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abstract

Engaging in collaborative teaching experiments in planning and design: co-creation for the shrinking City-Port Areas of Naples

Libera Amenta, Benedetta Pastena, Sara Piccirillo

Abstract

City-Port Areas (CPA), traditionally considered synergic centres for trade, commerce, living and tourism, are nowadays under pressure due to urbanisation activities, over-tourism, climate change, and other intertwined conditions of risk (natural and anthropogenic). It is possible to identify fragmented and shrinking territories in CPA - wastescapes - that foreshadow opportunities for sustainable, circular and socially inclusive urban regeneration. Regenerating wastescapes in the CPA calls for a collaborative approach that can give voice to all stakeholders, through different methods. Two of them have been explored in two didactic activities analysed in this paper. The transition towards a sustainable and just environment requires interdisciplinary and collaborative approaches involving different skills, while ensuring the development of innovations that can be formulated in Urban Living Lab settings. In the first place, this paper analyses the use of images and visions as a co-design tool that can facilitate the understanding of urban phenomena, while ensuring public participation in the processes of co-designing possible future scenarios. Secondly, it unpacks the gamification process that, even if not innovative per se and not free of limitation, when experimented in the didactic experiences, seems to be a stimulating method to engage the discussion among students, enhance their preparedness and awareness to cope with societal and socio-technical transitions, while opening up to the local communities. Combining theories of sustainable urban regeneration with innovative teaching practices such as co-creation methods and serious gaming, research by design through students' experimentations aims to explore new perspectives to address the challenges of sustainable change in CPA and to raise students' awareness of complex issues such as circular economy, resource management and urban resilience.

Keywords:
City-Port Areas, inclusive planning processes, collaborative urban design, gamification, co-creation, teaching, just transition

Sperimentazioni didattiche collaborative di pianificazione e progettazione: la co-creazione per le City-Port Areas di Napoli in contrazione

Tradizionalmente considerate centri sinergici di scambio, commercio e turismo, le City-Port Areas (CPA) sono oggi sotto pressione a causa della crescente urbanizzazione, dell'overtourism, dei cambiamenti climatici e di altre condizioni di rischio interconnesse (naturali ed antropiche). È possibile identificare territori frammentati e in contrazione nelle CPA - wastescapes - che costituiscono opportunità per una rigenerazione urbana sostenibile, circolare e socialmente inclusiva. La rigenerazione dei wastescapes nelle CPA richiede un approccio collaborativo che possa dar voce a tutti gli attori, attraverso diversi metodi. Due di questi sono stati esplorati in due attività didattiche analizzate nel contributo. La transizione verso un ambiente sostenibile e giusto richiede approcci interdisciplinari e collaborativi che coinvolgano diverse competenze, garantendo lo sviluppo di soluzioni innovative da formulare in contesti di Urban Living Lab. In primo luogo, il contributo analizza l'uso di immagini e vision come strumenti di co-design che facilitino la comprensione dei fenomeni urbani, garantendo al contempo la partecipazione del pubblico ai processi di co-progettazione di possibili scenari futuri. In secondo luogo, il paper tratta il processo di gamification che, anche se non innovativo di per sé e non privo di limitazioni, quando sperimentato nelle esperienze didattiche, sembra essere un metodo stimolante per animare la discussione tra gli studenti, migliorare la loro preparazione e consapevolezza per far fronte alle transizioni sociali e sociotecniche, confrontandosi con le comunità locali. Combinando le teorie della rigenerazione urbana sostenibile con pratiche didattiche innovative quali i metodi di co-creazione e il serious game, la research by design attraverso le sperimentazioni degli studenti mira a esplorare nuove prospettive per affrontare le sfide del cambiamento sostenibile nelle CPA e a sensibilizzare gli studenti su questioni complesse come la circular economy, la gestione delle risorse e la resilienza urbana.

Parole Chiave:
City-Port Areas, processi di pianificazione inclusivi, progettazione urbana collaborativa, gamification, co-creazione, didattica, transizione equa

Engaging in collaborative teaching experiments in planning and design: co-creation for the shrinking City-Port Areas of Naples

Libera Amenta, Benedetta Pastena, Sara Piccirillo

1. Introduction: City-Port Areas in contraction. Challenges and opportunities for sustainable and circular regeneration

City-Port Areas (CPA) are part of a larger regional system, shaped by both natural and man-made processes; they are the main hubs of globalisation, where global flows of goods and people shape similar locations with different transformation process and with specific challenges that need to be tackled by planners in site-specific ways. As synergic centres for trade, commerce, living and tourism, CPA are nowadays under pressure and increasing their footprint due to urbanisation activities, overtourism, global shipping and the effects of climate change and other interrelated risk conditions (Hein, 2022).

Coastal areas are particularly vulnerable to climate change because they are exposed to multiple interdependent risks and impacts (such as storm surges, sea level rise and coastal erosion). Interconnected hazard conditions, which can be cascading and cumulative, are identified when many threats interact with each other, increasing vulnerability and risk to human and ecological systems (Gallina et al., 2020).

Today it is possible to intercept a contraction of CPA identifying fragmented and shrinking territories - namely *wastescapes* (REPAiR, 2018) - that foreshadow opportunities for urban regeneration, focusing on sustainability, circularity and social inclusion. CPA are a laboratory to test and experiment for the sustainable and just transition of these territories towards circularity. *Wastescapes* of CPA have been previously defined as "resource-scapes of the coastline" (Amenta & Attademo, 2023), meaning fragile territories in a multi-risk condition but rich in opportunities for a circular regeneration.

The phenomena of globalisation and metropolisation of the territory, together with the containerization of ports, have undermined the complex inter-scalar relations between cities and coastal areas, creating - in very different contexts - a mosaic of *wastescapes*: obsolete industrial spaces, underutilised or abandoned areas in a transitional condition (Russo, 2023). Deindustrialisation, changed technological requirements in maritime logistics, new commercial routes and the concentration of maritime traffic in bigger and more efficient ports are only some examples of the profound changes that have been affecting port infrastructures, as well as coastal landscapes, contributing to the shrinking of the CPA over time, with the ending of life cycles of buildings and infrastructures (European Parliament, 2008).

Shrinking is rooted in demographic decrease and deeply influences the physical space creating different patterns and related narratives (Haase et al, 2014; Wolff & Wiechmann, 2018; Cassatella, Bovaro, 2021). With particular reference to the contexts exclu-

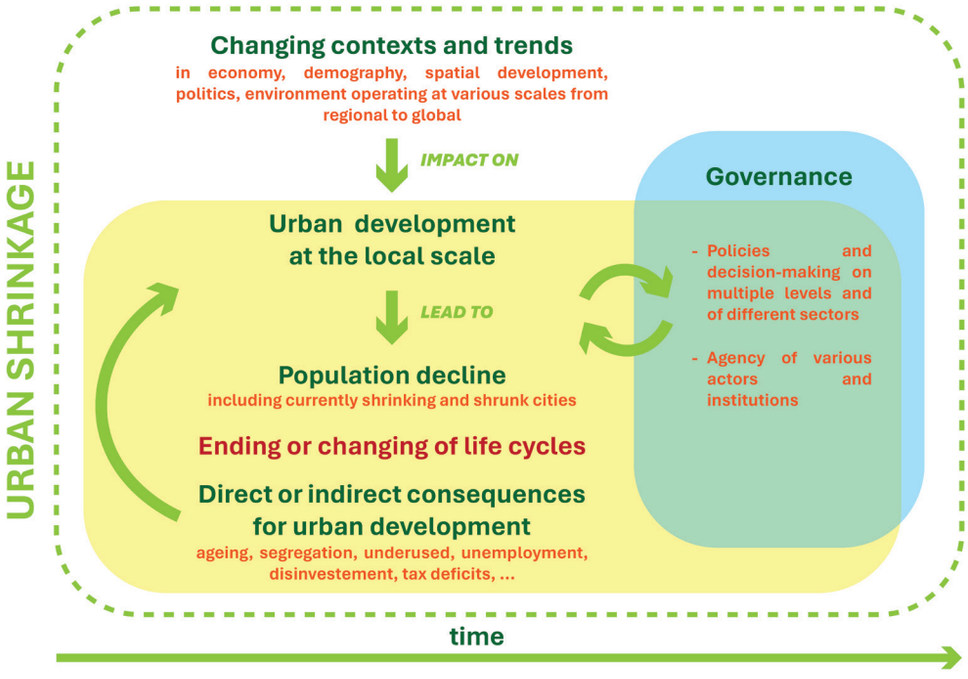

Fig. 1 – Heuristic model of urban shrinkage. Source: re-elaboration by Benedetta Pastena on the basis of Haase, Rink, Grossmann, Bernt and Mykhnenko (2014)

ded from main public services and employment poles (Lazzarini et al. 2022), CPA far from metropolitan centers are more prone to stagnation and shrinking (Fujii, 2010). However, the process of shrinking of the CPA is also related to linear metabolic processes and the ending or changing of life cycles of territorial assets, under the changing socio-economic and technological dynamics (Fig. 1).

