It requires attention to instrumental values based on the utilitarian approach (values of use and independent from direct use), but also to "intrinsic values" (Fusco Girard

& Nijkamp, 1997a)[8], based on a non-utilitarian approach: to ecosystem values, "in itself and for itself" values. It also requires, in order to be implemented, a rigorous technical evaluation, but also a participatory evaluation processes by the users, for the comparison between the pursuit of intrinsic values and instrumental values, and therefore between intrinsic values and opportunity costs.

3.1.2 The EU Taxonomy

The EU Taxonomy (European Commission, 2021a) is a classification system for sustainable economic activities. Its overall goal is to create transparency and disclose the impact of investments. It is part of the EU Action Plan Financing Sustainable Growth (European Commission, 2018). The Taxonomy aims to enable the financial system to guide investment decisions into a more sustainable direction and thus accelerate the transition to a circular economy in Europe and beyond.

The lack of a commonly accepted and inclusive definition and circularity measurement methodology hampers the transition to a more circular economy. It obstructs the development and access to finance, credit risk assessment, and transferability and replicability of projects and investments across regions and jurisdictions.

The Expert Group of Support to Circular Economy Financing proposes a sector-agnostic Categorisation system for the circular economy that defines categories of activities substantially contributing to a circular economy. This categorisation system is intended as a contribution to the future work of the Sustainable Finance Platform on the EU taxonomy of activities contributing to the circular economy objective.

The EU Taxonomy is a unified EU-wide classification system for sustainable economy activities intended to steer "green" investments towards environmentally sustainable economic activities. It creates an operational list of economic activities with technical screening criteria, which determine in which cases each economic activity makes a substantial contribution to an environmental objective.

The report setting out draft technical screening criteria has been prepared by a Technical Working Group of the Platform on Sustainable Finance set up to advise the Commission on the development of the EU taxonomy. It covers the four non-climate environmental objectives set out in the Taxonomy Regulation: water, circular economy, pollution prevention, and biodiversity & ecosystems (the two climate related objectives have been addressed in a previous exercise). It recommends how a "substantial contribution" to sustainability should be identified across a series of priority economic activities. It also sets out "Do No Significant Harm" (DNSH) technical screening criteria for these four objectives.

The purpose of this call is to gather further evidence and feedback on the proposed recommendations for technical screening criteria. The criteria presented in the report are part of the Sustainable Finance Platform's working document and do not represent a final view.

They are presented to gather feedback and evidence from a broader set of stakeholders, to improve the criteria and make them more robust and usable in view of the final report to be presented to the European Commission in November 2021.

[8] See the section *The "Complex Social Value" of cultural heritage* in Deliverable 2.4 "Databases of indicators / data in pilot cities".

The Taxonomy shall serve as a tool to distinguish sustainable from non-sustainable economic activities. For companies, it should serve as a transition tool to increase the sustainability of their operations over time.

This idea of continuous improvement toward greater sustainability underscores the need to regularly review and update the Taxonomy's criteria. This is a very interesting approach derived from the EU Taxonomy which proposes a development process of criteria and highlights that they can be either qualitative or quantitative and consist of three components: principles, metrics, and associated thresholds. Criteria that are connected with political goals that have a certain date (e.g. to achieve a certain threshold by a certain year) can require an updating the criteria. Similarly, as overarching goals for environmental objectives are strengthened over time, the criteria to assess economic activities must be updated accordingly. There is no fixed schedule for the review of criteria, but the Technical expert group on sustainable finance[9] has signalled a recommended trajectory for many of the quantitative climate change mitigation criteria.

The Technical expert group on sustainable finance emphasised the need for the Taxonomy to be predictable and therefore suggests to review criteria that are relevant for "transitional activities" every third year (EU Technical Expert Group on Sustainable Finance, 2020).

This is the reason for the consideration of EU Taxonomy Guidelines in the definition of our quanti-qualitative matrix[10].

3.1.3 The Paris Agreements on Climate Change[11]

The Agenda 2030 and the Paris Agreement in 2015 (COP21) represent two key frameworks for facing climate change and guiding the world towards a more sustainable development model.

The Paris Agreement, adopted at the Conference of the Parties "COP21" (UNFCCC, 2015), is one of the agreements developed at the international level to define strategies to mitigate the effects of climate change. It involved the member states of the United Nations Framework Convention on Climate Change (UNFCCC) to define targets for reducing greenhouse gas emissions (from the year 2020) and to monitor the trend of the global average temperature. Guidelines to implement the Paris Agreement (2015), defined at the COP24 Conference of the Parties (WHO, 2018), lowered the temperature increase limit from 2 ◦C to 1.5 ◦C. COP24 is also of particular relevance for the "Special Report: Health and Climate Change" (WHO, 2018), which highlights the link between health and climate change and the consequent need to reformulate climate policies, including at the fiscal level, incorporating the issue of protecting and safeguarding the health of human beings and the planet.

As highlighted by the Lancet Report (Watts et al., 2018), focused on the objectives of the Paris Agreement (UNFCCC, 2015) and the indications of the report of the Intergovernmental Panel on Climate Change (IPCC, 2018), "the economic benefits from the health benefits would substantially outweigh the cost of any intervention in a ratio of 1.45 to 2.45, saving thousands of billions of dollars worldwide" (Re, 2021). In this perspective, the model here proposed is that of the circular economy. It identifies a monitoring system including 41 indicators. The Lancet Countdown (Watts et al., 2019) indicators are organised in five main domains: climate change impacts, exposure and vulnerability;

[9] https://ec.europa.eu/info/publications/sustainable-finance-technical-expert-group_en

[10] (see **Errore. L'origine riferimento non è stata trovata.**). Detailed description and information about EU Taxonomy C ompass (and the related integration of criteria into business databases and other IT systems) are available at https://ec.europa.eu/sustainable-finance-taxonomy/

[11] This section was elaborated basing on (Fusco Girard & Nocca, 2020; Antonia Gravagnuolo et al., 2020).

adaptation, planning and resilience for health; mitigation actions and health co-benefits; finance and economics; and public and political engagement. Therefore, they are related to the impacts of climate change on health (first domain), to the actions for reducing them (second domain), to the solutions able to mitigate these impacts (third domain), to the costs concerning the both in terms of the damage caused and the solutions to be adopted (also to achieve the goals of the Paris Agreement) and, finally, to the effectiveness of both public and community participation.

Decarbonizing the economy and particularly the energy sector is one of the main ambitions for the European Union towards 2050 sustainability goals, to maintain global warming within the limit of 1,5 degrees' increase (IPCC, 2019). Already since the Paris agreement, in the European Green Deal and in the United Nations Framework Convention on Climate Change, there has been reference to the need of tackling climate change by encouraging actions aimed at reducing carbon emissions. Many European countries have agreed to draw up all development plans for the future with the objective of achieving zero net carbon by 2050, through the use of innovative technologies in every sector. The objective of reducing carbon emissions needs to be achieved in cities and regions. The Agenda 2030 for Sustainable Development of the United Nations with the Sustainable Development Goals (United Nations, 2015c) has already set targets to make cities and human settlements inclusive, safe, resilient and sustainable (SDG 11), to ensure access to affordable, reliable, sustainable and modern energy (SDG 7) and to ensure sustainable consumption and production patterns (SDG 12), decoupling economic growth from environmental degradation, increasing resource efficiency and promoting sustainable lifestyles. The United Nations New Urban Agenda (United Nations, 2017) at article 71 strengthens this vision recommending sustainable resources management and the reduction of greenhouse gas emissions.

Cities account for between 60 and 80 per cent of energy consumption and generate as much as 70% of human-induced greenhouse gas emissions (United Nations, 2015c). The concepts of "post-carbon cities", "zero-carbon cities" and "carbon neutral cities" have raised attention in the last years to address the challenges of global warming, striving to find effective strategies for cities development able to reduce climate changing carbon emissions. The concept of "post-carbon cities" has been explored in recent years, following the acknowledgment of the need of decarbonising cities and the economy. The concept of "post-carbon cities" signifies a rupture in the carbon-dependent urban system, which has led to high levels of anthropogenic greenhouse gases and the establishment of new types of cities that are low-carbon as well as environmentally, socially and economically sustainable (Fujiwara, 2016). Post carbon transition has gained momentum in the institutional spheres and researchers, as "an adoption of new forms of energy and adaptation to the climate change that is already taking place" (European Commission, 2007; Vidalenc & Theys, 2013). Post carbon cities must reach a massive reduction of greenhouse gas emissions (GHG) by a factor in 2050 of four compared to 1990, a near self-sufficiency in carbon fossil fuels – oil, gas, coal – and develop the capacity to adapt to climate change (Meeus et al., 2012).

Post carbon cities is proposed as a concept allowing to put in a nutshell energy and climate issues. Resilience with regards to oil price rising and supply disruption is one of the key challenges addressed by post-carbon cities. The "zero-carbon city" concept is based on lower-carbon emission level. Zero-carbon cities avoid carbon emissions and realize their functions adopting low carbon structures and technologies, aiming at balanced development of economy, society, and environment (Zhao et al., 2011), establishing "science-based carbon reduction targets, policies and action plans,

including governance and capacity building to enable them to contribute to the successful implementation of the Paris Agreement and the EU's strategic vision for carbon neutrality by 2050"[12].

The adaptive reuse of cultural heritage buildings can be an opportunity to implement the circular economy in the historic built environment, if a life-cycle approach is adopted to assess the environmental impacts of reuse vs. new construction. The Life-Cycle Assessment can be a valuable method to stimulate policy makers to incentivize energy retrofitting interventions in existing heritage buildings, providing evidence-base of the environmental benefits of reusing vs. constructing new "zero net carbon" buildings. Moreover, the adaptive reuse of cultural heritage can have many additional positive impacts, for example on urban regeneration and enhanced attractiveness, jobs creation in heritage-related sectors (economic spill overs), as well as citizens' identity, civic responsibility and people wellbeing (CHCfE Consortium, 2015; Fusco Girard & Gravagnuolo, 2017; Antonia Gravagnuolo et al., 2017; Gustafsson, 2019a).

3.1.4 The European Quality Principles for EU-funded interventions upon cultural heritage[13]

A key result of CLIC collaboration with the ICOMOS is represented by the publication of the document "European Quality principles for EU-funded interventions with potential impact upon Cultural Heritage", stemming from the work of an expert group assembled by the ICOMOS, under the mandate of the European Commission and in the framework of the flagship EU Initiative of the European Year of Cultural Heritage 2018, "Cherishing heritage: developing quality standards for EU-funded projects that have the potential to impact on cultural heritage".

The main objective of the document is to provide guidance on quality principles for all stakeholders directly or indirectly engaged in EU-funded heritage conservation and management (i.e. European institutions, managing authorities, international organisations, civil society and local communities, private sector, and experts).

The starting point of the document affirms the importance of cultural heritage for Europeans as "a resource for society, retaining and transmitting the many and diverse values of Europe's culture to the future" (ICOMOS, 2019, p.11). Further, the document recognizes the contribution of cultural heritage to sustainable regional development and therefore cultural heritage sector receives support from a wide range of EU policies also those related to regional development, social cohesion, agriculture, urban, maritime affairs, environment, tourism, education, disaster risk management, the digital agenda, research and innovation (ICOMOS, 2019, p.12).

The main objective of the document is to provide guidance on quality principles for all stakeholders directly or indirectly engaged in EU-funded heritage conservation and management (ICOMOS, 2019, p.14). One important basis for the document is to find opportunities to assess conservation projects supported by the European Commission all over EU. Conservation is in the document used as the overall designation for preservation, restoration, (re)use and conservation activities. The document focuses on the core issue of quality in interventions on cultural heritage, and provides a summary of key concepts, international charters, European conventions and standards and changes in understanding and practise of heritage conservation (ICOMOS, 2019, p.5).

[12] https://energy-cities.eu/project/zero-carbon-cities/
[13] This section was elaborated basing on (Gustafsson, 2019b).

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Intensive work is currently underway to develop strategic position for investment and financing from European Regional Development Fund, the Social Fund, the European Maritime and Fisheries Fund for the programme period 2021-2027.

The national strategic positions 2021-2027 shall be based on national goals and regional priorities regarding the future regional growth work, and consider the EU Commission's investment guidelines for cohesion policy funds 2021-2027 and the country-specific recommendations.

This opens up for the cultural heritage sector to provide a basis for clarifying how cultural heritage contributes to meet the objectives proposed by the European Commission and provide an interpretation of its relevance to sustainable development in general.

Today all regions in Europe are working with smart specialisation strategies which are boiled down to the EU Structural Funds' regional Operative programs within the objective investments for employment and growth. The concept of trading zone can be usefully applied to elaborate an innovative concept in which heritage is no longer the monopoly of restricted groups, but becomes a production factor for an inclusive and sustainable development model, i.e. the economy of tomorrow. The trading zone is an active arena or a field of force corresponding to the actors' various policies, values, legal frameworks and resources. The trading zones are therefore negotiation models between cultural heritage, economic growth and sustainable development. This encourages a completely new paradigm for the cultural heritage sector; from a supply-driven planning concept to demand-driven, heritage-led development where cultural heritage is understood as an infrastructure for adaptive re-use and conservation as an investment. Cultural heritage planning could then be mainstreamed and clearly integrated into smart specialisation strategies which would focus not only on preservation, but on the adaptive re-use of historic buildings and how these activities could be linked to inclusive, sustainable and innovation-driven development.

3.1.5 The New European Bauhaus [14]

From the very beginning, the circular economy has been a design-led agenda, which encourages upstream solutions that build to systemic change. The New European Bauhaus initiative, taking inspiration from the influential Bauhaus movement, provides Europe with the opportunity to demonstrate the potential of the circular economy, and lead the way in the transition.

Announced by Ursula Von De Leyen in 2020, The New European Bauhaus has the chance to connect two acts of the European story in the 21st Century: the moment we are in, and the future we want to inhabit.

The former sees us grappling with myriad interwoven and complex problems, aware of opportunities for innovation and progress but frustrated by the scale and pace of change. The latter can be characterised by the notion of redefining value creation by adopting a circular economy: a framework for an economy that is regenerative by design, built on the principles of eliminating waste and pollution, keeping products and materials in use, and regenerating natural systems. At European level, the direction towards a circular economy has been set since 2015, and is captured in the current Circular Economy Action Plan. This supranational intent is supported by the explosive acceptance that the circular economy has received, from many sectors of society, including businesses small and large, academia, the media and citizens.

[14] https://medium.com/circulatenews/the-new-european-bauhaus-and-the-circular-economy-69037a708a41

The New European Bauhaus builds on the European heritage of reconciling art and science; thinking and doing. It builds on the heritage of the Enlightenment, challenging contemporary rules and searching for a better way. This project gives us the chance to elevate the circular economy discourse from technicalities and resource economics to an aspirational project for society, with deep cultural resonance. Considering the inspiration for the New European Bauhaus, it is useful to consider what the contributions of the original movement may look like in the context of today's circular economy opportunity.

Materials and making

The Bauhaus brought creatives closer to the materials, tools, and techniques that would combine to create their products, encouraging them to experiment with these capabilities in new ways. This led to improvements in ease of manufacture, light weighting, and aesthetics. It was also a step away from the backwards 19th century industrial context, and a declaration on the priority of the human experience.

Today, new capabilities in biomaterials, additive manufacturing, digital fabrication, and artificial intelligence are unlocking limitless possibilities for making. Designing for the circular economy is not 'one size fits all', so is itself a creative challenge for the designer. Relevant solutions range from bio designed packaging that dissolves the moment it is used, to building facades that incorporate algae to generate energy, to manipulating the structure of materials to build in new properties, to using durable materials for product longevity.

Innovators are already unlocking such possibilities, but real progress requires system innovation in tandem with technological innovation. If we want a circular economy that is safe, healthy, and regenerative, materials matter: it's not just about 'closing the loop', but considering the materials that are in the loop. So designers need to work with the system today, whilst moving it towards new outcomes. Innovators need to understand, predict, and respond to the systemic implications of their inventions. They need a place to experiment, in a way that is visible and connected to industry and routes to scale.

Design with purpose

The Bauhaus rejected the ornamentation and decoration that had characterised art, design, and architecture at the beginning of the 20th century. The new approach offered rational, elegant solutions to problems, without adornments that did not provide function or value. A century later, the Bauhaus maxim of 'form follows function' continues to inspire designers.

Yet many of today's designers are facing a similar opportunity to break with the practices of recent decades. They are questioning how they create value, for their users and society at large. Faced with mounting challenges, today's designers are dissatisfied with the prospect of creating unnecessary or superficial things that do not provide function or value. They desire to solve real problems, for people and increasingly for the wider systems in which they sit. Evidence of this can be found in the 'right to repair' movement, decentralised production and the maker movement, calls for society centred design, and a wave of impact-driven design challenges.

Designers want a legacy to be proud of, and the backdrop of the 21st century offers uniquely abundant ways to use design and creativity with true purpose and meaning. Creatives around the world are discovering that the circular economy framework offers guidance to deliver on this potential, and the New European Bauhaus can further act as a crucible for innovation. It could be said that 'form follows function' has a new interpretation: the way things look is led by their fit for a regenerative, circular economy.

Collective creativity

"The guiding principle of the Bauhaus was therefore the idea of creating a new unity through the welding together of many 'arts' and movements: a unity having its basis in Man himself and significant only as a living organism." - Walter Gropius

The Bauhaus school provided a new movement with a place to ferment. Rather than working in isolation, in line with the stereotype of the artist at the time, those at the Bauhaus school worked in cross-disciplinary collaboration. This enabled more profound leaps in design theory, techniques, and expression.

In the context of contemporary challenges, revolutionary collaboration has never been more necessary. From global issues such as climate change, plastic pollution, and ecosystem degradation, to reimagining linear food and fashion systems, these complex problems require working together in new ways. No one actor, industry, or government holds the answer. Creating the conditions for different individuals and communities to work together in a dynamic state is key to systems change. However, these spaces are few and far between today. Despite efforts, even the most progressive organisations struggle to overcome the 'corporate immune system' that inhibits new ideas. Europe has a key role to play in creating spaces where different actors can come together with the freedom and security to experiment, united around a common vision or challenge. In the coming years, the New European Bauhaus initiative seeks to establish at least five pilots across member states. By establishing iconic, exemplary experiences and spaces, the European Commission can encourage solutions that are locally relevant, whilst bridging cultural lines through their connection to the north star of the circular economy.

In establishing the New European Bauhaus, Europe can take the lead in shaping a clear and compelling narrative for progress in this century. As Walter Gropius said, 'society needs a good image of itself'. For many, that image is already coming into focus: they can see the benefits of a society that rests on the principles of a circular economy.

The best way to communicate that image is to bring it off the page of a report or website, and instead to show it to people, to engage their senses and let them experience it first-hand. This is where art and design excel. As such, the New European Bauhaus is a chance to connect the people, technologies, and issues of our time, and demonstrate that a different future is possible.

3.1.6 The Human-Centred development approach

Many recent documents at European level have put attention on the human aspect of development strategies: in the New Urban Agenda of UN Habitat (United Nations (Habitat III), 2017) the human-centred paradigm is the precondition to "make cities and human settlements inclusive, safe, resilient and sustainable" (United Nations, 2015b) and assumes as its ground all previous international documents and treaties on human rights. In the same year, European Commission has launched the European Pillar of Social Rights (Establishing a European Pillar of Social Rights, 2017), since the first Treaty (European Comission, 1997) the European Union has declared that "the aims of the Union are inter alia to promote the well-being of its peoples. It works for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment". The human scale of the city can be more in particular interpreted as the city where the economy is an instrument and not a goal; where the wellbeing of people and health are considered in their priority; where are implemented synergies and cooperative networks and symbiosis; where are localized many networks of communities, able to

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

self-manage, self-organize; where all public spaces and participation principles are implemented and not only theoretically proposed (Fusco Girard, 2016).

Also in the last time, this human-centred perspective has been strongly stressed by the European Union, especially in proposing new development strategies based on circular economy model. Indeed, the European Pillar of Social Rights is assumed as compass both in recent European Green Deal (European Commission, 2019b) and in the definition of "A New Industrial Strategy for Europe" (A New Industrial Strategy for Europe, 2020) to ensure that the expected transitions are socially fair.

In two recent European Commission documents (European Commission, 2019c, 2020c), the human-centred city is achieved through research and innovation actions in six fields - "people", "place", "prosperity", "resilience", "governance", "measuring innovative cities". It highlights in which way they create opportunities for citizens to accelerate the transition to inclusive, resilient, safe, climate-proof and resource-efficient ecosystems (in the first document) and also they are useful to address global urban challenges assuming a holistic perspective (in the second document).

Human-centred development assumes the key role of tangible, material, economic values together with intangible, qualitative, immaterial values, such as trust and cooperation as engine of synergies and thus of development. The humanization paradigm requires the promotion of a "new economy" for the production and distribution of wealth (Fusco Girard, 2020). Also the form of solidaristic, social, cooperative economy are examples of interesting new perspectives. The circular economy as the economy of co-evolution (Kallis & Norgaard, 2010) and of relationships offers interesting directions. It reflects an image of the human being which is not based on the conventional/traditional *homo aeconomicus*, but it recognizes also other dimensions: the *homo oecologicus*, the *homo socialis*, *homo reciprocans*, *homo politicus*: of the human being in relation to others and to the Hearth, putting in relation the *homo economicus*, *homo socialis*, *homo oecologicus* (Costanza, 1992).

The implementation of the circular model to urban regeneration strategies requires a paradigm shift in which all economic values co-exist and co-evolve with eco-logical values and with social/human ones, thus allowing the implementation of a human-centred strategy (Bosone & Fusco Girard, 2019; Fusco Girard & Nocca, 2019). Human-centred development strategy assumes as its main goal the centrality of human being's needs and rights (health, well-being, work, housing, services, quality of life, etc.) interpreted in a relational perspective, in order to achieve the "human flourishing" (Hannis, 2016). The adoption of a systemic approach requires considering that, the various components of the urban system are interconnected and that impacts on one of them have inevitable effects on the others. This means that the new human-centred circular regeneration strategies must take into account the impacts they have not only in terms of the physical transformation of space but also on the social level (improving the quality of life, increasing social inclusion and cohesion, etc.). At environmental level (reducing emissions, implementing decarbonisation strategies and limiting global warming) and at economic level too (distributing wealth, creating new business opportunities, etc.)(Fusco Girard, 2020).

In this perspective, the regeneration of cultural heritage and landscape becomes a "productive activity" (Fusco Girard et al., 2014) that multiplies values preserving the existing ones and producing "new" ones in multiple dimensions.

The implementation of the circular and human-centred regeneration strategies should require the identification of the "intrinsic value" (Fusco Girard & Nijkamp, 1997b) of the settlement system, interpreted as the intangible value which spatially express the relation between man and landscape and constitutes the ground for other values, with which it is connected. This perspective offers a vision and a direction to implement circular human-centred regeneration strategies able to

regenerate the “complex value” of landscape (Fusco Girard, 1987a; Fusco Girard & Nijkamp, 1997b). The recognition of intrinsic value and the relationality are the elements that connect the humanistic approach with the ecological one. In this perspective, the circular economy, interpreted as the economy of coevolution (Kallis & Norgaard, 2010) and of relationships, allows to adopt a systemic vision, attentive to interdependencies. In this scenario, the centrality of human beings overcomes the anthropocentric vision to highlight the relationships, in the space and in the time, between human beings, between people of this and of future generation, but also between people and nature (Fusco Girard, 2019b).

In this sense the shift to a human-centred paradigm implies a cultural change, because culture represents the specific product of human beings that shapes the society’s vision of the world, influencing people’s choices and behaviours, connecting them with nature and with others.

In this perspective, the development of the human being’s creative capacity be-comes the main goal of development and it expresses its main potential through the involvement and the empowerment of local communities, in terms of active citizenship, pro-active participation and self-organization capacity (Fusco Girard, 2019b, 2020).

The circular human - centred adaptive re-use of the heritage asset is proposed here to transform dead assets into living systems (Fusco Girard, 2020), to be managed as living organism, able to continuously adapt themselves to changing contexts and to external conditions. The general conditions for the success of the circular-human centred adaptive reuse can be summarized into the re-generative capacity, the symbiotic capacity, and the generative capacity (see section CLIC theoretical framework of Circular Adaptive Reuse of Cultural Heritage).

The above-mentioned underlines the importance of evaluation - also at the European level defined as “cross-cutting dimension” (European Commission, 2019c, 2020c) - to elaborate methods and tools to assess, monitor and improve the performances of circular and human-centred regeneration strategies.

The evaluation in the perspective of the circular economy implies to interpret phenomenon through a systemic perspective and to adopt more specific and integrated approaches, allowing to consider multidimensional impacts and to capture the complexity of values involved in regeneration processes.

3.1.7 The Circular Economy and Circular City model

The **circular economy** represents a **pathway to sustainability**, promoting a development model that **“decouples growth from resource constraints”** (Ellen MacArthur Foundation, 2015), **internalizing negative environmental and social externalities, or reducing them through innovative production-consumption models** and business models (Ellen MacArthur Foundation, 2014). A circular development model is also **“regenerative”**: this means that not only negative externalities are reduced, but also **positive environmental, social (and cultural) impacts are produced** to benefit the society as a whole (Wijkman and Skånberg, 2015).

The implementation of this model requires diversified action at the macro, meso and micro level (Ghisellini, Cialani, Ulgiati, 2016), the macro level referring to governmental action (laws, regulations, taxes and incentives) (European Commission, 2015a; Yuan, Bi, Moriguichi, 2008), while micro level refers to the scale of the single actor and enterprise business model. The meso level refers to the relationships between actors, especially enterprises in industrial ecology and industrial symbiosis studies (Boons *et al.*, 2011; Chertow, 2000, 2008; Dong and Fujita, 2015; Jacobsen, 2008) and eco-

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

industrial parks (Shi *et al*., 2010; Yu *et al*., 2015) while in other studies it is linked to the scale of the city / territory considering the relationships and synergies between territorial actors (Chen *et al*., 2012; van Berkel *et al*., 2009).

The **circular economy model** exploits synergies in the business/financing sector, in the social, cultural and institutional dimension through innovative public-private-civic partnerships for the management of commons, and environmental synergies through adaptive reuse of buildings and landscapes, of their embodied energy and local materials.

The **Circular economy** is a **sustainable economy that enables a continuous positive development cycle** that **preserves and enhances the created values, in an indefinite time, of cultural and natural capital**, **optimises resource yields** and **minimises system risks by managing finite stocks and renewable flows** (Ellen MacArthur Foundation, 2013, 2015; Ghisellini et al., 2016; Kirchherr et al., 2017; Korhonen et al., 2018; Wijkman & Skånberg, 2015). Thus, it is a **win-win-win regenerative approach** where economic growth and heritage conservation (tangible and intangible) and community co-exist and co-evolve (Fusco Girard & Gravagnuolo, 2017). It focuses on closed loops especially in recovering (and recycling) values in order to keep materials circulating through the economy and by considering the potential of cultural heritage in adaptive re-use that includes, socially and environmentally responsible use, innovative sourcing and designing to address human needs and well-being. It adopts a whole system perspective (consider value in a broader view) and longer, multiple and cascade cycles and it addresses all sectors of society at all levels (European Commission, 2015a; European Commission & Eco-innovation observatory, 2016).

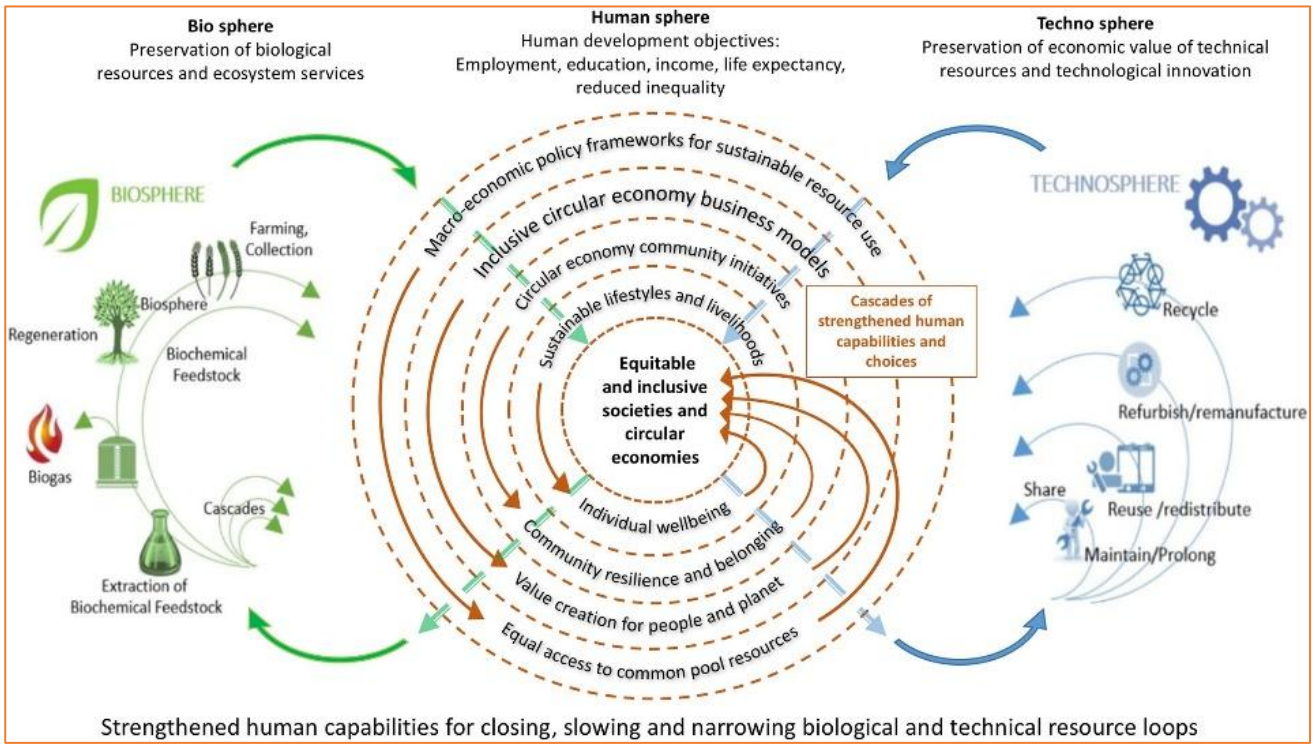
Figure 1 expresses in different terms the circular economy model, where each value in one dimension is generative of impacts / values / externalities (disvalues) in other dimensions. The symbolic dimension becomes attractor of economic activities. The environmental value becomes attractor of economic activities as well, which in turn enhance livelihoods income and employment in a reciprocal process.

The circular economy model, in this sense, projects the economic dimension into a multidimensional space, and thus requires a multidimensional / complex notion of value.

The co-evolutive model of ecological economics sees in culture a fundamental filter: culture influences the quantity of wastes discharged in the ecosystems, the quantity of resources extracted from ecosystems, and the percentage of wastes reused / recycled, the perception of economic needs, the consumption patterns, etc.

Figure 1 - The conceptualization of the circular economic model

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758



Source: (Schröder et al., 2020)

Many **European cities and regions are developing their strategies for the circular economy** (Amsterdam, Paris, London, Glasgow, Kalundborg, Rotterdam, Brussels, Lille…), stressing the role of territorial actors and synergies to deliver new services and products and sustainable, "circular" production-consumption strategies, with the aim of boosting sustainable economic growth while enhancing the environment and social benefit (European Commission, 2015a). While most of the strategic plans for the circular city are focused on waste management and industrial symbiosis, studies focus also on the social and institutional dimensions as key to achieve a "full" circular development (Moreau *et al*., 2017).

The circular economy concept has been often linked to the concept of sustainability in scholarly literature (Geissdoerfer *et al*., 2017). However, **the definition of sustainability can be still challenging, since scientific studies often do not consider "culture" as a key dimension and fourth pillar of sustainability** (CHCfE Consortium, 2015). Culture, cultural heritage and landscape are considered as key resources for sustainable development in Europe (European Commission, 2014b, 2015b; European Parliament, 2017a). Culture, cultural heritage and cultural landscape (which include natural preservation (European Parliament, 2017a) can drive a new European development model based on the circularization of processes (the circular economy) (European Commission, 2014a, 2015a, 2017). For example, the **BES evaluation framework (Sustainable and Equitable Wellbeing)** developed by the Italian National Institute for Statistics (ISTAT) identifies that the **quality of the landscape as an "indicator" of wealth and wellbeing** (ISTAT, 2015). Thus, it can be argued that the multidimensional benefits expected by the implementation of a circular economy development model can be "measured" using the **landscape "beauty" as a complex indicator**, correlated to environmental wealth, enhanced wellbeing and human health.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Strategic investments are needed to implement the circular economy model, both through policies aimed at re-orienting producers' and consumers' behaviours, and through bottom-up definition of new industrial relationships, business models, social corporate responsibility. It is more and more clear that investments in cultural heritage produce positive impacts in the economic, social, cultural and environmental dimensions. A regenerative development model, as proposed in the circular economy European policy documents, can be achieved introducing culture as one strategic area of investment.

The unique beauty of European cultural landscapes is an attractor of investments and economic activities linked to tourism, but also to cultural and creative industry, traditional "bio" food production, artistic creation, and are a reason for cultural identity, social cohesion and wellbeing. Their beauty is able to stimulate new relationships and a renewed responsibility, which entails the responsibility towards the "other" man and towards the environment.

Beauty, economy and fairness could become pillars of the circular economic model through which Europe will realize sustainable development.

The approach proposed by **Faro Convention on the Value of Cultural Heritage for Society** (Council of Europe, 2005) introduced the idea of **"heritage community"**, pointing out the ability of cultural heritage to strengthen communities' bonds.

Cultural heritage can produce wealth both directly, through use values, which meet demand and supply, both indirectly, through relational values, which get the foundation of symbiotic processes and in turn generate added economic, social and environmental values. In this way, cultural heritage can subvert the negative dynamics which affect our times, by producing **synergies and symbiosis**, tackling the **loss of relationships**, and by **regenerating common memories and knowledge**, addressing the **loss of local identity driven by globalization process**. Local communities are fundamental for cultural heritage conservation, as they contribute both to understand and to share its complex values " (Fusco Girard L.; Nijkamp P., 1997; Fusco Girard, 1987b), reinforcing their perception and enhancing the real availability to pay for conservation (Fusco Girard, 2014).

In the framework of the UN-Agenda 2030, the **regeneration of cultural landscape, supported by circular relationship between city and countryside, is critical to achieve most of the SDGs** (Hosagrahar *et al*., 2016; UN-Habitat, 2015). In fact, the major issues of sustainability lie in the **landscape**: poverty and social inequality, distribution and consumption of resources, production of waste, climate change, loss of biodiversity.

Acting on landscape is not only possible to regenerate cultural heritage, but to deal in a structural way the main challenges of our time too. This requires the development of approaches, methods and technical tools that are the result of new scientific knowledge, which pushes for reconfiguration of didactic paths, scientific research and the same vocational training.

"The challenge of sustainability is won or lost in the city" has been repeatedly noted (United Nations, 2016). Indeed, the New Urban Agenda proposed to Quito by UN Habitat suggests a series of indications to achieve sustainable development in the concrete space of cities. This New Urban Agenda, while reaffirming the call to the category of responsibility, introduces the idea of civic responsibility (par 156), after emphasizing the central role of culture (par 124) (United Nations, 2017).

Cultural heritage is an example of hybrid resource between market and public institutions, general interest and specific interest, collective and personal... cultural landscape is a hybrid between nature and culture. The perspective of cultural heritage and landscape as a "common goods" opens up the conservation scenario to new innovative forms of business, financing and

governance, abler to conserve / valorise the heritage together with the social and natural environment through the subsidiarity principle.

Innovation is here interpreted in the perspective of the circular economy. Commons and circular economy are interrelated: **the circular economy offers a co-evolutive perspective in conservation / management of the heritage, imitating nature auto-poietic processes**.

The circular economy expresses the new capitalist model (4.0), because:

- it takes into account / incorporates the external effects on the natural and social environment in generating economic wealth;
- it expresses a form of co-evolutionary capitalism that makes integration of environmental, social, development goals (Porter and Kramer, 2011);
- it projects the conventional economy in a multi-dimensional space in which, therefore, economic, ecological and social values coexist:
- it modifies and enriches the very notion of value towards a complex economic, ecologic and social value (Complex Value " (Fusco Girard L.; Nijkamp P., 1997; Fusco Girard, 1987b)).
- it modifies the project of investment/project/plan that necessarily becomes systemic.
- technological innovation fosters innovation reducing costs/enhancing performances.

This requires hybrid trans-disciplinary approaches able to combine millennial traditional knowledge with scientific knowledge, develop multistakeholder win-win business, financing and governance models, inclusive planning and decision-making. The circular paradigm is assumed here not only for the economic grow but also for promoting the human development paradigm, without "waste of people".

It projects the capitalist economy in a *multidimensional* space in which, therefore, economic, ecological and social values coexist. It is modified and enriched the very notion of value through the notion of Complex Social Value " (Fusco Girard L.; Nijkamp P., 1997; Fusco Girard, 1987b). The CE is a central political project for Europe, as it offers the potential to set a strong perspective on renewed competitiveness, positive economic development, and job creation (Morgan and Mitchell, 2015). **The circular economy vision for a competitive Europe, makes strong cases for business models centred on re-use, rather than consumption of ecological resources, and regenerative practices that have, on top of economic advantages, beneficial impacts for society as a whole** (Ellen MacArthur Foundation, 2015).

3.1.8 Urban Agenda for the EU: Partnership Circular Economy and Partnership Culture and Cultural Heritage

In June 2018, RURITAGE and CLIC gathered for the first time in Berlin, on the occasion of the first European Cultural Heritage Summit in order to explore together with other 7 projects on cultural heritage, the connections between European funded projects on cultural heritage and its valorisation at the European level. The projects took this further on 15-16 November 2018 in Brussels at the Fair of European Innovators in Cultural Heritage, where they gathered input to support the newly founded Urban Agenda Partnership for Culture and Cultural Heritage.

European-funded projects, in particular H2020 projects on culture and cultural and natural heritage have long heralded the importance of multi-level cooperation between EU Member States and Associated Countries, cities, citizens, the European Commission and other stakeholders.

The creation of an Urban Agenda partnership on Culture and Cultural Heritage, which can aid in guiding and coordinating these actors and their efforts, is music to our ears. There is no area more suited than culture and cultural heritage to further the stated aim of the Urban Agenda to stimulate growth, liveability and innovation to tackle societal challenges in the cities of Europe, including small and medium sized cities. Indeed, the scoping paper issued in June 2018 by the German Federal Ministry of the Interior, Building and Community (one of the coordinators of the new partnership, together with Italy) clearly shows that the German ministry and the active H2020 and other European-funded projects are largely aligned on the benefits of culture and cultural heritage: "The formation of sustainable societies, characterized by high quality of life, cultural diversity, individual and community well-being, social equity and cohesion, and strong economic performance."

CLIC project contributed to the *White Paper and Recommendations* to the EU Urban Agenda partnership on culture and cultural heritage[15] working with other nine European-funded projects on cultural and natural heritage, as well as on these projects' partners, including the two leading city networks ICLEI and EUROCITIES, engagement with 26 European cities and 20 regions. Buildings can only have cultural worth by virtue of evolving intangible factors, such as shared memory, dialogue and social meaning, that spin a heteroglossic web from the past into the future.

The aim was to create progress within the cultural priorities of European cities. Progress which, as emphasized in the UNESCO reports in 20161 and 2017, connects sustainable development and cultural heritage according to several objectives and strategies:

- Building on the power of culture to promote human and inclusive cities, through the transformation of cities into human-centred, inclusive, creative and innovative places, while fostering peaceful and tolerant societies;

- Improving the quality of the built and natural environment through culture by making cities compact and at human scale; considering climatic sustainability, resilience and green actions; making public spaces more inclusive; safeguarding urban identities;

- Integrating culture in urban and rural policies and vice versa to foster sustainable urban development through a sustainable local development, enhancing rural-urban linkages, improving urban governance, creating new financing methods for urban development.

