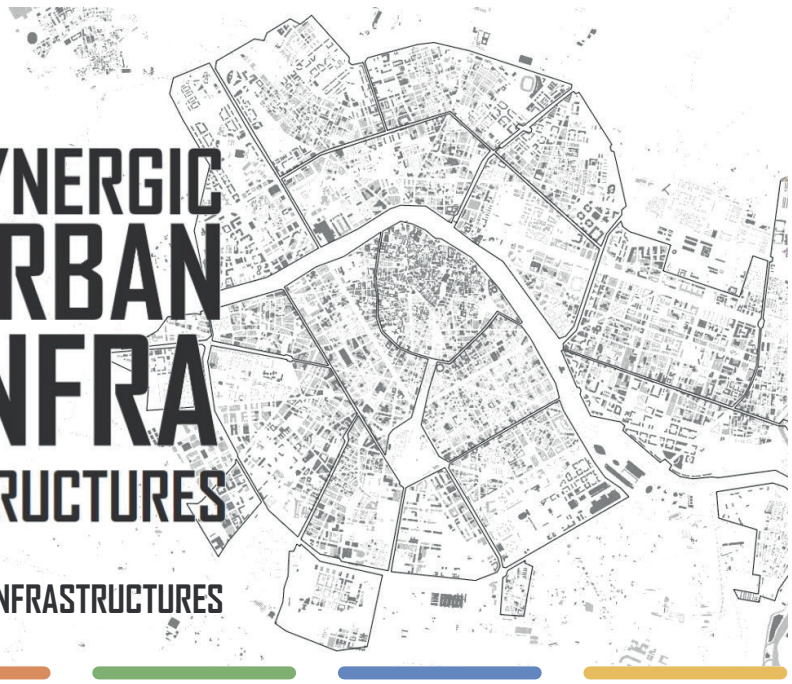
VLC SYNERGIC URBAN INFRA STRUCTURES



VALENCIA SUMMER SCHOOL ON SYNERGIC URBAN INFRASTRUCTURES

Editors: Juanjo Galan Vivas | Luis Bosch Roig

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edUPV
Universitat Politècnica de València

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SUMMARY

This book summarizes the goals, methods, implementation, and results of the VLC Summer School on Synergic Urban Infrastructures. The course was organized as a Blended Intensive Program (BIP) by the Polytechnic University of Valencia with the collaboration of other universities from the ENHANCE Alliance (Politecnico di Milano, Technical University of Berlin, RWTH Aachen University, Norwegian University of Science and Technology, and Warsaw University of Technology). The course was triggered by an ambitious goal: exploring new tools and procedures to inform the urban planning process in a time of increasing specialization and scientification of the planning discipline. As presented in this book, the use of the `synergy ¿concept provided a useful platform to integrate different urban dimensions by considering how each urban infrastructure or system (green, blue, social, housing, mobility, and energy) interacts with each other. In particular, following a highly interdisciplinary approach, 36 students and 16 professors from different academic fields worked together during the course in the development of conceptual frameworks, methodological tools, and synergistic proposals for a pilot area located in the city of Valencia (Spain). Overall, the development and results of the Summer School displayed in this book exceeded the highest expectations of the organizers and participants, paving the way for future and more ambitious collaborations within the Urban Planning pathway of the ENHANCE alliance.

ACKNOWLEDGMENT

To all the teachers of the VLC Summer School, to Ana Alemany and Nuria Llobregat (ENHANCE-UPV Office), to Paula Cardells for her logistic and administrative support (International Office of the UPV School of Architecture), to the City Council of Valencia (specially to Nacho Lacomba for his technical support), to all the local people who joined the participatory activities, to Julia Martinez Villaronga for the layout and typesetting of the book, … and very specially to all the students of the VLC Summer School.

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Polytechnic University of Valencia: Ignacio Del Rio, Gamir Cubel Lilan, Flor Francis Kannampallil, Mohamad Hamdache, Amina Zannouti Jarradi, and Adela Archiles Segarra.