Through collaborative teaching experiments in planning and design, this work aims to contribute to the debate on the analysis and regeneration of CPA. To so so, although much previous research has focused on sectoral analysis or theoretical models (Healey, 1997, Foster, 1999), this study takes a more comprehensive approach applied on education experiments through co-creation techniques. It integrates the physical, social and cultural dimensions of CPA together with the associated waste landscapes. By combining theories of sustainable urban regeneration with innovative teaching practices such as co-creation methods and serious gaming (Cross, 1972, Sanders&Stappers, 2008), this research-by-design approach utilises students' experimentation to explore new perspectives on addressing the challenges of sustainable regeneration in CPA. It also aims to raise students' awareness of complex issues such as circular economy, circular urban metabolism, resource management and urban resilience.

Teaching methods such as co-creation are inherently more democratic learning methods that require openness and free thinking from both students and staff. If students are able to grasp the complexity of urban contexts, they must grapple with a variety of data, navigate multi-level governance systems, and work within a multi-level planning framework, and this can become challenging in a limited amount of time.

A learning process based on experimentation and observation is supported by the

co-creation approach. Students can critically evaluate and develop a deeper understanding of the difficulties they face on the ground by engaging in the field and speaking directly with local authorities and stakeholders.

Serious games and role-playing have been highlighted as valuable teaching tools as they enable students to understand the needs and priorities of all parties involved in the planning process, both human and non-human. These methods provide a useful framework for discussing difficult issues in a group context.

However, co-creation presents its own difficulties, such as time constraints (Bovill, 2020), organising participants, and ensuring that students are actively involved, especially in overcoming reluctance to express their thoughts. These challenges are largely due to the hierarchical structures and power imbalance in education systems (Geurts et al., 2024).

Despite these challenges, co-creation offers important opportunities for teachers and students. While students work together on their final products, teachers can watch them improve their ideas and attitude to work in groups towards their future career. Co-creation not only enhances the students' educational experience, but also provides insightful information about how they approach the challenges of sustainable urban development in CPA.

This paper[1] proposes two different teaching approaches - towards the implementation of co-creation activities - in two design studios held at the Department of Architecture of the University of Naples Federico II. The two cases presented both focus on the metropolitan area of Naples, and one of them, more precisely, on the city of Naples itself.

Both teaching experiences analysed focus on the co-creation of shared images, visions, and alternative scenarios. This approach serves as a potential method for addressing the transformations of CPA through co-creation methods, particularly in relation to settlement processes, population expansion and contraction, the life cycles of City-Port infrastructures and buildings, and the preservation and enhancement of environmental and landscape systems. The image as a highly evocative project device can network landscapes of waste and communities (Viganò, 2010), interpreting the complexity of contemporary urban and territorial phenomena in a participatory, circular and multiscalar way. To design a new image of the city, shared with local actors, means calling all stakeholders involved in the process to the decision table to develop a long-term strategic vision aimed at the reappropriation of each denied territory. This approach is applied in didactic experiments, as a field of investigation through which to develop a shared knowledge of the territory, enhancing the awareness and preparedness of students to cope with the transition of CPA, as well as to test the interaction with different stakeholders, enhancing the contamination between local actors and universities, between physical and socio-cultural dimensions.

The application of co-creation methods in teaching activities involving a whole class of students (Bovill, 2020) is seen in this paper as a way to challenge students' own capacities and boundaries to work in groups, and to stimulate them to talk to each other to

achieve a common (spatial) solution and vision, also through the engagement of local stakeholders with further activities.

As above mentioned, this paper brings together, as validation of theories and approaches, the methodologies developed for two didactic experiences. The first one was developed within the ARC5UE Urban Design and Planning[2] course, a.y. 2023-2024, integrated with the Final Synthesis Laboratory B, in which students investigated the City of Pozzuoli, in the metropolitan area of Naples, as a critical urban context densely rich in potentialities related to the outstanding landscapes, but also characterised by fragility and vulnerability. Pozzuoli is represented by strong anthropization and cultural-historical value, while interfacing complex topics such as climate change, vulnerability, multi-hazard and risk exposure in a territory with a strong resilient character.[3] The second one is referred to the Co.De. "City as Sociotechnical Network"[4] course, a.y. 2023-2024, within the "Social Design Laboratory", in which the students explored the case study of Piazza Garibaldi, the historical central station square of the city of Naples, and today the main intermodal hub in the Metropolitan City, which represents a critical hotspot in terms of sustainable mobility, liveability and management of public spaces, and as an intercultural exchange scene.

These two didactic experiences have been understood as a part of the more complex methodology of the Urban Living Labs (Amenta et al. 2019).

Within this framework, this paper aims to answer the following main research question:

"What collaborative strategies can be adopted to circularly regenerate the wastescapes of the City-Port Areas, through the involvement of stakeholders?"

Subquestions would arise from this main question:

- *"How can the use of co-creation be implemented for developing new images of the future for wastescapes in City-Port Areas?";*
- *"How to enhance awareness and preparedness of students to plan for transitions?".*

2. Research background. Co-creation for the transition of *wastescapes* of City-Port Areas

Over time, in relation to the changing needs of the contemporary city, the dismantling and abandonment of different portions of City-Port Areas (CPA) have increased. Considering the widespread presence of *wastescapes* (REPAiR, 2018; Amenta, Attademo, 2016) in Europe and beyond, it is urgent to develop strategies for the sustainable and circular regeneration of these spaces, valorising their strategic position and role from a metabolic perspective. Regenerating these areas, through a circular lens, offers the opportunity to transform the city without consuming new soil, considered as a scarce resource (Williams, 2019). This approach is part of the

shared strategy among the European Union Member States, which sets the target of zero land consumption by 2050 (European Commission, 2021). Furthermore, it is crucial to investigate the social impacts of the circular transition and the implications of the Circular Economy on people (Davies et al., 2024).

CPA are characterised by a dense concentration of industrial, commercial and logistic activities. This coexistence, however, with the phenomenon of urban shrinking, presents significant challenges in terms of accessibility and liveability. The presence of port infrastructures, disused factories and degraded industrial areas can negatively affect the physical accessibility and perception of space, effectively excluding these areas from city life, its metabolism and its policies. This condition is particularly widespread and relevant for the Italian coast, considering that 3% of the Italian territory today consists of disused industrial areas (ISTAT, 2011) and that these areas, for functional and logistical reasons, have been planned near a watercourse and/or sea.

Moreover, it is important to note that CPA were initially designed for specific industrial purposes, without considering any possibility for housing, or other kinds of activities that could foresee a co-existence among different functions (e.g. leisure activities). However, nowadays, different actors such as creative industries in the sustainability sector, architects, filmmakers, designers and musicians, are infiltrating the shrinking territories of the CPA*5*, creating a more vibrant and mixed-use environment. It is therefore essential to plan this transition, also envisioning its long-term impacts, that could ensure a sustainable co-existence in the contemporary CPA, between the ongoing industrial activities and the newly added residential functions, as well as creative industries, and possibly leisure activities. This implies the need for a collaborative planning approach that can involve a wide range of stakeholders and ensure that their needs are taken into consideration, to encourage the redevelopment of brownfield sites and, more in general, the regeneration of *wastescapes* - with great attention to de-polluting the soil. Nowadays, in CPA the creation of accessible public spaces for leisure activities, and the promotion of other functions that are compatible with the surrounding persisting industrial environment is an open question on which it is urgent to focus with the project. In this way, the *wastescapes* of CPA could be transformed from abandoned territories to an integral and vital part of the city, contributing to its development, economic dynamism and circular metabolism (Lucertini & Musco, 2020).