3.2 Multi-Criteria Decision Analysis (MCDA) methods[16]

All interventions in urban contexts, especially those concerning the regeneration and reuse of cultural heritage, involve a particularly high number of actors (private, public and Third Sector). Each of these actors is the bearer of demands and objectives that they pursue autonomously, independently of a general framework of compatibility. These objectives are therefore multiple, heterogeneous and often conflicting. The conflicting nature of the objectives and demands is an intrinsic and not additional element in the choices of intervention in urban contexts.

For this reason, through the assessment, it is necessary to understand how to resolve these conflicts by attempting to give a complex answer to a complex problem, i.e. a problem for which several aspects must be considered simultaneously. This implies that several objectives must be pursued at the same time, which are heterogeneous (i.e. they cannot be reduced to one another)

[15] https://rockproject.eu/documents-list/download/386/white-paper-and-recommendations-to-the-eu-urban-agenda-partnership-on-culture-and-cultural-heritage

[16] This section was elaborated basing on (De Montis et al., 2004; Fusco Girard, 1987b; Ishizaka & Nemery, 2013; Montis et al., 2000).

and conflicting (i.e. maximising the pursuit of one leads to a reduction in the level of pursuit of the others, preventing them from reaching maximum values). Moreover, these objectives are often expressed in an uncertain or ambiguous manner and are pursued by a multiplicity of actors and groups, each pursuing different strategies.

In the formal terms of decision theory, this integrated approach can be defined as a procedure that seeks optimality in the pursuit of many (non-reducible and conflicting) objectives at the same time, considering the others as constraints (i.e. reducing one with reference to the others).

The presence of heterogeneous and sometimes conflicting objectives makes it impossible to reduce the assessment of benefits to a single common denominator. This means that it is not possible to find a project that maximises the pursuit of all objectives simultaneously. On the other hand, one is often only faced with priorities that appear to be incompatible (such as those of economic development and those of environmental protection).

Today's society is characterised by extreme fragmentation with a multiplicity of decision-making centres and groups intervening and interacting in decisions with different contractual strengths, and generally each group or decision-making centre has different and heterogeneous interests or objectives. Fragmentation, diversity, heterogeneity and complexity are the characteristics of the real system in which also the choices related to the regeneration and re-use of cultural heritage have to be made.

Multi-criteria analyses are an attempt to respond to evaluations of projects with tangible and intangible benefits by putting them on an equal footing with many objectives at the same time. This type of analysis recognises the multiplicity of groups involved in the decision-making process and the impacts of the project.

These methods go beyond the field of economic-estimative research but have led to an adaptation of the methods of economic evaluation of projects to include the evaluation of non-monetary benefits through the recognition of the multiplicity of decision-making actors from the social groups involved and their consequent conflicts.

In other words, it was precisely the development of these multi-criteria/multi-group methods that contributed to pointing out the difficulty of making aggregations (by identifying a single final index of project preference) and the advisability of estimating their various impacts or benefits in terms of "effectiveness" (i.e. the ability to pursue a set of objectives) and "equity" (i.e. the behaviour of the projects with reference to the various groups).

The use of non-monetary scales (interval scales or even ordinal scales) to integrate the assessment of cultural, social and environmental impacts with economic ones seems to be necessary in order to be able to use evaluation methods with some success in the cultural heritage sector for which the more traditional economic analyses are reductive. This means substituting analyses of economic impacts with multidimensional impact analyses as a prerequisite for solving selection problems and for applying project evaluation methods.

Recent documents at international level (EuropeAid & European External Action Service, 2015) have highlighted the complexity and multidimensionality of the objectives to be pursued and therefore assessed. In the light of the growing awareness that environmental problems are closely linked to economic and social impacts, the difficulty of managing the uncertainties, high stakes, urgency, and disputes that characterise decisions concerning environmental problems (Funtowicz & Ravetz, 1990) and influence the choice of method has emerged in the international scientific and political debate.

A number of theoretical (Castells & Munda, 1999; Giuseppe Munda, 1995) and empirical studies (Andreoli & Tellarini, 2000; Mendoza & Prabhu, 2000; M. Porter & Janssen, 1996) have shown that MCDA provides a useful tool for decision support in the field of environmental decision making, as it allows for the consideration of multiple objectives, the use of different types of data, and the involvement of different stakeholders. More generally, many studies (De Toro, bartlomovic, kiselakova) have highlighted the relevance of these methods with reference to the issue of sustainable development, trying to clarify their usefulness and formulate quality criteria (Figure 2) to guide the choice with reference to a specific problem and user demands (Montis et al., 2000).

Figure 2 - List of quality criteria for MCDA methods

		MAUT	*AHP*	*Evamix*	*ELECTRE III*	*Regime*	*NAIADE*	*MOP/GP*
Operational components of methods								
Criteria	Inter-dependence	Not allowed	Allowed	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
	Completeness	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Required
	Non-linear preferences	Allowed	Not allowed	Not allowed	Not allowed	Not allowed	Allowed	Allowed for some variants
Weights	Transparency of process, type of weights	Cardinal weights assigned	Cardinal weights assigned	Ordinal weights assigned	Cardinal weights assigned	Ordinal weights assigned	No weights assigned	Weights assigned for some variants
	Meaning	Trade-offs	Importance	Importance	Importance	Importance	No weights	Importance
Solution finding procedure		Complete ranking	Complete ranking	Complete ranking	Non-dominated option/s calculated	Complete ranking	Non-dominated option/s calculated	Non-dominated option/s calculated
Applicability in user context								
Project constraints	Costs	Depending on the numbers of attributes, stakeholders involved, etc.	Depending on the numbers of attributes, stakeholders involved, etc.	Depending on the numbers of attributes, stakeholders involved, etc.	Depending on the numbers of attributes, stakeholders involved, etc.	Depending on the numbers of attributes, stakeholders involved, etc.	Depending on the numbers of attributes, stakeholders involved, etc.	Depending on of the numbers attributes, stakeholders involved, etc.
	Time	Depending on the numbers of attributed, stakeholders involved, etc.	Depending on the numbers of attributed, stakeholders involved, etc.	Depending on the numbers of attributed, stakeholders involved, etc.	Depending on the numbers of attributed, stakeholders involved, etc.	Depending on the numbers of attributed, stakeholders involved, etc.	Depending on the numbers of attributed, stakeholders involved, etc.	Depending on the numbers of attributes, stakeholders involved, etc.
Structure of problem solving process	Stakeholder participation	Necessary	Necessary	Supported	Supported	Supported	Necessary	Supported by a few variants

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

	Problems structuring	Via the construction of utility functions	Via the construction of suitable hierarchies	Via the construction of the evaluation matrix	Sometimes cumbersome	Vie the construction of the Regime vector	Via the construction of the evaluation matrix	Model based
	Tool for learning	Appropriate	Appropriate	Not appropriate			Appropriate	interactive MOP
	Transparency	High	High	High	Medium	Medium	High	Low
	Actors communi-cation	Via the integration of stakeholders	Via the integration of stakeholders	Via the integration of stakeholders	Via the integration of stakeholders	Via the integration of stakeholders	Via the integration of stakeholders	Via the integration of stakeholders
		MAUT	AHP	Evamix	Electre III	Regime	NAIADE	MOP/GP
Applicability for problem structure								
Indicator characteris-tics	Geographical scale	Different can be treated	Different can be treated	Different can be treated	Different can be treated	Different can be treated	Different can be treated	Different can be treated
	Micro-macro link	Possible	Possible	Possible	Possible	Possible	Possible	Possible
	Societal/ technical issues	Different issues are possible	Different issues are possible	Different issues are possible	Different issues are possible	Different issues are possible	Different issues are possible	Different issues are possible
	Methods combinations	Possible	Possible	Possible	Possible	Possible	Not possible	Possible
Data situation	Type of data	Qualitative and quantitative possible	Qualitative and quantitative possible	Qualitative and quantitative possible	Mainly quantitative	Qualitative and quantitative possible	Qualitative and quantitative possible	Mainly quantitative
	Risk/ uncertainties	Risky outcomes: probabilities, sensitivity analysis	Via sensitivity analysis	Via ordinal criteria only	Via thresholds		Via stochastic and fuzzy numbers	Via sensitivity analysis and fuzzy numbers
	Data processing amount	High	Medium	Low	High	Medium	Medium	Medium
	Non-substitutability	Not possible	Not possible	Not possible	Not possible	Not possible	Not possible	Possible via constraints or lexicographic ordering

Source: (Montis et al., 2000)

According to Roy's (B. Roy, 1986; Bernard Roy, 1996) seminal texts, multi-criteria methods can be divided into three operational approaches (Bernard Roy, 1996, p. 241):

a) methods based on the use of a single synthesis criterion without incomparability,
b) methods based on synthesis by outranking with incomparability,
c) methods based on interactive local judgements with trial-and-error iteration.

Another possible division refers to two groups of multi-criteria methods, i.e. discrete and continuous, depending on whether the set of alternatives is finite or infinite (J. H. Voogd, 1982).

A brief description of some of the most commonly used methods is given below (Figure 3):

- Among the Single synthesizing criteria
  - Multiple attribute value theory (MAUT)
  - Analytic Hierarchy Process (AHP)
  - Evaluation matrix (Evamix)

- Among the Outranking methods
  - ELECTRE (ELimination Et Choix Traduisant la REalit'e)
  - Regime
  - Novel Approach to Imprecise Assessment and Decision Environments (NAIADE)

- Among goal, aspiration or reference-level approach

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

- Technique of Order Preference Similarity to the Ideal Solution (TOPSIS)

If the user wants to avoid the elicitation methods or parameters, TOPSIS can be used because only ideal and anti-ideal options are required (Ishizaka & Nemery, 2013).

MCDA methods using a single-criteria approach seek to convert the impacts related to the different criteria into a criterion or attribute that expresses the performance of each alternative against all evaluation criteria simultaneously. The higher the index, the more the performance meets the criteria, making the alternative preferable.

Figure 3 - MCDA methods classified by problems kind

Choice problems	Ranking problems	Sorting problems	Description problems
AHP	AHP	AHPSort	
ANP	ANP		
MAUT/UTA	MAUT/UTA	UTADIS	
MACBETH	MACBETH		
PROMETHEE	PROMETHEE	FlowSort	GAIA, FS-Gaia
ELECTRE I	ELECTRE III	ELECTRE-Tri	
TOPSIS	TOPSIS		
Goal Programming			
DEA	DEA		

Source: (Ishizaka & Nemery, 2013)

3.2.1 Single synthesizing criteria methods

3.2.1.1 Multiple attribute value theory (MAUT)

MAUT is based on multi-attribute utility theory (von Neumann & Morgenstern, 1944) and on the main assumption that each decision-maker consciously or implicitly seeks to optimize a function that aggregates all their views (Ishizaka & Nemery, 2013).

The MAUT represents a formal and transparent method that can handle multiple objectives, intangible factors, risk, qualitative data and time-sequence effects in ex-ante evaluations based on the decision maker's preferences (Dillon & Perry, 1997).

This means that the preferences of the decision maker can be represented by a function, called the utility function U (Keeney & Raiffa, 1979), which allows the comparison of alternatives by calculating the expected utility of each of them. Since this function is not necessarily known at the beginning of the decision-making process, it must first be constructed by the decision-maker (with the possible help of a software package or an analyst). The global utility function is derived from the global utility score, which is the result of aggregating the marginal utility functions obtained from the marginal utility score given by the decision maker to each criterion. The utility score expresses the degree of well-being that those alternatives provide to the decision maker.

Utility scores, since they are expressed as real numbers, overcome the problem of incomparability between two alternatives (which is present in outranking methods) since they are always comparable. In this way it is possible to rank all alternatives from best to worst.

Preparing a multiple attribute decision using MAUT requires the following steps (Dillon & Perry, 1997):

1) define the alternatives, the objectives, the attributes and the outcomes of each alternative in each attribute. This step is the same to start all discrete MCDA methods;
2) obtain the set of decision-maker probability distributions for the outcomes associated with each design alternative in each attribute through direct involvement methods (Dillon & Perry, 1997);
3) obtain the utility function for each attribute by assigning weights to each attribute based on the order of importance of the attributes given by the decision maker. This is done by asking the decision maker a series of questions based on the axiom of continuity (Dillon & Perry, 1997, p. 10) and presenting trade-offs. This is a crucial step in MAUT;
4) using the appropriate multi-attribute global utility function U(x) to find the expected utility of each project alternative, across the aggregation of attribute distributions for each alternative in a global criterion;
5) summarising the results and interpreting them, choosing the project or combination of projects with the highest expected utility in order to maximise the utility function.

Assuming that (De Montis et al., 2004) considerations regarding the potential and limitations of MAUT are valid, we can state that:

- The whole process presents a clear and transparent structuring.
- The meaning and assignment of the weights is clear (the weights represent the importance of the criteria) and transparent.
- The definition of the solution is clear and transparent as it is the result of the aggregation of a classification of actions according to their expected utility.
- Through the utility function, MAUT ensures in risky project choices that the choice corresponds to the preferences of the decision-maker, provided that the underlying assumptions are always known to the analysts. However, this is also MAUT's main problem, as the assumptions must be met in order to derive the overall utility function.
- Information about the decision maker's preferences is needed to construct the individual utility functions for each attribute and to construct the aggregate utility function based on all attributes. These individual utility functions build the basis for the decision.
- Risks of the outcome are accounted for by the expected utility theory, while uncertainties are checked with a sensitivity analysis.
- The costs and time involved in formulating a utility function for each attribute increase as the number of issues addressed increases.
- The derivation of the utility function is the most delicate part of the whole procedure: it is possible to tackle a decision problem consisting of several issues, as long as they can be addressed and evaluated in terms of attributes.
- Stakeholder participation is necessary and desirable. Stakeholders are involved twice during the decision-making process: by expressing their preferences when developing the utility function for each attribute and by assigning probability to certain outcomes when calculating the expected utility.

- MAUT can handle several different scales and questions, using both qualitative and quantitative data. The amount of data required is usually quite high.
- MAUT is widely used for solving single problems (economic, financial, environmental) but is little used in the field of sustainable development, since it does not allow for the interdependence of attributes and is therefore unsuitable for solving complex decision-making problems, as in the case of problems in the field of sustainable development that involve several dimensions (economic, cultural, social and environmental).
- No social function is constructed, so no interconnections or interdependencies between individuals are taken into account.
- The MAUT method is unsuitable for large-scale problems, such as those related to sustainable development, because in these cases individual preferences expressed by utility functions cannot be considered as an acceptable proxy for social preferences expressed by a larger group of people (Arrow's impossibility theorem). This applies only in the case of small-scale decision problems.

3.2.1.2 Analytic Hierarchy Process (AHP)

AHP was developed by Saaty (Saaty, 1977, 1980). It is a particularly useful method when the decision maker is unable to construct a utility function, otherwise MAUT is recommended.

From a procedural point of view this approach consists of three steps:

1) construct suitable hierarchies;
2) establish priorities between elements of the hierarchies by means of pairwise comparisons;
3) check logical consistency of pairwise comparisons (Saaty, 1980, 1988, 2012; Saaty & Alexander, 1989; Saaty & Forman, 1993). This step is common in all methods based on pairwise comparisons like AHP.

Further, in addition to step 3, also a sensitivity analysis should be conducted. Step 3 and step 4 are optional but recommended as confirmation of the robustness of the results.

The first step concerns the structuring of the problem according to the divide and conquer criterion, i.e. the decomposition of complex problems into simple sub-problems, by means of a logical process aimed at constructing appropriate hierarchies. This decomposition process is divided into two phases

1) the structuring of the problem
2) the elicitation of priorities through pairwise comparisons.

The structuring of the problem takes place through the elaboration of hierarchies. The simplest model of hierarchy consists of a minimum of three levels in which the first level is the main objective (called 'goal') of the decision problem; the second level is the criteria and the third level is the alternatives. To structure more complex hierarchies, more levels can be considered, including them as sub-criteria. Thus the organisation of hierarchies means that the factors influencing the decision are organised in such a way as to move gradually from the general (upper level of the hierarchy) to the particular (lower levels). For the same decision problem, several hierarchies may also be

constructed (e.g. one for benefits, one for costs, one for risks, etc.). For the same decision problem, several hierarchies may also be constructed (e.g. one for benefits, one for costs, one for risks, etc.).

The elements of a hierarchy (i.e. criteria, sub-criteria, alternatives) are not linked to all the others but are grouped in disjointed sets; if an interdependence between some elements is recognised, they are placed in the same hierarchical level and linked to the same element of the higher level. If the choice of the number of hierarchical levels is unlimited (although, as a general rule, no more than seven elements per node is better), it is possible to include in the hierarchy all the criteria required by the decision problem. In this sense, a complete (i.e. exhaustive) list of evaluation criteria is allowed.

In the second step one proceeds with pairwise comparisons: the criteria with reference to their impact on the main objective, the sub-criteria with reference to the superordinate criterion and the alternatives with reference to the sub-criteria.

Following Ishizaka, “a priority is a score that ranks the importance of the alternative or criterion in the decision” (Ishizaka & Nemery, 2013) and, in this step, it have to be calculated distinguishing three types:

1) Criteria priorities. Importance of each criterion (with reference to the top goal).
2) Local alternative priorities. Importance of an alternative with reference to one specific criterion.
3) Global alternative priorities. Priority criteria and local alternative priorities are intermediate results used to calculate the global alternative priorities. The global alternative priorities rank alternatives with reference to all criteria and consequently the overall goal.

In pairwise comparisons, the “Saaty scale” (Saaty, 1988, 1992), which is a ‘semantic’ scale based on numerical values ranging from 1 to 9, is used to express the importance attributed to an item with reference to a criterion in the next higher level. Each number represents the numerical conversion of the verbal judgement. In this way it is possible to examine different elements with a homogeneous yardstick. In particular, the following values express the intensity of importance between elements:

1: if two elements have ‘equal’ importance;

3: if one recognises a ‘moderate’ importance of one element compared to another;

5: if one recognises a ‘strong’ importance of one element over the other;

7: if one recognises a ‘very strong’ importance of one element over another;

9: if ‘extreme’ importance of one element over another is recognised.

The numbers 2, 4, 6, 8 can be used to express intermediate values between two adjacent judgements (i.e. between ‘equal’ and ‘moderate’, ‘moderate’ and ‘strong’, etc.).

The pairwise comparisons are grouped and organised in a symmetrical and reciprocal matrix.

Once the matrix of pairwise comparisons has been obtained from the algorithmic aggregation, the principal eigenvector (related to unity) is determined to calculate the percentage weights to be assigned to each criterion and articulate the final hierarchy. In this way, the “priority vector” is obtained, which expresses the priorities among the elements belonging to the same node of the hierarchy.

Each component of the “priority vector x” represents the ‘local priority’ of an element (i.e. a node of the hierarchy) of the pairwise comparisons; the ‘global priority’ of that element (i.e. the weight assigned to it) is the product of its local priority with the global priority of the higher node. Pairwise

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

comparisons make it possible to obtain the 'local' weights of the criteria belonging to a set, analysed with reference to the sub-goals/objectives of the higher level. The principle of hierarchical composition, or of the so-called "Synthesis", is applied by multiplying the local weights of each criterion by the weights of the corresponding superordinate sub-goals/objectives; and the products thus obtained are added together. The "local" weights are then transformed by defining the "global weights" of the objectives at the top of the hierarchical structure, defining the main result of the assessment, i.e. the generation of a hierarchical ordering of the analysed alternatives (Franciosa, 2016).

Once the local priorities have been determined, it is possible to calculate the global ones so that a ranking of the various alternatives can be constructed on the basis of their relative scores. In order to assess how robust a chosen alternative is, i.e. how little it changes over time, sensitivity analysis is carried out, which allows us to change the weights of the criteria in order to estimate how much the ranking of the alternatives can change as they change. This analysis makes it possible to assess the repercussions due to the subjectivity of the choice of criteria to be used, of the methods of aggregation and of normalisation.

The final result is a complete ranking of the evaluated alternatives established through a vector of final weights: the higher the weight of the vector, the better the alternative. Based on the variation of the weights assigned to the higher elements ('sensitivity analysis'), one can examine how the priorities among the alternatives change. This option is very useful in understanding the sensitivity and thus the relative importance of the elements in a complex evaluation. The solution to the problem, following the application of the multi-criteria evaluation model, involves a sensitivity analysis that graphically identifies to what extent the preferability of an alternative is valid as the weights of the criteria and objectives change (D'Angiolo, 2013).

Step 3 Judgments on frequent pairwise comparisons may be inconsistent, as the human mind does not have the capacity to take all relationships into account simultaneously. Then we proceed to check the consistency of the ratings for each level.

To check the consistency of the matrix, i.e. its reliability, the corresponding eigenvalue λ is calculated, which then expresses the consistency of the judgments assigned (Fusco Girard & Nijkamp, 1997a).

The closer the λmax value is to the number n, the more consistent the result. Once the value λmax is known, it is possible to calculate the Coherence Index (C.I.):

Saaty proposes a 'consistency ratio' to appreciate the consistency of the matrix, calculated as R.C. = I.C./I.R. R.I. represents an experimental 'random index' that increases as the order of the matrix increases.

To be acceptable this value must be ≤ 10%. If this is not the case, it is necessary to revise the judgements of the pairwise comparisons by reshapinga new matrix.

Assuming De Montis et al. (De Montis et al., 2004) considerations regarding the potential and limitations of AHP are valid, we can state that:

- it is particularly useful in the presence of ill-defined objectives, conceptual deficiency in the description of the problem and difficulty in setting priorities.
- it facilitates stakeholder participation in assigning weights to the evaluation criteria; in this perspective, the weights reflect different social viewpoints.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

- When comparing elements in pairs, the different judgements given by each actor can also be integrated - by means of an arithmetic mean - resulting in a single weight for each criterion, which synthetically expresses the views of all actors involved.
- It is also possible to promote communication between actors if they are asked to work together to identify general objectives, evaluation criteria, sub-criteria, and deduce their importance.
- The method is useful in a range of decision-making problems (e.g. corporate policy and strategy, public policy, political strategy, environmental planning) at different geographical scales.
- The method can be integrated with other methods where a pairwise comparison of criteria can be made if normalised weights are required.
- AHP allows the use of qualitative and quantitative data; in particular, cardinal numbers can be directly normalised without the need for pairwise comparisons.

Moreover, it is advantageous because (Kuenz Murphy, 1993):

- judgments made through pairwise comparisons are more robust;
- it is a simple and intuitive methodology that does not require any particular specialisation;
- it is adaptable to the individual as well as to the group of people;
- it allows easy review of the entire decision-making process;
- it combines the inductive-systematic approach with the deductive approach.

The disadvantages of this methodology instead are (Kuenz Murphy, 1993):

- the dependence in part of the results on the (subjective) judgements of the decision-maker;
- it is a compensatory methodology since it is a linear function that can be expressed as the sum of the partial contributions of each criterion. This means that there is the possibility of compensating a low value with a higher one and this method can sometimes be undesirable (unlike the ELECTRE (ELimination Et Choix Traduisant la REalit'e) method, which eliminates with outranking a very weak alternative related to a criterion);
- the phenomenon of rank reversal may occur, i.e. the reversal of the ranking due to the insertion of a new alternative (ceteris paribus).

3.2.1.3 Evaluation matrix (Evamix)

Evamix was developed by Henk Voogd (H. Voogd, 1982; J. H. Voogd, 1983).

The evaluation matrix in this method can include both qualitative and quantitative data.

The procedure consists of 5 steps:

1) distinguish ordinal and cardinal criteria,
2) calculate dominance scores for all ordinal and cardinal criteria,
3) Calculate standardized dominance scores for all ordinal and cardinal criteria.
4) calculate global dominance scores
5) calculate rating scores (H. Voogd, 1982; J. H. Voogd, 1983).

Assuming that (De Montis et al., 2004) considerations regarding the potential and limitations of AHP are valid, we can state that:

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Since the starting point of Evamix is the construction of an evaluation matrix, it is not possible with this method to take into account the interdependence between the different evaluation criteria.

However, it is possible to consider all evaluation criteria required by the decision problem, since there is no limit to the number of criteria to be included in the evaluation matrix.

An ordinal weight, expressing the importance among all relevant criteria, is assigned to each criterion, and then the ordinal weights are transformed into cardinal weights.

Evamix supports stakeholder participation in assigning weights to the evaluation criteria, which are not integrated but are used to show the different points of view (i.e. economic, social, environmental) expressed by the stakeholders involved.

It is also possible to promote stakeholder communication if stakeholders are asked to work together to identify general objectives, points of view, evaluation criteria, sub-criteria and deduce their importance.

The method is used to address different decision-making problems at different geographical scales. Most frequently, Evamix has been used in urban and regional planning.

Evamix allows the use of qualitative and quantitative data. In particular, quantitative data are expressed on an ordinal scale and cardinal numbers are standardized on a scale of 0 to 1.

3.2.2 Outranking methods

The development of the outranking methods was started in France in the late 1960s by Bernard Roy and his team (Roy 1985). Outranking methods were developed in an attempt to manage with less strong assumptions and to require less information from than the methods described above (De Montis et al., 2004).

Outranking methods are based on pairwise comparisons based on the assignment of a degree of preference or outranking that reflects how much better an option is than another (Figure 4).

Figure 4 - Required inputs for MCDA ranking or choice method (Ishizaka & Nemery, 2013)

	Inputs	Effort input	MCDA method	Output
Ranking/choice problem	utility function	Very HIGH	**MAUT**	Complete ranking with scores
	pairwise comparisons on a ratio scale and interdependencies	↑	**ANP**	Complete ranking with scores
	pairwise comparisons on an interval scale		**MACBETH**	Complete ranking with scores
	pairwise comparisons on a ratio scale		**AHP**	Complete ranking with scores
	indifference, preference and veto thresholds		**ELECTRE**	Partial and complete ranking (pairwise outranking degrees)
	indifference and preference thresholds		**PROMETHEE**	Partial and complete ranking (pairwise preference degrees and scores)
	ideal option and constraints		**Goal programming**	Feasible solution with deviation score
	ideal and anti-ideal option	↓	**TOPSIS**	Complete ranking with closeness score
	no subjective inputs required	Very LOW	**DEA**	Partial ranking with effectiveness score

Source: (Ishizaka & Nemery, 2013)

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Since outranking methods take into account the possible variation in the preferences of decision-makers based on the information provided and/or after careful consideration of the decision problem, the developers of such methods have considered the incomparability of the options as an important premise. Indeed, the inclusion and consideration of this dynamic component of the decision-making process implies that one option is more or less good than another according to the set of criteria on which it is evaluated. For this reason, the use of pairwise comparisons to infer global rankings has a direct influence when an action is added to or de-listed from the problem (De Keyser & Peeters, 1996; Mareschal et al., 2008). Thus, it is not possible to identify a complete ranking from the outset or even to define a partial ranking at all. Thus, incomparability is a consequence of the non-compensatory aspect of these methods. Therefore, more than other methods, these methods encourage interaction between the model and the decision maker(s).

3.2.2.1 ELECTRE (ELimination Et Choix Traduisant la REalit'e)

ELECTRE (elimination and choice expressing reality) methods constitute one of the main branches of outranking methods.

The main feature and advantage of ELECTRE methods is that they avoid inter-criteria compensation and any normalisation process, which distorts the original data.

The ELECTRE methods, long and extensively developed by the father of outranking methods B. Roy (B. Roy, 1968), are relevant when dealing with decision problems with more than two criteria and if at least one of the following conditions is fulfilled (J. Figueira et al., 2005) the decision maker wants to avoid defining a common scale for criteria whose performance is expressed in different units (e.g. durability, weight, price, colour, etc.).

The problem does not tolerate a compensating effect and requires the use of indifference and preference thresholds to render small differences insignificant even if their sum is decisive.

Options are evaluated on an orderly scale or on a 'weak' interval scale when it is difficult to compare differences between two interval variables.

They can be subdivided according to the type of problem they solve (Ishizaka & Nemery, 2013).

The limitation of ELECTRE methods is that they are difficult to understand due to the complexity of the technical parameters required. For this reason, researchers have made some significant progress in automating the elicitation of these parameters, deducing them as criteria and thresholds from a clear classification made by the decision-maker with reference to the options (real or fictitious) to be evaluated. However, these methods may highlight some inconsistencies or contradictions of the decision-maker, requiring a re-assessment of judgements.

ELECTRE methods have been successfully applied in many sectors such as environmental management, agriculture and forestry, energy, water management, finance, tendering, transport and the military (J. Figueira et al., 2005). In particular, ELECTRE III is an established partial ranking method with successful real-world applications such as environmental and energy management (Josè Figueira et al., 2005; Hokkanen & Salminen, 1997; Karagiannidis & Moussiopoulos, 1997; Papadopoulos & Karagiannidis, 2008; Parent & Schnabele, 1988; Rogers & Bruen, 1998b, 1998a), and strategic planning (Kangas et al., 2001).

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

3.2.2.2 Regime

The Regime method was developed by Hinloopen et al. (Hinloopen et al., 1983), assessed and refined by Hinloopen (Hinloopen, 1985) and Hinloopen and Nijkamp (Hinloopen & Nijkamp, 1990). Regime is a qualitative multiple criteria method which can be included in the family of dominance analysis approaches, even though it is quite distinct from other methods in this family. This kind of methods aim to analyse complex situations, for which quantitative information are not allowed. Hinloopen and Nijkamp (Hinloopen & Nijkamp, 1990) list several such methods:

(a) the extreme expected value method (Kmietowicz & Pearman, 1976; Rietveld, 1980),

(b) the permutation method (Paelinck, 1977),

(c) the frequency method (Van Delft & Nijkamp, 1977),

(d) the multidimensional scaling method (Nijkamp & Voogd, 1980),

(e) the mixed data method (J. H. Voogd, 1983).

Since human activities and settlements are characterized by phenomena that are often impossible to measure, these methods are more focused on satisfying behavioural aspects (Simon, 1959) than the optimization of decision making process, as imprecise information precludes the attainment of an unambiguous maximum solution' (Hinloopen & Nijkamp, 1990, p. 38).

As in Evamix, an evaluation table is given and composed by scores of a number n of alternative scenarios with reference to m criteria. In the case of ordinal information, the weight can be represented by means of rank orders wj in a weight

vector w: w = (w1, w2, …, wj) T. The higher the value of the weight, the better the correspondent criterion.

The following main features characterize the multiple choice regime method:

the data included in the evaluation table can be cardinal as well as ordinal, as cardinal information can be considered as ordinal, with reference to the ranking position of each alternative.

The basis of the method is the regime vector. criterion scores between two alternative choice options is assessed by considering the difference between the scores. In case of ordinal information, the order of magnitude is not relevant, but only its sign (positive or negative).

The extension of the pairwise comparison to all the alternatives leads to the regime vector, composed of positive or negative signs, or eventually zeros, 'reflects a certain degree of (pairwise) dominance of choice option i with reference to I' for the unweighted effects for all judgement criteria' (Hinloopen & Nijkamp, 1990, p. 41). For all the combinations of comparisons, a regime matrix is drawn.

Usually, the regime vector is often composed of both signs.

Additional information has to be processed in a weight vector, considered as a 'rank order representation of an (unknown) underlying cardinal stochastic weight vector' (Hinloopen & Nijkamp, 1990, p. 41).

The weight vector is supposed to be consistent with the quantitative information incorporated in an unknown cardinal vector (consistency hypothesis).

The next assumption is about the dominance between two choice option and, therefore, between the respectively weight vectors.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Since the information about the weight vectors is unknown, the dominance is defined as an aggregate probability measure (or success score).

The rank order of choice options is then determined by the rank orders (or the order of magnitude) of the average probability that an alternative has a higher value than another alternative. Since the assessment of the average probability is the crucial point, a uniform density function is usually assumed for the probability distribution of the weight vectors. This argument is referred to as the 'principle of insufficient reason', and as the Laplace criterion, in case of decision-making under uncertainties (Taha, 1976). According to this statement, without any prior information, 'there is no reason to assume that a certain numerical value of weight vector has a higher probability than any other value' (Hinloopen & Nijkamp, 1990, p. 42).

Assuming that (De Montis et al., 2004) considerations about some important differences of REGIME respect other outranking methods are valid, we can state that:

- ELECTRE requires cardinal rankings, while he Regime method allows using mixed data
- The Regime method adopts ordinal weights to better describe real systems of preferences and seems more prudent in avoiding to attach cardinal values to measure the intensity of criteria importance.
- It has a simpler structure of the preference model than ELECTRE III, since is able to process mixed data adopting an
- ordinal scale for the impact scores.
- The result of the evaluation process is a complete ranking of the alternatives.
- The outcome of the analysis is quite easy to communicate and discuss.
- However, the Regime method does not admit incomparability among alternatives. Also it is not clear how the system operates in the stochastic domain.
- Despite the apparently simple structure of the Regime method, the resulting decision-making process may not be so transparent, as the analyst, involved in the task of explaining the exact mechanism of the algorithm, may meet significant difficulties in communicating the meaning and in involving the decisional community.

3.2.2.3 Novel Approach to Imprecise Assessment and Decision Environments (NAIADE)

NAIADE was developed by Giuseppe Munda (Giuseppe Munda, 1995). The impact or evaluation matrix may include quantitative and qualitative data; in particular, the values assigned to the criteria for each alternative may be expressed in the form of either crisp, stochastic, fuzzy numbers or linguistic expressions. Hence it allows the use of information affected by different types of uncertainty. It is a discrete method, and no weighting of criteria is used explicitly. The method is implemented by a software application called NAIADE.

From a procedural point of view the method consists of three steps:

1) the pairwise comparison of alternatives;
2) the aggregation of all criteria;
3) the evaluation of alternatives (Menegolo & Guimarães Pereira, 1996; G. Munda et al., 1994; Giuseppe Munda, 1995).

The first step is the construction of an evaluation matrix E, which is an m-by-n matrix characterized by m evaluation criteria and n alternatives. Its components are qualitative or quantitative entries, which express by rows the performance of each alternative with reference to a

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

certain criterion. Given a set of evaluation criteria j (j = 1, 2, …, m) and a finite set of alternatives i (i = 1, 2, …, n), the evaluation matrix E will be characterized by its qualitative and quantitative components and the pairwise comparison of alternatives (with reference to each criterion) is carried out by means of the concept of 'semantic distance' between two fuzzy sets.

The pairwise comparison of alternatives is based on six 'preference relations':

1. much greater than (>>)
2. greater than (>)
3. approximately equal to (-)
4. very equal to (=)
5. less than (<)
6. much less than (<<)

expressed for each criterion starting from the distance between alternatives. The above preference relations are analytically defined by means of six functions that express (for each criterion on the base of the distance between alternatives) an index of credibility of the statements that an alternative is 'much greater', 'greater', approximately equal', 'very equal', 'less' or 'much less' than another. This credibility index goes, increasing monotonically, from 0 (definitely non-credible) to 1 (definitely credible). Membership functions related to stochastic or fuzzy numbers consider in their mathematical expressions the semantic distance defined above.

Step 2 requires aggregation of all criteria. In order to take into account all criteria simultaneously, it is necessary to aggregate the evaluations related to the pairwise performance of alternatives according to each single criterion. A 'preference intensity index' of one alternative with reference to another is calculated and then an aggregate 'fuzzy preference relation' can be obtained where is the overall evaluation of a given fuzzy relation for each pair of actions.

Step 3 is the evaluation of alternatives. The evaluation of the alternatives derives from the information provided by the above aggregate fuzzy preference relation, defining for each action two functions + and –, from which separate rankings of alternatives are obtained. The function +(i) is based on the 'better' and 'much better' preference relations and with a value from 0 to 1 indicates how the alternative i is 'better' then all other alternatives. The second function –(i) is based on the 'worse' and 'much worse' preference relations, its value going from 0 to 1 which indicates how the alternative i is 'worse' than all other alternatives (Menegolo & Guimarães Pereira, 1996). The final ranking of alternatives comes from the intersection of two separate rankings obtained by means of the functions +(i) and (i), taking into account that it can also be an incomplete ranking because no dominated alternatives are calculated.

Additionally, NAIADE allows for another type of evaluation. It analyses conflicts between different interest groups and the possible formation of coalitions according to the proposed alternative options. Besides the 'impact matrix', also an 'equity matrix' is constructed, which contains linguistic evaluations of different social groups for each alternative. In particular, 'equity analysis is performed by the completion of an equity matrix from which a similarity matrix is calculated.

Through a mathematical reduction algorithm, it is possible to build a dendrogram of coalitions which shows possible coalition formation, and a level of conflict among the interest groups' (Menegolo & Guimarães Pereira, 1996, p. 1).

Because the starting point of NAIADE is the construction of an evaluation matrix, it is not possible with this method to take into account the interdependence existing between some different evaluation criteria. Since there is no limit on the choice of the number of criteria that can be inserted in the evaluation matrix, it is possible to consider all the criteria required by the decision-making

problem. In this sense a complete (i.e. exhaustive) list of evaluation criteria is allowed. No weights are assigned to the criteria. The final result offered by the method can be an incomplete ranking of the evaluated alternatives. In fact, the final ranking comes from the intersection of two separate rankings which allows to calculate also the non-dominated alternatives.

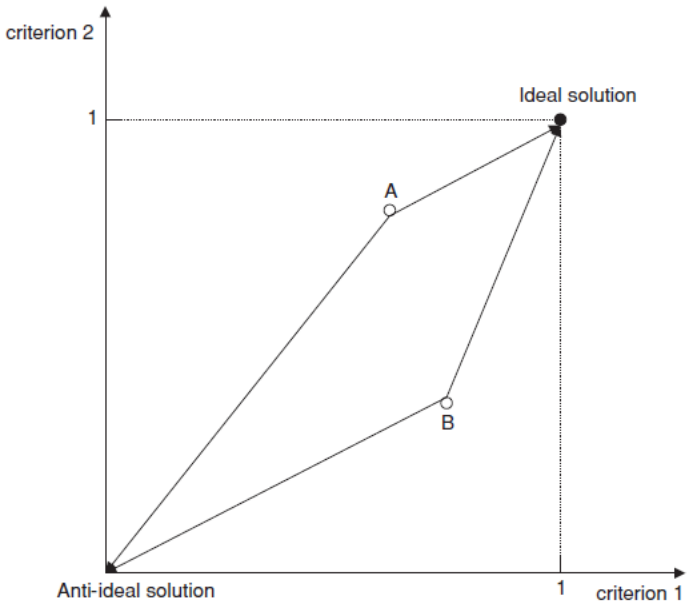
Stakeholder participation is explicitly supported in NAIADE. The method allows the construction of an equity matrix which reflect how the different social groups involved evaluate the alternatives. It is also possible to promote the actors' communication if stakeholders are called to discuss their evaluation of the alternatives. The method is used to cope with different decision-making problems (it has especially been used for problems of unsustainability) at different geographical scales. NAIADE allows using qualitative and quantitative data. In particular, qualitative data are expressed by means of linguistic evaluations and quantitative data may be expressed either in crisp, stochastic or fuzzy numbers.

3.2.3 Goal, aspiration or reference-level approach

3.2.3.1 Technique of Order Preference Similarity to the Ideal Solution (TOPSIS)

The TOPSIS method is characterized by a high degree of simplicity and comprehensibility as it uses only a minimal number of subjective parameters (from the user) as inputs, which are expressed as weights associated with the criteria. After having determined an "ideal solution" and an "antiideal solution", TOPSIS allows to find the best solution as the one which has the shortest distance to the ideal solution and the furthest distance from the antiideal solution (Hwang & Yoon, 1981; Lai et al., 1994; Yoon, 1980) as explained in Figure 5.

Figure 5 – TOPSIS method



Source: (Ishizaka & Nemery, 2013)

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

The TOPSIS method is developed in five steps:

1) collection of the performance of alternatives on different criteria in a decision matrix,
2) normalization of the performances in order to compare the measure on different units (through the methods of distributive normalization, ideal normalization),
3) the normalized scores are weighted
4) the distances to an ideal and anti-ideal point are calculated considering the actions of the decision problem (by collecting the best and worst performance on each criterion of the normalized decision matrix, assuming an absolute ideal and anti-ideal point, through the decision of decision maker),
5) proximity is given by the ratio of these distances.

3.3 The benefits of regeneration projects with qualitative multi-criteria methods

Qualitative multicriteria evaluation methods are useful to engage users in a way that is understandable by non-experts. They allow to introduce a ranking of priorities. These evaluation methods, therefore, are particularly useful to be used in processes of co-evaluation based on stakeholders/users engagement.