Local neighbours and experts

Alejandro Gómez Gil, Amparo Medina Piles, Ana Pilar Pacheco Campos, Begoña Ruiz, Carmen Albors Ramos, Francisco Juan Vidal, Gustavo Vivas Rebolledo, uan Manzano Juárez, Mamen Soler Bayona, María Ferriol Molina, Paula Cardells Mosteiro, Ramón Marín Tomás, Santiago Hernández Puig, Tomás Gómez Navarro, Vicent Martínez i Sebastià, Vicente Romeu Ibáñez

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FOREWORD

The Universitat Politècnica de Valencia was proud to host one of the first academic and immersive initiatives created by and for the European ENHANCE Alliance: The Summer School on Synergic Urban Infrastructures.
Seven Urban Planning academic teams from seven leading European technological universities have developed a learning experience that blends hybrid and on-site teaching methods, capturing the best of both worlds. There is a palpable sense of satisfaction, reflecting the ENHANCE Alliance's potential to drive forward advanced and innovative education.
The dedication of our teams is evident in the testimonies describing a hands-on educational journey through the vibrant neighbourhoods of Valencia. Thirty-six students from our seven institutions have brought dynamic energy to this pilot program, approaching urban planning from green, blue-water, social, and energy perspectives, offering fresh insights into the area.
As the Rector of the UPV, I am delighted to guide you through the rich learning experiences detailed in the following pages.

Prof. Dr. José E. Capilla Romá
Rector | Universitat Politècnica de València (Polytechnic University of Valencia)

One of the leading strategies of European universities in the last years, fully endorsed and supported by the EU, has been the creation and strengthening of university networks at international level. Universities, both in their education and research components, thrive when they are open to peer discussion, able to learn from diversity, and ultimately when knowledge is being exchanged in free and democratic debate environments.
The Enhance alliance, founded by seven leading European technical universities and subsequently enlarged to three more, is aimed at tackling the pressing challenges the EU is facing and will be facing in the next years, specifically as far as the green and digital transitions are concerned, by connecting students and researchers through a range of curricular and extra-curricular activities, able to strengthen cooperation and mutual learning.
With this stimulating background, Schools of Architecture have a specific and long-standing tradition of learning by design and research by design, with a strong connection to the actual spatiality of different contexts: the Valencia Summer School on Synergic Urban Infrastructure, held for the first time in Valencia in 2023, is a very interesting example of the ability to focus the attention and work in a time-restricted and intense design environment with a multicultural and multi-disciplinary class.
Students have learnt to work together in the exploration, interpretation and design of critical urban environments, and professors themselves have experienced a great exchange opportunity, based on the merge of different knowledge forms and perspectives, and enriched by diverse points of view.
The results are critically illustrated and discussed in this articulated book, which goes well beyond the individual training experience which inspired it, to propose critical reflections and design explorations in sustainable and resilient planning, aimed at tackling some of the most pressing challenges European cities are facing today.

Prof. Dr. Carolina Pacchi
Vice-rector for Institutional and community relations | Politecnico di Milano

After building the organizational structure and cooperation mechanisms within the ENHANCE Alliance, it is time to add the content to the idea of „One Campus". Thanks to the joint effort of 10 European technical universities, I am convinced that this project will soon become the natural platform for cooperation among students, teachers, and our entire academic community. In order to unlock our greatest potential, we allow the boundaries within our society to disappear. The grassroots initiative of the Valencia Summer School on Synergic Urban Infrastructures became such an awaited content. „Smart and Sustainable Cities and Communities" is one of the key pilot areas of the Alliance where we would like to develop the new models of the European cross-disciplinary and co-creative education to tackle the world's most pressing problems. Thus, the idea of the Summer School focusing on the synergies that contribute to the sustainable development of urban areas matched the ENHANCE goals perfectly. It was the extraordinary event that combined not only the scientific exchange of ideas and views but also provided the inspiring academic environment for sharing various cultural experiences. Intercultural meetings always foster building the atmosphere of openness, cooperation, and mutual support. Therefore, I am certain that the Valencia Summer School in 2023 contributed to developing the joint European sphere of knowledge by meeting the highest standards of the best practices in teaching.