Given that about 90% of world trade occurs via ship (European Maritime Safety Agency, 2023), the post-industrial landscapes of the CPA offer opportunities to think globally about worldwide economies and energetic issues (De Martino et al., 2023). The circular approach provides an alternative to the intensive exploitation of finite resources through the integration of sustainability, resilience and inclusion principles. Moreover, considering that the sea is today the scene of major world conflicts and a vehicle of consistent migratory flows, working in these *wastescapes* has a relevant political value, and allows us to observe closely the great geopolitical chan-

ges underway. These areas are characterised by a dynamic and precarious ecosystemic balance as an environmental border (Di Venosa, 2016) often interested by significant risk conditions. For these reasons, the *wastescapes* of CPA are intended as critical nodes of the land-sea interface. They are shrinking spaces that have played a key role in local and global economies and today represent privileged environments for ecological transition. They should be revitalised through an environmentally oriented project, for the interaction of skills, innovation, creativity and culture. Starting from the application of waste material recovery processes and nature-based regeneration of the *wastescapes* system, working on the circularity of *wastescapes* in the CPA means activating new life cycles for the discarded, dismissed or waiting territories, in order to protect the ecological balance of the coastal and marine zones, and contribute to the well-being of local communities and the conservation of sensitive marine ecosystems under different risk conditions.

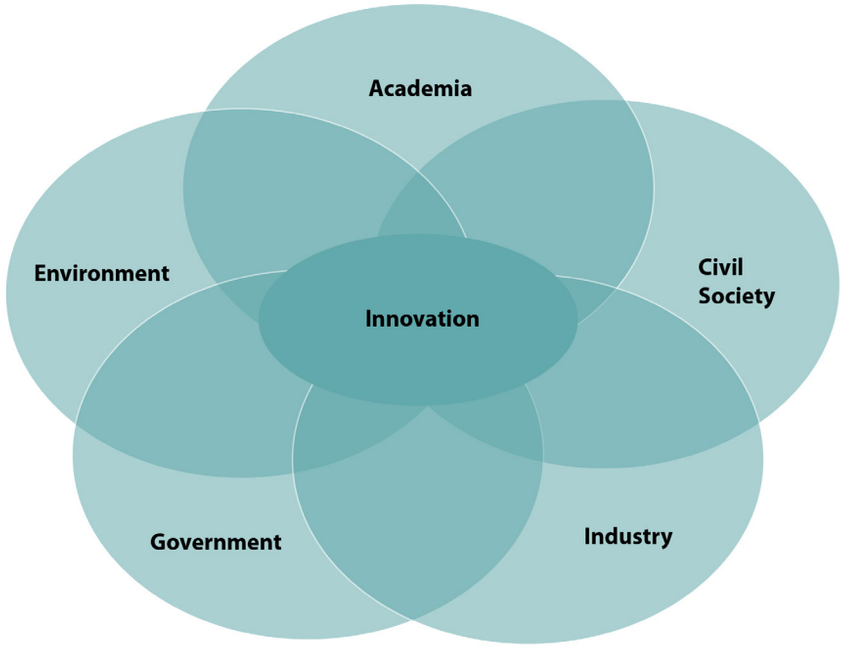

Fig. 2 – Quintuple Helix Open Innovation Model. Source: Al-Ali, Stephens, Ajayan (2020) adapted by the Authors

Research highlights the importance of the Quintuple Helix framework, merging the approaches of academia, industry, government, civil society, for the environment in developing innovation and shared knowledge, in the process of developing co-creation and co-governance ecosystems that support the New European Bauhaus (NEB) initiative;[6] thus, a "co-eco-approach" has been introduced for engaging stakeholders and encouraging collaboration, with the goal of improving future climate initiatives and integrating creativity, sustainability, and inclusivity to build a resilient and climate-ready Europe, in accordance with the principles of the European Green Deal and NEB initiative (Varvaris et al., 2024).

The study examines the Quintuple Helix model (Carayannis et al., 2017; Carayannis & Campbell, 2009), which is less well known than the Triple and Quadruple Helix models, and highlights its potential as a tool for addressing complex, multi-scalar governance challenges in CPAs. In particular, the Quintuple Helix model integrates environmental and social dimensions into innovation dynamics and demonstrates a greater ability to respond to current challenges related to sustainability, circular economy, and social inclusion (Fig. 2). The Quintuple Helix approach is employed for addressing the current intertwined challenges of shrinking urban contexts in coastal territories, including the ones posed by climate change. To do so, it focuses particularly on the role that academia, through teaching activities, can play in the just transition of CPA, facing the socioeconomic criticalities linked to the path towards climate neutrality (European Parliament, 2021).

3. Methodology

Enhancing communities' capacity to understand and implement circular principles is crucial for the successful regeneration of *wastescapes* in City-Port Areas, towards the creation of circular city hubs in shrinking territories. Collaborative design activities play a key role in this process by fostering knowledge sharing, engaging stakeholders, and developing innovative solutions that align with the goals of circular economy, regenerative cities, and sustainable urban design. The importance of co-design activities lies in their ability to bring together different stakeholders to collaboratively develop innovative solutions and visions. Using the Urban Living Laboratory (ULL) approach as an umbrella concept for different co-creation initiatives, we can see how the co-design activities explored in this contribution can provide a practical platform to test and refine design tools tailored to specific test cases. Through active participation, the co-design activities not only foster collaboration but also enhance community understanding of circular principles, while enhancing their capacity to cope with challenges that are constantly changing. This approach is essential for empowering communities to contribute to the regeneration of CPA, by aligning with circular economy goals and promoting regenerative urban development and sustainable design.

The two laboratorial experiences that are presented, even if very different in discipline background (planning/design), stage of graduation (bachelor/master), as well as application of tools (vision/gamification), share methodologically some objectives. By attempting to interpret in a collaborative environment the complexity of the urban (eco) systems, they tried to grasp the challenges related to the linear metabolic processes of growth, with the aim to facilitate the transition towards circularity, through a Research by Design approach (Rosemann, 2001; Amenta & Qu, 2020), in which the project can direct this transition. Moreover, these learning experiences have been exploring the hybrid geographies, including the geographies of waste (REPAiR 2018), as results of the ending of the life cycle of territories.

According to the ULL methodology and phasing, the proposed teaching methodology identifies three key steps - (1) the Co-Exploring phase; (2) the Co-Designing phase; (3) the Co-Testing phase -, whose declinations are different according to the Design Studio program they are developed in (Fig. 3). In the Co-Exploring phase students map the key territorial challenges as a starting element to build the knowledge framework and identify both the key actors of the transformation and the final users. This first “knowledge toolkit” is structured depending on the activities they are developing in the following phase, nonetheless, the process of knowledge is conducted by mapping and doing on-site explorations. The Co-Designing Phase indeed aims at the construction of visions for a circular city (fig. 4) , in the ARC5UE case, and towards the building of Scenarios by Serious Game, in the CoDe didactic experience. Implementing visioning as a transition from knowledge to design and applying serious gaming as a way of experiencing the process of the collaborative project for a just transition are two very different strategies part of the same methodology. The outputs of the Courses are of course different as