3.3.1 The concept of “benefits” in the projects

The main problem in project evaluation processes is the proper assessment of benefits, especially intangible benefits. Their omission, or rather their correct evaluation, leads to distorting effects in the evaluation of projects, to the point of making recourse to the evaluation process not only useless, but even counterproductive. Starting from the critical consideration that the cost-benefit analysis could not express these benefits exhaustively, some methods, at least in the initial phase, proposed giving up the cardinal scale and resorting to the scale that “structurally” is able to reflect these elements, that is, the ordinal scale. This implies, obviously, the loss of a lot of information, but it implies the possibility of expressing on the same level, which is qualitative, all the phenomena involved. In fact, in the cost-benefit analysis, benefit is defined as the amount of alternative goods and services that are willing to sacrifice (by those who use them), in order to enjoy certain benefits and that are therefore equivalent in terms of utility. The guiding concept is represented by the consumer's surplus. On the other hand, these quantities of goods and services are expressed using currency as the common unit of reference, so that it is possible to express relative values. In cost-benefit analysis, the cost of a project is represented by the value of the benefits based on the concept of willingness to pay: the cost of a project is evaluated, in short, by considering the maximum willingness to pay for the resources used in the project itself, if and when they were used in another way. In the qualitative multi-criteria methods, presented below, the concept of benefit is completely independent of willingness to pay and refers, instead, to the level of pursuit of certain preferences or goals. In other words, benefits simply become the consequences of a project positively evaluated against one or more objectives. A consequence or effect or impact of a project will be positively evaluated if the project, precisely because of that fact, contributes to the pursuit of that objective. If these positive consequences can be expressed in quantitative terms, we will speak of tangible benefit; in the other case, intangible benefit.

3.3.2 Estimating benefits using the expected value method.

The assumptions for applying this method proposed by Schlager are as follows:

1) it is possible to proceed with a graduation of objectives in order of importance;

2) it is possible to proceed to a graduation of projects in relation to the pursuit of each objective;

3) it is possible to estimate the probability of implementation of each of the alternative projects (to take account of uncertainty in the evaluation process).

To overcome all the difficulties of estimating the benefits expressed on a cardinal scale and the indirect costs of the projects, the ordinal scale is used. In other words, the estimates that are proposed are expressed in simple orders of preference, that is, they do not record the intensity of these preferences. Operationally, we proceed as follows (Schlager, 1986):

1) all objectives "n", are ranked in order of importance, with a decreasing index: n, n-1, n-2, ... ;

2) "m" projects are ranked in relation to their behavior, i.e. in relation to the ability to satisfy each objective, with an index m, m-1, m-2...in descending order;

3) each project is assigned a probability of implementation "p". Therefore, both for the weights expressing the order of importance of the objectives, and for the numbers indicating the ability to pursue the objectives by the individual alternative projects, and for those indicating the degree of probability, the numbers are used in a homogeneous manner, i.e. in their ordinal meaning, with three sequences ordered in descending order. It follows that it is possible to identify a certain value B for each alternative project, obtained by summing the products $n_i \; x \; m_i \; x \; p$ for each of the objectives that have been identified.

$$V = p \sum (n_i m_i)$$

Obviously, for what has been stated, the greater the value of $p\sum(n_i m_i)$ the more preferable is the project point the matrix of the Table 1 and the relative profile that follows illustrates a simple theoretical application, which refers to three objectives and three alternative projects point.

Table 1 – Table for identifying preferable project

Projects	Objectives	O1: protection of settled social classes	O2: protection of cultural/environmental resources	O3: minimization of the cost of protection interventions	Values of benefits of projects: $V = p \sum(n_1 m_1 + \cdots + \cdots .. n_n m_n)$
		Objective weight: 2	Objective weight: 3	Objective weight: 1	
		Project ranking	Project ranking	Project ranking	
P_A	Probability of actuation = 0,6	3	1	3	0,6 [(2x3 + (3x1) + (1x3)] = 7,2
P_B	Probability of actuation = 0,5	2	2	1	0,5 [(2x2 + (3x2) + (1x1)] = 5,5
P_C	Probability of actuation = 0,9	1	3	2	0,9 [(2x1 + (3x3) + (1x2)] = 11,7

Source: (Schlager, 1986)

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

From it is deduced that the project P_C is the one able to better pursue the objectives that have been set, having it the highest "value". As can be seen, the estimate of the benefits resulting from a project for the protection of cultural/environmental resources is resolved with numbers that exclusively express the greater or lesser capacity of one project compared to another to achieve the objectives. These numbers express "orders" and not quantities, in the sense that, for example, the number 2 does not express, with reference to number 1, the concept of double quantity, but only that it is preferable, that is, "comes first"; it indicates, in short, a place in the ranking. Evidently, the benefit of a certain project, understood as a contribution to the achievement of the objective, for example, "protection of cultural values", is expressed exclusively in qualitative terms: which is undoubtedly not only legitimate, but also quite simple. How should one interpret, in effect, the "final" summary numbers that express the "value" of the benefits of each project, and thus the differences between these "values"? Obviously, one cannot expect to obtain satisfactory results by introducing only qualitative information, orders of preference or priorities into the analysis: the numbers obtained in this way should not be read in their cardinal meaning, because they can only provide orders of preference and nothing more. On the other hand, as Nijkamp points out (Nijkamp, 1979) the application of the operations of product and sum of ordinal numbers is possible only when four axiomatic conditions are satisfied. The difference between the "value" of the benefits of one project and another does not indicate, therefore, how much one project is preferable to another, i.e. the difference in the level of pursuit of the various objectives by each project. Basically, with this method, while it is true that intangible benefits can be taken into account in the same way as other benefits, it is equally true that this circumstance is resolved by using the ordinal scale as the common scale; the result is, therefore, only indicative. The same weights to be attributed to the individual objectives, open, on the other hand, a series of problems related to their identification, anything but easily resolved. Only in the absence of information this method, with the clarifications referred to above, and usable for a first orientation.

3.3.3 Estimating benefits using the Schimpeler and Grecco method

Schimpeler and Grecco's method of the effectiveness matrix proposes an improvement over the procedure previously set out, in that on the one hand it seeks to replace the ordinal measurement scale with an interval scale and on the other it recognizes the need to develop a social evaluation of projects, i.e. one that takes into account the preferences and values of all the social groups that make up the community (Schimpeler & Grecco, 1968).

Benefits are estimated as the probability of achieving the objectives. These Estimates have significance in differential terms, but not in and of themselves. The assumptions are that one has alternative designs and that one is able to give each of the n objectives or criteria pointwise weight for first is a numerical measure of utility (i.e., the hierarchy of objectives). The following condition has to be verified:

$$\sum_{j=1}^{n} u_j = 1$$

It must also be assumed to be able to estimate the effectiveness (e_{ij}) defined as the measure of the probability that objective "i" can be pursued if project "i" is adopted. It is thus possible to estimate the total utility of a project U_i, as the measure of the benefits achieved by project i with reference to all objectives simultaneously:

$$U_i = \sum e_{ij}\, x\, u_j$$

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

The indices of effectiveness e_{ij} are assigned with the belief that 1 means that with project i the pursuit of a goal is fully guaranteed; mn-30 means that the pursuit of a certain goal i is, in practice, impossible with the project. So, the benefit estimation problem boils down to simulating the effectiveness indices e_{ij}. In general terms, the effectiveness matrix has the form shown in the following Table 2:

Table 2 – Efficiency matrix

Alternative projects	Criteria and objectives				Value of benefits
	G_1	G_2	G_j	G_n	
P_1	e_{11}	e_{12}	e_{1j}	e_{1n}	$\sum e_{1j} \cdot u_j$
P_2	e_{21}	e_{22}	e_{2j}	e_{2n}	$\sum e_{2j} \cdot u_j$
P_i	e_{i1}	e_{i2}	e_{ij}	e_{in}	$\sum e_{ij} \cdot u_j$
P_m	e_{m1}	e_{m2}	e_{mj}	e_{mn}	$\sum e_{mj} \cdot u_j$

Source: (Schimpeler & Grecco, 1968)

This matrix expresses how the generic project P_i succeeds in achieving each of the objectives $G_1, G_2, \ldots\ldots$ and therefore expresses the effectiveness of each project, understood as its capacity to satisfy several objectives at the same time.

Each row of the matrix can be interpreted as the profile of a project, i.e. in the form of how it performs against all objectives. Each column, on the other hand, indicates the difference in the ability of the various projects to pursue the same objective.

Having calculated for each project P_i the sum of the products of the numerical indices of utility U_j with reference to the objectives J, i.e. the total utility, the project characterized by the highest value of U will be chosen.

In terms of optimization, it will be sufficient to find that project which maximizes the value $\sum u_j \; x \; e_{ij}$ compatibly with the available resources.

In fact, since it is recognized that each social group attributes a different value to the same objective (and this is certainly the case for the objective “protection of cultural values”), and since estimates of a project's effectiveness may differ (since each social group perceives the project's ability to achieve its objectives differently), it is also possible to propose an evaluation of projects for each social group. These evaluations for each group can then be aggregated into an overall evaluation U_i: $U_i = U_i^1 + U_i^2 + \ldots U_i^k + \ldots\ldots U_i^P$

$$\text{where:} \quad U_i^k = a_k \sum_{j=1} u_j^{n\ldots\ldots k} \, e_{ij}^k$$

where a is equal to the percentage of the overall population represented by group K;

u_j^k is equal to the weights of the objectives by group K;

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

e_{ij}^{k} is equal to the indices of effectiveness of project i, estimated by the group K;

$U_i^k$is equal to the total utility of the benefits of project i for group K;

U_i is equal to the overall social utility of project i point.

On the other hand, the estimation of values e_{ij} implies the use of an interval scale, because it is proposed, in light of what has already been said, as an evaluation of the differential degree of the pursuit of each objective by each project

In other words, with reference to the Schlager method, here not only is it expressed whether one project is preferable to another in terms of its contribution to the pursuit of the objectives, but there is also an effort to estimate by how much the degree of preferability is greater.

Regarding the benefits related to the protection of cultural values, the method proposes an estimate of the same based on the degree of probability that the objectives themselves are achieved by the project P_i.

This circumstance implies a certain prior estimate of the effects of the project, and therefore the adoption of a scale certainly different from the ordinal point.

In essence, there is the recognition that it is necessary to make a prior analysis of the differential impacts of each project in terms of protection, corrected in probabilistic terms.

But it is not made explicit how to carry out this analysis, i.e., what units of measurement to use: the estimate of benefits is, therefore, resolved once again on an intuitive basis. It is evident, in fact, that in order to predict whether a certain project involves a greater contribution to protection than another, it is necessary to have some idea of the effects of both, and of their difference. If this difference is substantially null, it will be said that the projects involve an analogous benefit or rather have an analogous effectiveness and therefore will have the same index; if it is different, it will be said that one project is more effective than another with reference to the objective in question.

But the prediction, even if approximate, of this difference implies the introduction of a certain scale of measurement, which is then transformed into the effectiveness index, which expresses only the different probabilities of achieving the objectives.

It is evident, however, that both the predicted value method and that of Schlager and Grecco attempt to solve all evaluative problems within the framework of a technical elaboration procedure. It is imagined that the designer is able to summarize and resolve all evaluations by himself; that is, he is able to transform the facts of a project into terms of social evaluation by aggregating the various evaluations into certain synthetic indices, which are called the value or utility of a project. These synthetic indices, if the operations by which they have been aggregated and deduced are correct, express the ability of a redevelopment project to simultaneously pursue all programmatic goals.

3.4 Impact assessment methods for cultural heritage

In recent years, the issue of assessing the impacts of urban development interventions on the conservation of cultural heritage has assumed international importance.

In particular, with reference to the multiplicity and heterogeneity of the existing assessment frameworks, the need emerges to elaborate an assessment system able to be specific with reference to the single impact sectors but, at the same time, able to capture the interrelationships existing among them, in a global and systemic perspective.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

In fact, once the cultural value of the asset/area in question has been recognised, the next step is to assess the impact of the proposed interventions at a multidimensional level. This involves integrating assessments of cultural impacts (i.e. impacts at the physical level as well as at the level of meaning and values) with broader assessments that also include economic, social and environmental aspects. The following is a brief description of the most widely used and internationally recognised assessment methods that, to a greater or lesser extent, attempt to offer a solution to this problem.

The vastness and diversity of cultural heritage assets implies having to deal with many different variables that determine impacts at a multidimensional level. Therefore, it is desirable that impact assessment processes are able to make use of the variety of existing tools, without relying entirely on just one of them.

3.4.1 Heritage Impacts Assessment (ICOMOS)

In 2011, ICOMOS published its “Guidance on Heritage Impact Assessments for Cultural World Heritage Properties”, the only official ICOMOS methodological guideline concerning the management of cultural heritage change through the assessment of impacts of major redevelopment projects affecting cultural heritage and landscapes. In particular, the “Guide to Cultural Impact Assessment” (HIA) refers to sites on the World Heritage List (ICOMOS, 2011) that are recognised as having “Outstanding Universal Value” (OUV) (UNESCO, 2008).

This document was created as an outgrowth of Environmental Impact Assessment, which is limited when applied to cultural heritage because it disaggregates all possible attributes of cultural heritage and assesses the impact on them separately, adopting specific points of view. Despite this, HIA does not use community and social impact methods, such as ‘Community Impact Assessment’ (CIA) and Community Impact Evaluation (CIE) method (D. Lichfield & Lichfield, 1997; Dalia Lichfield, 2009; N. Lichfield, 1995) (see 3.4.3), but focuses exclusively on assessing the impacts of large urban interventions on the conservation of cultural heritage features and values. Rather than providing a conclusive methodology, ICOMOS wanted to suggest a perspective to be adopted in order to elaborate assessment systems that are fit for purpose, capable of considering the specificities of the property and the local context and useful in providing information for clear and transparent decision-making processes. The HIA is proposed as a tool to assess not only the impacts of large urban development projects, but it is also useful to assess the possible vulnerability of an asset/site undergoing a change in terms of urban policies (e.g. changes in land use and urban planning policies, management of infrastructure and tourism flows, etc.).

The main objective is to avoid or minimise negative impacts on internationally significant places. Therefore, the HIA must clearly highlight whether the OUV of a property/site is threatened by a proposed change or development and, for this reason, consideration of the cultural and/or natural heritage value under consideration must be the premise of any assessment process. The proposed evaluation must be able not only to consider the risk that the proposed change in a place/site might damage its value, but also to identify which are the potential beneficiaries of the change and for which reasons to evaluate the cases in which the public benefit might possibly counterbalance and justify the proposed intervention (e.g. in the case of acquisition of new knowledge). Therefore, the Guidance highlights the importance of relating the “weight” of the change to the “weight” of the values of the asset/site and the significance of the place. In this phase decision-makers are responsible for assessing whether heritage conservation needs are prioritised over development and use needs (new or existing), agreeing on solutions that mitigate negative impacts, and choosing those that

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

optimise benefits in multiple dimensions (cultural, environmental, social and economic) and that guarantee a context-sensitive intervention (Drury & McPherson, 2008).

Cultural heritage impact assessments are part of the broader group of analytical approaches to assessing development impacts that include environmental impact assessment (EIA) and social impact assessment (SIA) adopting a systemic methodological approach. In particular, many countries have adopted EIA in their spatial planning systems as a tool for assessing impacts as a result of development processes/projects (Glasson & Therivel, 2019; Morris & Therivel, 2009). In cases where statutory environmental impact assessments[17] are carried out and there is cultural heritage of particular importance, such as World Heritage List (WHL) properties that are recognised as OUV, EIAs also include cultural heritage sections as one of the factors to be assessed among a number of other socioeconomic and biophysical factors, the weight of which is given according to perceived importance in the process (Pereira Roders & Van Oers, 2012).

In these cases, although part of an EIA, the HIA does not add to the normal EIA requirements but uses the specific procedure outlined for an HIA that clearly focuses on the OUV and the attributes that convey that OUV. Therefore, the requirements should be made clear at the planning or scoping stage, the contents should be summarised at the beginning of the Environmental Statement, and the full technical report of the HIA should be included as a technical appendix.

Although the steps of an EIA and HIA are similar (defining the scope of the investigation - establishing a baseline against which to assess impacts - establishing the significance and relevance of the asset - assessing impacts), the HIA is more limited in that the analysis of impacts relates only to proposed changes to a particular asset or area of cultural significance, whereas in the case of the EIA the impacts on cultural heritage are one part of the possible overall impacts of a major development project (urban infrastructure). However, many recognise that EIA is still far from identifying a process for determining impacts on cultural significance (Bond et al., 2004; European Commission et al., 2004; Jones & Slinn, 2008).

On the regulatory side, there are still no national regulatory frameworks to ensure and guide monitoring strategies towards the implementation of HIA and EIA. In addition, the capacity of the competent authorities in this field through the development of specific skills and professionals able to increase their competences according to the different conservation needs, also considering the current instances of change at a global level, is also a determining factor. The presence of these skills varies greatly from one state to another: in some cases they are very weak within national governmental structures while in other cases environmental skills are more developed and are used as a basis or complement for the implementation of HIA (Pereira Roders & Van Oers, 2012).

The main steps of HIA are five (see Annex 2 – The Heritage Impact Assessment steps).

The final output of the evaluation contained in the HIA report should show both the evaluation for each OUV attribute and the results obtained for each individual or collective property attribute according to both a qualitative and quantitative assessment.

In addition, there should follow a testing phase of the proposals against existing policy frameworks and the management plan for the property and surrounding area to check the compatibility of the proposal (in terms of scale, pattern, uses, etc.) against the attributes of the asset/site.

[17] Directive 85/337/EEC (EC, 1985), amended by Directive 97/11/EC (EC, 1997) and the Strategic Environmental Assessment Directive 2001/42/EC (EC, 2001).

The relationship between the attributes of the asset/site and those of the context should also always be considered, so that the proposed development complements and even improves the area under consideration.

Impacts should also be assessed with reference to the authenticity and integrity[18] of the asset/site, the characteristics of which should be described already at the time of WHL entry or at the stage of SoOUV elaboration [¶79-88 of the Operational Guidelines[19]]. In this perspective, compared to the matrix of criteria and indicators proposed within the CLIC framework[20], rather than using a 4-point scale (as indicated in the proposal), the HIA could be the tool to assess indicators related to the regeneration of cultural values[21].

An aspect that is emphasised in the ICOMOS document is the question of the recipients of any benefits deriving from the development resulting from the intervention on the asset/site, as well as the economic-financial aspects linked to the feasibility of the intervention and their influence on the decision-making processes. Therefore, the overall evaluation of the proposal must take into account this complexity, highlighting the real progress determined by the intervention proposal compared to a zero state where there is no intervention.

In particular, what is evident is that the guidance proposed by ICOMOS focuses very much on the efficiency of the procedure rather than on the expected results from the point of view of the protection of heritage attributes (Pereira Roders et al., 2013). Many concepts introduced in the document such as “limits of acceptable change” and “absorptive capacity” are still very vague and there are no explanations or methods to make them operational. Therefore, the need for a more objective global approach to the Historic Urban Landscape, which considers the relationship between attributes and values also in different development contexts, still remains open. Such a value-based approach underlines the need for a broader and more complex scope of action related to the management of the Historic Urban Landscape, in which also conservation must be considered as a “dynamic process of change management” (Australia ICOMOS, 1979, 2013), including the attributes that convey the heritage, the values that define it and their relationships that represent its cultural significance, relying, in their understanding, also on participatory dynamics (Avrami & Mason, 2019). Therefore, it is in the direction of the practical implementation of the “Landscape-based approach”, through appropriate methods and tools, that international research has been orienting itself in recent years, shifting the attention more and more towards the evaluation of the impacts linked to the dynamics of place development on the meanings contained in the Historic Urban Landscape, rather than on the conservation of the object itself. A survey of practices where the Heritage Impact Assessment method has been applied to assess the impacts of large urban regeneration projects shows that from 2011 to the present day, this tool has been interpreted and applied in different ways by different local institutions, considering it fundamental for urban planning choices.

The HIA Guidance has been applied in many cases (Pereira Roders & Van Oers, 2012) but it excludes the economic and social dimension of heritage regeneration. The HIA remains a sectorial framework unable to address the complex challenges of integrated impact assessment (Fusco Girard et al., 2015; Morrison-Saunders et al., 2014; Pope et al., 2013). Furthermore, its main limit

[18] Authenticity refers to the way in which attributes transmit OUV and integrity refers to the fact that all attributes transmitting OUV are existing within the property and not eroded or threatened (ICOMOS, 2011).

[19] https://whc.unesco.org/en/guidelines/

[20] See Deliverable 2.7 “CLIC Framework of Circular Human-Centred Adaptive Reuse of Cultural Heritage”.

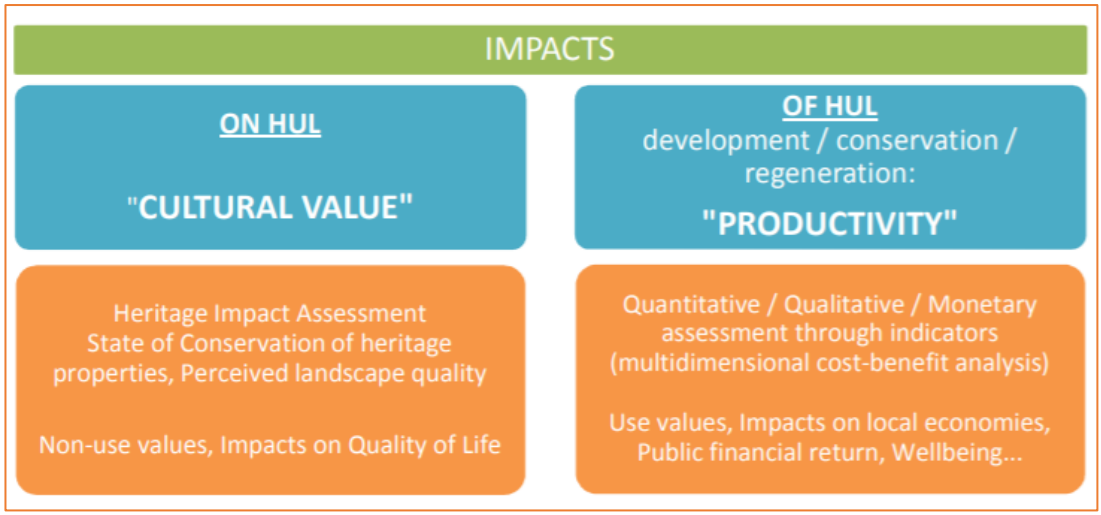
[21] See Deliverable 2.4 “Databases of indicators / data in pilot cities”.

consists in evaluating only the impacts “on” the cultural value and not the impacts “of” HUL for the enhancement of city productivity (Antonia Gravagnuolo & Girard, 2017). The aim for which the HIA was elaborated clearly emerges in this weakness as its first goal was to support the managers of WHL sites from the risks of an aggressive urbanization. Thus, this preventive approach is not able to consider the multidimensional productivity of CH in HUL perspective.

However, With reference to the CLIC proposal, the HIA could be useful to assess indicators related to the regeneration of cultural values[22].

Figure 6 shows two possible approaches to impact assessment: impacts “on” the cultural value and the impacts “of” HUL for the enhancement of city productivity.

Figure 6 - Impacts of HUL conservation / regeneration on cultural value and overall city productivity



Source: (Antonia Gravagnuolo & Fusco Girard, 2017).

3.4.2 Social Impact Assessment based on Theory of Change and Social Return on Investment

Social Impact Assessment includes the **processes of analysing, monitoring and managing the intended and unintended social consequences**, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions.

SIA is best understood as an umbrella or overarching framework that embodies the evaluation of all impacts on humans and on all the ways in which people and communities interact with their socio-cultural, economic and biophysical surroundings. SIA thus has strong links with a wide range of specialist sub-fields involved in the assessment of areas such as: aesthetic impacts (landscape analysis); archaeological and cultural heritage impacts (both tangible and non-tangible); community impacts; cultural impacts; demographic impacts; development impacts; economic and fiscal impacts; gender impacts; health and mental health impacts; impacts on indigenous rights; infrastructural impacts, institutional impacts; leisure and tourism impacts; political impacts (human rights,

[22] See Deliverable 2.4 “Databases of indicators / data in pilot cities”.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

governance, democratization, etc.); poverty; psychological impacts; resource issues (access and ownership of resources); impacts on social and human capital; and other impacts on societies. As such, comprehensive SIA cannot normally be undertaken by a single person, but requires a team approach[23].

The tool uses the Social Return on Investment (SROI) guidelines to define, measure and document the impact generated. The SIA is limited to monitoring only three main outcomes that will be continuously analysed and consists of three main steps

- identification of the social impact value proposition through the theory of change;
- identification of the 3 main indicators that will be used in monitoring the 3 main outcomes;
- identification in quantitative terms of the social value that the organisation intends to create over the next 10 years.

The Theory of Change

The ToC (Theory of Change), is a "rigorous and participatory process in which different groups and stakeholders, in the course of planning, articulate their long-term objectives (impact) and identify the conditions they believe must be in place for those objectives to be achieved. These conditions are schematised into the desired outcomes and are organised graphically into a causal structure" (Taplin & Clark, 2012). In other words, ToC, following a causal correlation that is very common in the field of project design (input - activity - output - outcome - impact) shifts the focus from "input - output" to "output - outcome(s)" and from asking "what actions should be taken to achieve the objectives?" to "what medium- to long-term change should be achieved for the benefit of the main target groups of the activities/projects and what are the best pre-conditions to achieve it?".

It is a rather rigid methodology focused on identifying a main (and unambiguous) theory of change produced (with a fairly close correlation between resources employed and value generated), to which more outcomes are linked at an intermediate level. It is not by chance that it is a very effective tool in the design/evaluation of development cooperation interventions (Magli, 2018), which hardly have a bottom up source, but are usually carried out (or should be carried out) according to a more linear process: "problem identification - intervention design - project implementation - evaluation of the problem resolution (based on the change produced)".

The theory of change is also fundamental as a basis for measuring and evaluating an organisation as it can offer a theoretical framework that can be used to assess whether an action/project is delivering the expected results or needs to be improved. For an evaluation or measurement to be effective, the right elements need to be taken into account. The theory of change makes it possible to identify strategic outcomes that need to be measured. Many organisations set too broad objectives that cannot be measured; the theory of change allows the organisation to focus on concrete and defined objectives and related outcomes, which can potentially be measured. This means that outcome measurement can feed into the organisation's strategy to ensure that resources are allocated effectively. The organisation will then be able to adapt its activities according to what works and predict what will happen in terms of results, "defining possible corrective activities or motivating the reasons for a given result" (Perrini & Vurro, 2013).

The strategy outlined through the organisation's definition of the theory of change finds its completion within the impact measurement process, which puts in a temporal sequence the phases through which the evaluation is to proceed. In addition to communicating externally, measuring the

[23] https://www.iaia.org/

impact generated and, above all, defining the theory of change that underlies it is an excellent basis for strategic planning because it methodologically works through a pathway that starts from the need one is trying to satisfy to the change one wants to achieve (Kail & Lumley, 2012). Thinking about one's own organisation's theory of change at the beginning of the process of reformulating one's strategy can be extremely helpful in focusing on the objective, as it allows one to identify existing causal links and different stakeholder views. As a result, instead of focusing on what the organisation is already doing, the focus shifts to understanding what activities are needed to achieve the objectives. The process of developing a theory of change starts with the identification of the organisation's or project's objective and then works backwards through the steps that are necessary to achieve it. By developing a theory of change, organisations can understand how different aspects of their work combine to achieve the final goal. Understanding causal links helps the process of assessing the importance of each activity and what resources will need to be invested in them (Venturi, 2015; Zamagni et al., 2015, 2018).

Social Return on Investment (SROI) method

The SROI allows to express in monetary terms the social value generated by a given intervention. It is in fact a matter of estimating, for each euro invested, how many have been generated at the level of positive social impact. One of the main strengths of SROI is its ability to synthesize the social impacts generated in a monetary value.

SROI is a structured process to understand, determine and manage the value of the social, economic and environmental outcomes generated by an activity or organisation (Venturi, 2015; Zamagni et al., 2015, 2018).

The tool, which is widely used around the world, is useful for both strategic planning and for communicating the social impact generated, which in turn can attract investment. In addition, the SROI can also be used by investors themselves to compare different investment options and assist in the decision-making process. The tool provides a detailed analysis of how value is created and is able to economically quantify the social value generated.

The SROI (The SROI Network, 2012) allows the calculation of a ratio between benefits and costs using a series of financial proxies to define the social, economic and environmental value of an investment project (A. Gravagnuolo, 2015). The seven basic principles of the SROI approach are:

1. stakeholder engagement;
2. measuring expected and unforeseen changes, both positive and negative;
3. assessing what matters with the appropriate tools;
4. use only what is material (relevant);
5. do not overestimate outcomes;
6. be transparent in measurement;
7. verify the outcome including third parties.

Conducting an SROI analysis involves six steps[24]:

[24] https://socialvalueuk.org/resources/sroi-guide/

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

1. Establish the scope of the analysis and identify the main stakeholders. Stakeholders are the people or organisations that experience the change generated by the activities. During the following steps additional categories of stakeholders not initially considered may be revealed.

2. Mapping outcomes. Creation of an impact map, or a theory of change, showing the relationship between inputs, outputs and outcomes.

3. Demonstrate outcomes and assign value to them. This step involves selecting indicators and finding data to show how outcomes are achieved.

4. Define impact. Having collected the evidence of outcomes and given them a monetary value, it is necessary to discount the aspects of change that would have occurred anyway or that are the result of other factors.

5. Calculate the social return on investment and the ratio. This step consists of adding up all benefits, subtracting negative values and comparing the result with the investment. This is the moment when the sensitivity of the results can be checked.

6. Give back, use and integrate. The last step is to share the results with stakeholders, answer their questions, integrate processes for robust and regular evaluation and verification of information.

However, it was also pointed out that the procedure of reducing outcome indicators to “equivalent economic value” necessarily leads to approximate results, not representative of all effects observed and measured (Vecchiato, 2015).

The topic of social impact is of great topicality and debate at international level: the main contributions developed by the academic and international financial community in this field tend towards the definition of quantitative and synthetic indicators: among these, the most used tool is the SROI (Social Return on Investment), which, through the estimate of future discounted social savings, monetizes the social impact of an investment. Measuring social impact is a complex practice since the concept itself is composed mainly of qualitative variables, which in many cases are difficult to quantify[25].

The assumption from which SROI starts is that every day our actions and activities create and destroy value, changing the world around us. Although the value we create goes far beyond what can be rendered in financial terms, the latter is the only kind of value that is usually measured and accounted for[26]. As a result, the things that can be bought and sold take on greater importance, while many other important things are overlooked. Decisions made in this way are not as positive as they could be because they are based on incomplete information about their true overall impact. Social Return on Investment (SROI) is an approach to measuring and reporting on this broader concept of value; it aims to reduce inequality and environmental degradation, improve well-being, and integrate social, economic, and environmental costs and benefits into the analysis. SROI measures the value of social impacts created by an organisation in relation to corresponding investments. The final result is a ratio of monetized social value (Ragozino, 2018).

The SROI measures change in ways that are relevant to the people and organizations that experience or contribute to it. It explains the story of how the change was created by measuring social, environmental, and economic outcomes and using monetary values to represent them. This

[25] https://bilanciosociale.bancaetica.it/bilancio-sociale-2014/impatto-sociale-banca-etica/
[26] http://wikits.fqts2020.it/index.php?title=SROI

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

allows a ratio of benefits to costs to be calculated. For example, a ratio of 3:1 indicates that a €1 investment generates €3 of social value.

The SROI is concerned with value rather than money. Money is simply a common unit of measurement, being, in this sense, a useful and shared form of value attribution. Just as a business plan contains much more information than just financial projections, the SROI is much more than a number. It is a story that tells us about change, on which to base decisions; a story that encompasses case studies, including qualitative, quantitative and financial information. An SROI analysis can take many forms. It can cover the social value generated by an entire organization, or it can focus on a specific aspect of an organization's work. There are also a number of ways to accomplish SROI. It can be done well as an in-house exercise or, alternatively, with an outside researcher.

There are two types of SROI:

- Evaluative, conducted ex-post and based on actual outcomes already achieved;
- Predictive, to predict how much social value will be created if activities achieve expected outcomes.

The predictive SROI is particularly useful in the planning stages of an activity. It can help highlight how the investment can maximize impact and be useful in identifying what should be measured once the project is underway.

The lack of reliable outcome data is a major challenge in conducting an SROI analysis for the first time. To conduct an evaluative SROI you will need data with reference to outcomes, whereas a predictive SROI will provide the basis for a useful approach to defining outcomes. It is often preferable to begin using SROI by estimating the expected social value, rather than by assessing the value already created: this ensures that good data collection systems are in place to conduct a comprehensive analysis in the future. The level of detail required will depend on the purpose of your SROI; a brief analysis for internal purposes will take less time than a comprehensive analysis that achieves the verification requirements for an external audience.

Finally, while on the one hand, the SROI contributes to stakeholder engagement by highlighting their values and strengthening the relationship between investors and organizations, on the other hand, there is still a lack of rules and references to be able to conduct a comparison between different analyses and the difficulty of monetizing social results emerges (Ragozino, 2018).

As part of a thesis (Magli, 2018) carried out at the IUAV University of Venice, an in itinere evaluation tool of the regenerative process of the Asilo Filangieri in Naples (a good practice included also in the CLIC platform27) was elaborated with the aim of defining a tool able to bring out and represent the value generated on the territory and on the people who live it by a free and independent urban regenerative process, without a time limit and instead endowed with a strong character of social innovation and local development" (Magli, 2018).

However, the complexities of using this tool at the Asilo Filangieri was supported by the following reasons.

- An evaluation in itinere refers to an ongoing process, which is difficult to identify in a defined time frame. Certainly, in this case, one could consider the time frame "from 2012 to today", but it would prove to be a static evaluation and an end in itself and "to date", with little room for future interpretation.

[27] https://clicplatform.eu/search?q=l%27asilo

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

- The SROI, due to its cumbersome process, is a predominantly "external" evaluation tool, which is difficult to hand over to a community as a self-assessment methodology that becomes constant over time and can be replicated in complete autonomy. Especially if this community is informal and not clearly aggregable/identifiable.
- The SROI (based on the Theory of Change) was created to measure the existence (or not) of a change (positive or negative) generated by an activity, a project or an organisation. If, however, as often happens in regenerative processes "from below", this change is not so well defined (or at least does not depend on a specific mandate) nor are the actors who produced it, but consists of a spontaneous activation of energies that act on a place, changing it in a changing way ("Energy in motion" described above in relation to the Asylum), how can everything be traced back to such an explicit and precise measurement of the outcomes produced?
- The SROI (rightly) leads all the measurement of value back to a monetary estimate in order to bring the world of social work closer to that of impact finance, providing both with a common territory in which to meet.

Experiences such as that of L'Asilo are born (also) with the political claim to escape the existing market and monetary logic. Therefore, in these cases, the attempt to quantify the "value of the immaterial" in money could seem a contradiction and a stretch.

For this reason, CLIC's approach is oriented towards the use of multi-criteria valuation methods which, by integrating different valuation scales, use both quantitative and qualitative indicators.

3.4.3 Community Impact Evaluation (CIE)

Lichfield's approach (N. Lichfield, 1988), called Planning Balance Sheet (PBS), was born to adapt the economic analysis to the problems of physical planning and is configured as a multidimensional evaluation procedure. within it it is possible to proceed to the extraction of a private and social financial analysis or a more formalized multi-criteria analysis. This method of the Planning Balance Sheet was first applied in urban planning in Ipswich and Peterborough by Lichfield and then refined (Nathaniel Lichfield, 1970).

It seeks to take into account both tangible and intangible elements, expressed on different scales, also using Fuzzy evaluations. We consider both direct and indirect users, wanting to identify "if" the well-being, following a certain plan/project of intervention, undergoes variations (positive or negative), "to what extent" and "for whom" in particular. It is therefore a method that focuses on the effects of a plan/project on all social groups in a given community, i.e. attentive to the redistributive objectives, as well as the objectives of protection efficiency. In this sense it is particularly congruent with the notion of sustainable development.

More specifically, it can be noted that on the one hand it refers to the Cost-Benefit Analysis, not only in the sense that it represents its evolution in urban planning practice, but because it refers to the same theoretical principles in the evaluation of benefits (and costs): on the other hand it tries to interact with the Cost-Benefit Analysis, with what it "escapes" from it, providing for the analysis of all quantitative and qualitative impacts and their distribution on the different social groups, using the most appropriate units of measurement, i.e. fuzzy evaluations.

The Planning Balance Sheet was later modified and called Community Impact Evaluation (CIE), both to emphasize that it is a more comprehensive type of analysis than sectoral impact analyses (such as those for energy, and transport, etc.), and to point out that it is not only the impact that is

relevant, but especially its effect on the welfare of the community concerned (D. Lichfield & Lichfield, 1997; Dalia Lichfield, 2009; N. Lichfield, 1995).

The Planning Balance Sheet method has been used for several years now to evaluate town planning plans and projects. however, it is always necessary, time by time, to adapt the general method to the specific case as differences may always collide:

1) The scale of the Plan (from regional to local);
2) The type of plan (strategic, traditional);
3) The content of the Plan (sectoral, general, expansion, conservation, etc.);
4) The time and money resources available to the firm.

While referring to the rich bibliography now existing (N. Lichfield, 1995) it is possible to point out a series of 12 operations that must be followed in the application of this evaluation procedure:

1. Description of the urban and regional system before the plan/project (the status quo)
2. Detailed description of alternative project plans
3. Description of the urban and regional system after the plan/project
4. Comparative description of design options
5. Planning variables
6. Specification of design options through plan variables
7. Changes in the urban and regional system by means of project plans
8. Prediction of impacts from design variables (including the identification of the sectors in which the community affected by the interventions under examination can be divided)
9. Definition of the sub-sectors into which the community is further divided
10. Evaluation of impacts with reference to sectoral objectives
11. Summary of sectoral preferences
12. Evaluation report

They can be traced back to the three phases of description, analysis and conclusions.

The CIE is more in-depth described in the Annex 3 – The Community Impact Evaluation phases.

Assuming the CIE (D. Lichfield & Lichfield, 1997; N. Lichfield, 1995) as a reference model (in which the evaluation process is proposed as a sequence of steps), the advancement of the method proposed by CLIC consists in emphasising the probability that characterises impacts through a dynamic and participatory evaluation process that, for this very reason, co-evolves with the needs expressed by the actors involved in the process and is increasingly refined and adapted to their satisfaction. Furthermore, the uncovered aspect in the CIE is the assessment of cultural impacts and CLIC represents a complement and an advancement in this respect.

Starting from the steps that characterize the CIE, it is possible to trace analogies with the phases of the CLIC methodological proposal even if, as previously underlined, it reinterprets them in a dynamic perspective that foresees a feedback mechanism according to which, following a process of brainstorming and critical co-evaluation by all the stakeholders involved, it is possible to go back to the previous steps, repeating the process every time an improvement is deemed appropriate.

Therefore, the steps should not be interpreted according to a rigid time sequence but according to a dynamic perspective that co-evolves with the emergence of the different priorities and needs of the stakeholders involved.

The first Phase 1: knowledge phase**Errore. L'origine riferimento non è stata trovata.** and the second phase of Definition of objectives and evaluation criteria correspond to the first step of CIE “Description of the urban and regional system before the plan/project (the status quo)”.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

The third phase Phase 3: Development of project alternatives the contents of different steps of CIE:

- step 2 - Detailed description of alternative project plans,
- step 3 - Description of the urban and regional system after the plan/project,
- step 4 - Comparative description of design options,
- step 5 - Planning variables, step 6 - Specification of design options through plan variables,
- step 7 - Changes in the urban and regional system by means of project plans.

Phase 3 can be repeated several times to arrive at a more precise definition of the project alternatives.

The phases from the phase 4 to the phase 7 of CLIC Methodology (§4.3) constitute the iterative components of the proposal.