Prof. Dr. Jan Słyk, PhD, DSc (Arch)
Vice-Rector for Academic Affairs | Warsaw University of Technology

The Summer School on VLC_SYNERGIC URBAN INFRASTRUCTURES was organized within the ENHANCE alliance with the aim of providing participants with the necessary skills to design and apply new methodologies to maximize synergies between different urban infrastructures (green, blue, energy, social, mobility, and housing). RWTH Aachen University was involved in the co-design and implementation of the course with four professors and researchers from the Chair and Institute of Urban Design and the Chair and Institute of Urban and Transport Planning, and with six students who proceeded from a wide range of programs (M. Sc. Transforming City Regions, Computational Social Systems, and Construction and Robotics). They all represent the academic diversity of RWTH Aachen University and its potential to contribute to the endeavors of the ENHANCE Alliance. We are really pleased to see that the work produced in the VLC_Summer School is now available to the public in this book, and we expect this collective work to be the first of many more to come.

Prof. Dr. Ute Habel
Vice-Rector for International Affairs | RWTH Aachen University

For the students of the ENHANCE Summer School 2023 in Valencia, the School was not only an educational experience: It also was a glance into the complexity of interdisciplinary planning. Such was connecting different perspectives and knowledge on urban planning and design in discussions and thoughtful solutions. Thus, the students were enabled to create sustainable, livable cities and environments for the future. The functional connection of urban systems and sp aces emerged by linking ideas, concepts, and visions. Such approach is representative for the potential of the ENHANCE Alliance as a catalyst for collaboration and common innovative thinking of students from different European universities with the aim for a more sustainable urban future.

Prof. Dr. Kristin Wellner
Dean of the Faculty VI Planning Building Environment | Technical University of Berlin

Urban planning and design challenges are a pressing concern in current times. How we plan, design, and govern determine how liveable our cities are. Here, cities in Europe with diverse urbanisation pathways, strategic plans, pedagogies, and planning cultures can learn a lot from each other. Educating young planners and designers in transdisciplinary settings are an important and exciting way to ensure that our future cities are in good and capable hands. It is indeed a moment of great pride that planning and architecture students from NTNU participated in the first edition of the blended intensive summer school 'synergic urban infrastructures' along with students from 5 other ENHANCE university alliance partners. It is my strong belief that this collaboration will be the start of many other exciting endeavours.

Prof. Dr. Sara Brinch
Dean, Faculty of Architecture and Design | Norwegian University of Science and Technology (NTNU)

An intense knowledge, even affection, for the culture and territory in which we have grown up is not at all incompatible with a strong global vocation, that is, the desire to know and experience everything that other cultures and territories can bring to us and what we can bring to them. Absolutely committed to this concept, students in architecture schools nowadays are being trained as future practitioners with the conviction and ambition that their future professional field of action is the whole world. As a result, they are increasingly demanding that their learning environment expands its boundaries, incorporating faculty and knowledge from other countries and cultures. In response to this demand, the European Commission promotes the formation of alliances of universities that are initiating their common journey by developing joint activities, such as intensive workshops, to increase mutual knowledge and to pursue the ambition of a European area of higher education in which student mobility is extremely easy. This is the case of the activity documented in this publication, of which our school feels remarkably proud and satisfied and to which it intends to give, without a doubt, continuity, and growing commitment.

Prof. Dr. Ivan Cabrera i Fausto
Dean of the Higher Technical School of Architecture | Universitat Politècnica de València (Polytechnic University of Valencia)

The following pages capture the essence of the VLC Summer School as an example of immersive learning in which professors' and experts' bold vision and determined action converge in the ENHANCE Alliance environment, bringing inter-university collaboration as the catalyst for the experience.
The combination of talents, resources and wills has generated an unprecedented initiative, charting a new horizon in how we conceive and facilitate the learning process. This initiative, a pioneer in the Alliance environment, not only offers students an interdisciplinary, deep, and meaningful vision of the Urbanism field of study but also challenges established norms, transcends academic and geographical boundaries, and invites participants to immerse themselves in an ocean of knowledge where theory intertwines with practice synergistically. The VLC Summer School is the prelude to new learning experiences that will awaken our students' curiosity and exploration of academic knowledge through creativity.