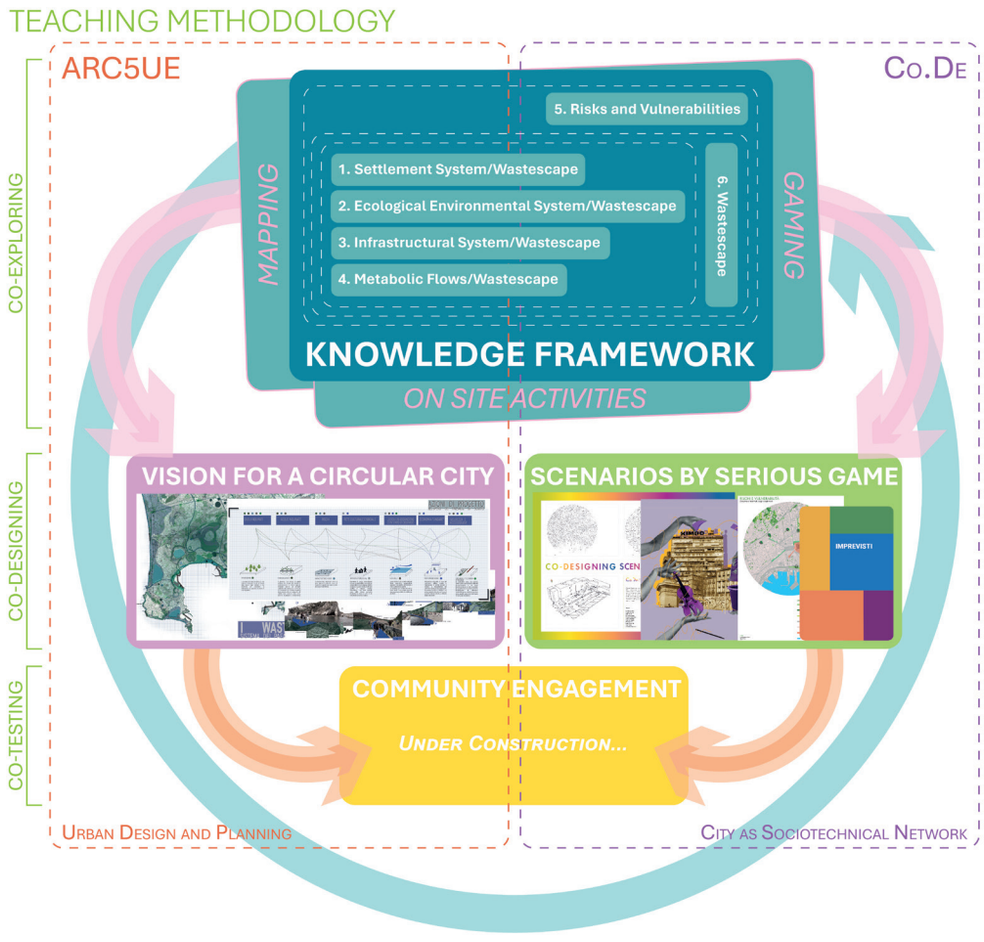

Fig. 3 – The teaching methodology. Source: the Authors

well, this is also due to the students' background and the skills they are asked to acquire during the Degree Courses and the didactic laboratories they are part of.[7] While the Co.De. Degree Course - recently established - focuses more on the design object and its creation in relation to community processes, the ARC5UE study framework develops investigation on urban and architectural themes looking through a systemic lens. The Co.De. "City as Sociotechnical Network" course students are asked to design a serious game through which co-build scenarios and the students of ARC5UE "Urban Design and Planning" course have to develop visions for a circular city comprehending circularity guidelines and a design toolkit. Finally, the Co-Testing phase comprehends in both cases the testing of the outputs and their assessment thanks to community involvement.

3.1 Building a shared image of the city for the co-creation of visions as collaborative planning approach in teaching methods

Fred Polak wrote in 1961 that the visual image, particularly if it stimulates active participation in the process of imaging, can have the greatest direct impact on the population (Polak, 1961). Indeed, the power of images is stronger than is

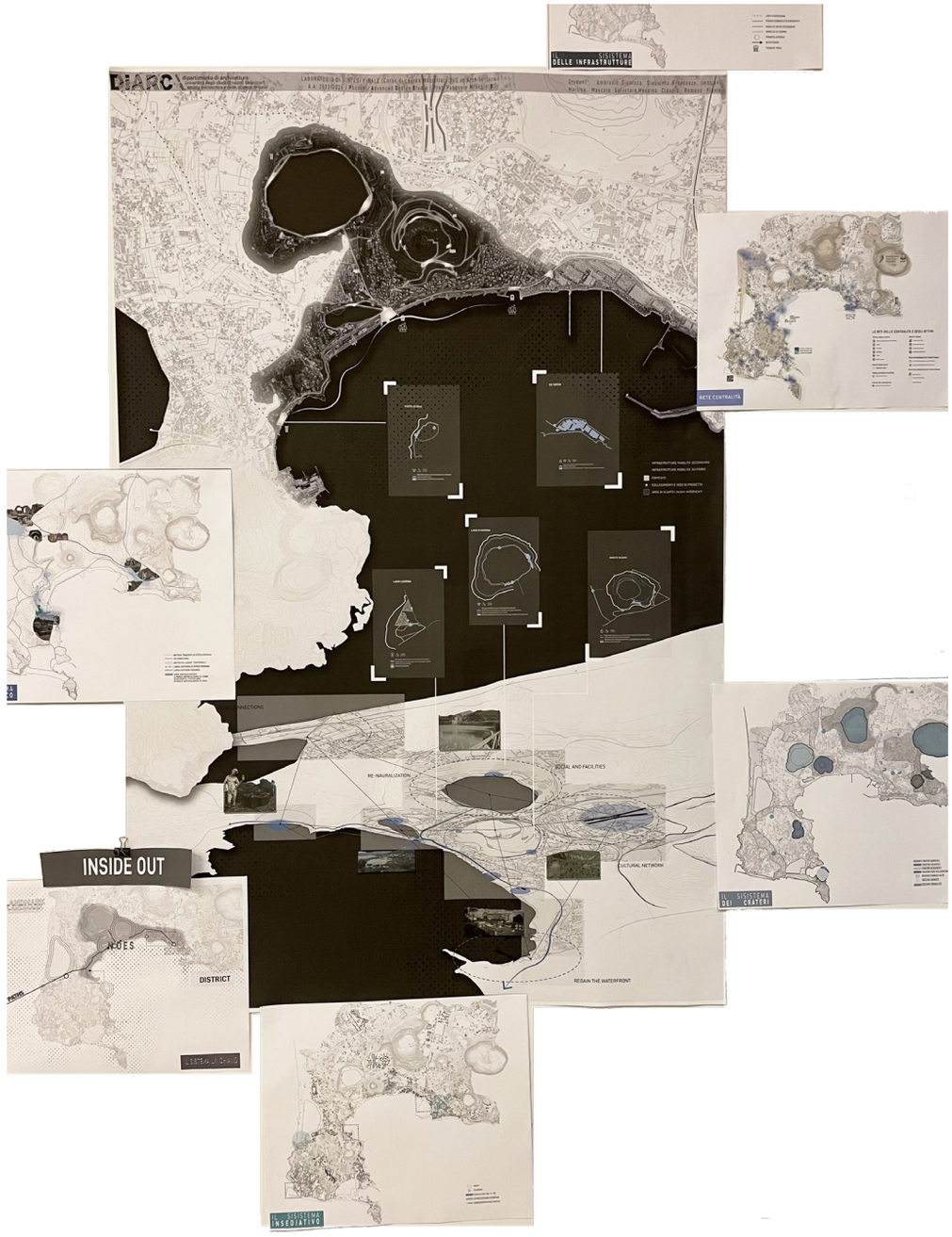

Fig. 4 – Strategic Vision. Source: ARC5UE Urban Design and Planning Course, a.y. 2023-2024, output by students G. Ambrosio, F. Giaquinto, M. Imbriani, S. Mascolo, C. Messina, F. Romano.

usually acknowledged (Freedberg, 1989). The ‹‹mental picture of the exterior physical world that is held by an individual [...] is the product both of immediate sensation and of the memory of past experience, and it is used to interpret information and to guide action›› (Lynch, 1960). The image has the impact of governing human behaviour (Boulding, 1956), and therefore addresses our approach to reality. As urban design and planning researchers, the reality we are interested in is the territorial and urban realm; in this field, the image can become a

powerful and democratic - because of its accessibility, directness and notoriety among the population - device to acquire knowledge and guide processes, to govern and address urban spatial and development transformations, even more if its construction is shared.