Indeed, the pair of phase 4 Phase 4: Evaluation through qualitative criteria and 6 Phase 6: Evaluation through quantitative-qualitative indicators is assimilable to the steps 8, 9 and 10 of CIE which respectively provides:

- Prediction of impacts from design variables (including the identification of the sectors in which the community affected by the interventions under examination can be divided),
- Definition of the sub-sectors into which the community is further divided,
- Evaluation of impacts with reference to sectoral objectives.

In the same way, the pair of phase 5 Phase 5: Synthesis, discussion and re-assessment is assimilable to the steps 11 and 12 of CIE which respectively provides:

- Summary of sectoral preferences,
- Evaluation report.

Establishing these analogies, we can interpret the succession of steps 4,5,6 and 7 of the CLIC methodology as a reiteration of the CIE. The Phase 4: Evaluation through qualitative criteria implies the definition of criteria (planning variables) and their validation and prioritization through the dialogue with different groups of stakeholders to be involved and which could be potentially affected by the impact of project (CIE steps 8,9,10). Then, the Phase 5: Synthesis, discussion and re-assessment allows the validation of the first set of results obtained from the previous brainstorming phase through the discussion and the sharing of a summary of sectoral preferences and an evaluation report (CIE steps 11 and 12).

At this point, if the results do not satisfy all stakeholders, a re-assessment of the criteria and the weights to be attributed to each of them must be carried out by returning to step 4.

On the contrary, if the results meet with the consensus of all stakeholders, we can move on to step 6 Phase 6: Evaluation through quantitative-qualitative indicators**Errore. L'origine riferimento non è stata trovata.** in which the steps 8,9, and 10 of CIE are repeated, but in a more in-depth way because the information are more specific and are expressed both in a qualitative and quantitative forms.

Finally, moving on to Phase 7: Discussion and Circular Iteration), a new phase of discussion with stakeholders is envisaged, again based on the shared analysis of results through an informed discussion and the communication of results to stakeholders through the preparation of evaluation reports.

4 CLIC Methodology for impacts assessment of cultural heritage adaptive reuse

Based on what described before, the CLIC methodology is conceived as an iterative and interactive process in which, through feedback mechanisms, uncertainties and evolving preferences can be re-assessed at successive stages of development.

The methodology described here is divided into seven phases:

1. **Knowledge phase**: description and analysis of the status quo of the examined urban area;
2. **Definition of objectives and evaluation criteria**: the dialogue with local stakeholders and listening to the needs expressed by the territory in order to define project requirements and parameters for assessing the performances connected with them;
3. **Development of project alternatives**: the organisation of a public consultation contributes to the identification and implementation of the needs perceived by the local community, turning into a research opportunity for the elaboration of design solutions capable of responding to the different needs (requirements) that emerge;
4. **Evaluation through qualitative criteria**: by means of specific evaluation methods it is possible to assign a weight to each criterion which reflects its influence and importance with reference to the fulfilment of the requirements, and thus the achievement of the objectives, established in the previous steps;
5. **Synthesis, discussion and re-assessment**: on the basis of the evaluation of the project alternatives obtained, it is possible to re-define the proposals through their classification, reorganization and reshaping towards the definition of an “satisfying project” (Simon, 1959);
6. **Evaluation through quantitative-qualitative indicators**: the “satisfying project” (Simon, 1959) as such, involves the consideration of more specific and complex criteria including quantitative data. Therefore, the set of criteria and indicators used for the first evaluation is supplemented and detailed for a more accurate assessment;
7. **Discussion and Circular Iteration**: the final evaluation on the “satisfying project” (Simon, 1959) aims to test the evaluation framework, in terms of user-friendliness and data retrieval, and to verify and demonstrate that the “satisfying project” (Simon, 1959) responds better to the project objectives than the initial projects.

4.1 CLIC theoretical framework of Circular Adaptive Reuse of Cultural Heritage

Circular re-use is characterized by the capacity to move towards the regeneration of the different forms of capital. The circular re-use is thus the regenerative re-use that contributes to implement the transition towards a de-carbonized local economy (ecological economy). It is organized assuming that the natural system is functioning from the perspective of circular processes. Thus, it minimizes waste and negative environmental impacts and ecological footprint; it re-uses/recycles wastes, transforming these into resources (for example biomass as fertilizer, etc.). It extracts most of its resources from the surrounding territory; it re-uses ‘grey’ water; it uses as far as possible renewable energy sources; it contributes to regenerate the ecosystems services on which the human activities and the wellbeing of people depend; it promotes the use of nature-based solutions (walls, vertical gardens, roofs, urban areas for agriculture, urban forests, etc.). All in all, it contributes to transform

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

the linear metabolism into a circular one, imitating the wisdom of nature. The cultural re-use is able to regenerate also cultural values/meanings/sense horizons, if "well" managed.

But the above ideas are only some of the attributes of circular re-use. Many others are linked also to economic/financial aspects, to social and cultural dimensions. The **financial circular re-use of cultural heritage** is the re-use able to regenerate the financial resources for functioning over time (balancing grants support coming from public/private sources). **From a social perspective, the circular re-use of cultural heritage is the re-use able to generate a community, i.e., a heritage community**. The circular re-use is characterized by **synergies/symbioses and cooperative activities** which increase productivity.

A common feature of "circular" experiences is the search for synergies/cooperation between different subjects or groups of subjects and between these groups and the relevant institutions. The re-use of the cultural heritage can be also interpreted as a way to improve the immaterial social infrastructure of the city, generating micro-communities through the management of cultural heritage as a common good, characterized by "intrinsic value". It reflects the value that has been present over centuries and millennia. **The circular re-use transforms dead assets into living systems** (Fusco Girard, 2020)**, and is thus able to promote city resilience** (Fusco Girard, 2012)**.**

The most frequent functions in many cultural heritage adaptive re-use good practices **re-interpret and make up-to-date the original cultural and social values of places for the community**.

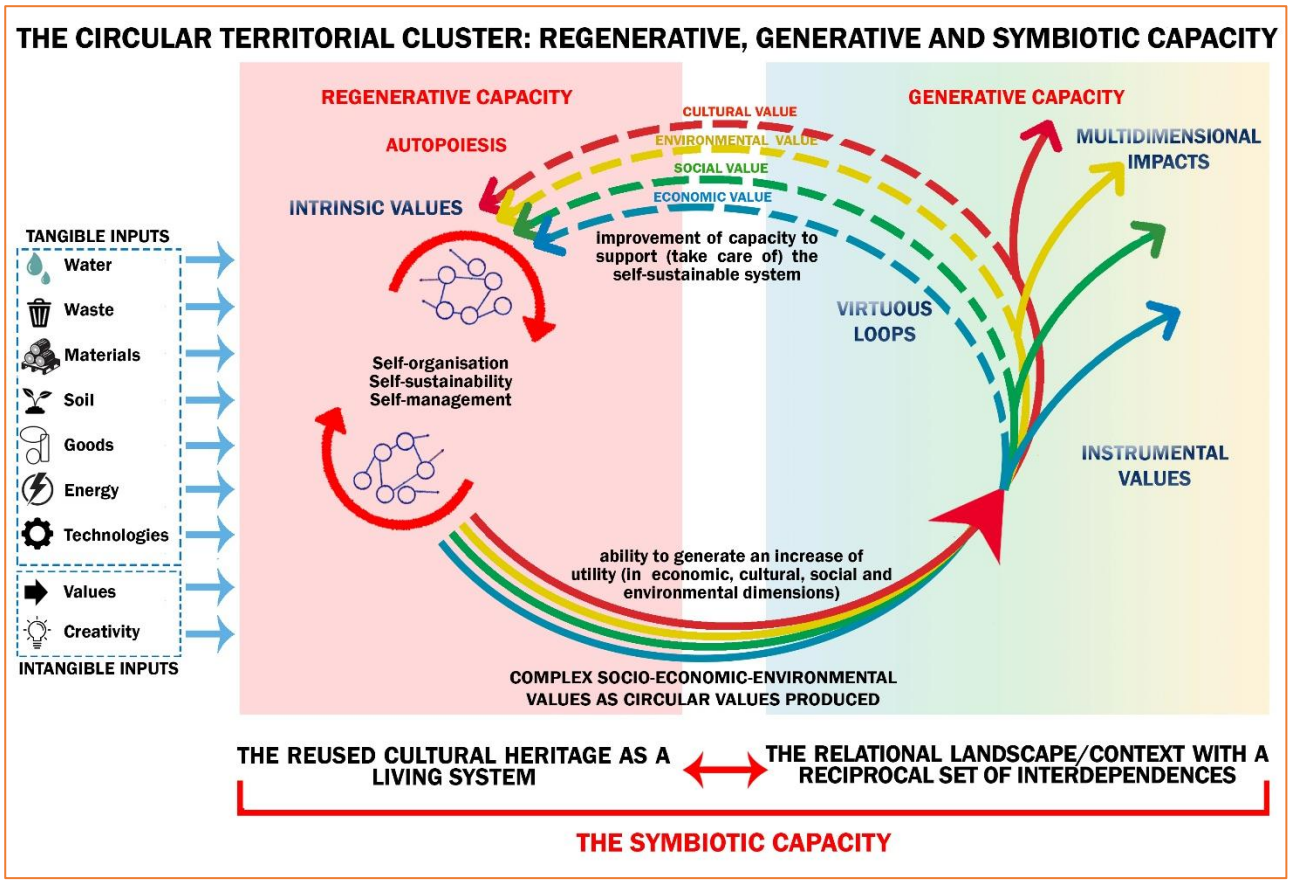
Thus, a conceptual model of adaptive re-use of cultural heritage in the perspective of the circular economy has been synthesized, according to three main critical drivers[28] (Figure 7):

- a **regenerative capacity** linked to the self-regeneration of the cultural assets, as well as of the economic, environmental and social resources needed for its maintenance over time (in analogy with the circular economy principle of extending the use value of resources in the largest time horizon possible). In other words, it expresses the regenerative capacity of resources in relation to the time in which they are consumed;
- a **generative capacity**, linked to the net positive economic, environmental and social externalities generated in the area/territory – which in part come back to the heritage asset;
- a **symbiotic capacity**, linked to the cooperation and collaboration approaches that enable a more efficient use of resources (such as those realized in "industrial symbioses"), as well as clustering processes in the territory (implementing an "economy of relationships").

Figure 7 – The triple circular model of cultural heritage adaptive re-use: conceptual model

[28] See Fusco Girard, 2020, 2021

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758



Source: Horizon 2020 CLIC; presented at CLIC LabT London[29], February 2019

(Fusco Girard, 2020)

The diagram in Figure 7 helps to distinguish intrinsic values (in the self-organization, in the right side) and multidimensional generated impacts (in the left side), some of which can come back to the ecosystem for reinforcing it, through virtuous circular loops. This diagram underlines the ecosystem organization of the heritage asset, with externalities and the relevance of symbiotic processes in the comprehensive ecosystem and out the ecosystem (the externalities on the landscape etc.). It suggests that the functions should be chosen so that some of them can sustain themselves and also can support some other activities. For example, in the reuse of an historic industrial site, residential and commercial functions are justified if they support social, cultural, civic ones, coherent with the intrinsic value of the asset. The diagram distinguishes between linear impacts and nonlinear impacts, characterized by feedback loops, reciprocal integration, systemic interdependences which can transform virtuous processes into vicious ones, starting from a specific threshold. Among these, for example, it is necessary to consider also the intangible/intrinsic/ecosystemic values (the spirit of places, the sense of belonging, of attachment of a community to a certain space, etc., (which are reflected in the notion of “complex social value” (Fusco Girard L.; Nijkamp P., 1997; Fusco Girard, 1987b)) and which determine the “attractiveness” of a space. The evaluation of the attractiveness

[29] https://www.clicproject.eu/laboratories-of-transdiciplinarity-in-london/

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

(as well as of adaptive capacity) of a site with reference to external investments, new functions, visitors, etc. and the evaluation of the "repulsive capacity" of a site in conditions of degradation, unused, decaying, etc., represents concrete questions in terms of evaluation. They find a solution with participatory evaluation procedures, also based on dashboards and visual models/versions.

According to the CLIC theoretical framework, a structured set of evaluation criteria was developed, aimed to reflect the circular economy perspective in cultural heritage adaptive reuse.

4.2 Evolutionary co-evaluation approach

Recently, the European Union has launched Policy Labs considered as "physical space designed to foster creativity and engagement to develop interactions, processes and tools contributing to bring innovation in the European policy-making" (European Union, 2020). They represent a tool to realize human-centred strategies by collaborative platforms for the production of knowledge and for the creation of effective and operational innovative solutions.

In this perspective, processes of co-creation, co-planning, co-design are stimulated in a re-iterative process (UN-Habitat, 2020) by exchanging skills and experiences etc. on the basis of a hybrid approach that combines deductive approaches with inductive approaches, based on good practices (Fusco Girard & Vecco, 2019). Evaluation processes, or rather co-evaluation grounded on communicative capacity, also through images, drafts etc., are introduced: citizens are stimulated as active users and not as passive spectators, able to propose new ideas and hypotheses for solving specific problems stimulating a participatory communicative dialogic process (Olejniczak et al., 2020a) through the critical thinking, to distinguish, to put in relation, to identify shared priorities based on facts and not opinions, to hierarchize needs and issues, to stimulate creativity and future oriented mind set (Fusco Girard, 2019b, 2019a, 2021b; Fusco Girard & Vecco, 2021; Nocca & Fusco Girard, 2018). Thus, participative evaluations are particularly adapt to consider not only short-term impacts but also medium and long term impacts. The general objective is to improve the choices, i.e. to bring about a positive transformation, through interviews, workshops, forums, deliberative forums, arenas, brainstorming, modelling, visualization of available solutions, re-elaboration of prototypes, empirical verification, re-evaluation of results. The above is particularly evident when is involved the third sector, between state and market. This valuation requires processes of deliberative type (Jacobs, 1961) being interpreted as a process of construction of values not already given, but precisely constructed (Buchanan, 1954; Knight, 1982; Sen, 2021), on the basis of a shared knowledge and the public debate of good reasons that are opposed to other good reasons, making the strongest ones win. The result is characterized by the achievement of a satisfactory level of consensus. This evaluation is elaborated on the basis of a social and cultural perspective, i.e. linked to the local culture, to the world view, the symbolic, spiritual, intangible values of the people and not only on the expert knowledge of the technicians. The intrinsic value allows and stimulates the circular human-centred reuse, because it reflects the culture of a community/site (Fusco Girard, "Draft CLIC Framework, 21/12/2020")(Fusco Girard, 2021a). It reflects the autopoietic capacity of heritage in a socio-ecological context, and also the generative capacity in term of community generation and employment increase. The intrinsic value requires particular attention to the natural/ecological system of a site, and to safeguard its health, on which human health itself depends. It also involves the enhancement of the landscape, which becomes all the more qualified the more it is safeguarded in its dynamic ecosystem equilibrium. And also, the above contributes to the psychological and physical well-being of people, as evidenced by several recent studies (P. Sacco et al., 2018; P. L. Sacco & Teti, 2017). Fragile or insubstantial social relationships determine a lower quality of life and generate less resilience. The process of identification, interpretation and evaluation of the intrinsic

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

value represents a cultural and social/community construct, which can be realized with iterative and interactive participatory processes, with subsequent approximations, through iterations/interactions steps. It helps to orient the reuse of cultural assets. These qualitative evaluations should be characterized by a level of consensus that is as high as possible in different contexts, so that they can be satisfactory, and therefore intersubjective and replicable. Once this intrinsic value has been defined, it must be placed in relation to the opportunity costs (Fusco Girard, 1987b) that result from the preservation of this value. If the opportunity costs assessed are too high, i.e. they go beyond a certain threshold tolerable/compatible with a series of constraints that the specific context determines, the cultural site / landscape characterized by the above-mentioned intrinsic value will not be preserved in coherence with the intrinsic value. In other words, conservation intervention will be acceptable if the proposed changes reduce opportunity costs to a reasonably acceptable level. Of course, the threshold of tolerability/compatibility is also subject to evaluation and interpretation by the community.

In conclusion, the new approaches that implement the eco-social conversion of the economy in the adaptive reuse in design, planning and managing:

- are based on the ability to incorporate external effects;
- are based on the centrality of the collaborative/ synergistic perspective of the different subjects involved, even institutional ones, also on the basis of new forms of agreements/contracts;
- are able to incorporate long-term impacts;
- attach importance to the use values, compared to exchange values and to intrinsic value;
- are characterized by a systemic logic, which takes into account multiple interdependencies. Are useful to avoid/minimize the different forms of underutilization of resources;
- are attentive to all technological innovation, and in particular to digital technologies to improve overall productivity;
- are attentive to the use of local resources (material, energy, human, social, ecological, etc.);
- are aimed at the production of intangible services, rather than material goods;
- are interested in ensuring long-term relationships with buyers and users;
- are interested in using fewer natural resources;
- are attentive to the flow of ecosystem services that are derived from natural resources and support human activities;
- are attentive to the circular closure of processes (as Mother Nature teaches), so that each output is as much as possible reused as input to produce other goods;
- are attentive to the well-being (and the variation of well-being) on the part of the subjects, which is also linked to qualitative and perceptual aspects.

Few but effective indicators should be identified that take into account the above and in particular all the fundamental principles assumed here. For example, a project that proves to contribute to the process of decarbonisation of the local economy; that it succeeds in becoming financially/economically/socially self-sustainable over time; that proves that there is an effective demand for the new functions envisaged, including through temporary experimentation; that is able to fit in the existing natural and built landscape ; that uses natural light; that re-use waste; that use renewable energies, conserving the permeability of the land and the employment of persons becomes preferable to be in financed. Evaluation plays a key role if it is interpreted in a comprehensive way: as a technical and participative process, able to manage instrumental as well intrinsic values. Instrumental values (market, use, independent of use values) are assessed through many tools based on WTP. But they do not consider the needs of future generations and of poor people. They undervalue the resources/impacts. The evaluation of intrinsic values is

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

complementary: it is necessary but not sufficient. They both are required in the in choices of adaptive reuse of heritage assets, in coherence with the conversion of current economy.

It is possible to transfer the concept of intrinsic value from natural ecosystem heritage to cultural heritage. This notion of intrinsic value is not an infringement but a way to promote more effective choices. This attractive "intrinsic value" has given cultural heritage its authentic vitality and shows an unitive capacity for activities and persons. This can be understood as a complementary and reciprocal structure and a set of behaviors and actions, as found in natural ecosystems, where a specific attractive capacity involves and unites different components: as a specific unitive capacity (Genovesi, 1765). The reused cultural heritage attracts people and thus generates or regenerates a heritage community.

In this perspective, its capacity is similar to the intrinsic value of natural ecosystems: they have a unitive or "glue "capacity. The set of anthropocentric instrumental and intrinsic values represents the overall systemic value of these cultural sites or historic urban landscapes. They should be assessed (Faber et al., 1995) and managed with care and wisdom (Zeleny, 2011). The assessment of the intrinsic value of cultural heritage is useful in the choice of new use values for heritage assets. Furthermore, the integration of an approach based on instrumental values (assessed with economic tools) and intrinsic values may improve more choices in planning and management processes. This integrates quantitative approaches of a positivist nature (such those of natural and economic sciences) with approaches of constructivist/interpretative nature (non-quantitative) used by human sciences (i.e., anthropology, history, sociology, etc.) (Ross & Ben Jaafar, 2006)..

The assessment of the intrinsic value of cultural heritage as a circular structural order is a recommendation for others to design and plan development strategies based on circular economic and territorial models. These circular territorial solutions should be characterized by a co-evolutive dynamic between man-made complex adaptive system and natural complex adaptive systems. Circular territorial projects are characterized first of all by ***place-led*** and ***nature-led solutions***. Thus, they can contribute to re-generative ecosystem services, as happens in nature: they are in fact designed, organized, and managed as "vital natural organism[s]" able to co-evolve with others.

Ex-ante, on-going and ex-post evaluations should be proposed in order to overcome traditional trade-offs and identify creative solutions, and to promote participation of all the stakeholders (Fusco Girard and Nijkamp, 1997). Their participation within new networks and their cooperation attitude are founded on trust. Trust depends on - inter alia – "good" (impartial, rigorous, critical) evaluations by public institutions, and not on formal ones.

A complex of values exists in urban context: instrumental values, use values, non-use values, and "intrinsic" values. These values, that can be increased (or not) through new actions/projects of transformations and management, are to be assessed.

Evaluating means interpreting a general context, foreseeing impacts before using resources, land, spaces, etc., and comparing alternatives with some anchor elements. By evaluating approaches, it is possible to deduce priorities, alternatives, and consider multiple, multidimensional and conflicting criteria/objectives. Evaluation is necessary for decision-making processes in a time of crisis, with more and more scarcity of resources and energies to improve governance, urban planning, design and management.

Evaluation processes are fundamental tools for new governance towards sustainability, for checking creative and resilient initiatives. New governance is based on experiences and best practices interpretation and comparison by experts and also by the general public. Creative cities have to invest more and more in assessment as support for decision-making.

The evaluation of the creative potential of a city is more and more required for city/region development so that the areas of strength and the ones of weakness can be properly selected.

Evaluation processes help make decisions on “if”, “what”, “where”, “when”, “for whom” and “with whom” to implement adaptive reuse creative initiatives and when to stop them. Evaluations are necessary tools in different pacts, agreements, city contracts, in participation processes, in finance and microcredit, in taxation, in sustainability focus groups, in auditing, in choices at a strategic, tactical and management level and in general for investigations.

Evaluation is a fundamental tool for selecting innovative alternatives and for building choices in urban planning and design which can synthesize many values, and produce multiple benefits for many agents, in a win-win perspective. They are to be evaluated in their quantitative and qualitative, direct, indirect and induced impacts, in the short, medium and long term, beyond any bureaucratic or strictly economic approach.

Innovative alternatives are characterized by high uncertainty, costs and risks.

Lack of knowledge is the common element in all creative choices/actions. Therefore, they require experimental and testing approaches in order to learn from their successes or failures and about the specific characteristics of the dynamic urban system in supporting uncertain and/or irreversible effects (critical capacity thresholds). Evaluations may suggest how to improve experiences, whether to transfer them into ordinary practices or totally change them.

An integrated assessment process does not only help to compare given and defined alternatives but it also stimulates to identify and explore alternative new solutions. So the evaluation process can become the engine of city creativity.

An iterative and interactive decision-making process is activated through continuous feedbacks and improvements in the level of achievement of objectives. The creative city systematically collects data and information to improve knowledge for a critical judgment/assessment required in urban planning. Data, information, knowledge are to be structured in a systemic way so as to allow for comprehensive evaluations and comparisons with new ideas and their implementation and performance in satisfying needs in the material and immaterial space.

Considering that creativity is interpreted here in relation to promotion of economic, social and ecological resilience, specific indicators about density of relationships in different dimensions are required. People’s involvement in reaching the common good, social inclusion, community sense, collective identity becomes relevant to reflect benefits of relations.

The evolutionary perspective should be chosen:

- when faced with the choice between what to keep and what to replace, it is necessary to move in a dynamic perspective;
- when it is needed to introduce innovations into a certain heritage site/context in order to make it not only more vital but also more long-lasting;
- when the energy issue is fundamental to economic production;
- when it is preferable to use multicriteria, social evaluations integrated with public debate, because the mere willingness to pay does not allow to assess the value of cultural resources;
- when there are no maximising solutions but only “satisfying” solutions;
- when there are circular processes of cause and effect between economic, ecological and social factors;
- when the entropic nature of all economic processes is recognised;

- when the importance of community values is recognised (promotion of communities in development strategies);
- when the importance of fundamental values such as transparency, accountability, cooperation and trust is recognised in the production of development prosperity;
- when it is recognised that the preferences of the subjects for whom transformation is envisaged are not already given, but need to be oriented/constructed (the climate change crisis being the most glaring demonstration of the failure of the orthodox economics);
- when it is recognised that the object of analysis is the evolutionary dynamics of complex and adaptive systems;
- when it is recognised that there is a general interest (common good) to be pursued and not only particular interests;
- when concepts such as self-organisation, learning capacity and regenerative capacity are introduced.

The above makes it essential to abandon the typical approach of mainstream economics (orthodox economics) and move in the direction of evolutionary economics, of which ecological economics is one of the most significant interpretation.

4.3 Methodological steps

4.3.1 Phase 1: knowledge phase

The first phase of the methodological process foresees the description and analysis of the status quo of the examined urban area through the collection of data concerning both the asset (one or more) and the related urban context.

For the elaboration of territorial framework, it's necessary to consult:

- Territorial Coordination Plans, from which it is possible to deduce the guiding criteria for the use of the territory, the eventual programmatic lines that affect the area of intervention and that concern large infrastructural interventions (big mobility axes), the location of particular facilities of primary general interest and the spatial distribution of the constraints and limitations to be imposed on the land use;
- Landscape plans, in order to know possible landscape constraints insisting on the project area, if it falls in a particularly valuable territorial context, and therefore to define the transformations of the territory compatible with the landscape values, the actions of recovery and enhancement of buildings and areas subject to protection as well as the interventions of landscape enhancement also in relation to the prospects of sustainable development;
- General Regulatory Plans, municipal or inter-municipal, to identify constraints, limitations, destinations and methods of use of the municipal or inter-municipal territory in order to guide its development and to organize the interventions (private and public) modifying the urban planning policy for a correct management of the territory;
- Detailed execution plans, subdivision plans and special area plans, in order to know further norms, dispositions and prescriptions insisting on the project area.

After this phase of consultation, it is opportune to select all the information regarding the area, extrapolating from the various documents consulted the excerpts relative to the area of interest and elaborating summary documents and graphs in which are highlighted:

- the points of interest present in the project area in terms of cultural and environmental heritage;
- the land use (zoning tables) and intervention categories (maintenance, building renovation, urban regeneration, new construction), highlighting the areas to be subjected to specific interventions;
- existing constraints on the area (seismic and hydrogeological constraints, landscape constraints, buffer strips, etc.).

To this end, it is advisable to identify and define, already at a preliminary stage, the levels of analysis and the related documents necessary to obtain information at that level. For example, it may be useful to analyze the contest at micro, meso and macro level (ESPON EGTC, 2020). In addition, the consultation of cadastral data allowed to know the cadastral consistency of the properties, in terms of dimensional data and ownership regimes.

BOX 1. KNOWLEDGE PHASE IN SALERNO

In Salerno, this phase developed in two steps.

A first step of consultation with the representatives of the Municipality of Salerno and responsible for the urban planning sector, for the collection of useful data for the constitution of the cognitive framework of the urban and territorial context of Salerno. To this end, data from existing urban plans (Territorial Coordination Plan of the Province of Salerno, Municipal Urban Plan, Hydrogeological Structure Plan, etc.) were used to construct a starting knowledge base:

- identification of cultural and landscape assets according to Legislative Decree 42/04 and the respective constraints (hydrogeological constraints, landscape constraints, buffer strips, Superintendence constraints, etc.),
- the land use (zoning tables)
- intervention categories (maintenance, building renovation, urban regeneration, new construction), highlighting the areas to be subjected to specific interventions.

In addition, data from drafting (Sustainable Mobility Urban Plan and related Strategic Environmental Assessment Procedure and Participatory Process) or recently approved (Sustainable Energy Action Plan) strategic policy documents were also considered, from which future development goals and strategic orientations were derived.

Moreover, ICHEC developed a methodology for mapping the cultural capital and its interplay with the urban mobility (transportation systems), tourism amenities and land uses (urban planning and regulations) .

A second step was the collection and processing of summary documents and graphs (see Table 3 in Annex 1 –) with particular focus on the area of Edifici Mondo. On the basis of the data obtained from the consultation of cadastral documents, a synthetic table was drawn up with the dimensional data of each building and classification of surfaces In addition, the consultation of cadastral data allowed to know the ownership regimes of the buildings. These data were used in

for the elaboration of “satisfying project” (Simon, 1959) to formulate hypotheses on the management system of these assets (shared management, concession, etc.).

Source: author’s elaboration

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

4.3.2 Phase 2: Definition of objectives and evaluation criteria

This is a phase of 'listening to the territory', in which a dialogue with local stakeholders is expected to be activated to know the needs expressed by them in order to define project requirements and parameters for assessing the performances connected with them.

In this phase, is useful the adoption of an action research approach (Adelman, 1993; Masters, 1995), based on empirical direct experimentations, through which ordinary people, together with other local stakeholders (institutions, academy, entrepreneurs, etc.), can develop and strength the powers of reflective thought, discussion, decision, and action.

The activation of a stakeholders' engagement process aims at building a heritage community around the local cultural heritage. The institutional and academic actors play a fundamental role in this phase as they are able to activate and facilitate the progressive empowerment of people through an awareness raising process about the value of cultural heritage, enhancing sense of belonging and building common knowledge, shared values and vision for the recovery and adaptive reuse of the heritage asset.

The stakeholders' engagement process can be articulated in five main steps:

a) the value of cultural heritage, tangible and intangible, is recognized through an action research approach based on empirical direct experimentations conducted by researchers together with a small group of activists in the local community;
b) activists and researchers start the stakeholders mapping exercise and engage key actors for the successive phases;
c) a parallel exercise of envisioning and knowledge building is carried out: stakeholders collect existing knowledge in form of books, documents, pictures, evidence of traditions, oral testimonies; site visits are organized. Based on the knowledge collected, the stakeholders group co–developed a shared "vision" for the recovery and adaptive reuse of the heritage asset;
d) the previous phases contribute to reinforce the awareness on heritage values and the demand of cultural and circular activities linked to the heritage site, preparing the ground for actions development;
e) the Heritage Community is established, with active and motivated members, to conserve and valorise cultural heritage through joined civic action and "circular" entrepreneurial activities.

In this phase is also useful to adopt participatory tools such as questionnaires and interviews to facilitate the interaction with local stakeholders and to stimulate their involvement in the process. They aim to probe the relationship between the everyday maker (Bang, 2005) and the built environment (Ost & Saleh, 2021), activating a sense making process (Weick, 1995) during which people map their cultural, natural and human assets; express and exchange their opinions, ideas, needs and aspirations but also; raise concerns and highlight conflicts related to the management, conservation and preservation of the cultural capital for future generations. Through these tools is possible to put human preferences, reflections and daily interactions with the cultural capital in terms of sensorial experiences (hearing, touching, seeing, tasting and smelling), at the center of the empirical research.

The information obtained from these tools can be elaborated as statistical data (for a more scientific use) or as thematic "maps" (such as perceptions maps, cultural maps, etc.) (Ost & Saleh, 2019).

It should be highlighted that the process is not linear nor planned in every detail since the start of the activities. The methodology is meant as a “learning-by-doing” process, in which needs and ambitions of engaged stakeholders are continuously tested and adjusted step by step, while results are periodically co-evaluated to re-orient action (Olejniczak et al., 2020b, 2017).

The activation of these co-decision and co-design activities allows to identify and plan the actions to be undertaken, create consensus on objectives and strategies, identify priorities for action and enable stakeholders to submit proposals for concrete action, in order to achieve a shared definition of sustainability and circular city objectives.

The dialogue with local stakeholders enables the translation of locally expressed needs into project specifications/requirements. At this stage, these specifications are still generic, but they are fundamental to orientate the project guidelines and can still be modified in the following project phases, keeping the project specifications/requirements unchanged. The activity of identification of the needs expressed by the stakeholders involved in the regeneration process aims to understand and classify them according to the degree of importance perceived by the stakeholders themselves in relation to each need. In this way it is possible to move from the identification of needs, to their translation into requirements that correspond to specific project performances expected by the proposals.

These project requirements can be expressed as criteria which, in this way, summarize the requirements resulting from the mediation between technical and local needs for the definition and evaluation of project alternatives (third phase) respect the performances of a “satisfactory circular project”. The definition of evaluation criteria is a prerequisite for making the evaluation process (fourth phase) transparent, comprehensible and the most objective possible.

BOX 2. DEFINITION OF OBJECTIVES AND EVALUATION CRITERIA IN SALERNO

In Salerno, starting from a phase of knowledge building and local stakeholders engagement, the research group activated processes of knowledge building, envisioning, and community engagement for the adaptive reuse of local cultural heritage inspired by the circular economy model. In this experimentation the stakeholders' engagement process was articulated in five main steps (see Annex 1).

This participatory process was finalized to the development of a Local Action Plan (LAP)[30] for the adaptive reuse of cultural heritage, in the perspective of the circular economy and circular city model.

The Salerno LAP was developed by the Municipality with the support of IRISS CNR through a participatory action carried out between October 2018 and June 2021.

The LAP of the city of Salerno is in line both with the objectives of the CLIC project and the UN Sustainable Development Goals. The LAP also aims to achieve a circular city goal through circular solutions in the built environment (e.g., water recovery, renewable energy, material reuse and recycling, biomaterials, nature-based solutions, etc.), energy efficiency actions and positive energy balance for historic and modern buildings, green infrastructure (e.g., city renaturation, green mobility, etc.), reconnecting the city-port and circular port area, and fostering innovative business and financing model and circular startups. Moreover, the purpose is to implement the circular and human-centred city model by transforming the abandoned/degraded/underused cultural heritage in a "vital place", attracting new tourists and businesses and to enhance the quality of life for residents. Its objectives are to co-develop and plan concrete actions for the adaptive reuse of abandoned and underused cultural heritage; build consensus on objectives and strategies; identify priorities for action/intervention; and activate public-private-social synergistic relations for cultural heritage adaptive reuse.

More than 50 civic society organizations, enterprises, public bodies and activists were involved in a series of meetings aimed at mapping the relevant cultural heritage of the city, both in abandonment and reuse state, and to identify objectives and viable strategies to adaptively reuse the abandoned and underused heritage assets, creating "Heritage Innovation Partnerships" able to carry out the agreed actions beyond the timeframe of the research project.

The "Local Action Plan" represents the strategic planning document which identifies the objectives for the sustainability of the territory and the individual actions (short, medium and long term) that the various actors, public and private, commit to implement to achieve the shared objectives.

Diverse activities were organized:

- HIPs – Heritage Innovation Partnerships Meetings,
- 2 HUL workshops,
- 1 peer-review meetings with other European cities representatives,
- 1 HIPs Stakeholders' Permanent Lab (Gravagnuolo et al., 2021).

After collecting a large amount of information from the different groups of stakeholders involved in the various co-design activities, the research team, together with representatives of the Municipality of Salerno, elaborated a set of "Impacts of circular adaptive reuse of cultural heritage", defining 3 "circularity dimensions" and 16 criteria, used by the Municipality as evaluation parameters in a The initial proposals: the Public Consultation process (see 0) for the re-use of the complex of so-called "Edifici Mondo".

Source: author's elaboration

[30] The co-creation process experimented in each CLIC pilot to elaborate a Local Action Plan (LAP) is in-depth explained in Deliverable 5.5 "Report: Local Action Plans for adaptive reuse of heritage and landscapes".

4.3.3 Phase 3: Development of project alternatives

This represents the phase of creative search for solutions through the elaboration of project alternatives that are proposed as a response to the project objectives and requirements expressed by the previous defined criteria.

At this stage of the project, each actor proposes a "particular vision" reflecting its point of view (for convenience we prefer to categories them into three types of actors: public, private and third sector). The solutions/concepts are proposed as concepts, both descriptive and graphic, with brief descriptions of the phases of generation of the project idea and its correspondence and coherence with the objectives and requirements.

BOX 3. DEVELOPMENT OF PROJECT ALTERNATIVES IN SALERNO

In Salerno, the elaboration of project alternatives was articulated in two steps:

- a The initial proposals: the Public Consultation process, launched by the Municipality of Salerno with the scientific support of CLIC academic partner IRISS CNR and in agreement with ICHEC, to involve all the local stakeholders in the elaboration of proposals for the adaptive reuse of the Edifici Mondo in the circular economy perspective;

- a From 14 proposals to four well defined projects: the Circular Business Model Workshop (CBMW), coordinated by ICHEC, with the scientific support of CLIC academic partner IRISS CNR and in agreement with the Municipality of Salerno, to further investigate the proposals selected in the public consultation with the aim to explore the urban, technical and economic-financial feasibility of the reuse ideas.

In the public consultation fourteen reuse proposals were submitted and only ten were selected as considered suitable by the Municipality after the evaluation and the score attribution considering the coherence of the proposal respect the circular economy model through the set of criteria established in the phase 2.

The ten selected proposals have been further investigated during the CBMW held in Salerno in May-June 2020 (online) and carried out in six sessions. It was organized as a laboratory of ideas and a moment of training and planning to identify possible reuse solutions for the Mondo Buildings, also promoting the creative combination of reuse ideas collected during the public consultation. After an internal evaluation of the ten proposals by the workshop participants, four proposals were selected, strongly characterized by elements of cultural enhancement and economic, financial, environmental and social sustainability:

1. Hippocratica Hills Health Heritage Hub and water paths
2. House of music
3. The identity between tradition and innovation
4. Solidarity condominium.

Source: author's elaboration

4.3.4 Phase 4: Evaluation through qualitative criteria

The qualitative assessment is a way to elaborate a first hierarchy of the project alternatives elaborated in the previous phase. This phase allows information to be gathered about stakeholders' motivations and attitudes in the form of opinions and points of view, which could not be captured by a quantitative analysis.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

This phase consists of two steps:

- criteria evaluation,
- proposals evaluation.

In analogy to the CIE, this phase provides:

1 Prediction of impacts from design variables (including the identification of the sectors in which the community affected by the interventions under examination can be divided),

2 Definition of the sub-sectors into which the community is further divided,

3 Evaluation of impacts with reference to sectoral objectives.

In particular, in the first step each stakeholder expresses a preference with reference to the importance he/she attaches to each criterion. This step can be repeated several times and for different groups of stakeholders to obtain an overall preference picture. Through specific evaluation methods (for example Simos-Roy Figuiera (SRF) method, NAIADE, REGIME, etc.) it is possible to transform in numbers the descriptive judgement through which preferences were expressed. More specifically, the numbers represent “weights” which explain the preferability of the criterion in terms of the greater importance attached to it. Therefore, as a result, a hierarchy of importance of the criteria will be obtained, resulting from the integration of all preferences expressed by the different stakeholder groups involved. In this hierarchy each criterion is given a weight that is integrated as an evaluation parameter in the evaluation model used. This phase is useful to test divergences or points of contact between the perceptions and visions of both the different groups of stakeholders and between them and the team of experts conducting the experiment. To this end, it is useful to organise focus groups in which the survey is repeated several times with a small group of people. This strategy, although guided, configures itself as an excellent model for testing the reactions of one’s target group in a controlled but almost “natural” way.

In the second step, proposals are evaluated. In this step they are asked to take a step forward in expressing their judgement. In fact, stakeholders are asked to assess the coherence of project proposals against each criterion, expressing their evaluation on a “scale” (Bogardus social distance scale, Thurstone scale, Likert scale, Guttman scalogram, Osgood semantic differential, etc.)

This step can also be repeated several times by the different stakeholder groups and the team of experts to integrate the technical vision with that of the stakeholders.

At the end of these steps, through the use of specific evaluation methods (i.e. ELECTRE and TOPSIS) capable of considering the evaluation of proposals in relation to the weight established for each criterion, it is possible to identify a preferable project alternative for each group of stakeholders.

BOX 4. EVALUATION THROUGH QUALITATIVE CRITERIA IN SALERNO

In Salerno, the evaluation through qualitative criteria was articulated in two steps:

–
– Step1: Macro-criteria and criteria definition and validation,
– Step 2: Macro-criteria prioritization (definition of a specific weights for each criteria based on stakeholders' preferences)
– Step 3: Proposals evaluation

In Step 1 the researchers team consulted with referents, experts and/or technicians of the Municipality of Salerno to elaborate and validate a set of macro-criteria useful for the evaluation of the 14 proposals for the reuse of the Edifici Mondo collected during the Public Consultation with the aim to elaborate a first ranking of preferability. The starting point was the set of criteria defined as requirements in the The initial proposals: the Public Consultation process. After a confrontation phase, the team defined and validated 13 macro-criteria and 27 criteria.