Speaking of the construction of the image of the city, the Structural Plan of Antwerp, elaborated by the Studio Associato Bernardo Secchi Paola Viganò between May 2003 and June 2006, in agreement with the local public administration, constitutes a paradigmatic example among the methodological references. This planning experience introduces ‹‹a reflection on the possible ways of renewing an urban practice that must be confronted increasingly with unexpected transformation phenomena›› (Fini, Pezzoni, 2010). The plan was developed following a request to define a new image for the city of Antwerp, which for decades has been affected by phenomena of abandonment, by the vast majority of the population, and simultaneously immigration from different cultures, without any kind of integration policy. This has generated a state of tension and degradation, whose complexity and unpredictability required the use of tools such as *images, scenarios, strategies* and *microstories*, which specify some strategic measures leaving the overall design of the plan undefined. The image device was used to frame seven urban issues and simultaneously address their future projections. *Waterstad, Ecostad, Spoorstad, Poreuzestad, Havenstad, Megastad and Villages and Metropolis* address contemporary challenges at different scales, dealing with different actors, and constitute guidelines for building a vision, policies and scenarios.[8]

In didactic experimentation, the image could be useful to build knowledge of metabolic processes, while understanding who are the actors active in the area and therefore the different interests and possible conflicts existing. This way, students are able to investigate specific topics based on the initial image of the city they have developed, which could be then deepened and shared with different groups of stakeholders. The image, therefore, lays the foundations for the development of a long-term strategic vision and based on the logic of circularity, communicates the directions of long-term transformation, bringing to light a latent collective imagination that is thus revealed and used in the definition of possible futures and, contextually, new territorial alliances, between tools and actors, between public, private and third sector, between universities and territory. The relationship with the institutions could create greater awareness and sensitivity towards the study territory, by bringing students closer to the concrete problems with which administrations have long measured themselves. Co-design as a form of dialogue between groups of actors becomes an instrument for discussion and participation. In this perspective, considering the complex lock-in governance of City-Port Areas (CPA), the instrument of the image could even be a more resourceful tool.

Acknowledging that students' perspectives provide disciplinary development

'in ways that other stakeholders could not' (Brooker & McDonald, 1999), the co-creation of a shared image of the city (Secchi & Viganò, 2009; Fini & Pezzoni, 2010), through a collection of project scenarios to structure a long-term vision, constitutes an innovative and collaborative planning approach in teaching towards the just transition.

Within the didactic activities of the "Urban Design and Planning"[9] course, the integration of the image through the methodology of SPArTaCHus research allows students to develop a knowledge framework for understanding and defining urban structures and processes, in the first phase of the course; during the second phase, to build a *vision* for a circular city, with the aim of interpreting and designing possible futures for the study area; and, in the last phase, to define spatial strategies that could outline *circularity guidelines & design toolkit* to foster sustainable and resilient growth in CPA.

3.2 Gamification in co-creation processes: shaping challenges and solutions for new urban visions

Emerged in the first decade of the 2000s, gamification is a method that has been applied mainly in the fields of education and learning (Salen, 2007), business (Werbach & Hunter, 2012), health (McGonigal, 2011) and urban planning (Poplin, 2011). Studies on ludification in experimental fields such as the arts have their origins in numerous researches dating back to the 1980s.

Gamification uses elements and dynamics typical of games, such as competition, rewards, levels of progression and immediate feedback, to transform complex processes into more engaging and accessible experiences (Hamari et al. 2014).

In the field of urban planning, this approach has proven particularly effective in promoting understanding of complex issues that often affect city government.

Gamification through role-playing, action games, interactive simulations, and collaborative and shared designs provides opportunities for co-design and co-decision-making, enabling citizens to actively participate in decision-making about urban space design. This technique makes complex topics and issues accessible and simple, increasing public participation, and bringing urgent issues such as resource use, public space management, and sustainable development closer to users. Through the easy-to-play game, important information can be conveyed and more lively discussion between citizens and specialists can be promoted, in order to realise more inclusive and liveable cities (Cecchini & Rizzi, 2001).

The integration of gamification into the didactic activities of the "City as Sociotechnical Network"[10] course, and building on the methodology of SPArTaCHus research, allows students to actively explore urban design not only as a theoretical topic but also as a dynamic interactive process that can lead to innovation. This approach leverages the co-design of the game's structure roles, enabling students to interact with each other and envision their study area from a renewed perspective. By framing learning in a ludic

and participatory context, gamification stimulates curiosity and intrinsic motivation, making students more likely to engage deeply with complex urban issues and collaboratively seek creative (and possibly innovative) solutions (Finn, 2014).

The "playful turn" in Western society is an expression of a broader cultural shift that promotes viewing modern life through a playful lens (Henricks, 2014; Beresin et al., 2018). This shift has encouraged educational methodologies, highlighting how play and learning can coexist and even enrich each other, especially in fields such as urban and social design, where imaginative engagement with real-world design practices can lead to innovative insights. The use of serious games is aimed at actually making complex issues accessible and simple, and particularly interesting in its application to urban planning and specifically in educational activities (Abt, 1972; Ampatzidou et al. 2018). These types of games can simulate real-world scenarios and allow players to reflect on the critical issues and potential of the study area, but also to experiment with different design solutions and their potential impacts. In particular, serious games can be structured specifically to address unique and complex urban needs, such as those of CPA. In this case, simulations can reproduce specific challenges such as balancing economic activity with the preservation of the natural environment or optimising the flow between maritime and urban spaces, and possible urban regeneration actions of city portions. This approach not only deepens the understanding of specific spatial issues but also opens a dialogue among students, citizens, planners and stakeholders, allowing all participants to explore the trade-offs and collaborative solutions needed for resilient urban development. It promotes cultural and social integration in urban and maritime development strategies, which is an essential step in building a shared "maritime mindset" (Hein, 2019).

4. Results

4.1. Mapping in Pozzuoli: reactivating the wastescapes network of the Phlegrean Fields towards a circular metabolism

Within the metropolitan area of Naples and the Phlegrean Fields volcanic context, the Municipality of Pozzuoli - case study proposed within the ARC5UE Urban Design and Planning course - is nowadays particularly investigated due to its multi-risk condition, one of whose components - bradyseism - turns out to be almost a unicum on a global scale. In accordance with UN SLG 2030 recommendations, it is imperative to promote inclusive disaster risk reduction and climate change adaptation measures (UNDRR, 2024). In the didactic environment, this means for students interfacing complex topics such as vulnerability, urban resilience and the climate crisis.

The territorial reading and its targeted interpretation led to the definition of some possible city images for the case study as a starting point to orient the transformation proposed by the students - for example: Historic city, Water City, Eco-City, Connected City, Productive City, Public City, Vulcanic City, Porous City, as in the example of

Antwerp Structural Plan (Secchi, Viganò, 2009). Starting from these preliminary city images whose characteristics have been derived from literature, students developed specific spatial visions for the case study of Pozzuoli. These visions integrate targeted design strategies for a different kind of growth (Russo, 2014) that is sustainable and resilient, and are accompanied by analysis of current challenges,[11] natural and anthropogenic risks and scarcity of resources. Looking at the existing heritage, in the broadest sense of the term, which is abandoned, disused, underused or at the end of its life cycle, not as waste but rather as an opportunity for regenerative territories identifies a guiding principle for the construction of new images of resilient cities. This is particularly true in the case study of Pozzuoli, a highly populated territory that must respond to different natural and anthropic risks, also related to pollution and unauthorised buildings. Within the context of the course projects, waste is no longer perceived as mere space, material, or energy to be discarded; rather, it is conceptualised as a flow and a valuable resource to be reintegrated into the urban metabolism.

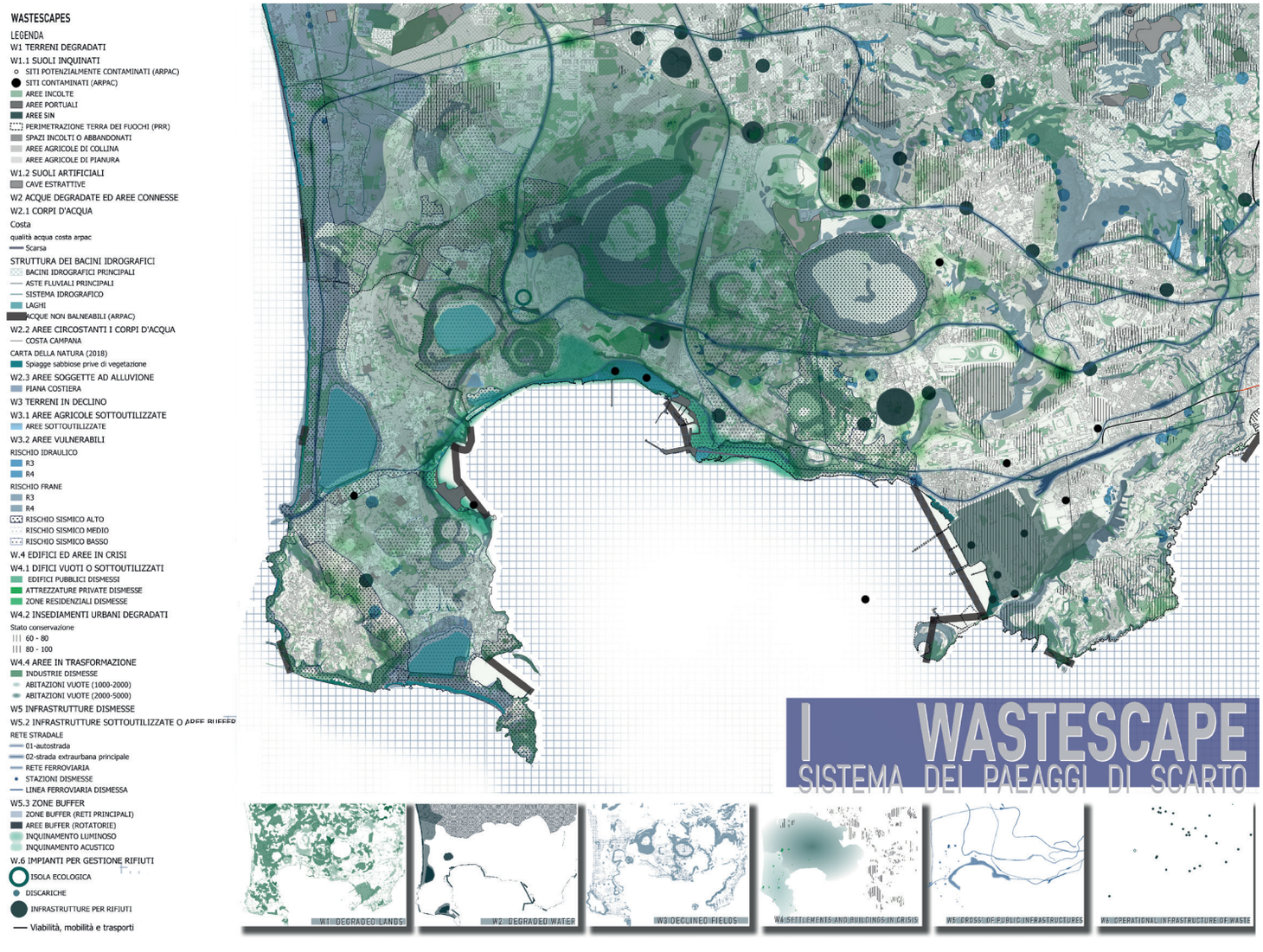

Fig. 5 – Wastescapes. Mapping the waste landscape system. Source: ARC5UE Urban Design and Planning Course output by students G. Ambrosio, F. Giaquinto, M. Imbriani, S. Mascolo, C. Messina, F. Romano.

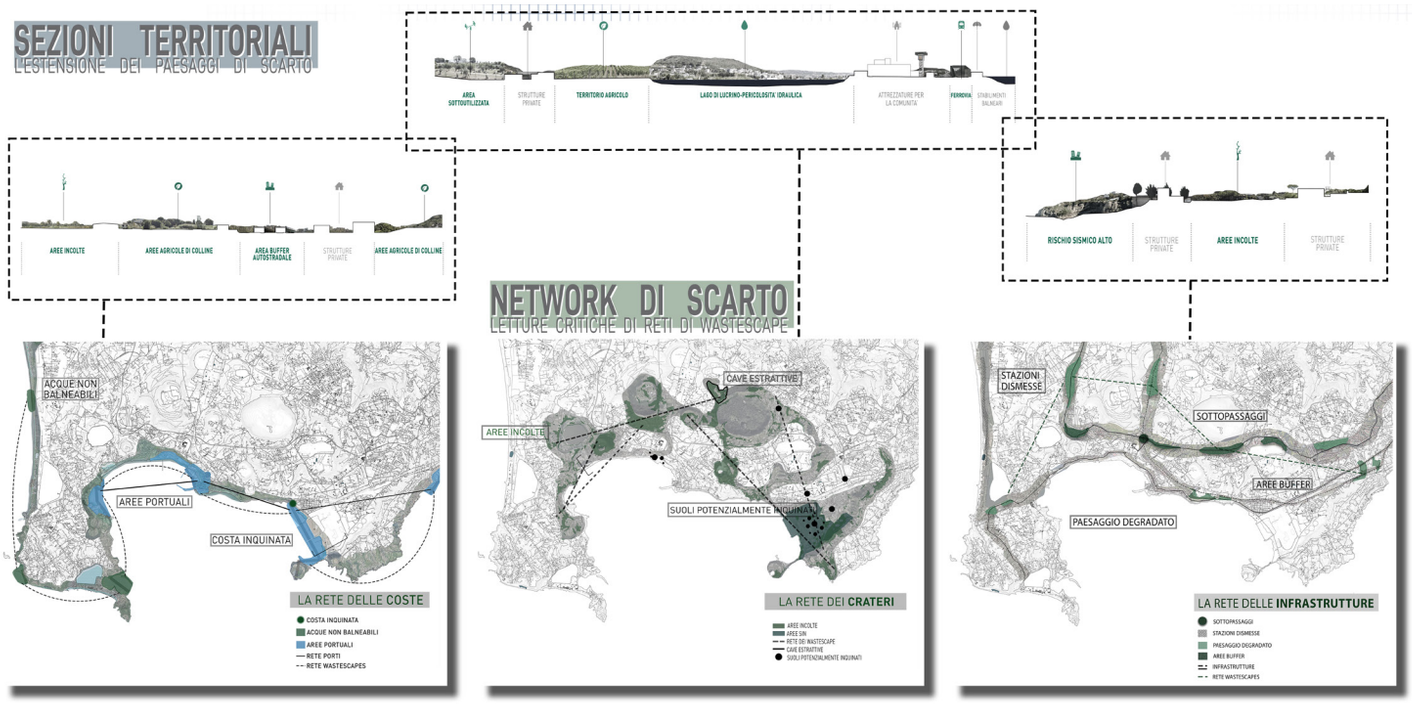

Fig. 6 – Waste Network. The Infrastructure Network, the Craters Network and the Coastal Network. Source: ARC5UE Urban Design and Planning Course output by students G. Ambrosio, F. Giaquinto, M. Imbriani, S. Mascolo, C. Messina, F. Romano.

For the mapping exercise, in a multiscale logic, the study area was expanded from the Municipality of Pozzuoli to the whole Phlegrean Fields system, also taking into account the Municipality of Bacoli and Monte di Procida, and the Neapolitan municipalities of Soccavo Pianura and Bagnoli Fuorigrotta. This has been done by the students to understand the metabolic processes in a qualitative way[12] at a territorial scale, focusing on its dynamics while overcoming administrative borders. Phlegrean Fields were mapped to create a shared database that identifies the abandoned and/or underutilised areas thematized in relation to the infrastructure, settlement, ecological, environmental, risks and vulnerabilities and metabolic system. Degraded land (W1), Degraded water and connected areas (W2), Declining field (W3), Settlement and building in crisis (W4), "Dross" of facilities and infrastructures (W5) and Operational infrastructure of waste (W6) (REPAiR, 2018) constitute the Phlegrean Fields network of wastescapes and the flows linked to it (Fig. 5). In one of the students' elaborations, this methodological process has led to the identification of three waste networks: the "Infrastructures Network", the "Craters Network" and the "Coastal Network" (Fig. 6). The latter highlights the marginal condition of the coastal system: despite its valuable landscape, historical, cultural and heritage value, it is mostly inaccessible, polluted and abandoned. In particular, CPA and their surroundings, once the heart of Pozzuoli economics as one of the most technological shipbuilding and production sites in Italy, are now completely excluded from the city life. Among these CPA, the port of Pozzuoli, closed to the public as private property, and the former Sofer industrial area, decommissioned in 2003, can represent two key nodes/hotspots in the strategy of reappropriation and regeneration of the waterfront. In line with the SPArTaCHus project, CPA in Pozzuoli are considered as environments exposed to multiple risks and complex chal-

lenges, linked to climate change, resource scarcity and unsustainable growth processes. These areas face interrelated problems such as energy supply, materials and agricultural land availability. However, they can become centres of innovation and incubators for circular solutions through mitigation and adaptation measures and nature-based solutions.