In Step 2 in order to prioritize the macro-criteria (through the definition of the weights for the criteria) and to facilitate the evaluation process, the team of researchers from the University of Portsmouth proposed the use of the Simos-RoyFiguiera (SRF) method (J. Figueira et al., 2005). The method was firstly tested with the research team and then implemented in two thematic focus group with different stakeholders. From each of them the obtained result was a set of weights reflecting the importance attribute by each group of stakeholders to each macro-criteria (Table 6 – Weighs assigned to macro-criteria). The different results obtained applying the method for each set of weights were analyzed, compared and discussed with actors and an evaluation report was elaborated and shared with stakeholders involved in the previous two thematic focus group.

After the establishing of weights, the team of researchers (IRISS CNR and Portsmouth) proceeded to a first qualitative evaluation of the 14 proposals collected during the Public Consultation, using the 1-9 points Saaty's scale (specifying the meaning of the score for each criterion).

In Step 3, starting from the 9 points evaluation, the research team applied TOPSIS method integrating the sets of weights as evaluation parameters and obtaining a first list of preferred alternative. Among these, the top ten in the ranking were selected from the Municipality to participate in CBMW.

Source: author's elaboration

4.3.5 Phase 5: Synthesis, discussion and re-assessment

This is the phase in which all the design proposals generated and developed in the previous phase are analyzed in a more specific way, classifying, reorganizing and reshaping the functions proposed by each of them towards the definition of an "satisfying project" (Simon, 1959).

The objective of this phase is to identify the functional mix for the definition of a project that best approximates and satisfies the design requirements of the "satisfying project" (Simon, 1959), i.e. the project that maximizes performances at multidimensional level (economic, environmental, cultural and social).

BOX 5. SYNTHESIS, DISCUSSION AND RE-ASSESSMENT IN SALERNO

Starting from the analysis of the 4 projects elaborated during the co-design workshop, a synthetic list of all the functions/uses proposed for the Edifici Mondo was elaborated. Based on this general framework, the team of researchers proceeded to classify them, identifying both some functions common to all projects and other functions that characterize the individual design alternatives.

Through the classification, reorganization and reshaping of the functions of the initial project proposals, the researchers team proceeds to identify the mix of functions that best meet the goals of the "satisfying project".

From this phase 4 "invariant functions" were obtained, meaning the functions present in all the Edifici Mondo and which, in the design hypothesis, are preferably located on the ground floor in order to offer greater accessibility and use. In addition, 4 macro-functions were defined, with their more specific functions, which were distributed within three Edifici Mondo (taking the project elaborated by the Municipality for the Santa Maria della Consolazione convent as the starting point).

Source: author's elaboration

4.3.6 Phase 6: Evaluation through quantitative-qualitative indicators

In this phase the assessment is deepened and refined through the definition and integration of qualitative and quantitative indicators. Here, the definition proposed by Milan Zeleny and recalled in Gravagnuolo et al. (Antonia Gravagnuolo et al., 2017) is adopted, identifying "criteria" as the specific "points of view" through which a goal or objective is analyzed and "indicators" as the elements through which criteria are assessed or "measured"—meaning, with "measure", both qualitative and quantitative assessments.

The objectives of using multidimensional criteria and specific indicators are diverse, from mapping and assessment of heritage attributes and values to ex-ante evaluations to assess heritage conservation vs. transformation choices to ex-post evaluations focusing on the actual impacts generated through heritage investments. In particular, ex-post evaluation is used in order to verify that the established objectives have been met, determining if there are unforeseen or unintended consequences and assessing in the meantime the performance of alternative approaches (OECD-Organisation for Economic Co-operation and Development, 2019).

The definition of indicator is not univocally recognized and the nuances between "indicators", "criteria", "objectives" and "attributes" may be not always clear in the applications. Indicators can be interpreted at different decision levels and are always linked to a set of "criteria", meant as "points of view" recognized as relevant (Antonia Gravagnuolo et al., 2017). Finally, indicators can be used to assess impacts, i.e., any change from an initial condition to a subsequent condition and they are referred to ex-post evaluation. They can also be used to analyse the state of a certain aspect (ongoing evaluation) and finally they can also support the decision-making phase before the implementation of a certain project (ex-ante evaluation).

Elaborating good indicators facilitates the decision-making phase, identifying limits and opportunities and thus reducing risks or costs. Through indicators, emerging issues and impacts can be envisaged, allowing corrective actions when necessary. Experts involved in the indicators elaboration are entrusted with the task of providing information that is comprehensible and credible by all for their correct use in the decision-making process (World Tourism Organization, 2004).

Despite a huge quantity of definitions is available, in the present study we adopted the description of an indicator as «a quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect changes connected to an intervention, or to help assess the performance of a development actor» (OECD-Organisation for Economic Co-operation and Development, 2014). Indicators must always be clearly defined in theoretical and operational terms and they must be simple and understandable according to their scope.

In this perspective, the definition of “satisfactory project” implies to consider more specific and complex criteria, including quantitative data. Therefore, at this stage the set of criteria used for the first evaluation should be complemented and detailed through the identification of indicators for a more accurate assessment.

Obviously, the effort to transform qualitative criteria into quantitative criteria is useful insofar as it improves the evaluation process, making it clearer and more transparent, but especially insofar as it allows for the collection of data. in fact, the risk of developing too specific quantitative indicators is that of not being able to find the data. For example, in CLIC’s experience this limitation was found especially for environmental data, as in local administrations the practice of monitoring is not yet widespread and there are no specific competences for it.

BOX 6. EVALUATION THROUGH QUANTITATIVE-QUALITATIVE INDICATORS IN SALERNO

In this phase, the research team repeated the use of the TOPSIS method to evaluate the preferability of the functions of the four selected proposals. Due to a greater level of detail in the proposals, it was possible to supplement the previous purely qualitative evaluation with quantitative data. Therefore, assuming the same weights of the previous evaluation phase, it was possible to use some of the circularity indicators to support decision-making processes for ex-ante evaluation (see §5 of D2.4). The DSS developed in CLIC for the Salerno - Edifici Mondo case study considers a set of criteria (Bosone et al., 2021) derived from the CLIC framework and adapted to this specific case.

From the CLIC framework and matrix we consider that some ex post indicators (performance indicators) can also be considered in an ex ante evaluation phase as target indicators. Therefore, it represents one of the possible derivations of ex-ante matrices to be tested for the evaluation of the project proposal elaborated in Phase 5: Synthesis, discussion and re-assessment (see D2.4).

With reference to the 57 indicators identified, for this test the research team used only 19, chosen on the basis of both the greater ease of retrieval of some data and evaluation of proposals compared to the information received during the various stages of consultation and design, and considering their significance for the assessment of impacts in the 4 dimensions (cultural, social, economic and environmental) and with reference to the three circularity dimensions of the tripod model (regenerative, generative and symbiotic capacity). The Table 8 shows the indicators chosen, for which the respective circularity dimension of the tripod model, the group of indicators (as indicated in §5 of D2.4), the relative criteria and unit of measure were indicated.

Source: author’s elaboration

4.3.7 Phase 7: Discussion and Circular Iteration

This methodological proposal aimed at defining an impact assessment framework for cultural heritage adaptive reuse in the perspective of the emergent circular economy and circular city model (Circular CHAR impacts assessment framework). The novelty of the approach implemented in the Horizon 2020 CLIC research project consists in the attempt to link the concepts of cultural heritage,

adaptive reuse and circular economy in an overall comprehensive impacts assessment framework that takes into account an enlarged definition of circular economy from a “human-centred” cultural perspective.

The main challenge with reference to the identification of a comprehensive impact assessment framework for circular adaptive reuse of cultural heritage is the definition of a common and recognized framework of criteria and indicators to assess quantitatively and qualitatively the multidimensional impacts of cultural heritage adaptive reuse projects and their ability to “close the loops” of diverse resources flows in line with the circular economy principles. The “Circular CHAR” impact assessment framework was structured for ex-post evaluation. Assuming the systemic perspective of the circular economy model implies that the evaluation phase should not be limited only to the ex-post assessment, taking into account the potential of using a structured framework of criteria and indicators also in the ex-ante and monitoring stages of the CHAR process, supporting decision-making and strategic planning processes and allowing to intervene in a preventive way to orient choices towards sustainability. Therefore, the Circular CHAR developed in this paper can be an excellent monitoring tool for circularity that allows coherent intervention on cultural heritage.

Circularity criteria can be adopted for ex-ante evaluation linked to decision-support systems, however cautious attention should be put to adapt the indicators and evaluation methods, since some of the impacts may be hard to be estimated and would need the identification of proxies to be used within multi-criteria analysis methods. Additionally, in the case of ex-ante evaluation (decision-support oriented), the involvement of multiple stakeholders and “points of view” could be key for effective and shared decisions in the longer term. It is important to highlight that the number of criteria identified for a full circularity assessment in ex-post evaluation can be hardly used in ex-ante decision-support evaluations. As decisions require the involvement of decision-makers, it is important to ensure that a limited number of relevant criteria are identified. For ex-ante evaluations, the relevant criteria can be selected according to the scale, stage and data availability of indicators. A hierarchy of priority for criteria and indicators can be identified applying diverse multi-criteria decision aiding approaches. The exercise of reducing and prioritizing criteria and indicators in ex-ante evaluation processes would benefit the effectiveness of decisions, including the point of view of multiple actors and interests. In this way, indicators can become a tool for discussion and sharing between community members, facilitated by open and deliberative laboratories such as policy labs (Olejniczak et al., 2020b, 2017).

Finally, there must be no time lag between the transition to a “circular” and “human-centred” model of sustainable development and the elaboration and implementation of multidimensional assessment processes: these two perspectives should be integrated from the outset into ongoing evaluation processes in order to bring about a real change in the definition of strategies and actions at both local, national and international level.

The possible limitations of the study can be linked to subjective interpretations of indicators that was noticed in the first phase of the analysis, establishing ad hoc rules in order to position correctly the indicators within the categorization table. We see therefore a need for in-depth studies aimed at improving the definition of indicator and at proposing well-established matrixes, with a clear distinction between quantitative and qualitative variables. Indeed, one of the greatest difficulties encountered while conducting the study consisted in identifying the typology, scale and sustainability dimension of the indicators. For example, depending on the context, indicators can be placed in the economic rather than cultural or social dimension. Sometimes there is a very thin and blurred boundary between these dimensions, and it would be appropriate to present more exhaustive descriptions and clearly structured matrices in future analyses, in which all the attributes that characterize the proposed indicators are shown. With regard to the environmental dimension, this is

more easily recognizable, but at the same time very rare and only few studies addressing the environmental advantages of CHAR have appeared in the international literature. This opens the ground for new analyses linked to the environmental implications of cultural heritage adaptive reuse at different scales, therefore not only the single building, but also the possible impacts on the circular city metabolic functioning.

Finally, it is worth to note that the contribution of cultural heritage to the implementation of the European Green Deal (European Commission, 2019a) has been recently highlighted by ICOMOS and Europa Nostra to build an internationally agreed “cultural heritage green policy agenda” through the European Cultural Heritage Green Paper (Potts, 2021). The present study aimed to contribute to the evolving international policies scenario for CHAR by providing a comprehensive framework that could be used at different levels for planning and design, as well as for the assessment of planned, ongoing and realized CHAR projects.

Proposing a multidimensional assessment of the impacts of the adaptive reuse of cultural heritage from the perspective of the circular economy model implies adopting a systemic perspective that is embedded in this model, capable of considering connections and interrelationships that exist between different systems. Despite the undeniable complexity, the evaluation tool can be interpreted as a means for simplification. It would not only orient the evaluation process towards an integration of the different values but would also favor a better management of the criticalities that the decision-making process itself poses at each stage of its development.

BOX 7. DISCUSSION AND CIRCULAR ITERATION IN SALERNO

Starting from this synthetic framework of all the proposed functions, the researchers team proceeds to identify the mix of functions that best meet the goals of the "satisfying project" (Simon, 1959). This process is configured as an iterative and interactive process which, starting from the evaluation of the project proposals, improves the decision-making processes through feedback mechanisms (Figure 12). This is the phase in which all the design proposals generated and developed in the previous phase were analyzed in a more specific way, classifying, reorganizing and reshaping the functions proposed by each of them towards the definition of an “satisfying project” (Simon, 1959). Based on this general framework, the team of researchers proceeded to classify them, identifying both some functions common to all projects and other functions that characterize the individual design alternatives. Through the classification, reorganization and reshaping of the functions of the initial project proposals, the researchers team proceeds to identify the mix of functions that best meet the goals of the “satisfying project”.

To this end, the TOPSIS method was also used in the final evaluation. In this final step, considering the same four project alternatives, the weights attributed to the different indicators have been changed in order to elaborate three different orders of preference, outlining three respective project scenarios.

Source: author’s elaboration

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

5 Conclusions and recommendations[31]

The CLIC project proposed the adaptive reuse of the existing cultural heritage as a real entry point towards the creation of the circular city. This moment only confirms the relevance of the proposal itself, in coherence with the European Green Deal and the new Action Plan for the Circular Economy.

On the other hand, the circular economy model in general (and therefore also the one applied to adaptive reuse) also satisfies social aspects. Indeed, the circular economy is a source of new employment, on the one hand. On the other hand, since it is founded and promotes cooperation, collaboration and coordination between different actors, it promotes synergies by stimulating new and coherent entrepreneurial and self-entrepreneurial activities.

The social aspect of the re-use is also the capacity to generate a community, a heritage community, which on its turn, takes care of the heritage, in a virtuous circular process. People perceives a sense of belonging/ attachment to a specific area and also a “meaning relationship”.

Thus the reuse of the cultural heritage can be interpreted and managed as a way to improve the immaterial social infrastructure of the city, generating micro-communities through the management itself of the heritage as a common, characterized by “intrinsic value” (that reflects the value that has been connoting over centuries and millennia). In this way, the re-use becomes able to stimulate inclusion/co-fruition. The cultural heritage contributes to the more fragile and immaterial infrastructure of our time, because it multiplies community relationships.

In truth, Covid19 and Climate Change are both testifying to the lack of effectiveness of (current) governance systems focused on continuous and daily emergencies, without a medium-long term strategic/systemic vision. It must be acknowledged that the current pandemic calls for a well-informed, and therefore truly aware, public opinion capable of critical discernment. It can thus demand attention from politics to overcome the current “short-termism”, opening the time horizon to the long term. This conscious public opinion contributes to supporting “bottom-up” the technical, operational and normative initiatives of public institutions, multiplying their positive effects. It is necessary to regenerate trust, which is the foundation of the good functioning not only of the market, but also of public institutions and of society. It is the foundation of every co-operative, synergistic, symbiotic capacity, which especially today is absolutely essential.

It is therefore necessary for each city to draw up a Cultural Strategic Plan as well: a change of mindset that goes beyond the regulatory, economic, financial, fiscal, etc. instruments is necessary in order to become effectively resilient. Schools, Universities, Mass media, Foundations, Research Centres, Third Sector Institutions, etc. should be involved through a strong network for sharing the culture of rights in a relational (and not self-centred) perspective: the culture of responsibility towards the others, the next generation and the nature. It is necessary to promote a widespread awareness that we are children of the Earth.

The evaluation process proposed in CLIC highlights that the evaluation process is configured as an iterative and interactive process in which the outcomes of each step are the result of comparison and brainstorming with the stakeholders involved. Here, Private Sector, Public Sector and Third Sector are considered as main stakeholders and CLIC approach stresses that the evolutionary

[31] See also https://www.clicproject.eu/editorial-from-pandemic-to-a-new-economy-towards-a-circular-economy-and-circular-city-article-by-luigi-fusco-girard/

character: processual, evolutionary, and co-evolutionary of evaluations is always considered by considering these three groups of subjects.

The latter, in addition to being the "producers of contents" are also the recipients of these outcomes and are also involved in the phase of their verification and validation. Therefore, this evaluation process is not a finite process that is limited to finding the "satisfying solution" (Simon, 1959), but it is a dynamic process, in which, through feedback mechanisms, uncertainties and evolving preferences can be re-assessed at successive stages of development (Figure 8).

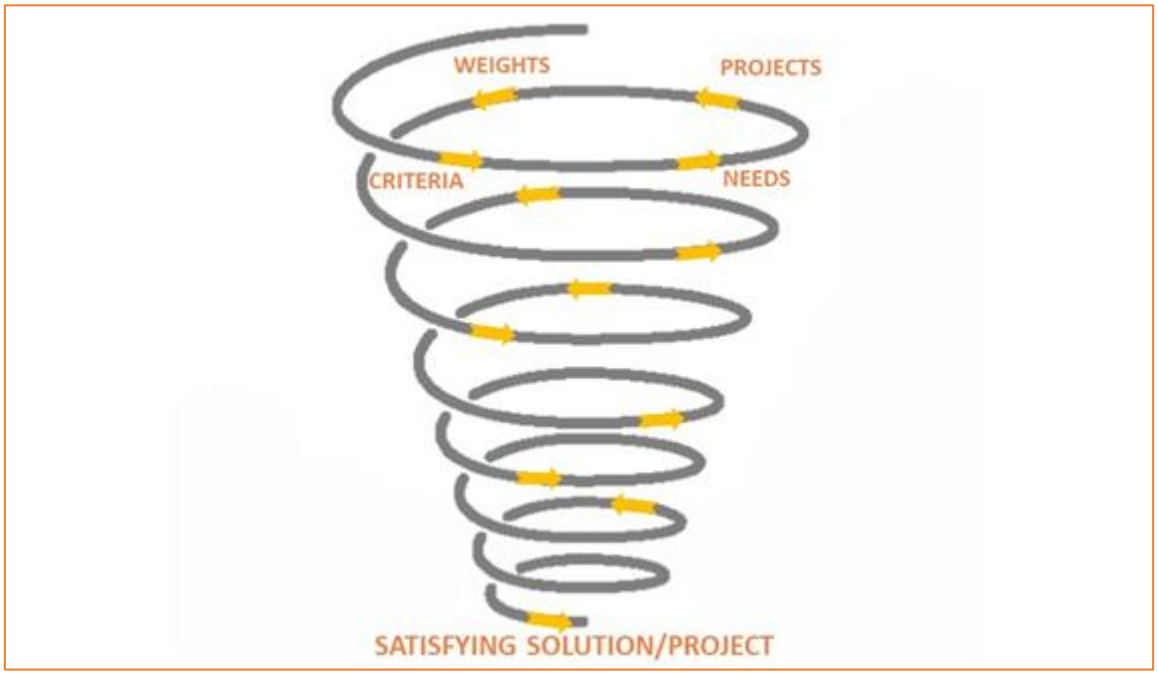
The "ideal" project (Carlsson & Zeleny, 1983) of re-use and thus the main goal of reuse-regeneration is to transform (in general) a dead site into a living system (Fusco Girard, 2020, 2021b), to be managed as a living organism, that is an organism capable of continuous adaptation to a changing/dynamic context, through learning, re-organizing, repair, self-regulating, and therefore capable of resilience.

The "ideal" project of re-use is identified through an evolutive approach able to combine and re-combine intrinsic and instrumental values through participatory approaches.

This approach allows to start a process of mutual capacity building in which the traditional cultural preconception that distinguishes the "educating" subject from the "educated" subject is overcome. In this vision everyone contributes to increase their know-how through cultural exchange and confrontation with others. Thus, evaluation becomes a process of active participation and self-learning (Fusco Girard & Nocca, 2020). This proactive process has an effect on all stakeholders involved, assuming an educational function not only because it improves their knowledge and increases their sensitivity to the issues addressed, but also because it positively influences their willingness to adopt collaborative attitudes in order to operationalise a medium-long term vision. Moreover, the co-production of collective knowledge contributes to strengthening stakeholders' awareness of their self-organisation capacities and the importance of their role in decision-making processes.

Therefore, rather than acting on the final solution, this methodological proposal aims to influence the whole process according to a critical and evolutionary approach that always calls into question the variables of the evaluation (criteria) according to the priorities established each time by the stakeholders involved.

Figure 8 – The dynamic approach of co-evaluation process for the identification of "satisfying solution"



Source: Fusco Girard, 2021

Assuming the CIE (D. Lichfield & Lichfield, 1997; N. Lichfield, 1995) as a reference model (in which the evaluation process is proposed as a sequence of steps), the advancement of the method proposed by CLIC consists in emphasising the probability that characterises impacts through a dynamic and participatory evaluation process that, for this very reason, co-evolves with the needs expressed by the actors involved in the process and is increasingly refined and adapted to their satisfaction. Furthermore, the uncovered aspect in the CIE is the assessment of cultural impacts and CLIC represents a complement and an advancement in this respect.

References

Adelman, C. (1993). Kurt Lewin and the Origins of Action Research. *Educational Action Research*, *1*(1). https://doi.org/10.1080/0965079930010102

Amion Consulting, & Locum Consulting. (2010). *Impact of Historic Environment Regeneration - Final Report*. https://historicengland.org.uk/content/heritage-counts/pub/impact-he-regeneration/

Andreoli, M., & Tellarini, V. (2000). Farm sustainability evaluation: Methodology and practice. *Agriculture, Ecosystems and Environment*, *77*(1–2). https://doi.org/10.1016/S0167-8809(99)00091-2

Angrisano, M., Biancamano, P. F., Bosone, M., Carone, P., Daldanise, G., De Rosa, F., Franciosa, A., Gravagnuolo, A., Iodice, S., Nocca, F., Onesti, A., Panaro, S., Ragozino, S., Sannicandro, V., & Fusco Girard, L. (2016). Towards operationalizing UNESCO Recommendations on"Historic Urban Landscape": A position paper. *Aestimum*, *69*. https://doi.org/10.13128/Aestimum-20454

Assari, A. (2012). Role of public participation in sustainability of historical city: usage of TOPSIS method. *Indian Journal of Science and Technology*, *5*(3). https://doi.org/10.17485/ijst/2012/v5i3.2

Australia ICOMOS. (1979). *Australia ICOMOS Guidelines for the Conservation of Places of Cultural Significance*. https://australia.icomos.org/wp-content/uploads/Burra-Charter_1979.pdf

Australia ICOMOS. (2013). The Australia ICOMOS Charter for Places of Cultural Significance, 2013. In *The Burra Charter*.

Avrami, E., & Mason, R. (2019). Mapping the Issue of Values. In *Values in Heritage Management*.

Balioti, V., Tzimopoulos, C., & Evangelides, C. (2018). Multi-Criteria Decision Making Using TOPSIS Method Under Fuzzy Environment. Application in Spillway Selection. *Proceedings*, *2*(11). https://doi.org/10.3390/proceedings2110637

Bang, H. (2005). Among everyday makers and expert citizens. In *Remaking governancePeoples, politics and the public sphere* (pp. 159–178). Policy Press. https://doi.org/10.1332/policypress/9781861346407.003.0009

Barbati, M., Figueira, J. R., Greco, S., Ishizaka, A., & Panaro, S. (2018). *A multiple criteria methodology for prioritizing and selecting portfolios of urban projects* (Working Paper in Operational Research).

Barbati, Maria, Rui Figueira, J., Greco, S., Ishizaka, A., & Panaro, S. (2018). A decision support system for preservation and reuse of the cultural heritage. *INU*, *4*(Special Issue “Adaptive reuse of cultural heritage and circular economy: the CLIC approach”), 23–24. https://www.clicproject.eu/wp-content/uploads/2019/07/A-decision-support-system-for-preservation-and-reuse-of-the-cultural-heritage-Barbati-Figueira-Greco-Ishizaka-Panaro_INU-2018.pdf

Behzadian, M., Khanmohammadi Otaghsara, S., Yazdani, M., & Ignatius, J. (2012). A state-of the-art survey of TOPSIS applications. In *Expert Systems with Applications* (Vol. 39, Issue 17). https://doi.org/10.1016/j.eswa.2012.05.056

Bertacchini, E. (2016). Introduction: Culture, sustainable development and social quality: A paradigm shift in the economic analysis of cultural production and heritage conservation. *City, Culture*

and Society, *7*(2), 69–70. https://doi.org/10.1016/j.ccs.2015.12.007

Bond, A., Langstaff, L., Baxter, R., Kofoed, H. G. W. J., Lisitzin, K., & Lundström, S. (2004). Dealing with the cultural heritage aspect of environmental impact assessment in Europe. *Impact Assessment and Project Appraisal*, *22*(1). https://doi.org/10.3152/147154604781766085

Boons, F., Spekkink, W., & Mouzakitis, Y. (2011). The dynamics of industrial symbiosis: a proposal for a conceptual framework based upon a comprehensive literature review. *Journal of Cleaner Production*, *19*(9–10), 905–911. https://doi.org/10.1016/J.JCLEPRO.2011.01.003

Bosone, M., De Toro, P., Fusco Girard, L., Gravagnuolo, A., & Iodice, S. (2021). Indicators for Ex-Post Evaluation of Cultural Heritage Adaptive Reuse Impacts in the Perspective of the Circular Economy. *Sustainability*, *13*(9), 4759. https://doi.org/10.3390/su13094759

Bosone, M., & Fusco Girard, L. (2019). Nuovo Umanesimo e rigenerazione urbana: l'economia civile tra l'economia della scuola francescana e l'economia circolare per la città prospera ed inclusiva. In L. Fusco Girard, C. Trillo, & M. Bosone (Eds.), *Matera, città del sistema ecologico uomo/società/natura il ruolo della cultura per la rigenerazione del sistema urbano/territoriale* (pp. 101–109). Giannini Publisher.

Bosone, M., Micheletti, S., Gravagnuolo, A., Garzillo, C., & Wildman, A. (2019). Towards a circular governance for the adaptive reuse of cultural heritage. *BDC. Bollettino Del Centro Calza Bini*, *19*(2), 279–305. https://doi.org/10.6092/2284-4732/7270

Brien, D. O., Esrc, A., & Fellow, P. (2010). Measuring the value of culture : a report to the Department for Culture Media and Sport. *Media*, *December*.

Buchanan, J. M. (1954). Social Choice, Democracy, and Free Markets. *Journal of Political Economy*, *62*(2). https://doi.org/10.1086/257496

Bullen, P. A., & Love, P. E. D. (2011). Adaptive reuse of heritage buildings. *Structural Survey*, *29*(5), 411–421.

Carlsson, C., & Zeleny, M. (1983). Multiple Criteria Decision Making. *The Journal of the Operational Research Society*, *34*(10), 1011. https://doi.org/10.2307/2580902

Castells, N., & Munda, G. (1999). International environmental issues: towards a new integrated assessment approach. In M. O'Connor & C. Spash (Eds.), *Valuation and the Environment – theory, method and practice,* (pp. 309–327). Edward Elgar Publishing.

CHCfE Consortium. (2015). *Cultural Heritage Counts for Europe*.

Chen, X., Fujita, T., Ohnishi, S., Fujii, M., & Geng, Y. (2012). The Impact of Scale, Recycling Boundary, and Type of Waste on Symbiosis and Recycling: An Empirical Study of Japanese Eco-Towns. *Journal of Industrial Ecology*, *16*(1), 129–141. https://doi.org/10.1111/j.1530-9290.2011.00422.x

Chertow, M. R. (2000). Industrial symbiosis: Literature and taxonomy. *Annual Review of Energy and the Environment*, *25*, 313–337.

Chertow, M. R. (2008). "Uncovering" Industrial Symbiosis. *Journal of Industrial Ecology*, *11*(1), 11–30. https://doi.org/10.1162/jiec.2007.1110

Costanza, R. (1992). *Ecological Economics. The Science and Management of Sustainability*. Columbia University Press.

Costanza, R., D'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem,

S., O'Neill, R. V., Paruelo, J., Raskin, R. G., Sutton, P., & Van Den Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature*. https://doi.org/10.1038/387253a0

Council of Europe. (2005). Framework Convention on the Value of Cultural Heritage for Society. In *Council of Europe Treaty Series* (No. 199). https://doi.org/10.1007/978-3-030-30018-0_1051

D'Angiolo, M. (2013). *Approcci e strumenti di valutazione per il paesaggio culturale: il caso studio del sito UNESCO costa d'Amalfi* [University of Naples Federico II]. http://www.fedoa.unina.it/9547/

Davies, J., & Clayton, L. (2010). *Heritage Counts 2010 England*.

de Groot, R., Brander, L., van der Ploeg, S., Costanza, R., Bernard, F., Braat, L., Christie, M., Crossman, N., Ghermandi, A., Hein, L., Hussain, S., Kumar, P., McVittie, A., Portela, R., Rodriguez, L. C., ten Brink, P., & van Beukering, P. (2012). Global estimates of the value of ecosystems and their services in monetary units. *Ecosystem Services*. https://doi.org/10.1016/j.ecoser.2012.07.005

De Keyser, W., & Peeters, P. (1996). A note on the use of PROMETHEE multicriteria methods. *European Journal of Operational Research*, *89*(3). https://doi.org/10.1016/0377-2217(94)00307-6

de la Torre, M., & Mason, R. (1998). *Economics and Heritage Conservation*. The Getty Conservation Institute.

De Montis, A., De Toro, P., Droste-Franke, B., Omann, I., & Stagl, S. (2004). Assessing the quality of different MCDA methods. In *Alternatives for Environmental Valuation*. https://doi.org/10.4324/9780203412879-14

Department for Culture Media and Sport. (2015). *Performance Indicator Guidance 2013/14*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/477934/Performance_Indicators_Guidance.pdf

Dessein, J., Soini, K., Fairclough, G., & Horlings, L. (2015). Culture in, for and as Sustainable Development. Conclusions from the Cost Action IS1007 Investigating Cultural Sustainability. In *Culture in, for and as Sustainable Development*. Jyväskylä University Press & European Cooperation in Science and Technology. https://doi.org/10.13140/RG.2.1.3380.7844

Dillon, J. L., & Perry, C. (1997). Multiattribute utility theory, multiple objectives and uncertainty in ex ante project evaluation. *Review of Marketing and Agricultural Economics*, *45*(1–2), 3–27. https://doi.org/10.22004/ag.econ.9180

Ding, J., & Schmidt, D. (2005). Rainbow, a new multivariable polynomial signature scheme. *Lecture Notes in Computer Science*, *3531*. https://doi.org/10.1007/11496137_12

Dong, L., & Fujita, T. (2015). Promotion of Low-Carbon City Through Industrial and Urban System Innovation: Japanese Experience and China's Practice. In *Asia and the World Economy* (pp. 257–279). WORLD SCIENTIFIC. https://doi.org/10.1142/9789814578622_0033

Douglas, J. (2006). Building Adaptation 2nd Edition. In *Building* (Issue November 1994). https://doi.org/10.1017/CBO9781107415324.004

Drury, P., & McPherson, A. (2008). Conservation Principles, Policies and Guidance. In *English Heritage*.

Ehrlich, P., & Roughgarden, J. (1987). The Science of Ecology. In *The Science of Ecology*.

Ellen MacArthur Foundation. (2013). Towards the Circular Economy. In *Ellen MacArthur Foundation*.

Ellen MacArthur Foundation. (2014). *Towards the circular economy. Accelerating the scale-up across global supply chains*.

Ellen MacArthur Foundation. (2015). Growth within: a circular economy vision for a competitive europe. In *Ellen MacArthur Foundation*.

ESPON EGTC. (2020). *Inception Report. HyperAtlas 3.0. Tools & Maps*. https://www.espon.eu/sites/default/files/attachments/ESPON-HyperAtlas_inception-report.pdf

EU Technical Expert Group on Sustainable Finance. (2020). Taxonomy : Final report of the Technical Expert. In *European Commission - European Commission* (Issue March). https://ec.europa.eu/info/files/200309-sustainable-finance-teg-final-report-taxonomy_en

EuropeAid, & European External Action Service. (2015). *Evaluation Matters. The Evaluation Policy For European Union Development Co-Operation*. https://ec.europa.eu/international-partnerships/system/files/evaluation-matters_en.pdf

European Comission. (1997). Treaty of Amsterdam amending the treaty in European Union, the treaties establishing the european communities and certain related acts. In *Signed on 2nd October and entered into force on 1 May 1999*.

European Commission. (2007). *Towards a "Post-Carbon Society". European research on economic incentives and social behaviour*. https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/Post Carbon Society.pdf

European Commission. (2014a). *Towards a circular economy: A zero waste programme for Europe* (Brussels, 2.7.2014 COM(2014) 398 final).

European Commission. (2014b). *Towards an integrated approach to cultural heritage for Europe*.

European Commission. (2015a). Closing the Loop - An EU action plan for the Circular Economy - (ANNEX 1). *Communication from the Commission to the European Parliament, the Council, the Europena Economic and Social Committee and the Committee of the Regions*.

European Commission. (2015b). *Getting cultural heritage to work for Europe Report of the Horizon 2020 Expert Group on Cultural Heritage*.

Establishing a European Pillar of Social Rights, Pub. L. No. COM(2017) 250 final (2017). https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0250&from=EN

European Commission. (2017). *Moving towards a circular economy with EMAS. Best practices to implement circular economy strategies (with case study examples)*. https://doi.org/10.2779/463312

European Commission. (2018). Action Plan: Financing Sustainable Growth. *EUR-Lex*.

European Commission. (2019a). The European Green Deal. *European Commission*. https://doi.org/10.1017/CBO9781107415324.004

European Commission. (2019b). The European Green Deal. In *European Commission*. https://doi.org/10.1017/CBO9781107415324.004

European Commission. (2019c). *The Human-Centred City: Opportunities for citizens through research and innovation*. https://doi.org/10.2777/489486

European Commission. (2020a). *A New Industrial Strategy for Europe*.

A New Industrial Strategy for Europe, Pub. L. No. COM(2020) 102 final (2020). https://ec.europa.eu/info/sites/info/files/communication-eu-industrial-strategy-march-2020_en.pdf

European Commission. (2020b). *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. Europess moment: Repair and Prepare for the Next Generation.*

European Commission. (2020c). *The Human-Centred City: Recommendations for research and innovation actions*. https://doi.org/10.2777/07963

European Commission. (2021a). EU taxonomy for sustainable activities. *European Commission*.

European Commission. (2021b). *Final report Urban Agenda for the EU on Circular Economy*. https://futurium.ec.europa.eu/en/urban-agenda/circular-economy/library/final-report-urban-agenda-eu-partnership-circular-economy?language=it

European Commission, Dupagne, A., Ruelle, C., Teller, J., & Cornelis, B. (2004). SUIT: Sustainable development of urban historical areas through an active integration within towns. In *Research report n° 16*.

European Commission, & Eco-innovation observatory. (2016). *Policies and Practices for Eco-Innovation Up-take and Circular Economy Transition. EIO bi-annual report*.

European Parliament. (2017a). Decision (EU) 2017/864 of the European Parliament and of the Council of 17 May 2017 on a European Year of Cultural Heritage (2018). In *Official Journal of the European Union* (2003/30/EC; Issue 20.5.2017). https://doi.org/10.1016/j.jclepro.2010.02.014

European Parliament. (2017b). *European Parliament TEXTS ADOPTED P8_TA-PROV(2017)0140 European Year of Cultural Heritage* ***I*. European Union.

European Union. (2020). *Policy Lab*. https://ec.europa.eu/jrc/en/research-facility/policy-lab

Evans, G., & Shaw, P. (2004). The contribution of culture to regeneration in the UK: a rewiev of evidence. A report to the Department for Culture Media and Sport. *Culture*, *January*.

Faber, M., Manstetten, R., & Proops, J. L. R. (1995). On the conceptual foundations of ecological economics: A teleological approach. *Ecological Economics*. https://doi.org/10.1016/0921-8009(94)00022-N

Figueira, J., Mousseau, V., & Roy, B. (2005). Electre methods. In J. R. Figueira, S. Greco, & M. Ehrgott (Eds.), *Multiple Criteria Decision Analysis: State of the Art Surveys* (pp. 133–162). Springer-Verlag.

Figueira, Josè, Mousseau, V., & Roy, B. (2005). Chapter 1 ELECTRE METHODS Introduction : A brief History. *Multiple Criteria Decision Analysis: State of the Art Surveys*.

Franciosa, A. (2016). *La valutazione dei processi urbani per la promozione della salute: una sperimentazione al paesaggio storico dell'area metropolitana di Napoli* [University of Naples Federico II]. http://www.fedoa.unina.it/10995/

Fujiwara, N. (2016). Roadmap for Post-Carbon Cities in Europe : Transition To Sustainable and Resilient Nazca Nuts. *POCACITO Policy Brief No. 3*, *3*.

Fund, H. L. (2013). *New ideas need old buildings*.

https://www.heritagefund.org.uk/sites/default/files/media/research/new_ideas_old_buildings_2013.pdf

Funtowicz, S. O., & Ravetz, J. R. (1990). Uncertainty and Quality in Science for Policy. In *Uncertainty and Quality in Science for Policy*. https://doi.org/10.1007/978-94-009-0621-1

Fusco Girard L.; Nijkamp P. (1997). *Le valutazioni per lo sviluppo sostenibile della città e del territorio*. Franco Angeli.

Fusco Girard, L. (1987a). *Risorse architettoniche e culturali: valutazioni e strategie di conservazione*. Franco Angeli.

Fusco Girard, L. (1987b). *Risorse Architettoniche e Culturali: Valutazioni e Strategie di Conservazione*. Franco Angeli.

Fusco Girard, L. (2012). Creativity and the human sustainable city: Principles and approaches for nurturing city resilience. In *Sustainable City and Creativity: Promoting Creative Urban Initiatives*.

Fusco Girard, L. (2014). Creative initiatives in small cities management: The landscape as an engine for local development. *Built Environment*, *40*(4), 475–496.

Fusco Girard, L. (2016). The City and the Territory System: Towards The "New Humanism" Paradigm. *Agriculture and Agricultural Science Procedia*, *8*, 542–551. https://doi.org/10.1016/j.aaspro.2016.02.070

Fusco Girard, L. (2019a). Implementing the circular economy: the role of cultural heritage as the entry point. which evaluation approaches? *BDC. Bollettino Del Centro Calza Bini*, *19*(2), 245–277. https://doi.org/https://doi.org/10.6092/2284-4732/7269

Fusco Girard, L. (2019b). The Human-Centred City Development and the Circular Regeneration. In L. Fusco Girard, C. Trillo, & M. Bosone (Eds.), *Matera, città del sistema ecologico uomo/società/natura il ruolo della cultura per la rigenerazione del sistema urbano/territoriale*. Giannini Publisher.

Fusco Girard, L. (2020). The circular economy in transforming a died heritage site into a living ecosystem, to be managed as a complex adaptive organism. *Aestimum*. https://doi.org/10.13128/aestim-9428

Fusco Girard, L. (2021a). *CLIC Deliverable D2.7 CLIC Framework of Circular Human-Centred Adaptive Reuse of Cultural Heritage*.

Fusco Girard, L. (2021b). The circular economy in transforming a died heritage site into a living ecosystem, to be managed as a complex adaptive organism. *Aestimum*, *77*, 145–180. https://doi.org/10.13128/aestim-9788

Fusco Girard, L., De Rosa, F., & Nocca, F. (2014). Verso il Piano Strategico di una città storica: Viterbo. In *BDC. Bollettino Del Centro Calza Bini* (Issue 1, pp. 11–37).

Fusco Girard, L., & Gravagnuolo, A. (2017). Circular economy and cultural heritage/landscape regeneration. Circular business, financing and governance models for a competitive Europe. *BDC. Bollettino Del Centro Calza Bini*, *1/2017*(1), 35–52.

Fusco Girard, L., Gravagnuolo, A., Nocca, F., Angrisano, M., & Bosone, M. (2015). Towards an economic impact assessment framework for Historic Urban Landscape conservation and regeneration projects. *BDC. Bollettino Del Centro Calza Bini*, *15*(2), 1–29.

Fusco Girard, L., & Nijkamp, P. (1997a). *Le valutazioni per lo sviluppo sostenibile della città e del*

territorio (L. Fusco Girard & P. Nijkamp (eds.)). FrancoAngeli.

Fusco Girard, L., & Nijkamp, P. (1997b). *Le valutazioni per lo sviluppo sostenibile della città e del territorio*. Franco Angeli.

Fusco Girard, L., & Nocca, F. (2019). Moving Towards the Circular Economy/City Model: Which Tools for Operationalizing This Model? *Sustainability*, *11*(22), 6253. https://doi.org/10.3390/su11226253

Fusco Girard, L., & Nocca, F. (2020). Climate change and health impacts in urban areas: Towards hybrid evaluation tools for new governance. *Atmosphere*. https://doi.org/10.3390/atmos11121344

Fusco Girard, L., & Vecco, M. (2019). Genius loci: the evaluation of places between instrumental and intrinsic values. *BDC. Bollettino Del Centro Calza Bini*.