4.2. Gamification in Piazza Garibaldi

Core centre of the mobility system in the metropolitan area of Naples, Piazza Garibaldi suffers from the typical problems of urban spaces located in the proximity of central stations: traffic congestion, air and noise pollution, patterns of unsafety and degradation of public space constantly manifest themselves in the area, threatening residents, commuters and tourists flows' efficiency paths. The square is undergoing a long-running process of urban regeneration, started in 2004 with the beginning of the conceptual design phase by Dominique Perrault Architecture. Finally inaugurated in 2019, Perrault's design profoundly changed the configuration of the square and its mobility network: it is undeniable that the international architecture firm project has improved the 59.000 sqm area in terms of liveability and accessibility, still the relations between the square and its boisterous urban context remain nowadays unsolved. In particular, criticalities in the social sphere, which is extremely heterogeneous from a socioeconomic and cultural point of view, result in a pressing matter.

"Co-design scenarios for all" is a serious game, developed by the students of Co.De. Degree Course, a. y. 2023-2024, with the aim of serving as a tool for co-creating scenarios for Piazza Garibaldi in Naples and its surrounding area. The students collaborated among themselves trying to grasp the influence of the local actors, and the role of the citizen associations on the redevelopment of the square, as an essential step to design this game for possible future implementation in an ULL activity.

The game adopts a multi-actor approach (MAA) - involving a targeted array of actors, particularly (end-)users (European Commission, 2024) and giving them instruments to participate in decision-making - and a multiscale logic, utilising three different scales S, M, and L (small, medium, large) to read and interpret the challenges at both local, urban and territorial level. The "City as Sociotechnical Network" course specifically focuses on the M and L scales, while always considering the context of Piazza Garibaldi and its relationships with the broader urban system, including Naples CPA.

The game provides a fun and strategic way to engage with complexities in urban design and explore the trade-offs involved in managing a city. The first phase of the course, which involved mapping and surveying the area, resulted in the game board representing Piazza Garibaldi and its spatial relationships (Fig. 7). Next, the students worked on identifying the actors, actions, and criticalities of the study-area to be inserted in the cards of the serious game. The Actors cards represent key stakeholders (citizens, government, businesses, non-profit organisations, etc.), each with their own interests and goals in the area. The Criticalities cards, which result from a critical view of the area and its problems, serve to highlight important issues that can be addressed through Action cards representing applicable

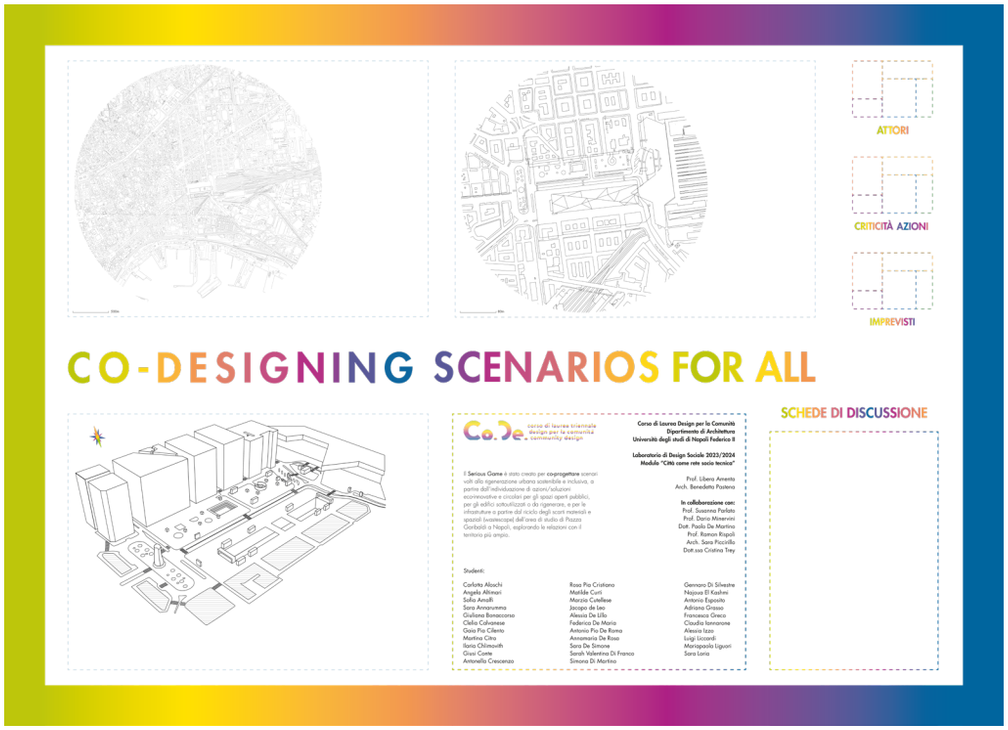

Fig. 7 – "Co-design scenarios for all" Game Board. Source: Co.De. course "City as Sociotechnical Network", a.y. 2023-2024, output by students: Giuliana Bonaccorso, Ilaria Chlimovith, Gaia Pia Cilento, Sarah Valentina Di Franco, Antonio Esposito, Francesca Greco.

solutions. The Unforeseen cards,[13] on the other hand, represent problems/opportunities that can arise and often put administrations and citizens in the position of having to find a different solution from the one initially imagined (such as heat weaves, strikes of public transportation, or in a positive lens extra EU funding, as shown in Fig. 7). Through these cards, the game encourages participants to reflect on the difficulties of the urban regeneration process and possible measures for the area.

"Co-design scenarios for all" Serious Game has been developed to imagine possible support for local actors in co-creation activities involving a wide range of stakeholders - both institutional and not - in identifying possible Eco-Innovative and Circular Actions/Solutions for public spaces, underused buildings and dismissed infrastructure in a systemic comprehensive and multicultural vision that faces together local issues and global challenges.

Fig. 8 – "Co-design scenarios for all" Unforeseen cards. Source: Co.De. City as Sociotechnical Network course, a.y. 2023-2024, output by students Sofia Amalfi, Sara Annarumma, Antonio Pio De Roma, Simona De Martino, Alessia Izzo, Luigi Liccardi

5. Discussion

Throughout this paper we have been exploring two teaching experiences: (i) co-creation for developing planning visions and (ii) gamification as a collaborative instrument for learning. Such didactic experiments are becoming increasingly popular within contemporary education programs in the (urban) design and planning field. They have been showing their potential to enhance student engagement, awareness about complex urban challenges, ability to cope with such complexity in a limited amount of time, and their embedded capacity to foster deeper learning and innovation. However, like any other teaching approach, they present benefits and drawbacks that must be analyzed and addressed for better future course design.

In the first teaching experience we showed that co-designing vision can encourage students to work together, share ideas, and develop skills for problem-solving as a team. The integrated environment of the ARC5UE Urban Design and Planning course, comprising different teaching modules, requires students to develop critical thinking, communication ability, and capacity to interpret complex problems from different angles. All these skills, pivotal for both academic and professional careers, can be enhanced through co-design exercises.

However, collaborative design also presents challenges. At first, it can be more time-consuming for students if compared to individual assignments since it requires that students agree on each design and communication choice made by the group. In addition, it can happen that not all the students engage in the common assignment as much as expected in the starting phase, and this can lead to issues such as frustration among the more active group members. Conflicts can also occur, especially when students have different working styles, methods, or communication approaches. Additionally, assessing individual contributions in group settings can be difficult for teachers, making fair evaluation a challenge and creating mistrust in the groups.

An additional aspect to take into account is the decision to assign a different topic to be deepened to each group. Despite their ability to thoroughly examine the assigned topic and achieve a high level of analysis and data development, the different themes assigned to each group may have limited the group's awareness of the broader concepts.

The second didactic experience in Co.De. course "City as Sociotechnical Network" showed that, through gamification, students were able to cooperate among themselves more easily. Through healthy competition, students were encouraged to collaborate more actively, and this was fostering a sense of community and shared purpose. However, there are potential negative aspects to consider. In the case presented, gamification was intended to co-create altogether a serious game (not just experience playing an existing game in class). This became a demanding task for students due to the limited amount of time available for developing it. Moreover, the Co.De. course was an integrated teaching course composed of three modules, making the teaching requirements even more complex since students needed to take into consideration the different perspectives of the modules. In addition, since creating the game was the output expected by the students, it became difficult to fully test the game with students and communities during the learning process itself. Upon reflection, it might have been more effective to restructure the course so that it prioritizes the game development early on, allowing

for more experimentation and iteration as the course progresses. The integration of gamified elements and collaborative activities from the beginning would have been beneficial for students making them more engaged. This could have been more helpful to process possible valuable feedback from the stakeholders participating in testing the game, facilitating in this way the process of refinement of both the game and the course structure itself.

Other elements to consider when choosing to apply a collaborative teaching method could be found in the different end results of the two approaches presented. The gamification process allows us to produce a series of scenarios in a short amount of time but with less detailed information for the design process of the case study area as an outcome. The students were mostly providing the design of the serious game understood as a platform for discussion of challenges and solutions among all stakeholders. This output was also related to the background of the students belonging to a design course and not to a planning one. On the other hand, the co-creation of visions requires a more accurate preparation and definition of project choices by the students (Fig. 8). To define the change model for the case study areas, students need to deal with complexity and better define design outputs, by developing circularity guidelines and a design toolkit of spatial strategies. This approach is preferred for the study-course of architecture (ARC5UE) where the urban and territorial project is central to the curriculum.

Experimenting with innovative teaching tools in a collaborative environment allows co-creation to stimulate the exchange between students, teachers, external experts and stakeholders. Thus, this makes it possible to develop innovative solutions to question dogmatic thoughts and open up to unexpected and unusual solutions, thereby overcoming the conditions of stagnation in the project resulting from conventional ways of acting and so-called path dependency (De Martino, 2021).

6. Conclusions

Wastescapes of City-Port Areas are understood as a laboratory where to experiment and test innovative methods for the sustainable and just transition towards circularity.

In this paper we argue that teaching activities based on co-creation processes can have a role in facilitating the preparedness of students to face contemporary (and future unforeseen) challenges, and to be prepared for uncertainties in their future life as designers and planners, helping them to develop a nonlinear way of thinking.

In general, the holistic approach implemented in the two didactic activities unpacked in this paper is based on Circular Economy, Circular Metabolism, and Regenerative Territories (Amenta et al. 2022) principles, where the sustainable and circular regeneration of wastescapes is combined with the recovery of waste materials, to generate new circular metabolic dynamics and closed resource loops. In CPA, this perspective has the specific aim to safeguard the ecological balance of the coastal territories and to improve the quality of life for all human and non-human actors.

The themes presented are the subject of in-depth exploration within the university research project FRA “SPArTaCHus,” which aims to reconsider residual landscapes, namely waste-

scapes, in port cities as potential circular centres and innovative districts. This approach, based on a circular metabolic model, intertwines four fundamental themes: ecology, flows, space, and governance.

Studying the CPA in Italy, and in particular in the Metropolitan Area of Naples, offers an opportunity to explore multi-risk territories rich in stratifications, vital nodes in the national and international economy, serving as bridges between land and sea, connecting the region to the rest of the world through maritime trade and the transport of goods and passengers. CPA not only provide access to the sea and global trade routes but also serve as crossroads of cultures, influences, and exchanges that have shaped the history and identity of cities over the centuries. Their enhancement is a central theme in future horizons; it is desirable to view these territories from a unique perspective that integrates the maritime, port, urban, and territorial landscape (Hein, 2011). A strategic vision structured through the shared construction of city images can be one of the useful tools for the urban regeneration of these complex and shrinking territories, in response to the fragilities of the land and its communities.

Teaching collaborative planning approaches in the time of transition is a challenging task to be addressed with an open mind and innovative tools. The open question that emerges after these didactic experiences is still which could be the skills that students - busy with co-creation activities (e.g. co-exploring and co-design) - need to develop to be able to plan within and for the just transition towards sustainability and circularity.

Endnotes

1 A preliminary version of this paper, only including the case study of Pozzuoli, has been presented at the Conference of the Italian Society of Urbanists (SIU) entitled “Novel Territorial Ecologies. Cohabiting Changing Worlds”, and held in Naples in June 2024. This preliminary paper is currently in the process of publication: Amenta, L., Pastena, B., Piccirillo, S. (2024) Costruire nuove immagini di futuro per i wastescapes delle City-Port Areas, in Atti della XXVI Conferenza Nazionale SIU. Nuove ecologie territoriali. Coabitare mondi che cambiano (paper in Italian and under publishing).

2 The Urban Design and Planning course - in Italian “Progettazione Urbanistica" - is part of the integrated class: “Final Synthesis Laboratory” (in Italian Laboratorio di Sintesi Finale), coordinated by P. Miano. Teacher of the Urban Design and Planning course: Libera Amenta. Tutor: Sara Piccirillo and Benedetta Pastena. Master Degree Course ARC5UE, five-year single cycle, DiARC, UNINA.

3 In this contribution, the teaching experiences are interwoven with and based upon the first research activities and methodological approach on the wastescapes of City-Port Areas developed within the framework of the University’s research "SPArTaCHus, Sustainable City-Port Areas Towards Circular Hubs. Rethinking life cycles of wastescapes in the City-Port Areas of the Metropolitan City of Naples". Funded initiative under the University Research Funding Program (FRA) 2022 of the University of Naples Federico II. Corresponding proponent: Libera Amenta.

4 The City as Sociotechnical Network course - in Italian “Città come rete sociotecnica” - is part of the integrated class: “Social Design Laboratory”, coordinated by S. Parlato. Teacher of the “City as Sociotechnical Network” course is Libera Amenta. Tutor: Benedetta Pastena. Community Design Degree Course Co.De., DiARC, UNINA, a.y. 2023-2024.

5 See as an example the redevelopment of the De Ceuvel location and other ongoing activities in the northern area of Amsterdam. See: https://deceuvel.nl/en/organisatie/, last access 04.11.2024.

6 See https://new-european-bauhaus.europa.eu/index_en, last access 04.11.2024.

7 Read the teaching programs for more accurate info at *https://www.google.com/url?q=https://www.docenti.unina.it/%23!/professor/4c4942455241414d454e54414d4e544c4252383348363643313239 43/programmi/shedainsegnamento&sa=D&source=docs&u-*

st=1734104442697063&usg=AOvVaw08zHOIUrNuiQy4T3pyI9AE for ARC5UE; and at *https://www.google.com/url?q=https://www.docenti.unina.it/%23!/professor/4c4942455241414d454e54414d4e544c4252383348363643313239 43/programmi/shedainsegnamento&sa=D&source=docs&ust=1734104442695099&usg=AOvVaw1UUvIN5v8TwR49ujR7S50-* for CoDe.

8 The Megastadt case is emblematic. It focuses on the metropolitan condition of Antwerp city, which belongs to several territorial networks (Fini, 2017), by including it in the urban network of the North West Metropolitan Area (NWMA). The NWMA hosts 137 million inhabitants and crosses the national borders of Belgium, France, Germany, Luxembourg, the Netherlands and the United Kingdom, including capital cities (Brussels and The Hague), the two largest European ports (Rotterdam and Antwerp), some regional capitals and cities with an important historical past (Delft, Haarlem, Ghent, Leuven, etc.) (Secchi, Viganò 2009, 162).

9 The course is part of the integrated class: "Final Synthesis Laboratory", coordinated by P. Miano. Teacher of the " Urban Design and Planning" course: Libera Amenta. Tutor: Sara Piccirillo and Benedetta Pastena. Master Degree Course ARC5UE, five-year single cycle, DiARC, UNINA.

10 The course is part of the integrated class: "Social Design Laboratory", coordinated by S. Parlato. Teacher of the "City as Sociotechnical Network" course: Libera Amenta. Tutor: Benedetta Pastena. Co.De Degree Course, DiARC, UNINA.

11 According to the United Nations (IPCC-SGE, 2007), the unpredictability of nature is one of the greatest challenges that contemporary cities are called upon to respond to.

12 Current research on Urban Metabolism ‹‹has focused on quantifying these flows, but without understanding why people favor one flowpath over another or why they fail to create links between different compartments of the urban system that could benefit from these flows, it is difficult to find ways to regulate the system and improve its health›› (Zhang, 2013).

13 The Unforeseen cards, developed for the Co-design scenarios for all serious game, have been used during the Futuro Remoto Science Festival at Città della Scienza (Naples, Italy) as part of the serious game "Non correre rischi. Attiva il metabolismo della tua città!" - Take no risks. Activate your city's metabolism! -, created by Libera Amenta, Rosaria Iodice, Benedetta Pastena, Sara Piccirillo, Bruna Vendemmia, Federica Vingelli in the framework of PE3 RETURN research.

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