Fusco Girard, L., & Vecco, M. (2021). The "Intrinsic Value" of Cultural Heritage as Driver for Circular Human-Centred Adaptive Reuse. *Sustainability*, *13*(6), 3231. https://doi.org/10.3390/su13063231

Garzillo, C., Gravagnuolo, A., & Ragozino, S. (2018). Circular governance models for cultural heritage adaptive reuse: the experimentation of Heritage Innovation Partnerships. *Urbanistica Informazioni*, *278*(Special Issue), 17–22. https://www.researchgate.net/publication/344285025_Circular_governance_models_for_cultural_heritage_adaptive_reuse_the_experimentation_of_Heritage_Innovation_Partnerships

Geddes, P. (1915). Cities in Evolution: An Introduction to the Town Planning Movement and to the Study of Civics. In *The Geographical Journal*. Williams & Norgate. https://doi.org/10.2307/1779702

Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy – A new sustainability paradigm? In *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2016.12.048

Genovesi, A. (1765). *Lezioni di Economia Civile* (F. Dal Degan (ed.)).

Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production*, *114*, 11–32. https://doi.org/10.1016/j.jclepro.2015.09.007

Glasson, J., & Therivel, R. (2019). Introduction to environmental impact assessment. In *Introduction to Environmental Impact Assessment*. https://doi.org/10.4324/9780429470738

Gravagnuolo, A. (2015). *La valutazione dei paesaggi culturali. Approcci e strumenti per la tutela e valorizzazione dei sistemi terrazzati.* [University of Naples Federico II]. http://www.fedoa.unina.it/10443/

Gravagnuolo, Antonia, Angrisano, M., & Nativo, M. (2020). Evaluation of Environmental Impacts of Historic Buildings Conservation through Life Cycle Assessment in a Circular Economy Perspective. *Aestimum*, *2020*. https://doi.org/10.13128/aestim-10004

Gravagnuolo, Antonia, Fusco Girard, L., Ost, C., & Saleh, R. (2017). Evaluation criteria for a circular adaptive reuse of cultural heritage. *BDC Bollettino Del Centro Calza Bini*, *17*(2/2017), 185–216.

Gravagnuolo, Antonia, & Girard, L. F. (2017). Multicriteria Tools for the Implementation of Historic Urban Landscape. *Quality Innovation Prosperity*, *21*(1), 186. https://doi.org/10.12776/qip.v21i1.792

Gravagnuolo, Antonia, Micheletti, S., & Bosone, M. (2021). A Participatory Approach for "Circular" Adaptive Reuse of Cultural Heritage. Building a Heritage Community in Salerno, Italy. *Sustainability*, *13*(9), 4812. https://doi.org/10.3390/su13094812

Gustafsson, C. (2019a). Conservation 3.0 - Cultural heritage as a driver for regional growth. *SCIRES-IT*, *9*(1), 21–32. https://doi.org/10.2423/i22394303v9n1p21

Gustafsson, C. (2019b). European Quality Principles for cultural heritage interventions and conservation 3.0. In L. Fusco Girard, C. Trillo, & M. Bosone (Eds.), *Matera, città del sistema ecologico uomo/società/natura il ruolo della cultura per la rigenerazione del sistema urbano/territorialeuomo/società/natura: il ruolo della cultura per la rigenerazione del sistema urbano/territoriale* (pp. 335–344). Giannini.

Hanania, L. R. (2014). Cultural diversity in international law: The effectiveness of the UNESCO convention on the protection and promotion of the diversity of cultural expressions. In *Cultural Diversity in International Law: The Effectiveness of the UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions*. https://doi.org/10.4324/9780203795842

Hannis, M. (2016). *Freedom and Environment: Autonomy, Human Flourishing and the Political Philosophy of Sustainability* (first). Routledge. https://doi.org/10.3197/096327116x14736981715823

Hinloopen, E. (1985). *De Regime Methode*. Free University Amsterdam.

Hinloopen, E., & Nijkamp, P. (1990). Qualitative multiple criteria choice analysis. *Quality and Quantity*, *24*(1). https://doi.org/10.1007/bf00221383

Hinloopen, E., Nijkamp, P., & Rietveld, P. (1983). Qualitative discrete multiple criteria choice models in regional planning. *Regional Science and Urban Economics*, *13*(1). https://doi.org/10.1016/0166-0462(83)90006-6

Historic England. (2014). *HERITAGE COUNTS 2014 - The Value and Impact of Heritage*. https://historicengland.org.uk/content/heritage-counts/pub/2014/value-impact-chapter-pdf/

Historic England. (2016a). *HERITAGE COUNTS Heritage and Society 2016*.

Historic England. (2016b). *HERITAGE COUNTS Heritage and the Economy 2016*.

Hokkanen, J., & Salminen, P. (1997). ELECTRE III and IV decision aids in an environmental problem. *Journal of Multi-Criteria Decision Analysis*, *6*(4). https://doi.org/10.1002/(SICI)1099-1360(199707)6:4<215::AID-MCDA139>3.0.CO;2-P

Hosagrahar, J., Soule, J., Fusco Girard, L., & Potts, A. (2016). Cultural Heritage, the UN Sustainable Development Goals, and the New Urban Agenda. *BDC. Bollettino Del Centro Calza Bini*, *16*(1), 37–54.

Hwang, C.-L., & Yoon, K. (1981). Multiple Attributes Decision Making Methods and Applications. *Multiple Attribute Decision Making*.

ICOMOS. (2005). Xi ' an Declaration on the Conservation of the Setting of Heritage Structures , Sites and Areas. *General Assembly of ICOMOS*, *2005*.

ICOMOS. (2011). *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*. https://doi.org/10.1017/CBO9781107415324.004

IPCC. (2018). Global warming of 1.5°C. In *Ipcc - Sr15*.

IPCC. (2019). Special Report: Global Warming of 1.5 C. In *Intergovernmental Panel on Climate*

Change. https://doi.org/10.1203/00006450-199705000-00009

Ishizaka, A., & Nemery, P. (2013). *Multi-Criteria Decision Analysis*. John Wiley & Sons Ltd. https://doi.org/10.1002/9781118644898

ISTAT. (2015). *BES 2015. Il benessere equo e sostenibile in Italia*.

Jacobs, J. (1961). The death and life of great American cities. The failure of town planning. *New York*, *71*.

Jacobsen, N. B. (2008). Industrial Symbiosis in Kalundborg, Denmark: A Quantitative Assessment of Economic and Environmental Aspects. *Journal of Industrial Ecology*, *10*(1–2), 239–255. https://doi.org/10.1162/108819806775545411

Jones, C. E., & Slinn, P. (2008). Cultural heritage in EIA - Reflections on practice in North West Europe. *Journal of Environmental Assessment Policy and Management*, *10*(3). https://doi.org/10.1142/S1464333208003056

Kabir, G., & Hasin, M. A. A. (2012). Comparative Analysis of Topsis and Fuzzy Topsis for the Evaluation of Travel Website Service Quality. *International Journal of Quality Research*, *6*(3).

Kail, A., & Lumley, T. (2012). Theory of Change: The beginning of making a difference. *New Philanthropy Capital*, *April*.

Kallis, G., & Norgaard, R. B. (2010). Coevolutionary ecological economics. *Ecological Economics*. https://doi.org/10.1016/j.ecolecon.2009.09.017

Kangas, A., Kangas, J., & Pykäläinen, J. (2001). Outranking methods as tools in strategic natural resources planning. *Silva Fennica*, *35*(2). https://doi.org/10.14214/sf.597

Karagiannidis, A., & Moussiopoulos, N. (1997). Application of ELECTRE III for the integrated management of municipal solid wastes in the greater Athens area. *European Journal of Operational Research*, *97*(3). https://doi.org/10.1016/S0377-2217(96)00252-4

Keeney, R. L., & Raiffa, H. (1979). Decisions with Multiple Objectives: Preferences and Value Trade-Offs. In *IEEE Transactions on Systems, Man and Cybernetics* (Vol. 9, Issue 7). https://doi.org/10.1109/TSMC.1979.4310245

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. In *Resources, Conservation and Recycling* (Vol. 127, pp. 221–232). Elsevier B.V. https://doi.org/10.1016/j.resconrec.2017.09.005

Kmietowicz, Z. W., & Pearman, A. D. (1976). Decision theory and incomplete knowledge: maximum variance. *Journal of Management Studies*, *13*(2). https://doi.org/10.1111/j.1467-6486.1976.tb00531.x

Knight, F. (1982). *Freedom and reform: essays in economic and social philosophy*. Harper Bros.

Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular Economy: The Concept and its Limitations. *Ecological Economics*, *143*, 37–46. https://doi.org/10.1016/j.ecolecon.2017.06.041

Kuenz Murphy, C. (1993). Limits on the analytic hierarchy process from its consistency index. *European Journal of Operational Research*, *65*(1), 138–139. https://doi.org/10.1016/0377-2217(93)90148-G

Lai, Y. J., Liu, T. Y., & Hwang, C. L. (1994). TOPSIS for MODM. *European Journal of Operational Research*, *76*(3). https://doi.org/10.1016/0377-2217(94)90282-8

Łatuszyńska, A. (2014). Multiple-Criteria Decision Analysis Using Topsis Method For Interval Data In Research Into The Level Of Information Society Development. *Folia Oeconomica Stetinensia*, *13*(2). https://doi.org/10.2478/foli-2013-0015

Lichfield, D., & Lichfield, N. (1997). *Community impact evaluation in the development process, Sustainable Development in a Developing World: Integrating Socio-economic Appraisal and Environmental Assessment*. Edward Elgar Publishing.

Lichfield, Dalia. (2009). Community Impact Analysis and Evaluation: Nat Lichfield's View of Planning. *Local Economy: The Journal of the Local Economy Policy Unit*, *24*(8), 658–668. https://doi.org/10.1080/02690940903367918

Lichfield, N. (1988). Economics in urban conservation. *Economics in Urban Conservation*. https://doi.org/10.2307/635463

Lichfield, N. (1995). *Community Impact Evaluation*. University College Press.

Lichfield, Nathaniel. (1970). Evaluation Methodology of Urban and Regional Plans: A Review. In *Regional Studies* (Vol. 4, Issue 2). https://doi.org/10.1080/09595237000185201

Lootsma, F. A. (1999). Multi-Criteria Decision Analysis via Ratio and Difference Judgement Applicd Optimization. In *Optimization*.

Magli, V. (2018). *LA FORMA DELLE CITTÀ. Presentazione di uno strumento di valutazione in itinere del processo rigenerativo dell'Asilo Filangieri a Napoli* [Università IUAV di Venezia]. https://www.glocalimpactnetwork.com/wp-content/uploads/2020/06/Magli_La_forma_delle_città.pdf

Mareschal, B., De Smet, Y., & Nemery, P. (2008). Rank reversal in the PROMETHEE II method: Some new results. *2008 IEEE International Conference on Industrial Engineering and Engineering Management, IEEM 2008*. https://doi.org/10.1109/IEEM.2008.4738012

Masters, J. (1995). The history of action research. *Action Research Electronic Reader*.

Meeus, L., De Oliveira Fernandes, E., Leal, V., Azevedo, I., Delarue, E., & Glachant, J.-M. (2012). *How to foster a quick transition towards local sustainable energy systems : final report, topic 2*. https://doi.org/10.2870/34173

Mendoza, G. A., & Prabhu, R. (2000). Multiple criteria decision making approaches to assessing forest sustainability using criteria and indicators: A case study. *Forest Ecology and Management*, *131*(1–3). https://doi.org/10.1016/S0378-1127(99)00204-2

Menegolo, L., & Guimarães Pereira, A. (1996). *NAIADE Manual*. https://www.weadapt.org/system/files_force/naiade.pdf?download=1

Montis, A. De, Toro, P. De, Droste-franke, B., Omann, I., & Stagl, S. (2000). Criteria for quality assessment of MCDA methods. *3rd Biennial Conference of the European Society for Ecological Economics,*.

Moreau, V., Sahakian, M., van Griethuysen, P., & Vuille, F. (2017). Coming Full Circle: Why Social and Institutional Dimensions Matter for the Circular Economy. *Journal of Industrial Ecology*. https://doi.org/10.1111/jiec.12598

Morgan, J., & Mitchell, P. (2015). *Employment and the circular economy. Job creation in a more resource efficient Britain*.

Morris, P., & Therivel, R. (2009). Methods of environmental impact assessment: Third edition. In

Methods of Environmental Impact Assessment: Third Edition (Vol. 9780203892909). https://doi.org/10.4324/9780203892909

Morrison-Saunders, A., Pope, J., Gunn, J. A. E., Bond, A., & Retief, F. (2014). Strengthening impact assessment: A call for integration and focus. *Impact Assessment and Project Appraisal*, *32*(1). https://doi.org/10.1080/14615517.2013.872841

Morrone, A. (2006). Guidelines for Measuring Cultural Participation. In *Montreal: UNESCO* (Issue December).

Munda, G., Nijkamp, P., & Rietveld, P. (1994). Fuzzy multigroup conflict resolution for environmental management. In J. Weiss (Ed.), *The Economics of Project Appraisal and the Environment*. Edward Elgar Publishing.

Munda, Giuseppe. (1995). *Multicriteria Evaluation in a Fuzzy Environment*. Physica-Verlag HD. https://doi.org/10.1007/978-3-642-49997-5

Nijkamp, P. (1979). Multidimensional spatial data and decision analysis. *Multidimensional Spatial Data and Decision Analysis.* https://doi.org/10.2307/2982082

Nijkamp, P., & Voogd, H. (1980). New Multicriteria Methods for Physical Planning by means of Multidimensional Scaling Techniques. *IFAC Proceedings Volumes*, *13*(3), 19–30. https://doi.org/10.1016/S1474-6670(17)65052-3

Nocca, F., & Girard, L. F. (2018). Circular city model and its implementation: towards an integrated evaluation tool. *BDC. Bollettino Del Centro Calza Bini*, *18*(1).

OECD-Organisation for Economic Co-operation and Development. (2014). *Measuring and managing results in development co-operation*.

OECD-Organisation for Economic Co-operation and Development. (2019). *Better Regulation Practices across the European Union*. OECD Publishing. https://doi.org/10.1787/9789264311732-en

Olejniczak, K., Borkowska-Waszak, S., Domaradzka-Widla, A., & Park, Y. (2017). The craft of policy labs: an overview of methods applied for development and testing of policy solutions. *3rd International Conference on Public Policy (ICPP3)*, 1–25. https://www.ippapublicpolicy.org/file/paper/593c8e25f0278.pdf

Olejniczak, K., Borkowska-Waszak, S., Domaradzka-Widła, A., & Park, Y. (2020a). Policy labs: the next frontier of policy design and evaluation? *Policy & Politics*, *48*(1), 89–110. https://doi.org/10.1332/030557319X15579230420108

Olejniczak, K., Borkowska-Waszak, S., Domaradzka-Widła, A., & Park, Y. (2020b). Policy labs: The next frontier of policy design and evaluation? *Policy and Politics*, *48*(1), 89–110. https://doi.org/10.1332/030557319X15579230420108

Ost, C. (2012). Mapping Heritage Economics for Spatial Analysis in Historic City Cores. In G. Licciardi & R. Amirtahmasebi (Eds.), *The Economics of Uniqueness. Investing in Historic City Cores and Cultural Heritage Assets for Sustainable Development* (pp. 245–283). The World Bank.

Ost, C., & Saleh, R. (2019). Introduction to perceptions mapping: the case of Salerno, Italy. *Agopuntura Urbana & Art Infoscape*, *12*(23), 137–162. https://doi.org/https://doi.org/10.6092/2281-4574/6639

Ost, C., & Saleh, R. (2021). Perceptions mapping: A participatory tool for urban conservation

planning. In Taylor & Francis (Ed.), *The Future of the Past: Paths towards Participatory Governance for Cultural Heritage*. CRC Press.

Paelinck, J. (1977). Qualitative Multicriteria Analysis: An Application to Airport Location. *Environment and Planning A: Economy and Space*, *9*(8), 883–895. https://doi.org/10.1068/a090883

Papadopoulos, A., & Karagiannidis, A. (2008). Application of the multi-criteria analysis method Electre III for the optimisation of decentralised energy systems. *Omega*, *36*(5). https://doi.org/10.1016/j.omega.2006.01.004

Parent, E., & Schnabele, P. (1988). *Le choix d'un am´enagement aquacole: Exemple d'utilisation de la m´ethode Electre III et comparaison avec d'autres methodes multicrit`eres d'aide `a la d´ecision.* (No. 47; Cahier Du LAMSADE). https://www.lamsade.dauphine.fr/mcda/biblio/Author/SCHNABELE-P.html

Pereira Roders, A., Bond, A., & Teller, J. (2013). Determining Effectiveness in Heritage Impact Assessments. *IAIA13 Conference Proceedings*, *May*.

Pereira Roders, A., & Van Oers, R. (2012). Guidance on heritage impact assessments: Learning from its application on World Heritage site management. In *Journal of Cultural Heritage Management and Sustainable Development* (Vol. 2, Issue 2). https://doi.org/10.1108/20441261211273671

Perrini, F., & Vurro, C. (2013). *La valutazione degli impatti sociali. Approcci e strumenti applicativi*. Egea.

Pintossi, N., Ikiz Kaya, D., & Pereira Roders, A. (2021). Identifying challenges and solutions in cultural heritage adaptive reuse through the historic urban landscape approach in amsterdam. *Sustainability (Switzerland)*, *13*(10). https://doi.org/10.3390/su13105547

Pope, J., Bond, A., Morrison-Saunders, A., & Retief, F. (2013). Advancing the theory and practice of impact assessment: Setting the research agenda. In *Environmental Impact Assessment Review* (Vol. 41). https://doi.org/10.1016/j.eiar.2013.01.008

Porter, M. E., & Kramer, M. R. (2011). Creating Shared Value. *Harvard Business Review*, *89*(nos. 1-2 (January–February 2011)), 62–77.

Porter, M., & Janssen, R. (1996). Multiobjective Decision Support for Environmental Management. *The Statistician*, *45*(3). https://doi.org/10.2307/2988482

Potts, A. (2021). *European Cultural Heritage Green Paper* (Europa Nostra). https://issuu.com/europanostra/docs/20210322-european_cultural_heritage_green_paper_fu

Ragozino, S. (2018). Social Impact Evaluation in Culture-led Regeneration Processes: Reflections on the "Social Return On Investment" Perspective. *PlaNext - next Generation Planning*, *7*, 63–81. https://doi.org/10.24306/plnxt/50

Rahim, R., Nurarif, S., Ramadhan, M., Aisyah, S., & Purba, W. (2017). Comparison Searching Process of Linear, Binary and Interpolation Algorithm. *Journal of Physics: Conference Series*, *930*(1). https://doi.org/10.1088/1742-6596/930/1/012007

Re, Si. (2021). Lancet countdown: prognosi riservata per clima e salute globale. *ScienzaInRete*. https://www.scienzainrete.it/articolo/lancet-countdown-prognosi-riservata-clima-e-salute-globale/simona-re/2019-11-21

Richieri Hanania, L. (2016). The UNESCO Convention on the Diversity of Cultural Expressions as a coordination framework to promote regulatory coherence in the creative economy. *International*

Journal of Cultural Policy, *22*(4). https://doi.org/10.1080/10286632.2015.1025068

Rietveld, P. (1980). *Multi Objective Decision Making and Regional Planning*. North Holland.

Rogers, M., & Bruen, M. (1998a). A new system for weighting environmental criteria for use within ELECTRE III. *European Journal of Operational Research*, *107*(3). https://doi.org/10.1016/S0377-2217(97)00154-9

Rogers, M., & Bruen, M. (1998b). Choosing realistic values of indifference, preference and veto thresholds for use with environmental criteria within ELECTRE. *European Journal of Operational Research*, *107*(3). https://doi.org/10.1016/S0377-2217(97)00175-6

Rojas, E. (2016). Urban heritage for sustainable development. In UNESCO (Ed.), *Culture Urban Future: Global Report on Culture for Sustainable Urban Development*.

Ross, J. A., & Ben Jaafar, S. (2006). Participatory needs assessment. *The Canadian Journal of Program Evaluation*, *21*(1), 131–154.

Roszkowska, E. (2011). MULTI-CRITERIA DECISION MAKING MODELS BY APPLYING THE TOPSIS METHOD TO CRISP AND INTERVAL DATA. *International Scientific Journal*, *6*(1).

Roy, B. (1986). Méthodologie multicritère d ' aide à la décision. *Politiques et Management Public*, *4*.

Roy, Bernard. (1996). *Multicriteria Methodology for Decision Aiding* (Vol. 12). Springer US. https://doi.org/10.1007/978-1-4757-2500-1

Saaty, T. L. (1977). A scaling method for priorities in hierarchical structures. *Journal of Mathematical Psychology*, *15*(3). https://doi.org/10.1016/0022-2496(77)90033-5

Saaty, T. L. (1980). *The Analytic Hierarchy Process*. McGraw-Hill.

Saaty, T. L. (1988). *Decision Making for Leaders*. RWS Publications.

Saaty, T. L. (1992). *Multicriteria Decision Making – The Analytic Hierarchy Process*. RWS Publications.

Saaty, T. L. (2012). Decision making for leaders. *IEEE Transactions on Systems, Man, and Cybernetics*, *SMC-15*(3). https://doi.org/10.1109/tsmc.1985.6313384

Saaty, T. L., & Alexander, J. M. (1989). *Conflict Resolution – The Analytic Hierarchy Process*. Praeger.

Saaty, T. L., & Forman, E. (1993). *The Hierarchon*. RWS Publications.

Sacco, P., Ferilli, G., & Tavano Blessi, G. (2018). From Culture 1.0 to Culture 3.0: Three Socio-Technical Regimes of Social and Economic Value Creation through Culture, and Their Impact on European Cohesion Policies. *Sustainability*, *10*(11), 3923. https://doi.org/10.3390/su10113923

Sacco, P. L., & Teti, E. (2017). Cultura 3.0: un nuovo paradigma di creazione del valore. *E&M*, *1*, 79–96.

Schimpeler, C. C., & Grecco, W. L. (1968). The community: an approach based on community structure and values. *Highway Research Record*, *238*, 123–152. https://trid.trb.org/view/134204

Schlager, K. (1986). The rank-based expected value method of plan evaluation. *Highway Research Record*, *238*. https://onlinepubs.trb.org/Onlinepubs/hrr/1968/238/238-009.pdf

Schröder, P., Lemille, A., & Desmond, P. (2020). Making the circular economy work for human

development. *Resources, Conservation and Recycling*, *156*, 104686. https://doi.org/10.1016/j.resconrec.2020.104686

Sen, A. (2021). Rationality and social choiche. In *Rationality and Freedom*. https://doi.org/10.2307/j.ctv1dv0td8.11

Shi, H., Chertow, M. R., & Song, Y. (2010). Developing country experience with eco-industrial parks: a case study of the Tianjin Economic-Technological Development Area in China. *Journal of Cleaner Production*, *18*(3), 191–199. https://doi.org/10.1016/J.JCLEPRO.2009.10.002

Simon, H. A. (1959). Theories of Decision-Making in Economics. *The American Economic Review*, *49*(3), 253–283. https://www.jstor.org/stable/1809901

Taha, H. A. (1976). *Operations Research*. Macmillan.

Taplin, D. H., & Clark, H. (2012). Theory of change basics: A primer on theory of change. *ActKnowledge*.

Taylor, C., Pratt, A., & Burns Owen Partnership. (2007). *A global methodology for capturing cultural statistics: Designing the UNESCO Framework (2009)*. https://ref2014impact.azurewebsites.net/casestudies2/refservice.svc/GetCaseStudyPDF/6398

Taylor, P., Davies, L., Wells, P., Gilbertson, J., & Tayleur, W. (2015). A review of the Social Impacts of Culture and Sport. *The Social Impacts of Engagement with Culture and Sport, Sheffield Hallam University*, *March*.

The SROI Network. (2012). *SROI. Guida al Ritorno Sociale sull'Investimento*. Matter&Co. https://www.humanfoundation.it/wp-content/uploads/2019/07/SROI-Guide_ITA_completa.pdf

Turner, R. K. (1993). *Sustainable Environmental Economics and Management: Principles and Practice*. Belhaven Pr.

UN-Habitat. (2015). *Habitat III Issue Papers 10 - Urban-Rural Linkages*.

UN-Habitat. (2020). *Valuing our communities and cities*. https://urbanoctober.unhabitat.org/sites/default/files/2020-09/Final World Cities Day 2020 Concept Notes on Valuing Communities and Cities.pdf

UNESCO. (1986). *The UNESCO framework for cultural statistics FCS*. UNESCO World Heritage Centre. http://uis.unesco.org/sites/default/files/documents/unesco-framework-for-cultural-statistics-1986-en_0.pdf

UNESCO. (1996). Our creative diversity. In *Our creative diversity*. https://unesdoc.unesco.org/ark:/48223/pf0000105586_fre

UNESCO. (2008). Operational Guidelines for the Implementation of the World Heritage Convention. *Operational Guidelines for the Implementation of the World Heritage Convention*, *July*.

UNESCO. (2009). 2009 UNESCO Framework for Cultural Statistics. In *UNESCO Institute for Statistics* (Vol. 5, Issue 2).

UNESCO. (2013). *UNESCO contribution to the Report of the UN Secretary-General on "Science, technology and innovation, and the potential of culture, for promoting sustainable development and achieving the Millennium Development Goals" for the 2013 ECOSOC Annual Ministeria*. https://www.un.org/en/ecosoc/newfunct/pdf13/sti_unesco.pdf

UNESCO. (2016). *Culture Urban Future: Global report on Culture for Sustainable Urban Development*.

UNFCCC. (2015). Adoption of the Paris Agreement. *Conference of the Parties on Its Twenty-First Session*.

United Nations. (2015a). *Habitat III Issue Papers 4 – Urban Culture and Heritage*.

United Nations. (2015b). Transforming our World: the 2030 Agenda for Sustainable Development. In *A/RES/70/1*. https://doi.org/10.1201/b20466-7

United Nations. (2015c). United Nations Transforming Our World: the 2030 Agenda for Sustainable Development. A/RES/70/1. In *United Nations* (Issue October).

United Nations. (2016). *Habitat III Policy Paper 1 – Right to the City and Cities for All*.

United Nations. (2017). New Urban Agenda. In *United Nations Conference on Housing and Sustainable Urban Development (Habitat III)*. United Nations.

United Nations (Habitat III). (2017). *New Urban Agenda*. www.habitat3.org

Van Berkel, R., Fujita, T., Hashimoto, S., & Geng, Y. (2009). Industrial and urban symbiosis in Japan: Analysis of the Eco-Town program 1997-2006. *Journal of Environmental Management*. https://doi.org/10.1016/j.jenvman.2008.11.010

Van Delft, A., & Nijkamp, P. (1977). *Multiple Criteria Analysis and Regional Decision Making*. Martinus Nijhoff.

Vecchiato, T. (2015). Valutare l'impatto sociale con metriche adeguate. *Studi Zancan*, *5*, 14–20. http://www.grusol.it/informazioni/09-02-16_1.PDF

Venturi, P. (2015). #SEWF2015. Osservando il flusso dell'Impresa Sociale. *Vita*. http://www.vita.it/it/blog/co-operare/2015/07/03/sewf2015-osservando-il-flusso-dellimpresa-sociale/3003/

Vidalenc, E., & Theys, J. (2013). Towards post carbon cities : Why ? How ? *Eceee 2013 Summer Study: Rethink, Renew, Restart*.

von Neumann, J., & Morgenstern, O. (1944). Theory of games and economic behavior. In *Theory of Games and Economic Behavior*. https://doi.org/10.2307/2981222

Voogd, H. (1982). Multicriteria Evaluation with Mixed Qualitative and Quantitative Data. *Environment and Planning B: Planning and Design*, *9*(2), 221–236. https://doi.org/10.1068/b090221

Voogd, J. H. (1982). *Multicriteria evaluation for urban and regional planning*. Delftsche Uitgevers Maatschappij. https://doi.org/https://doi.org/10.6100/IR102252

Voogd, J. H. (1983). *Multicriterial evaluation for urban and regional planning*. Pion.

Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Belesova, K., Berry, H., Bouley, T., Boykoff, M., Byass, P., Cai, W., Campbell-Lendrum, D., Chambers, J., Daly, M., Dasandi, N., Davies, M., Depoux, A., Dominguez-Salas, P., Drummond, P., Ebi, K. L., … Costello, A. (2018). The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come. In *The Lancet* (Vol. 392, Issue 10163, pp. 2479–2514). Lancet Publishing Group. https://doi.org/10.1016/S0140-6736(18)32594-7

Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Belesova, K., Boykoff, M., Byass, P., Cai, W., Campbell-Lendrum, D., Capstick, S., Chambers, J., Dalin, C., Daly, M., Dasandi, N., Davies, M., Drummond, P., Dubrow, R., Ebi, K. L., Eckelman, M., … Montgomery, H. (2019). The 2019 report of The Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate. *The Lancet*, *394*(10211), 1836–1878.

https://doi.org/10.1016/S0140-6736(19)32596-6

Weick, K. E. (1995). Sensemaking in Organizations (Foundations for Organizational Science). *Star*.

WHO. (2018). COP24 Special report: Health and Climate Change. *Who*.

WHO - World Health Organization. (2020). WHO Manifesto for a healthy recovery from COVID-19. In *World Health Organisation*.

Wijkman, A., & Skånberg, K. (2015). The Circular Economy and Benefits for Society: Jobs and Climate Clear Winners in an Economy Based on Renewable Energy and Resource Efficiency. *The Club of Rome*, 59.

World Tourism Organization. (2004). *Indicators of Sustainable Development for Tourism Destinations: A Guidebook*. World Tourism Organization. http://www.tourisk.org/content/projects/Indicators for Tourism Development.pdf

Yoon, K. (1980). Systems Selection By Multiple Attribute Decision Making. *ProQuest Dissertations and Theses*.

Yu, F., Han, F., & Cui, Z. (2015). Evolution of industrial symbiosis in an eco-industrial park in China. *Journal of Cleaner Production*, *87*, 339–347. https://doi.org/10.1016/J.JCLEPRO.2014.10.058

Yuan, Z., Bi, J., & Moriguichi, Y. (2008). The Circular Economy: A New Development Strategy in China. *Journal of Industrial Ecology*, *10*(1–2), 4–8. https://doi.org/10.1162/108819806775545321

Zamagni, S., Venturi, P., & Rago, S. (2015). Valutare l'impatto sociale. La questione della misurazione nelle imprese sociali. *Impresa Sociale*, *6*, 77–97.

Zamagni, S., Venturi, P., & Rago, S. (2018). Valutare l'impatto sociale. La questione della misurazione nelle imprese sociali. *Impresa Sociale*, *12*. https://www.rivistaimpresasociale.it/rivista/articolo/valutare-l-impatto-sociale-la-questione-della-misurazione-12

Zanakis, S. H., Solomon, A., Wishart, N., & Dublish, S. (1998). Multi-attribute decision making: A simulation comparison of select methods. *European Journal of Operational Research*, *107*(3). https://doi.org/10.1016/S0377-2217(97)00147-1

Zeleny, M. (2011). Multiple Criteria Decision Making (MCDM): From Paradigm Lost to Paradigm Regained? *Journal of Multi-Criteria Decision Analysis*, *18*(1–2), 77–89. https://doi.org/10.1002/mcda.473

Zelený, M., & Hufford, K. D. (1992). The application of autopoiesis in systems analysis: are autopoietic systems also social systems? *International Journal of General Systems*, *21*(2), 145–160. https://doi.org/10.1080/03081079208945066

Zhao, J., Kong, Y., & Liu, C. (2011). Dongtan vs. Masdar: A tale of two zero-carbon cities. *Advanced Materials Research*, *243–249*. https://doi.org/10.4028/www.scientific.net/AMR.243-249.6919

Acronyms

[AHP]	[Analytic Hierarchy Process]
[APC]	[Author Processing Changes]
[API]	[Application Programming Interface]
[BES]	[Benessere equo e sostenibile]
[CBA]	[Cost-Benefit Analysis]
[CC]	[Creative Commons]
[CE]	[Circular Economy]
[CDIS]	[Culture for Development Indicators]
[CH]	[Cultural Heritage]
[CHAR]	[Cultural Heritage Adaptive Reuse]
[CHCfE]	[Cultural Heritage Counts for Europe]
[CIA]	[Community Impact Assessment]
[CIE]	[Community Impact Evaluation]
[CMBW]	[Circular Business Model Workshop]
[COP]	[Conference of the Parties]
[DMP]	[Data Management Plan]
[DNSH]	[Do No Significant Harm]
[DOI]	[Digital Objective Identifier]
[DS]	[Data Sets]
[DSS]	[Decision Support System]
[EIA]	[Environmental Impact Assessment]
[ELECTRE]	[ELimination Et Choix Traduisant la REalit'e]
[EU]	[European Union]
[Evamix]	[Evaluation matrix]
[FAIR]	[Findable, Accessible, Interoperable and Reusable]
[FCS]	[Framework for Cultural Statistics]
[GA]	[Grant Agreement]
[HC]	[Heritage Community]
[HIA]	[Heritage Impact Assessments]
[HIPs]	[Heritage Innovation Partnerships]
[HUL]	[Historic Urban Landscape]

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

[ICOMOS] [International Council on Monuments and Sites]
[ISTAT] [Italian National Institute for Statistics]
[IPCC] [Intergovernmental Panel on Climate Change]
[IS] [Information System]
[LAP] [Local Action Plan]
[LCA] [Life-Cycle Assessment]
[MAUT] [Multiple attribute value theory]
[MCDA] [Multi-Criteria Decision Analysis]
[NAIADE] [Novel Approach to Imprecise Assessment and Decision Environments]
[NUA] [New Urban Agenda]
[OpenAIRE] [Open Access Infrastructure for Research in Europe]
[OECD] [Organisation for Economic Co-operation and Development]
[ORDP] [Open Data Research Pilot]
[OUV] [Outstanding Universal Value]
[PBS] [Planning Balance Sheet]
[PC] [Project Coordinator]
[PM] [Project Manager]
[PMT] [Project Management Team]
[PL] [Permanent Lab]
[RIS] [Research and Innovation for Smart Specialisation]
[SDGs] [Sustainable Development Goals]
[SIA] [Social Impact Assessment]
[SoOUV] [Statement of Outstanding Universal Value]
[SR] [Scientific Responsible]
[SRF] [Simos-RoyFiguiera]
[SROI] [Social Return on Investment]
[TEG] [Technical Expert Group on Sustainable Finance]
[ToC] [Theory of Change]
[UN] [United Nations]
[UN Habitat] [United Nations Human Settlements Programme]
[UNESCO] [United Nations Educational Scientific and Cultural Organisation]
[UNFCCC] [United Nations Framework Convention on Climate Change]
[WH] [World Heritage]

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

[WHC]	[World Heritage Convention]
[WHL]	[World Heritage List]
[WHO]	[World Health Organization]
[WP]	[Work Packages]

Annex 1 – Dynamic co-evaluation: the experimentation in Salerno, Italy

This Annex 1 aims to describe the evaluation process conducted to identify new possible uses of the Edifici Mondo in Salerno, a group of four heritage buildings in the historic city centre[32]. The dynamic co-evaluation here described was conducted as implementation of the CLIC methodology for the assessment of adaptive reuse projects in the ex-ante phase (decision support). The phases and steps proposed are described below according to the data and processes conducted in Salerno, one of the CLIC pilot cities.

Phase 1: Knowledge phase

This first phase of the project foresees the description and analysis of the status quo of the urban area through the collection of data concerning both the single buildings and the urban context in which they are inserted. In particular, for the urban context, urban planning tools and programs (Strategic Orientation Document, Municipal Urban Plan, European Structural Development Funds interventions, Action Plan for Sustainable Energy, etc.) were consulted in order to know the existing constraints on the project area and the urban framing provided by the Municipal Urban Plan, with the relative zoning. In addition, the consultation of cadastral data allowed to know the cadastral consistency of the properties, in terms of dimensional data and ownership regimes. These data were useful to elaborate a classification of the surfaces (Table 3), distinguishing them into: gross walkable surfaces, useful covered surfaces, green areas (meaning permeable surfaces or covered with vegetation) and green surfaces (meaning the surfaces of roofs that can be converted into green roofs). In addition, knowledge of the ownership of the land registry parcels belonging to the four Edifici Mondo has made it possible to elaborate, during the elaboration of the project proposals, reflections also on the management system of these assets (shared management, concession, etc.).

[32] The object of study is coherent with the typologies of cultural heritage and landscape that was highlighted in the Horizon 2020 Call.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Table 3 – Surfaces classification

DIMENSIONAL DATA					
	Gross Floor Surface (sqm)	**Covered Surface (sqm)**	**Useful Uncovered Surface (sqm)**	**Green Areas (sqm)**	**Green Surfaces (sqm)**
San Massimo Palace					
1st level	420	240		730	
2nd level	1670	1340			
3rd level	1500	1300			
4th level	880	780			870
TOTAL	**4470**	**3660**	**-**	**730**	**870**
Convent of Santa Maria della Consolazione					
1st level	810	470	130	1050	
2nd level	1480	830			
3rd level	1150	710	170		
4th level	450	250			190
TOTAL	**3890**	**2260**	**300**	**1050**	**190**
Convent of San Pietro a Maiella and San Giacomo					
1st level	500	300		240	
2nd level	650	480			
3rd level	930	780			
4th level	380	270			90
TOTAL	**2460**	**1830**	**-**	**240**	**90**
Convent of San Francesco					
1st level	1560	700			
2nd level	2310	1140	180	1770	
3rd level	2630	1470			100
4th level	1520	780			
5th level	520	420			780
TOTAL	**8540**	**4510**	**180**	**1770**	**880**
TOTAL	**19360**	**12260**	**480**	**3060**	**1160**

Source: author's elaboration

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Phase 2: Evaluation objectives and criteria

The objective of the evaluation is to identify new uses / functions for the Edifici Mondo and the entire urban area, considering also the green areas and open spaces, through a process of co-evaluation.

The Local Action Plan of Salerno foresees, between its actions, the adaptive reuse of the four building called “Edifici Mondo”. Thus, this evaluation process is framewd within the LAP action for its implementation.

In Salerno, starting from a phase of knowledge building and local stakeholders engagement, the research group activated processes of knowledge building, envisioning, and community engagement for the adaptive reuse of local cultural heritage inspired by the circular economy model.

After collecting a large amount of information regarding the building, the research team, together with representatives of the Municipality of Salerno and involving local stakeholders, elaborated a set of criteria able to express in a synthetic form the requirements of a “satisfactory circular project”. Furthermore, the elaboration of these criteria was also aimed at constituting a set of evaluation parameters that could be used by the Municipality in the phase of listening to reuse proposals coming from local stakeholders. In fact, stimulated by the interaction and confrontation with them, the Municipality decided to organise a The initial proposals: the Public Consultation process for the reception of re-use proposals for the “Edifici Mondo”. So, in order to establish evaluation criteria aligned with the CLIC framework, a set of “Impact criteria of circular adaptive reuse of cultural heritage” (section 2.2 of public consultation[33]) was elaborated, defining 3 “circularity dimensions” and 16 provisional criteria:

1- *Regeneration of cultural, natural, social and economic resources*

1.1 Regeneration of the historical-cultural values and of the cultural and social significance of the buildings as cultural heritage: how are the values and the “meaning” of the Edifici Mondo preserved and “regenerated”/re-interpreted thanks to the proposed project?

1.2 Regeneration of environmental resources through technical and technological solutions that are compatible with the cultural heritage, and in particular

- Generation of energy from renewable sources;
- Water recovery and reuse systems;
- Reuse and recycling of materials;
- Bio-architecture, green and nature-based solutions;
- Reduction of construction and management waste.

1.3 Regeneration of economic and financial resources through the generation of positive cash flows when fully operational.

2- *Promotion of synergies / symbiosis and cooperation*

2.1 Partnerships and collaboration networks that can be activated: Which stakeholders would be involved in the reuse project? Who are the beneficiaries of the project?

2.2 Contribution of the re-use idea to the implementation of the National Strategy for Research and Innovation for Smart Specialisation (RIS3 Campania)

[33] http://www.comune.salerno.it/allegati/30257.pdf

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

2.3 Increase of social capital, trust and cooperation, through the promotion of processes of cooperation, collaboration, mutual support, also by identifying new uses/functions related to the civil and sharing economy
2.4 Increase of human capital through the improvement of competences and skills, innovation, creativity, education, recovery of traditional knowledge.

3- Ability to generate net positive impacts in the territory, considering citizens' health and well-being and the social, environmental, cultural and economic costs of the idea of reuse

3.1 Job generation (direct employment in the management phase)
3.2 Contribution to the promotion of a local micro-community (also on the basis of the management as a "common good" of the heritage foreseen by the Faro Convention, Council of Europe, 2005)
3.3 Improvement of the quality of the historic urban landscape
3.4 Contribution to the improvement of air quality and microclimate
3.5 Improvement of the cultural liveliness of the area
3.6 Location of creative, cultural, innovative, arts and crafts enterprises
3.7 Increased attractiveness of commercial, tourist, recreational, residential activities
3.8 Improvement of the overall quality of life, health and well-being of residents
3.9 Increased awareness of the cultural value of heritage and co-creation of new cultural and social values

The above criteria were used to orient pPublic Consultation proposals, as well as for their evaluation.

Phase 3: Development of project alternatives

The initial proposals: the Public Consultation process

The Municipality of Salerno launched a public consultation to involve all the local stakeholders in the elaboration of proposals for the adaptive reuse of the Edifici Mondo in the circular economy perspective. The four buildings, owned by the Municipality (Saint Massimo Palace) and the State (Convent of San Pietro a Maiella and San Giacomo, Convent of Santa Maria della Consolazione, Convent of San Francesco) are located in the upper historic centre of the city of Salerno and are in a state of abandonment and degradation. The public consultation is considered an operational experiment and contributes first of all to the identification of the needs expressed by the local community about regeneration processes/projects, providing an opportunity to express ideas, points of view, opinions and proposals. The public consultation was an opportunity to search with stakeholders for the best proposals for adaptive reuse and thus enhancement of public assets. To this aim, it was framed as an experimentation of a possible governance tool to be included in the "Regulation for the shared management of the cultural heritage as a common good", approved as an action within the "Local Action Plan for the adaptive re-use of the cultural heritage in the perspective of the circular economy and circular city model", allowing individual or associated subjects, including private ones (companies, foundations, cooperatives, associations, individual

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

citizens, etc.) to present re-use proposals. Section 2.1 of the public consultation defines the "Objectives of adaptive reuse of cultural heritage in a circular economy perspective"[34]:

"The adaptive reuse of cultural heritage in the perspective of circular economy is oriented towards the ability to regenerate different forms of capital (manufactured capital natural capital social capital human capital economic-financial capital). Circular reuse is aimed at transforming abandoned places into "living" systems, and as such regenerative. In this way it is able to generate positive effects in the context and contribute to the resilience of the city/territory system over time. Circular reuse is configured as the regenerative reuse that helps to implement the transition to a local de-carbonized economy (green economy). It minimizes waste, negative environmental impacts, and ecological footprint; it reuses/recycles waste, turning it into resources for new production cycles. It derives most of its resources from the surrounding area: it uses renewable energies as much as possible; it reuses rainwater and grey water; it contributes to regenerating the ecosystem services on which human activities and people's well-being depend; it promotes the use of green and nature-based solutions. It contributes to transform linear metabolism (extraction-production-consumption-waste/emissions) into circular (reuse, recovery, recycling...), imitating the wisdom of nature. In addition, circular reuse is characterized by seeking the ability to regenerate financial resources for its operation over time, minimizing subsidies from public/private sources. Circular reuse is a promoter of economic impacts in terms of locating new activities, also generating new direct, indirect, induced jobs. From the social point of view, circular reuse is oriented to generate a community, a "community of heritage" convention of lighthouse that in turn takes care of the heritage itself, in a virtuous circular process. Circular reuse is characterized by the search for synergies/synergies and cooperative activities between the subjects of the territory that increase the overall productivity of the intervention. The reuse of cultural heritage also re-produces intangible values: cultural values. The reuse of cultural heritage is also able to regenerate values cultural horizons and meaning, generating new contemporary meanings and new values related to the original meanings and value. In summary, the circular reuse of cultural heritage aims to regenerate tangible and intangible, natural, social and economic cultural resources of the territory, to promote synergies/synergies and cooperation between public, private and civil society actors, and to generate net positive economic, social, environmental and cultural impacts in the territory".

In particular, the Municipality asked to highlight as much as possible the essential characteristics of the valorization scenario, in coherence with the urban and environmental prescriptions in force, indicating the foreseeable economic, social, cultural and environmental impacts deriving from the implementation of the project. In order to ensure a homogeneous and comparable articulation of the proposals, a participation form was provided divided into three sections:

1) the first, concerning the general description of the project idea with the indication of the objectives of the adaptive reuse proposal in relation to the circular economy model, indicating the foreseeable economic, social, cultural and environmental impacts of the project;

2) the second, an outline summary of the investments, indicating the possible sources of financing, the costs and possible revenues during the management phase;

3) the third one, dedicated to the graphic design of the project.

[34] http://www.comune.salerno.it/allegati/30257.pdf

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

In addition, the form gave participants the opportunity to express their interest in participating in the “Circular Business Model” co-design workshop organized, as part of the CLIC project, by the City of Salerno, ICHEC Business School Brussels and IRISS CNR.

Fourteen reuse proposals were submitted and evaluated considering the consistency of the proposal with the circular economy model.

The evaluation was carried out by scoring on the basis of:

- consistency of the proposal with reference to the purpose of the consultation and the expected impacts (max. 20 points)

- feasibility of the proposal (max. 10 points)

Therefore, the total score attributable to each proposal was 30, while the minimum score (threshold) for eligibility to participate in the CMBW was set at 15. The Proposal Evaluation Committee was composed of representatives from the Municipality of Salerno and IRISS CNR (as project coordinator).

At the end of Public Consultation the Municipality collected 14 reuse proposals.

Phase 4: Evaluation through qualitative criteria

To support the definition of an adaptive reuse strategy for Edifici Mondo, two methods were applied and integrated: the Decision Support System (CLIC DSS) developed by the University of Portsmouth (UoP) team and the TOPSIS method. The integration of these two methods had a double aim:

- on one hand, to explore the relevant issues for the reuse of the Edifici Mondo starting from the analysis of the different points of view expressed by the stakeholders involved in the process (through the method of the Simos-RoyFiguiera (SRF) by UoP);
- on the other hand, to support the process of defining and evaluating design alternatives for the adaptive reuse of the Edifici Mondo through an multicriteria evaluation tool: the TOPSIS method.

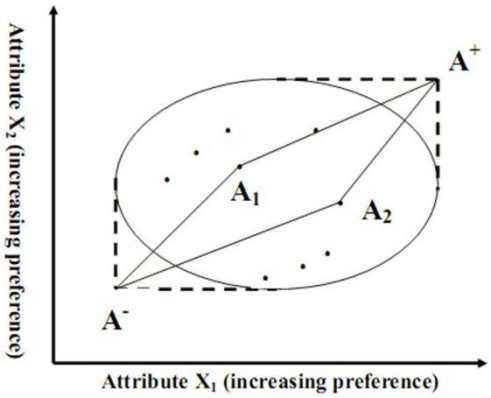
Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

BOX 8. TOPSIS (Technique for Order Preference by Similarity to Ideal Solution): methodological note

Multiple-criteria decision analysis (MCDA) is a sub-discipline and full-grown branch of operations research that is concerned with designing mathematical and computational tools to support the subjective evaluation of a finite number of decision alternatives under a finite number of performance criteria by a single decision maker or by a group (Lootsma, 1999).

Among all the MCDA methodology, TOPSIS is an operational evaluation tool that which is used very often, in different fields of scientific research and not only, to help/support decision-makers between different alternatives of specific projects. This method is based on the concept that the chosen alternative should have the shortest geometric distance from the positive ideal solution and the longest geometric distance from the negative ideal solution (Assari, 2012) .

Figure 9 – Basic concept of TOPSIS method (A + = Ideal point, A − = Negative-Ideal Point).



Source: (Balioti et al., 2018)

Rahim et al (2018) underline that the positive ideal solution is defined as the sum of all the best values that can be reached for each attribute, while the negative ideal solution consists of all the worst values reached for any attribute (Rahim et al., 2017).

TOPSIS takes into account both the distance to the positive ideal solution and the distance to the negative ideal solution by taking the proximity relative to the positive ideal solution.

Based on the comparison of the relative distance (Rahim et al., 2017), an alternative priority order can be obtained. This method is widely used to complete the decision-making process. This is due to the concept is simple, easy to understand, efficient calculation, and has the ability to measure the relative performance of the decision of alternatives (Ding & Schmidt, 2005; Kabir & Hasin, 2012; Łatuszyńska, 2014; Zanakis et al., 1998).

TOPSIS uses attribute information to the full, provides a cardinal classification of alternatives and does not require attribute preferences to be independent. To apply this technique, attribute values should be numerical, either monotonically increasing or decreasing, and have commensurable units.

Behzadian et al. (Behzadian et al., 2012), conducted a literature review of the existing reference literature on the TOPSIS method (266 papers from 103 journals since the year 2000) to understand how it works among the many MCDA/MCDM methods developed to solve real-world decision-making problems.

In this research, they have argued that among the numerous MCDA/MCDM methods developed to solve real-world decision problems, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) continues to work satisfactorily across different application areas (Behzadian et al., 2012).

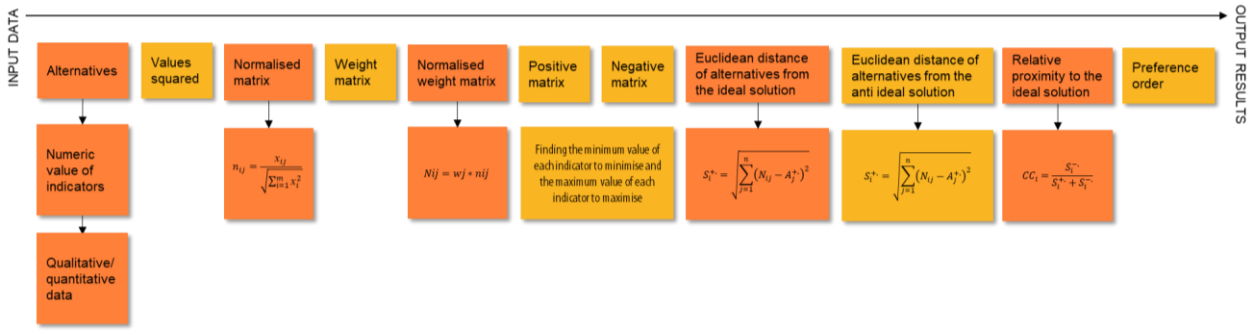
In a study of Zeleny (Carlsson & Zeleny, 1983) it emerges that TOPSIS is used for four main reasons:

BOX 8. TOPSIS (Technique for Order Preference by Similarity to Ideal Solution): methodological note

a) TOPSIS logic is rational and understandable;
b) the computation processes are straightforward;
c) the concept permits the pursuit of the best alternatives for each criterion depicted in a simple mathematical form;
d) the importance weights are incorporated into the comparison procedures (Carlsson & Zeleny, 1983).

According to a study of Ishizaka and Nemery, TOPSIS method is based on five computation steps (the orange ones in Figure 10). The first step is the gathering of the performances of the alternatives on the different criteria. These performances need to be normalized in the second step. The normalized scores are then weighted and the distances to an ideal and anti-ideal point are calculated. Finally, the closeness is given by the ratio of these distances (Ishizaka & Nemery, 2013).

Figure 10 – Computation steps of TOPSIS method



Source: author's elaboration

Roszkowska argues that an extension of the TOPSIS technique can be used to solve many real-world theoretical problems (Roszkowska, 2011). Microsoft excel is the software which is used for this evaluation method. Also, DECERNS software can be used for this method. TOPSIS is not based on a complex algorithm and therefore a "black box" section is unnecessary (Behzadian et al., 2012). In excel is necessary to insert a minimal number of data, associated to different indicators. When the criteria and weights have been defined, the excel model will run.

In Salerno, the evaluation through qualitative criteria was articulated in three steps:

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

- Step1: Macro-criteria and criteria definition and validation,
- Step 2: Macro-criteria prioritization (definition of a specific weights for each criteria based on stakeholders' preferences),
- Step 3: Proposals evaluation.

Step1: Macro-criteria and criteria definition and validation

In Step 1 the researchers team consulted with officers, experts and technicians of the Municipality of Salerno to revised the set of macro-criteria useful for the evaluation of the 14 proposals received for the reuse of the Edifici Mondo with the aim to elaborate a first ranking of preferability. After a discussion phase, the team defined and validated 13 macro-criteria (Table 4) and 27 criteria (Table 5).

Table 4 – The 13 macro-criteria defined for the evaluation of the 14 proposals for the reuse of the Edifici Mondo collected during the Public Consultation

	Macro-criteria	Description
1	Regeneration of historical and cultural values	Ability to regenerate historical and cultural values through compatible interventions capable of transmitting the identity values of the heritage and of positively affecting the perceptual quality of the landscape.
2	Regeneration of human capital	Capacity to regenerate human capital through the provision of learning opportunities and the promotion of activities aimed at the recovery of traditional knowledge and the development of entrepreneurial skills.
3	Regeneration of environmental resources	Capacity to regenerate environmental resources through the use of circular technical and technological solutions (e.g. solutions for the recovery/reuse of water, reduction of waste and the use of non-renewable energy, natural-based solutions) compatible with the historical fabric of the area.
4	Economic and financial self-sustainability	Ability to sustain itself over time with its own resources.
5	Activation of partnerships and collaborative networks	Ability to activate partnerships and collaborations with different stakeholders.
6	Local Symbiosis	Ability to activate or promote a local network for the extension of the life cycle of materials and resources.
7	Citizens' participation	Ability to involve citizens in the implementation of the proposal.
8	Contribution to the implementation of the RIS3 Strategy of the Campania Region	Consistency of proposed uses and functions with the Smart Specialization Strategy of the Campania Region.
9	Generation of jobs	Ability to create full-time jobs.
10	Contribution to the cultural vitality of the city (Cultural Vibrancy)	Ability to contribute to the cultural vitality of the area through the promotion of arts and crafts, cultural activities and events, and the establishment of creative and cultural enterprises.
11	Contribution to the attractiveness of the Research, Development and Innovation sectors	Ability to attract innovative/technology startups/enterprises.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

12	Contribution to the attractiveness of the cultural tourism sector	Ability to attract activities in the field of cultural tourism and related services.
13	Contribution to the liveability of the area	Ability to improve the liveability of the area through the improvement of pedestrian routes and perception of safety, the maintenance of local stores and different social groups in the historic center.

Source: author's elaboration

Then, the 13 macro-criteria were detailed in 27 specific criteria (Table 5), on the basis of criteria used in Public Consultation.

Table 5 – The 27 specific criteria for the evaluation of 14 proposals of adaptive reuse

Macro-criteria	ID_Criterion	CRITERION
Regeneration of historical and cultural values	C1	Compatibility with the historical and cultural value of the asset
	C2	Capacity to regenerate and transmit the identity value of the cultural heritage
	C3	Ability to positively affect the perceptive quality of the landscape
Regeneration of human capital	H1	Ability to provide formal and informal learning opportunities for the improvement of competences and skills
	H2	Ability to promote activities aimed at recovering traditional knowledge
	H3	Capacity to promote entrepreneurial skills
Regeneration of environmental resources	N1	Capacity to implement circular solutions to extend the life cycle of materials and reduce waste production
	N2	Capacity to implement circular solutions for the recovery/reuse of water
	N3	Capacity to implement circular solutions to reduce the use of energy from non-renewable sources
	N4	Capacity to implement natural-based solution
	N5	Potential to generate environmental and/or health risks
Economic and financial self-sustainability	E1	Ability to sustain itself over time with its own resources

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Activation of partnerships and collaborative networks	P1	Ability to activate partnerships and collaborations with different stakeholders
	P2	Ability to include marginalised groups
Local symbiosis	P3	Ability to activate or promote a local network for the extension of the life cycle of materials and resources
Citizen participation	PE1	Ability to involve citizens in the implementation of the proposal
Contribution to the implementation of the RIS3 Strategy of the Campania Region	R1	Coherence with the Smart Specialisation Strategy of the Campania Region
Generation of jobs	J1	Capacity to create full-time jobs
Contribution to the cultural vitality of the city (Cultural Vibrancy)	CV1	Capacity to attract creative and cultural enterprises
	CV2	Capacity to promote arts and crafts
	CV3	Capacity to promote cultural activities and events
Contribution to attractiveness for Research, Development and Innovation (R&D) sectors	RD1	Attractiveness of attracting innovative/technological start-ups/enterprises
Contribution to attractiveness for the cultural tourism sector	CT1	Attractiveness of attracting cultural tourism activities and services
Contribution to the liveability of the area	L1	Ability to implement walkability in the historic centre
	L2	Ability to preserve local shops in the area
	L3	Ability to favour the perception of security in the area
	L4	Ability to contribute to the maintenance of different social groups within the historic centre

Source: author's elaboration

Step 2: Macro-criteria prioritization (definition of a specific weights for each criteria based on stakeholders' preferences)

After defining and validating the set of macro-criteria, the next step was a prioritization phase during which the direct interaction with Salerno City Council representatives and experts allowed to explore the different points of view and the importance attributed by each group of interlocutors to the different macro-criteria. In order to prioritize the macro-criteria (through the definition of the weights for the criteria) and to facilitate the evaluation process, the team of researchers from the University of Portsmouth proposed the use of the Simos-RoyFiguiera (SRF) method (J. Figueira et

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

al., 2005). The method was firstly tested with the research team and then implemented in two thematic focus group with different stakeholders. From each of them the obtained result was a set of weights reflecting the importance attribute by each group of stakeholders to each macro-criteria (Table 6 – Weighs assigned to macro-criteria). The different results obtained applying the method for each set of weights were analyzed, compared and discussed with actors and an evaluation report was elaborated and shared with stakeholders involved in the previous two thematic focus group.

The process has to be conducted in this way:

1. A deck of cards with the name of each criterion on a card has to be prepared. It is useful to add a brief description of each criterion and to provide each individual or small group with this set of cards.

2. Each individual is asked to rank order the cards according with the importance of the related criteria, from the least important to the most important. If some criteria are equally important, the corresponding cards should be arranged together in the same line. This yields a ranking of equally important subsets or packs of criteria.

3. The difference between two successive pairs of subsets of criteria can be more or less large. When determining the weights, it is important to take into account such smaller or bigger differences of importance (or intensity). So, providing also a deck of blank cards, it is possible to ask the participants to insert these blank cards in the intervals between successive pairs of subsets of criteria in the ranking. The meaning of the blank cards is as follows: having no blank cards means that the difference between the weights of the subsets of criteria is minimal, say one unit; one blank card means twice the unit, two blank cards means three times the unit, and so on.

4. Each participant is asked to identify how many times the most important criterion is more important than the least important one. To simplify the question, it is possible to reason in terms of votes asking a question of this type: Assume the least important criterion has been given one mark, how many marks would you assign to the most important one?

In all the process it is very important to take notes of the motivations and the hesitations expressed by the participants. Collecting all this information, one has the opportunity to perform a series of analyses considering even more than one vector of weights, defining different versions of the problem for which the solution will be acceptable, and therefore robust, even having different sets of values for the weights.

This method was first tested in a follow-up meeting with researchers from the IRISS CNR and was then implemented in two thematic tables with representatives of the Municipality of Salerno and experts. Thanks to the use of this method, a scale of priorities corresponding to the vision of each of the stakeholder groups involved was deduced from each thematic table. The prioritization phase of the macro-criteria was useful in transforming the importance attributed to each macro-criterion into a “weight” to be integrated into the configuration parameters of the evaluation model (M. Barbati et al., 2018; Maria Barbati et al., 2018). From the comparison carried out in the two thematic tables it was possible to define two first sets of weights (W1 and W2 respectively).

In order to consider also points of view from outside the municipal administration, data from a questionnaire created for other purposes, but with similar themes to those explored in the interaction phase, were analyzed. From these data and taking into account the necessary approximations, a further set of weights (W3) was elaborated and used in the evaluation.

Finally, the set of weights (W0) developed as a result of the interaction with the IRISS expert group was also considered.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Table 6 – Weighs assigned to macro-criteria based on stakeholder interaction

Macro-criteria	Weights
Regeneration of historical and cultural values	0,105691
Generation of jobs	0,105691
Regeneration of environmental resources	0,105691
Economic and financial self-sustainability	0,105691
Regeneration of human capital	0,089431
Local Symbiosis	0,089431
Citizens' participation	0,089431
Contribution to the cultural vitality of the city (Cultural Vibrancy)	0,065041
Contribution to the liveability of the area	0,065041
Contribution to the attractiveness of the Research, Development and Innovation sectors	0,056911
Contribution to the attractiveness of the cultural tourism sector	0,056911
Contribution to the implementation of the RIS3 Strategy of the Campania Region	0,03252
Activation of partnerships and collaborative networks	0,03252

Source: author's elaboration

Step 3: Proposals evaluation

After the establishing of weights, the team of researchers (IRISS CNR and UoP) proceeded to a first qualitative evaluation of the 14 proposals collected during the Public Consultation, using the 1-9 points qualitative Saaty's scale (Saaty, 1977). Starting from the qualitative 1-9 evaluation, the research team applied TOPSIS method integrating the sets of weights as evaluation parameters and obtaining a first list of preferred alternative (Table 7).

Since in this phase the proposals were presented following a very descriptive approach, supported (not in all cases) by drawings and diagrams, the evaluation does not yet consider quantitative indicators but is based only on macro-criteria assessment. The qualitative criteria in each step were assessed using linguistic variables and rating them through 1-9 Saaty's scale (in which 1=Low; 3=Medium low; 5=Fair; 7=Medium high; 9=High) (specifying the meaning of the score for each criterion). The weights attributed to the indicators are the same as those used in the SRF method described in Step 2: Macro-criteria prioritization (definition of a specific weights for each criteria based on stakeholders' preferences).

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Table 7 – First ranking of preferability

Ranking of preferability	Alternatives
1	Hippocratica Hills Health Heritage Hub
2	The house of music
3	Water paths
4	The identity between tradition and innovation
5	Solidarity condominium Hippocratica Civitas - urban solidarity and resilience
6	SALERNO (re)STARTS
7	Discreet interventions for the reactivation of Edifici Mondo
8	Hotel Complex "Plajuim Montis"
9	Reggia di Salerno
10	Creative reuse of abandoned buildings under an artistic key
11	Tourism Learning Based
12	Academy ASSE3 T - Academy for the Environment and the Empathetic-Ethical-Ecological-Economic Sustainable Development of the Territory
13	The Awakening of the Senses
14	School hotel

Source: author's elaboration

Phase 5: Synthesis, discussion and re-assessment

From 14 proposals to four well defined projects: the Circular Business Model Workshop (CBMW) process

With reference to the 14 reuse proposals presented, only ten were selected as considered suitable by the Municipality after the evaluation and the score attribution considering the set of criteria established in the Phase 2: Evaluation objectives and criteria. The selected proposals have been the subject of in-depth studies during the Circular Business Model Workshop (CBMW)[35] held in Salerno in May-June 2020 (online) and carried out in six sessions.

[35] The process and the outcomes of the Circular Business Model workshops held in each CLIC pilot are detailed described in Deliverable 4.5 "Circular Business Model workshops for cultural heritage adaptive reuse".

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

The Circular Business Model Workshop was organised as a laboratory of ideas and a moment of training and planning to identify possible reuse solutions for the Edifici Mondo, also promoting the creative combination of reuse ideas collected during the public consultation. In particular, the workshop was aimed at investigating the urban, technical and economic-financial feasibility of the reuse ideas, thanks to the contribution of international and local experts, considering the specific contextual conditions and the circular reuse model described in the public consultation (section 2.1).

Although the municipality selected only 10 proposals, all participants in the public consultation were invited to take part in the workshop. During the CBMW, participants were asked to prioritize, from the presented proposals, the most important themes they wish to work on during the workshop upcoming sessions, assessing the level of attractivity of the different ideas/proposals (considering the provided description, the value proposition from economic, environmental/energetic, cultural and social standpoints and main stakeholders) and sharing their ranking with other teams. Every participant had 5 votes to attribute in full or partially to one or several proposals. At the end of this step the groups were set up around four distinct project hypotheses, strongly characterized by elements of cultural enhancement and economic, financial, environmental and social sustainability, thanks to the application of the “circular” model of adaptive reuse developed with the CLIC project. After a general consultation with workshop participants, it was decided to work on four proposals synthesized from the Public Consultation result:

1. Hippocratica Hills Health Heritage Hub and water paths (5H)
2. House of music (HM)
3. The identity between tradition and innovation (IT)
4. Solidarity condominium (SC).

Solidarity Condominium (SC) promotes sociality, health and intergenerational well-being, the House of music (HM) stimulates local and international cultural productions and make Salerno a regional/national cultural attraction, the project Promotion of Salerno's cultural identity between tradition and innovation (IT) aims at involving the productive fabric of the entire province of Salerno also in relation to agri-food and the Mediterranean Diet, and finally Hippocratica Hills Health Heritage Hub and water paths (5H) capable of attracting entrepreneurial, training and social activities in the medical, pharmaceutical and wellness sectors, enhancing the tangible and intangible cultural heritage of the Salerno Medical School.

Phase 6: Evaluation through quantitative-qualitative indicators

Also in this phase, the research team repeated the use of the TOPSIS method to evaluate the preferability of the functions of the four selected proposals. Due to a greater level of detail in the proposals, it was possible to supplement the previous purely qualitative evaluation with quantitative data. Therefore, assuming the same weights of the previous evaluation phase, it was possible to use some of the circularity indicators to support decision-making processes for ex-ante evaluation developed in D2.4. The evaluation framework developed in CLIC for the Salerno - Edifici Mondo case study considers a set of criteria (Bosone et al., 2021) derived from the CLIC framework[36] and adapted to this specific case.

From the CLIC framework and matrix we consider that some ex post indicators (performance indicators) can also be considered in an ex ante evaluation phase as target indicators. Therefore, it

[36] See Deliverable 2.7 “CLIC Framework of Circular Human-Centred Adaptive Reuse of Cultural Heritage”.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

represents one of the possible derivations of ex-ante matrices to be tested for the evaluation of the project proposal elaborated in D2.4.

Based on the multidimensional criteria identified and discussed with the city's key stakeholders (policy-makers, professionals, civil society), a set of quantitative and qualitative decision support indicators was developed to compare and evaluate the design alternatives developed for the Edifici Mondo. Some of the quantitative indicators are extracted from the “National Innovative Programme for Quality of Living” of the Italian Ministry of Sustainable Infrastructure and Mobility.

On the basis of the highlighted quantitative-qualitative criteria and indicators, it is possible to identify a set of synthetic composite indicators, useful for investment decisions by public and private actors, in line with the European Commission's indications for sustainable finance and EU Taxonomy.

The indicators and variables identified will also represent the results to be monitored during the development of the project, ensuring the achievement of the proposed objectives, in particular in relation to financing mechanisms based on “pay for result” and “pay for success” models, including the hypothesized revolving funds.

With reference to the 57 indicators identified, for this test the research team used only 19, selected on the basis of both the greater ease of retrieval of some data and evaluation of proposals compared to the information received during the various stages of consultation and design, and considering their significance for the assessment of impacts in the 4 dimensions (cultural, social, economic and environmental) and with reference to the three circularity dimensions of the tripod model (regenerative, generative and symbiotic capacity). The Table 8 shows the indicators chosen, for which the respective circularity dimension of the tripod model, the group of indicators (as indicated in §5 of D2.4), the relative criteria and unit of measure were indicated.

Table 8 – List of circularity indicators for ex-ante evaluation

Circularity dimension	Indicator group	N.	Criteria	N.	Indicator	Unit of measure	Solidarity Condominium	The identity between tradition and innovation	House of Music	Hippocratica Hills and Water Paths
REGENERATIVE CAPACITY	CULTURAL CAPITAL REGENERATION	1	Regeneration of cultural capital	1.1	Identity values, sense of belonging (components of intrinsic values)	1-9 scale (Saaty)	9	9	9	9
				1.2	Authenticity and integrity conservation	1-9 scale (Saaty)	9	9	9	9
	FINANCIAL CAPITAL REGENERATION	2	Financial self-sustainability	2.1	Payback period	n. of years	5	6	4	11
				2.2	Return on Investment (ROI)	%	17	14	24	6
				2.3	Net Present Value of investment (NPV)[37]	€	4.304.562	1.488.481	2.603.183	2.373.669
		3	Local investment	3.1	Percentage of local co-financing on total investment, including crowfunding, local co-investors, financial participation in community foundations and other local co-investment forms	1-9 scale (Saaty)	9	7	9	7
	NATURAL CAPITAL REGENERATION	4	Energy efficiency	4.1	Percentage of KWh generated on total estimated energy need (Energy assessment)	1-9 scale (Saaty)	7	5	7	9
		5	Freshwater efficiency	5.1	Litres of rainwater recovered through water filtering and recovery systems	1-9 scale (Saaty)	7	5	5	9
		6	Nature-Based Solutions	6.1	Use of Nature-Based Solutions in the adaptive reuse of the heritage building or site	sqm	454	2452	725	1830

[37] The data was assessed based on estimation of costs and revenues conducted with Iniziativa partner (INI).

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Circularity dimension	Indicator group	N.	Criteria	N.	Indicator	Unit of measure	Solidarity Condominium	The identity between tradition and innovation	House of Music	Hippocratica Hills and Water Paths
	NATURAL CAPITAL REGENERATION (Circular solutions)	7	Carbon emissions	7.1	Life Cycle Assessment, C02eq/sqm of the adaptive reuse intervention	1-9 scale (Saaty)	1	1	1	1
	SOCIAL CAPITAL REGENERATION	8	Local community	8.1	Number of people involved in the care of cultural heritage as common good	1-9 scale (Saaty)	9	7	5	9
	HUMAN CAPITAL REGENERATION	9	Education and training	9.1	Number of people educated and trained	1-9 scale (Saaty)	7	7	7	7
		10	Traditional skills	10.1	Number of people employing traditional skills and construction techniques involved in the adaptive reuse intervention	1-9 scale (Saaty)	9	9	7	7
SYMBIOTIC CAPACITY	ACCESSIBILITY OF THE URBAN AREA	11	Public and green space accessibility	11.1	Percentage of public and green space recovered / regenerated or made more accessible	%	4	16	11	37
	PARTNERSHIPS AND SYNERGIES	12	Participation in decision-making	12.1	Number of organisations involved in the decision-making phase of the adaptive reuse process	%	25	33	50	58
GENERATIVE CAPACITY	EMPLOYMENT GENERATION	13	Jobs creation	13.1	Number of jobs directly and indirectly created	n.	250	540	936	930
	QUALITY OF LIFE, WELLBEING AND HEALTH	14	Participation in culture	14.1	Number of people participating in cultural activities in the area	1-9 scale (Saaty)	7	9	5	9
		15	Quality of life	15.1	Proximity shops in the area compared to total shops	1-9 scale (Saaty)	9	9	7	9
		16	Biodiversity	16.1	Implementation of actions for natural heritage and biodiversity conservation	sqm	866	3678	2600	8410

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

These indicators support a multidimensional analysis: **economic-financial indicators** are necessary to assess the financial viability and self-sustainability of the proposed adaptive reuse intervention on abandoned and/or underused cultural heritage; **environmental indicators** are used to promote closed cycles of energy, materials, water in material cultural heritage, and avoid other environmental costs such as soil consumption, biodiversity loss, pollution, greenhouse gases emission; **social indicators** set social goals and targets and estimate the social impacts of alternative interventions, such as citizens and people inclusion, new opportunities for cultural participation, access to social services, increased wellbeing and quality of life; **cultural indicators** are related to the conservation, regeneration and transmission of cultural heritage values, both tangible and intangible, instrumental and intrinsic, in line with the “complex” notion of value of cultural heritage proposed in the CLIC project.

Assuming the same weights of the previous evaluation, the ranking of preferability obtained through the TOPSIS method was the follow:

Table 9 – Ranking of preferability of four proposals in the second evaluation step

Ranking of preferability	Proposal
1	Hippocratica Hills Health Heritage Hub and water paths
2	House of music
3	The identity between tradition and innovation
4	Solidarity condominium

Phase 7: Discussion and Circular Iteration

Starting from this synthetic framework of all the proposed functions, the researchers team proceeds to identify the mix of functions that best meet the goals of the "satisfying project" (Simon, 1959). This process is configured as an iterative and interactive process which, starting from the evaluation of the project proposals, improves the decision-making processes through feedback mechanisms (Figure 11). This is the phase in which all the design proposals generated and developed in the previous phase were analyzed in a more specific way, classifying, reorganizing and reshaping the functions proposed by each of them towards the definition of an “satisfying project” (Simon, 1959). Based on this general framework, the team of researchers proceeded to classify them, identifying both some functions common to all projects and other functions that characterize the individual design alternatives. Through the classification, reorganization and reshaping of the functions of the initial project proposals, the researchers team proceeds to identify the mix of functions that best meet the goals of the “satisfying project”.

To this end, the TOPSIS method was also used in the final evaluation. In this final step, considering the same four project alternatives, the weights attributed to the different indicators have been changed in order to elaborate three different orders of preference, outlining three respective project scenarios. The weights attributed to the indicators are the same as those used in the SRF method described in section

Only for the “natural capital regeneration” group of indicators have the weights remained unchanged since the starting point was that this aspect was an essential condition for each project proposal. Therefore, the weights of the other groups of indicators have been modified as follows. In

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

the first project scenario (Ecological-social scenario) the maximum weight (among those attributed with the SRF method) was given to the indicators belonging to the groups characterized by a socio-cultural component ("cultural capital regeneration", "social capital regeneration", "human capital regeneration", "partnerships and synergies", "employment generation" and "quality of life, wellbeing and health"), while all the other more specifically economic indicators were given the minimum score. In the second project scenario (Ecological-economic scenario), the reverse criterion was applied with reference to the first scenario, attributing the maximum score to the group of indicators characterized by an economic component ("financial capital regeneration"), while those of a socio-cultural nature were given the minimum score. Finally, in the third scenario (balanced scenario), equal weight was given to ecological, socio-cultural and economic indicators.

The result of the three final steps is set out in the table below:

Table 10 – Ranking of preferability of four proposals in the third evaluation step, according to the three scenarios

Ranking of preferability	Ecological-social scenario	Ecological-economic scenario	Balanced scenario
1	Hippocratica Hills Health Heritage Hub and water paths	House of music	Hippocratica Hills Health Heritage Hub and water paths
2	Solidarity condominium	Hippocratica Hills Health Heritage Hub and water paths	House of music
3	The identity between tradition and innovation	The identity between tradition and innovation	The identity between tradition and innovation
4	House of music	Solidarity condominium	Solidarity condominium

The results are consistent with the characteristics of the functions of the various project proposals. In fact, in the ecological-social scenario the first two positions are occupied by proposals in which the value proposition is strongly characterized by attention to well-being and improvement of the quality of life by investing in local resources, training and enhancement of services for citizens. In the ecological-economic scenario, the first two positions are occupied by project proposals that provide highly remunerative functions (commercial activities based on local know-how, catering and hospitality activities) with very positive values (especially House of Music) in terms of Payback period and Net Present Value. Finally, the balanced scenario re-proposes the same order of preference obtained from the evaluation of proposals carried out in the second step, leaving the weights unchanged. This confirms that, excluding the influence of the weights on the importance attributed to the various indicators, those project alternatives that present a varied but balanced functional mix, in which the functions are organized and chosen according to a systemic logic that guarantees that they are harmoniously complementary, are preferable.

Starting from these considerations, a synthetic list of all the functions/uses proposed for the Edifici Mondo was elaborated. Based on this general framework, the team of researchers proceeded to classify them, identifying both some functions common to all projects and other functions that characterize the individual design alternatives. The first "invariant" functions identified for all projects on the Edifici Mondo are the following:

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

- Pedestrian green corridors equipped with greenery, waterways, artwork and adequate lighting (improvement of the microclimate, air quality, urban beauty and liveability, safety).
- Gardens and green courtyards planted with essences related to the Salerno Medical School
- Public spaces set up for open-air events (urban liveability, “safety” in particular in post-pandemic period).
- Technologies for “circular” buildings: energy efficiency, renewable energy, rainwater and grey water recovery and recycling systems, intelligent waste management systems (circular economy for the built heritage).
- Nature-based solutions for buildings: green roofs, green facades, use of greenery to absorb micro-dust and harmful pollutants, regeneration of urban soils, permeability of urban soils (improving microclimate, air quality, urban beauty and liveability, health safety).
- Commercial activities (shops and craft shops).
- Catering and social activities (restaurants, bars, neighbourhood mini-co-working spaces).
- Residential and hospitality co-housing: mini-apartments with adjoining common spaces for socialising, for permanent or temporary residential use (Solidarity Condominium model).

The further functions characterizing the proposed re-use projects are listed below, and represent three project alternatives that can be assessed in relation to the (summarized) circularity criteria.

Promotion of local culture (IT-SC)

- Exhibition spaces and showrooms of typical local products in the province of Salerno (remuneration depending on the payment by the companies exhibiting and selling their products) (IT).
- School of the Mediterranean Diet with spaces dedicated to education and training (remuneration depending on training courses for chefs, nutritionists, restaurateurs, health assistants, teachers, etc., and organisation of cultural, experiential and educational events) (SC-IT).

Medical and pharmaceutical research (5H-SC)

- Medical and pharmaceutical research laboratories of excellence linked to the tradition of the Medical School of Salerno (remuneration according to research activities for companies and public sector, “EBRIS” model) (5H).
- Educational laboratories of the Medical School of Salerno (remuneration according to educational and training activities, e.g. laboratories, summer schools, etc., addressed to physicians, researchers, teachers, botanists, etc. with international professors) (5H-SC).
- Wellness, spa & gym (remuneration according to the use of wellness spaces such as spa rooms and gyms for all ages, model with direct payment and agreement with the SSN) (SC-5H).
- Exhibition spaces and showrooms for herbal and pharmaceutical products linked to the Salerno Medical School (remuneration depending on the payment by the companies exhibiting and selling their products) (5H).

Music, theatre and art production (HM-SC)

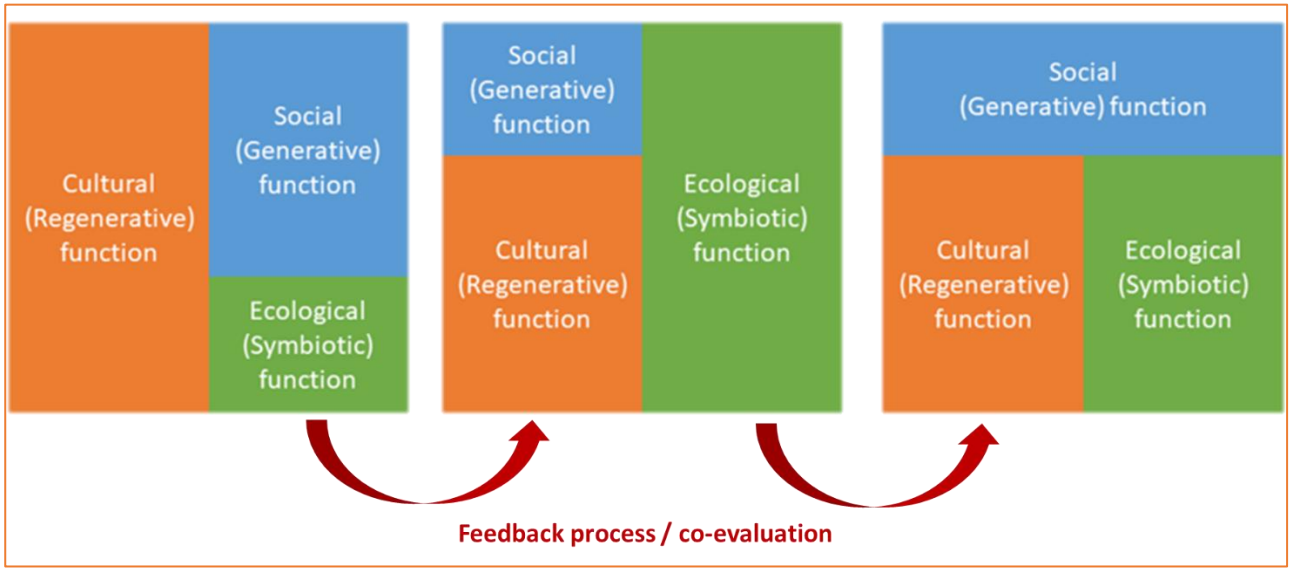
Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

- Rehearsal and recording rooms for musical, theatrical and artistic productions (remuneration depending on the rent of the rehearsal and recording rooms) (HM).
- Classrooms for further training of musicians, performing artists, performers (remuneration depending on participation in training activities) (HM).
- Workshops for making and repairing musical instruments (remuneration depending on the sale of new or repaired musical instruments) (HM).
- Digital and intergenerational handicrafts for repair, recovery and design and creation of handicraft products between tradition and innovation (profitability depending on the sale of products and educational and training activities) (SC).

From four projects to a new project proposal that combines diverse functions towards a satisfying solution

Starting from this synthetic framework of all the proposed functions, the researchers team proceeds to identify the mix of functions that best meet the goals of the "satisfying project" (Simon, 1959). This process is configured as an iterative and interactive process which, starting from the evaluation of the project proposals, improves the decision-making processes through feedback mechanisms (Figure 11).

Figure 11 – Feedback mechanisms in iterative and interactive co-evaluation process



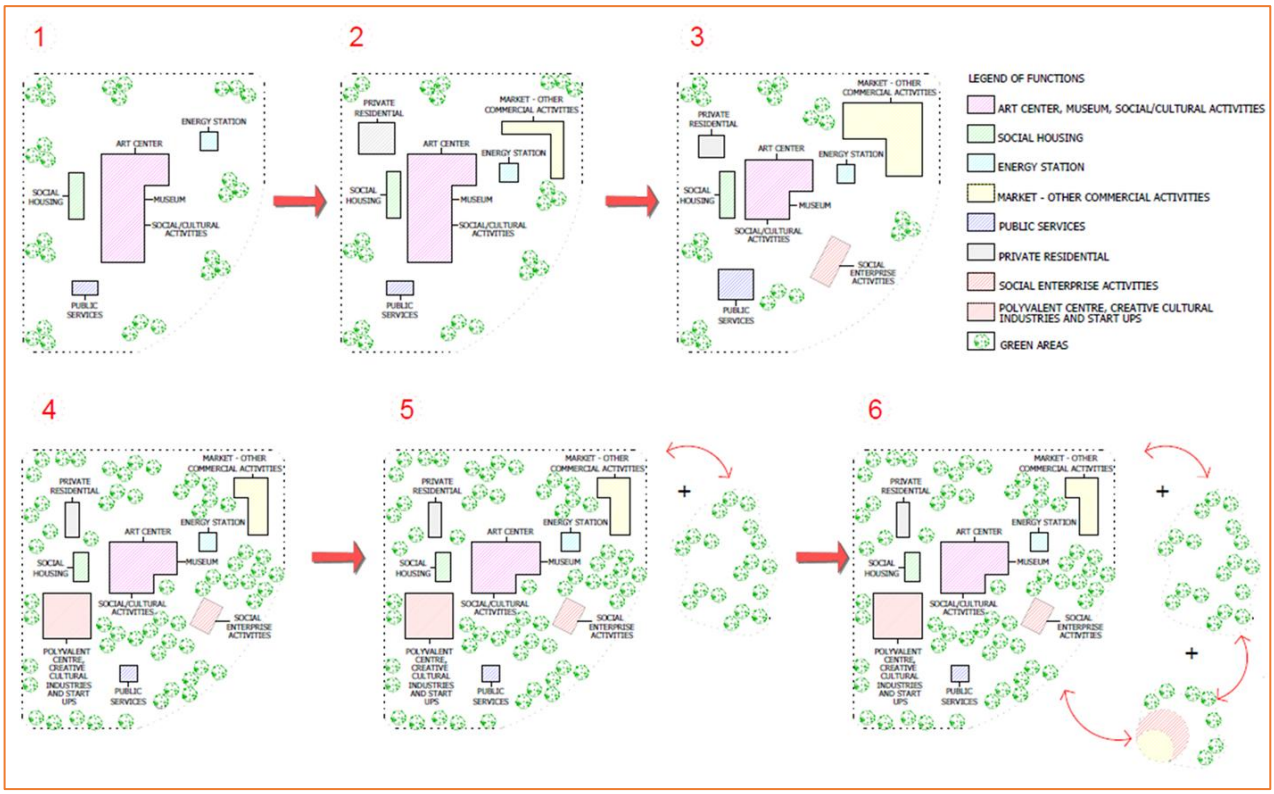
Source: author's elaboration

Through the classification, reorganization and reshaping of the functions of the initial project proposals (Figure 12), "new" synthetic functions are defined to design the "satisfying project" (Simon, 1959). It is important to emphasize that this process has been one of progressive refinement and

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

improvement and not of inclusion/exclusion of some functions with reference to others. The functions have been progressively grouped according to their affinity, integrability and complementarity, in order to facilitate the elaboration of the proposal for a “satisfying project” (Simon, 1959).

Figure 12 - The evolutionary process toward a satisfying design solutions. The integration between circular business plan and design



Source: author’s elaboration

From this phase 4 “invariant functions” were obtained, meaning the functions present in all the Edifici Mondo and which, in the design hypothesis, are preferably located on the ground floor in order to offer greater accessibility and use. They are:

1) Proximity shops/shops,
2) Bars and restaurants,
3) Neighbourhood services (counters for the public, toy library),
4) Co-working spaces.

In addition, 4 macro-functions were defined, with their more specific functions, which were distributed within three Edifici Mondo (taking the project elaborated by the Municipality for the Santa Maria della Consolazione convent as the starting point). They are:

1) Housing and Hospitality:

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

- Co-housing (residences and common spaces)
- Apartments and rooms

2) Research, Innovation and Training:
   - Laboratories
   - Training rooms
   - Conference rooms

3) Culture
   - Equipped courts
   - Polyfunctional cultural services

4) Health and Wellbeing
   - SPA and wellbeing
   - Sport

The master data relating to both the urban area and the buildings (see Phase 1: Knowledge phase) were used to elaborate a classification of the surfaces, distinguishing them into: gross walkable surfaces, useful covered surfaces, green areas (meaning permeable surfaces or covered with vegetation) and green surfaces (meaning the surfaces of roofs that can be converted into green roofs). In addition, knowledge of the ownership of the land registry parcels belonging to the four Edifici Mondo has made it possible to elaborate, during the elaboration of the project proposals, reflections also on the management system of these assets (shared management, concession, etc.).

Considering that the ground floor of all Edifici Mondo is considered to be occupied by invariant functions, the other functions have been distributed in this way:

1) The convent of San Pietro a Maiella and San Giacomo is the smallest and has been used entirely for research about the Salerno Medical School (Figure 13).

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Figure 13 – Reuse proposal for the convent of San Pietro a Maiella and San Giacomo

Source: author's elaboration

San Massimo palace is in the heart of Salerno's city centre and is considered the most representative by both the administration and the citizens. In fact, after obtaining the eco-bonus, citizens insist that they would like it to be reused for a public and social function.

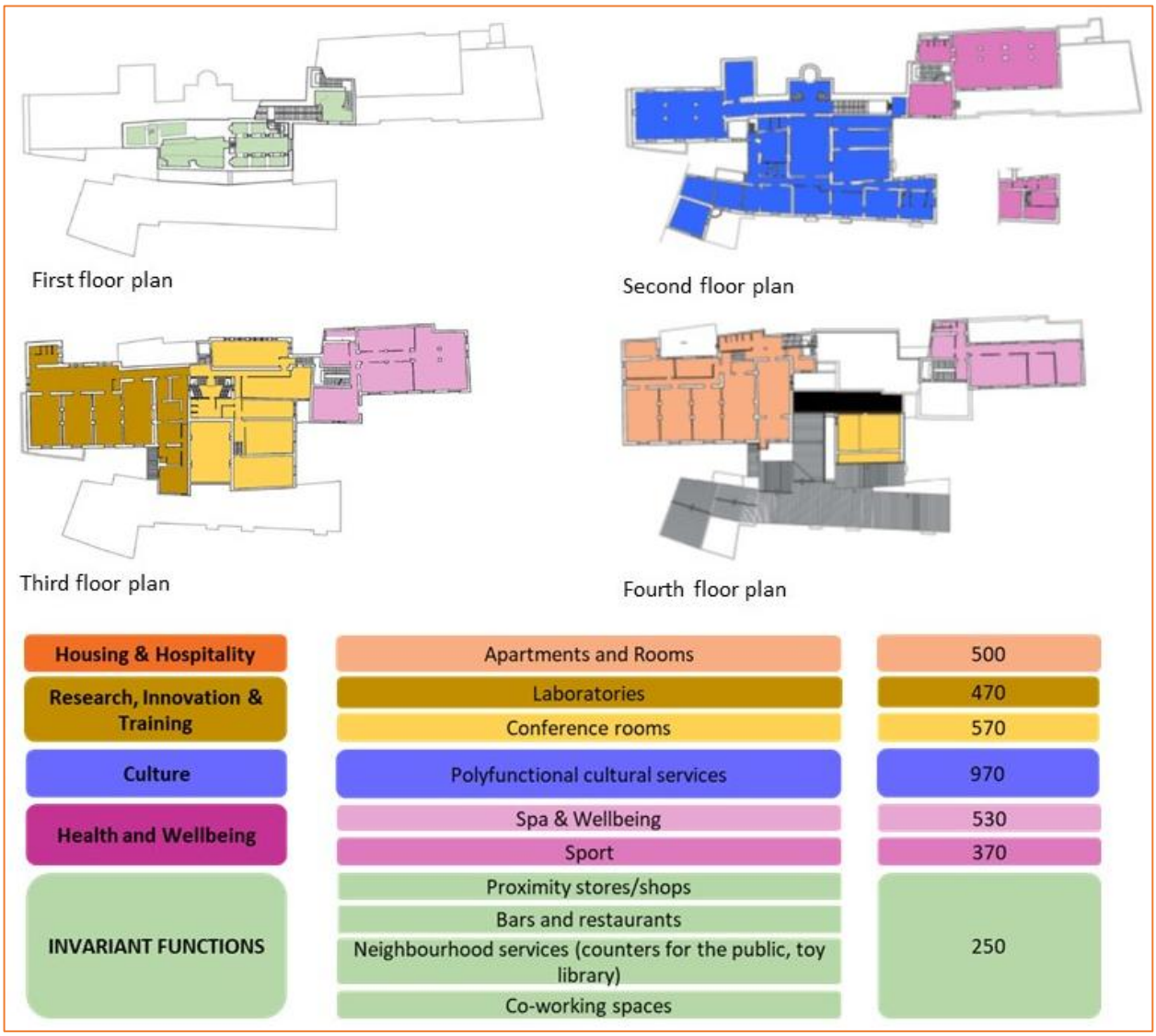
Observing the plans, it can be seen that the building is organized in two separate blocks which are developed in height on three levels (Figure 14). Considering the first block (on the left, looking at the plan), in our design proposal, on the first floor the insertion of cultural functions has been hypothesized in order to support the representative vocation of the building. These functions would be integrated with conference rooms and laboratories dedicated to research, inserted on the second floor, while on the third and last floor, the subdivision of the spaces into large panoramic rooms suggests the placement of residential functions for flats and luxury rooms.

The second block (on the right when looking at the plan), thanks to the presence of large spaces without dividing walls, would be well suited to host functions related to sport (first floor) and wellness

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

(second and third floors), considering that, especially for the latter function, the building enjoys a certain panoramic view.

Figure 14 – Reuse proposal for San Massimo palace



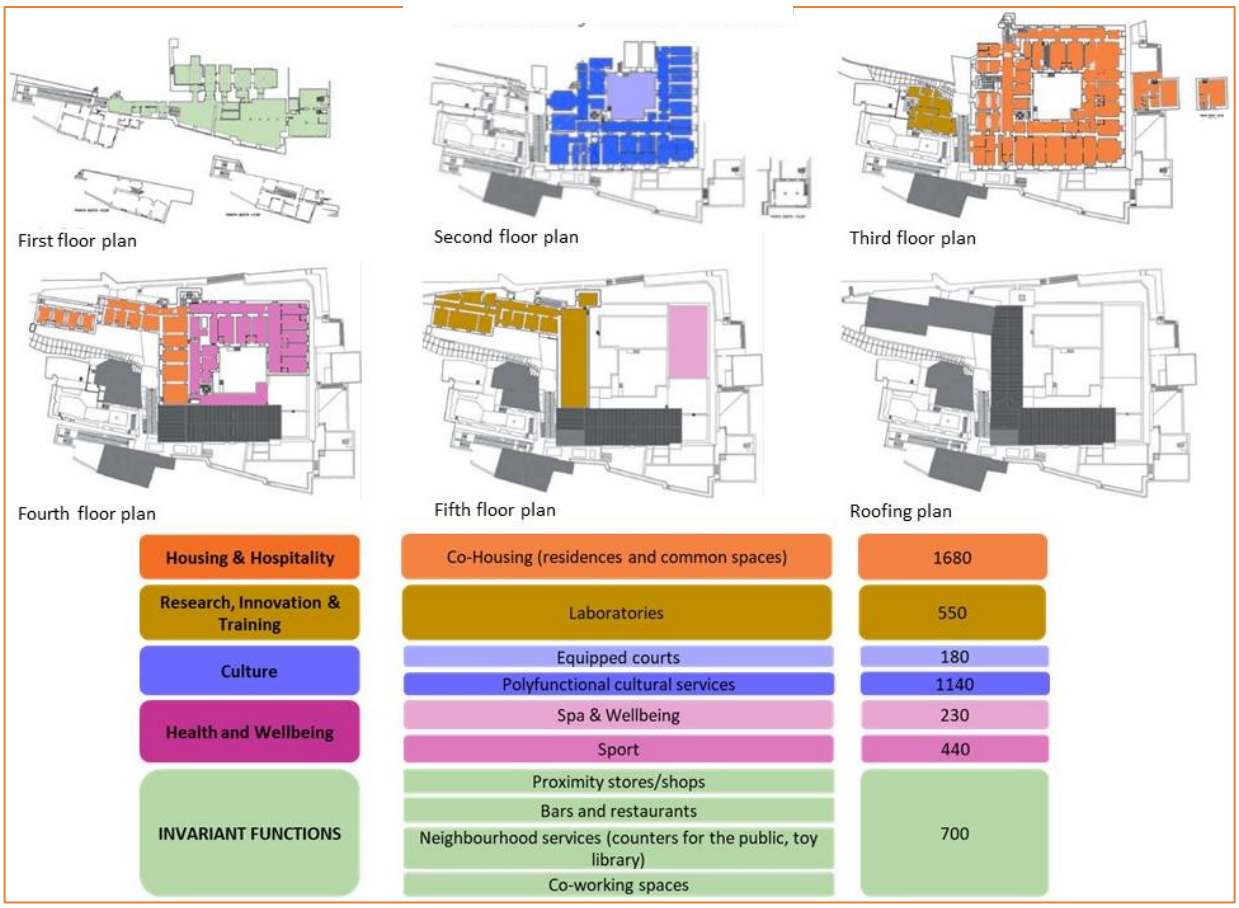
Source: author's elaboration

For the Convent of San Francesco (Figure 15), the idea was to integrate the co-housing function already elaborated by the municipality for the Santa Maria della Consolazione project proposal because, due to its monastery configuration it results adequate to hosting this function in which private and shared spaces co-exist. This function was mainly distributed at third and a half of fourth floor and is integrated with cultural polifunctional structure, due to the presence of equipped courtyard, which could allow the organization of open air events and activities. The other half of the

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

foruth floor is dedicated to sport activities, at the service of the host of co-housing area. Finally, at the fifth level, the presence of a large panoramic space could be useful to include a Spa, while, the other spaces are dedicated to laboratories for cosmetic and therapeutical products to be used in the Spa.

Figure 15 – Reuse proposal for the convent of San Francesco



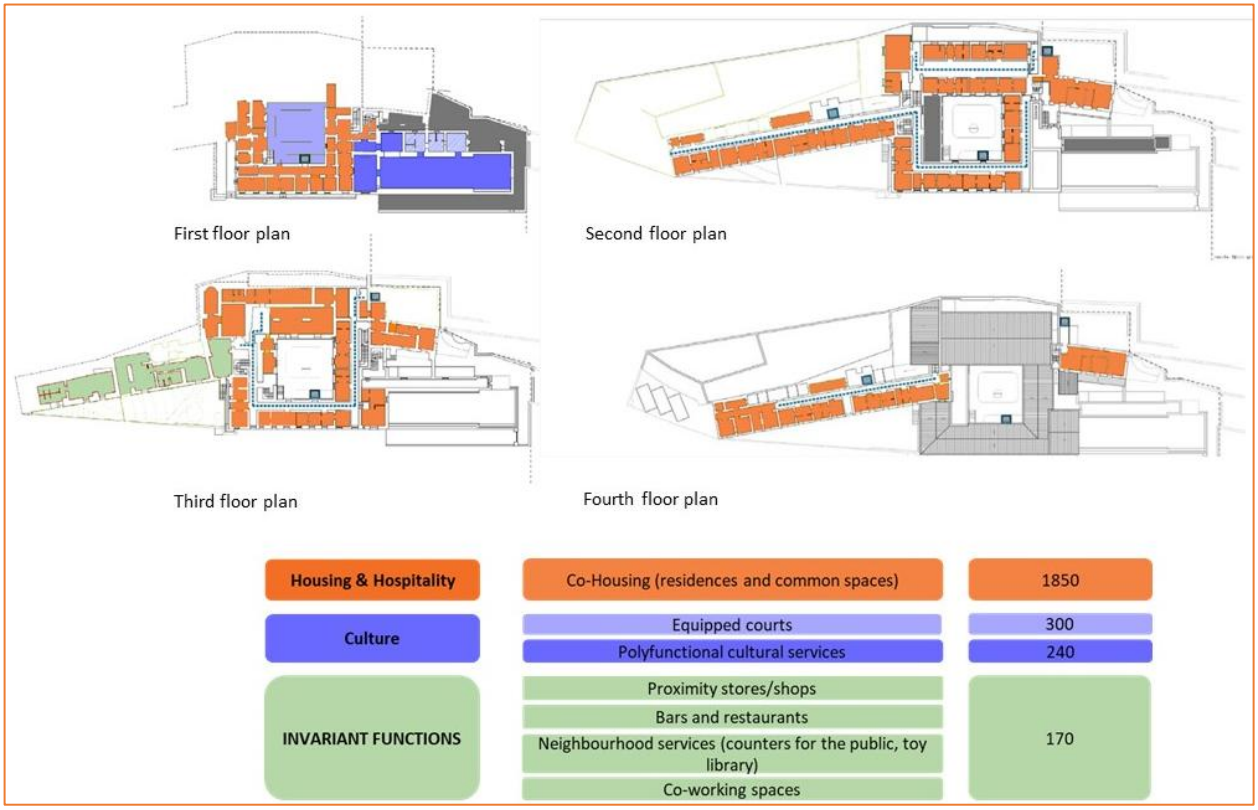
Source: author's elaboration

Finally, for the convent of Santa Maria della Consolazione (Figure 16), starting from the documentation acquired, the quality, quantity and articulation of the management hypotheses elaborated during the public consultation and the CBMW, the Municipality of Salerno have elaborated a project for adaptive reuse of convent Saint Maria della Consolazione which was included in the list of financeable cultural asset in the call "National innovation programme for quality of living" of Italian Ministry of Infrastructure and Transport. Considering the proximity of this building to other important buildings such as the Martucci Conservatory of Music, the EBRIS biomedical research foundation, and notable points of interest for the city such as the Minerva Gardens and Arechi Castle, the response to the consultation and the outcome of the subsequent co-design workshop was generally oriented towards a building with a predominantly residential and cultural function: permanent and temporary residences, hospitality, work/co-working spaces, events and

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

conference rooms, but also meeting spaces, urban gardens, greenery and “nature-based” solutions for environmental and urban regeneration. Taking these considerations into account and considering that the call meets these objectives, the administration therefore proposes to breathe new life into the convent of Santa Maria della Consolazione, through a series of services for the benefit of fragile social categories such as the elderly, young couples, students and out-of-town researchers interested in living a new residential experience that combines private and shared spaces.

Figure 16 – Reuse proposal for the Convent of Santa Maria della Consolazione



Source: author’s elaboration

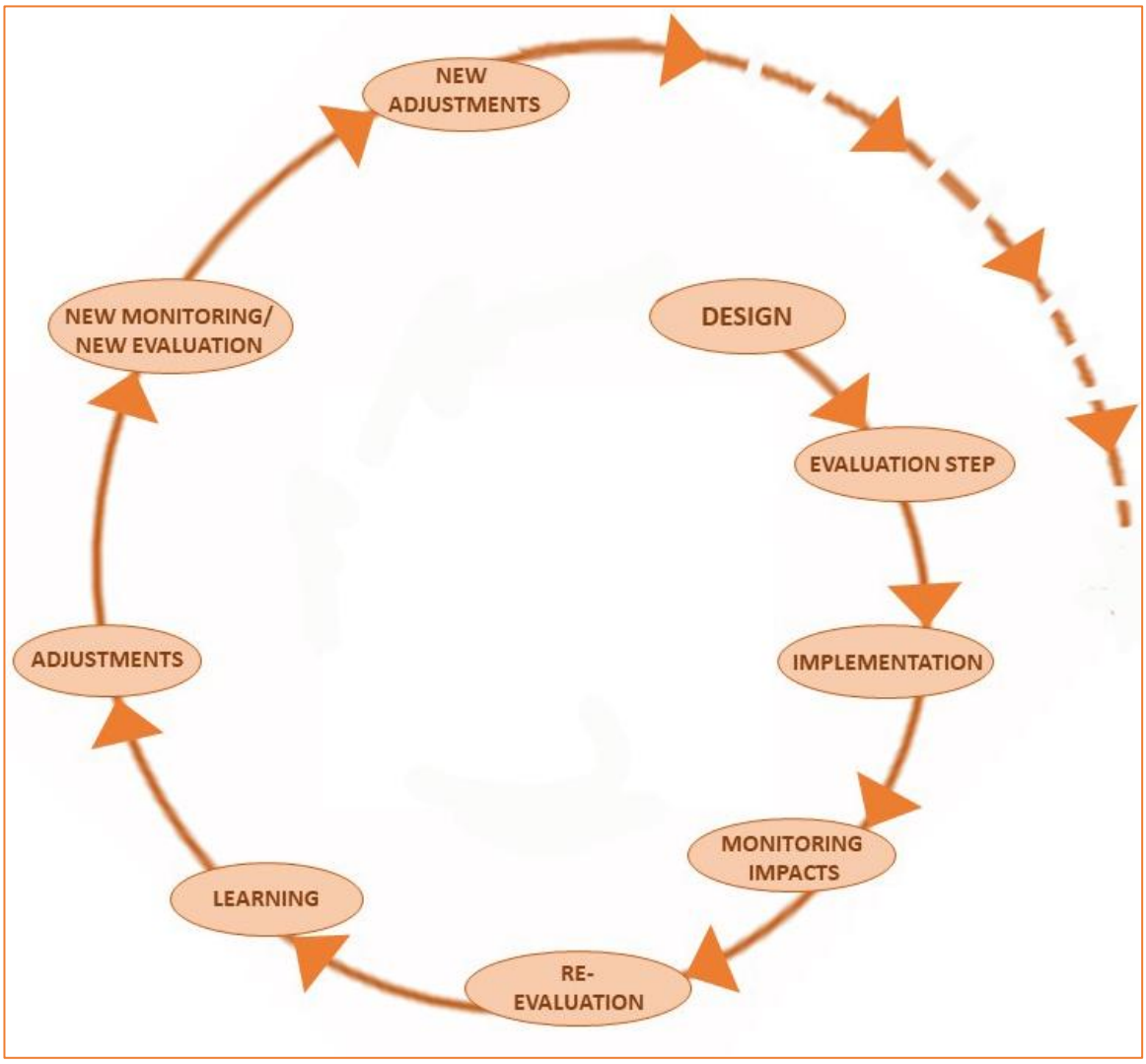
As can be seen from the diagram (Figure 17), the evaluation process has been progressively improved and refined. It is configured as an iterative and interactive process in which the outcomes of each step are the result of comparison and brainstorming with the stakeholders involved. The latter, in addition to being the “producers of contents” are also the recipients of these outcomes and are also involved in the phase of their verification and validation. Therefore, this evaluation process is not a finite process that is limited to finding the “best solution”, but it is a dynamic process, in which, through feedback mechanisms, uncertainties and evolving preferences can be re-assessed at successive stages of development.

Therefore, rather than acting on the final solution, this methodological proposal aims to influence the whole process according to a critical and evolutionary approach that always calls into question

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

the variables of the evaluation (criteria) according to the priorities established each time by the stakeholders involved.

Figure 17 - The dynamic approach of adaptive reuse in the perspective of the circular economy: the co-evaluation process



Source: author's elaboration

On the basis of this experimentation and the observations made so far, it can be concluded that the project is the result of a process of progressive and continuous refinement that starts from the choice of functions and their intensity to arrive at a combination that maximizes benefits in all dimensions.

It is important to emphasize that this process has been one of progressive refinement and improvement and not of inclusion/exclusion of some functions with reference to others. The functions

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

have been progressively grouped according to their affinity, integrability and complementarity, in order to facilitate the elaboration of the proposal for a "satisfying project" (Simon, 1959). Therefore, this evaluation process is not a finite process that is limited to finding the “satisfying solution” (Simon, 1959), but it is a dynamic process, in which, through feedback mechanisms, uncertainties and evolving preferences can be re-assessed at successive stages of development (Figure 8). Indeed, the evaluation is not meant here as a “tool-driven” process, but as a “human-driven” process, supporting stakeholders’ engagement, open spaces for discussion and confrontation, co-evaluation of preferences, synergies and conflicts, establishing a cyclical process towards the identification of the most “satisfying solution” (Simon, 1959) based on circularity criteria.

Assuming the CIE (D. Lichfield & Lichfield, 1997; N. Lichfield, 1995) as bottom-up reference model (in which the evaluation process is proposed as a sequence of steps), the advancement of the method proposed by CLIC consists in emphasising the probability that characterises impacts through a dynamic and participatory evaluation process that, for this very reason, co-evolves with the needs expressed by the actors involved in the process and is increasingly refined and adapted to their satisfaction. Furthermore, the uncovered aspect in the CIE is the assessment of cultural impacts and CLIC represents a complement and an advancement in this respect.

The ambition of this work is to provide the scientific community and policy-makers with a method and a tool for the multidimensional assessment of the impacts of cultural heritage reuse processes in the perspective of the circular economy that can be validated and tested in different contexts in order to highlight its limits and potential.

It is plausible that, after an experimental phase, this method could potentially become a protocol and even a standard for reuse and regeneration of cultural heritage.

Annex 2 – The Heritage Impact Assessment steps

The steps of an HIA are:

OUV definition and stakeholder involvement

In the case of World Heritage List properties, their international significance is established at the time of inscription and defined as “Outstanding Universal Value” (OUV). This OUV is expressed through a series of attributes that are subject to preservation and that the States Parties undertake to maintain and preserve. Therefore, for the implementation of the HIA, it is essential to understand why an asset is deemed to have OUV and which attributes characterise it. This information is contained in the Statement of Outstanding Universal Value (SoOUV), the elaboration of which is indicated as a requirement in the Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO, 2008) paragraph 154-5. The statement is developed for each listed property and, in addition to clearly establishing the attributes that reflect the OUV, also highlights the connections between them to encourage the HIA process to be able to consider impacts both individually and collectively, rather than on a standard range of receptors (ICOMOS, 2011).

The definition of the attributes of the asset and their official recognition are necessary to spread the knowledge of the OUV of the asset among all the actors involved in the intervention proposal and to initiate their involvement and confrontation throughout the decision-making process, defining the scope of the intervention, the expected results and the consequent impacts elaborating both the development project and the planning process in a proactive rather than reactive way.

Elaboration of the Scoping Report

All stakeholders agree on a Scoping Report (or HIA summary) based on a shared timetable and development programme. This document aims to:

- provide a description of the asset included in the WHL and its OUV, also including a summary of the status quo of the context;

- describe the proposed intervention and possible alternatives. In particular, the report should specify whether the proposed intervention falls within a WHL property or within a buffer zone or within the context of the property but outside of both;

- describe the survey and assessment methodology to be adopted considering both the parties to be involved (local stakeholders, existing heritage community, etc.) and the baseline information to be collected, also relying on previous studies and methodologies already developed in the specific field. It should be able to provide (as far as possible) a picture of the existing knowledge about the property/site, identifying possible information gaps and testing the level of reliability of the available information for the assessment.

At this stage it is important that those responsible for preparing the HIA have appropriate expertise in relation to the needs of the site, its OUV (tangible and intangible attributes) and the nature and extent of the proposed modifications. This phase requires a great deal of collaborative capacity within the team of experts involved in the HIA and represents an opportunity to experiment with cross-sectoral partnerships and to develop new skills in the field of cultural heritage impact assessment and to share good practice through its implementation.

Data collection

An HIA is more effective the more documentation is available to carry out the assessment. Working on assets included in the WHL, in this case the initial documentation is the SoOUV and the identification of the attributes that convey the OUV. At this stage the HIA should also collect and consider all other studies and surveys that concern the study area to integrate the contextual knowledge with information regarding other values (e.g. national and local) present in the area and to fully understand the history and identity of the place under consideration.

Asset value assessment: approaches, methods and tools for the identification and evaluation of attributes

"Data collection should allow to quantify and characterise heritage attributes and to establish their vulnerability to proposed changes" (ICOMOS, 2011, §4).

As anticipated, the initial database of information must consist of all potential data sources, collected through the use of different techniques (desk study, historical research, site visits, etc.) and, if possible, also supported by field studies to make the HIA more robust. The use of newer digital technologies can help to "visualise" the arrangement of attributes (e.g. through spatial modelling and rendering systems), relationships (which can also be expressed as processes) and associations between them, facilitating the development of predictive impact scenarios.

It is important that in the HIA Report there is a clear and comprehensive textual description of individual and/or groups of heritage attributes, specifying their individual and/or collective condition, the interrelationships between them, their respective importance and possibly also an indication of their capacity for change.

Understanding the full meaning of the OUV of a WH-listed property/site and all other complementary values is a crucial part of the HIA process. In the ICOMOS document the value of heritage attributes is assessed in relation to legal, international or national designations, priorities or recommendations established in national research agendas and attributed values.

The importance of the resource is then determined by professional judgement according to a qualitative assessment (Very High; High; Medium; Low; Negligible; Unknown), so although this method should be used as objectively as possible, discretion at this stage is inevitable. This rating scale is considered applicable to the different types of heritage: archaeological sites, built heritage or historic urban landscape, historic landscape, intangible heritage or associations. For each typology, ICOMOS provides an explanation of the different levels of importance in order to facilitate the assessment and guide it on the basis of criteria and considerations that are as objective as possible.

Assessment of impacts

Following the indications present in the ICOMOS Xi'an Declaration (ICOMOS, 2005), ICOMOS intends to offer, through the HIA, a tool capable of assuming a systemic perspective for the evaluation of the overall impact. Therefore, it is essential both to identify the changes on each attribute, with particular attention to those affecting the OUVs on which the HIA mainly focuses, and to assess the intensity of the specific change (and thus the impact) on a specific attribute. The

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

relationship between the magnitude of the change on the specific attribute and the importance of the attribute itself, allows to define the “significance of the effect” (ICOMOS, 2011, §5).

In order to assess the magnitude of the impact, without considering the value of the asset, ICOMOS proposes a 5-point scale (No change; Negligible change; Minor change; Moderate change; Major change), while for the significance of the effect of the change - i.e. the overall impact - on an attribute ICOMOS provides a 9-point scale (Major beneficial; Moderate beneficial; Minor beneficial; Negligible beneficial; Neutral; Negligible adverse; Minor adverse; Moderate adverse; Major adverse) as it considers that it is a function of the importance of the attribute and the magnitude of the change, which can be either negative or positive. Therefore, the central point of the scale is represented by the “neutral” value.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Annex 3 – The Community Impact Evaluation phases: methodological note

This Annex 3 aims to provide more detailed information about the evaluation method of the Community Impact Evaluation.

First phase: description

In the description phase, the following points must be focused on:

1) the urban and regional system before the plan/project (the status quo). In order to identify the amounts of the plan/project it is first necessary to describe the "status quo" as accurately as possible.
2) Detailed description of alternative project plans. Always in order to identify the impacts of each project plan on the existing system, it is necessary to describe in detail their characteristics.
3) Description of the urban and regional system after the plan/project. Each intervention plan/project will produce a modification on the territory. In order to be able to draw a judgment of preferability necessary to see what changes are produced by each alternative on the existing system, and describe them in the most comprehensive way.
4) Comparative description of design options. After highlighting the characteristics of each plan, it is necessary to describe in homogeneous and more analytical terms alternative options that must be compared with each other.
5) Planning variables. Each plan hypothesis produces a change in the existing system that depends on a number of variables involved. Is therefore necessary to know what are the reference variables, typical of each choice of intervention, and which are responsible for changes in the system.
6) Specification of design options through plan variables. After defining the design options and design variables, it is preferable to specify the nature of the change that is made by the projects more carefully (than in step 4).

Second phase: analysis

In the analysis phase, focus on the following elements:

7) Changes in the urban and regional system by means of project plans. It is necessary to identify the changes to be highlighted in the elements of the urban and regional system as a result of the project variables. It is possible to construct a matrix in which in the rows the elements of the system are placed and in the columns the expected situation as a result.
8) Prediction of impacts from design variables. In this phase, the impacts of the project alternatives on the urban and regional system must be punctually identified. This part represents the heart of the analysis, since only through a precise prediction of impacts will it be possible to identify a reliable ranking of preference. This phase is in turn divided into five stages:
   a) enumeration of design variables as identified in point 5.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

b) Identification of the sectors into which the community affected by the interventions under examination can be divided (Table 11). Each plan/project in fact will have a certain impact on one or more sectors into which the society is divided and these sectors must be precisely identified. It is necessary to understand which are the main actors involved in the implementation of the Plan (producers/operators) and which are the stakeholders affected by the impacts (consumers), in terms of advantages (benefits) or disadvantages (costs). A list of producers and users shown in the table.

Table 11 – List of involved producers and users

Producers/operators
Local government
Private subjects
Owners
Public/private subjects
Consumers
Inhabitants of urban area
Direct users
Local employees
Indirect users
Potential users
……
……..
……..

Source: elaboration of (Fusco Girard, 1987b) based on (D. Lichfield & Lichfield, 1997; N. Lichfield, 1995)

c) Evaluation of impacts, to answer what can be defined as the key question of the evaluation process, i.e. what will be the impacts on the community sectors previously identified in terms of change in the various activities following the implementation of the planned interventions.

d) Identification of the impacts. Since they do not have a uniform character, it is necessary to identify: their category and type; their value referred to the unit of measurement that is considered most appropriate; the probability that the impacts will occur and how they will evolve over time; the importance of the impacts with regard to certain significant factors.

e) Identification of sectoral objectives. Sectoral objectives express the perception of well-being with reference to each of the subjects considered. once the impacts have been identified with reference to the sectors into which the community is divided, it becomes possible to compare the objectives of each of the sectors involved in relation to the impacts themselves.

9) Definition of the sub-sectors into which the community is further divided. Once the general sectors and their respective impacts have been identified, it is possible to proceed with a functional definition of sub-sectors into which the community itself can be further subdivided.

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

Third phase: conclusions

In the third phase, i.e., that of conclusions, Table 12, Table 13 and Table 14 are constructed. In particular:

10) Table 12: Evaluation of impacts with reference to sectoral objectives.

All the analyses carried out are transferred to the main evaluation table which is traditionally called Table 12. This table lists the sectors (and possibly sub-sectors) into which the community is divided, the impacts (physical effects and effects on activities), the sectoral objectives, the unit of measure (with which to express costs and benefits), the welfare impacts of each alternative (in numerical or symbolic terms), the order of preference of the interventions. partial results (conclusions) related to each sector are also reported in the table.

Table 12 – Alternatives evaluation

		Impacts		Objectives	Unit of measure		Impacts on wellbeing				Preference order
N.	Sectors	Physical effects	Effects on activities	Sectorial	Costs	Benefits	Alternatives				
							A1	A2	A3	A4	

Source: elaboration of (Fusco Girard, 1987b) based on (D. Lichfield & Lichfield, 1997; N. Lichfield, 1995)

11) Table 13: summary of sectoral preferences.

The reading of the general conclusions, i.e., the preferability of one of the alternatives over the others, turns out to be quite complicated if reference is made only to Table 12, in which a large amount of information is reported simultaneously. Table 13 summarizes the results inferred from the partial balances in Table 12. Subsequently, it is preferred to aggregate the conclusions relating to each sector into a further Table 14, from which general conclusions can be easily found.

Table 13 – Summary of sectoral preferences

N.	Sectors	Preference order
I	**First category of stakeholders**	
1.0 2.0 3.0 4.0 5.0	List of Stakeholders: S1 S2 S3 S4 S5	

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

N.	Sectors	Preference order
I	Conclusions of first category of stakeholders	
II	**Second category of stakeholders**	
1.0 2.0 3.0 4.0 5.0	List of Stakeholders: S1 S2 S3 S4 S5	
II	Conclusions of second category of stakeholders	
	General conclusions	

Source: elaboration of (Fusco Girard, 1987b) based on (D. Lichfield & Lichfield, 1997; N. Lichfield, 1995)

12) Evaluation report.

The report is ad-hoc questions are asked about the study under review, and on the basis of the material available (especially with reference to Table 12 and Table 13) it is checked whether it is possible to answer these questions.

In fact, it is possible to apply the diagram in Table 12 in any multi-criteria assessment process to infer the conclusions regarding preferability for each subject.

For example, techniques such as the Evamix, the Analytic Hierarchy Process, the regime analysis, can be applied with reference to the sectoral objectives of each subject, the PBS method allows to highlight how different social groups perceive the various options, and therefore allows to predict the different coalition strategies and conflicts between different social groups. This is highlighted in Table 14.

Table 14, considering the different groups of stakeholders involved or involved in a project, as well as the impacts that they achieve from each project alternative, highlights the distribution of benefits and costs for the different social groups, highlighting which are the social groups that welcome a certain plan alternative and those that, on the contrary, welcome it unfavorably. For example, an alternative that produces an excellent impact for a certain group, and mediocre/low or bad impacts for the other groups, is an alternative that will put the former in conflict with the latter, who, on the contrary, will tend to coalesce.

Table 14 therefore serves to make explicit the intensity of the conflicts and provides indications on how to manage them in the most effective way by choosing the alternatives that minimize the conflict between different groups. From the above it results that the CIE is a method that contributes both in the technical perspective of evaluations and in that of a communicative logic. It allows to

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758

generate complex values of use, non-use, intrinsic, etc., and helps to coordinate a large number of subjects with different objectives " (Fusco Girard L.; Nijkamp P., 1997; Fusco Girard, 1987b). It provides the initial framework to identify positive sum strategies to elaborate a dynamic interactive evaluation process, during which the original preferences can be modified through participation.

Table 14 – Conflicts and coalition strategies

		Alternatives			
N.	**Sectors**	**A1**	**A2**	**A3**	**A4**
1.0	S1	bad	very bad	good	bad
2.0	S2	moderate	good	bad	very good
3.0	S3	good	bad	good	very bad
4.0	S4	very bad	bad	very good	good
5.0	S5	moderate	very good	moderate	moderate
6.0	S6	very good	good	very bad	good

Source: elaboration of (Fusco Girard, 1987b) based on (D. Lichfield & Lichfield, 1997; N. Lichfield, 1995)

Project: CLIC
Deliverable Number: D2.5
Date of Issue: October 2021
Grant Agr. No: 776758