Nuria Llobregat, PhD.
International Affairs Director | Universitat Politècnica de València (Polytechnic University of Valencia)

With the inaugural edition of the ENHANCE Summer School students of six different European universities were invited to dive in into the complexities of the topic of "SYNERGETIC URBAN INFRASTRUCTURES". Their focus lay on implementing innovative and systemic synergies, including established concepts such as blue-green infrastructures, while also exploring emerging ideas and fields of action in urban planning, design, and construction. This exploration aimed to fully grasp the potential of integrating green, blue, energy, social, and mobility infrastructure, not only for enhancing open spaces but also for housing or education infrastructure. Next steps would be to consider the implications for new professions in shaping and maintaining synergetic urban infrastructures, including higher education of planners and designers. Embracing the different disciplinary and international perspectives, approaches, and methodologies, the ENHANCE alliance aims to empower the next generation of urban planners to tackle the complex challenges of our time and higher education. We appreciate the start and look forward to more!

Prof. Dr.-Ing. Angela Million
Director of the Department of Urban and Regional Planning | Technical University of Berlin

The International Summer School VLC_SYNERGIC URBAN INFRASTRUCTURES is an initiative that the Department of Urbanism at the UPV has supported from the first moment, for several reasons. Firstly, due to the interest of its theme, design and apply interdisciplinary methodologies to maximize synergies between the different urban infrastructures. Secondly, for addressing urban problems of our city, Valencia, from an international perspective. And last but not least, because it is an initiative with a strong involvement of faculty from our department, along with a brilliant international group of professors from other universities. On behalf of the Department of Urbanism, I thank students and teachers for their participation and congratulate them for the work carried out, in a collaborative co-creation environment that has proven to be very productive.

Prof. Dr. Javier Pérez Igualada
Head of the Department of Urbanism | Universitat Politècnica de València (Polytechnic University of Valencia)

1 INTRODUCTION

1.1_THE VLC SUMMER SCHOOL ON SYNERGIC URBAN INFRASTRUCTURES

Juanjo Galan | Associate Professor. Polytechnic University of Valencia

1.1.1. Goal: Support Integrative Urban Planning

With the overarching goal of promoting sustainable and resilient urban planning, the Summer School VLC_SYNERGIC URBAN INFRASTRUCTURES was organized as a Blended Intensive Program (BIP) within the ENHANCE alliance with the aim of providing participants with new skills to detect and maximize synergies between different urban infrastructures (green, blue, energy, social, mobility, and housing). This aim responds to the integrative character that the urban planning discipline is expected to have, and to the need of counterbalancing the increasing incorporation of specialized knowledge and silos that make it difficult for students and teachers to fully understand and purposefully use the manifold interactions between different urban systems, elements, or infrastructures.

The course was divided into two phases (online and face-to-face or onsite) and included a co-creation process in which students and tutors with the support of decision-makers and representatives of the civil society collectively developed diagnoses, visions, and proposals for a Pilot Site in the city of Valencia. The students who completed the course were awarded a certificate of participation in the ENHANCE Summer School with 4,5 credits (ECTS) equivalence.

1.1.2. A course co-designed by teachers from the ENHANCE alliance: Shifting from Smart to Synergic planning

The VLC_Summer School was codesigned by teachers from different universities of the ENHANCE alliance in a one-year long process that was expected to generate an open academic network on Urban and Spatial Planning. The network included professors and researchers from the Politecnico de Milano, RWTH Aachen University, Technical University of Berlin, Norwegian University of Science and Technology, Warsaw University of Technology, and the Technical University of Valencia (as promoter and coordinator of the initiative). As displayed in Figure 1.1.1, a total of four online meetings and one face-to-face seminar were organized to co-define and co-select the goals, learning outcomes, learning methods, contents, structure, schedule, pilot area, recruitment and selection process for applicants, and potential research outcomes of the course. The face-to-face seminar proved to be especially important and, despite the linear process displayed in Figure 1.1.1, the co-design of the course implied multiple iterations that permitted to improve its pedagogical alignment. Interestingly and following the held discussions, the central topic of the course changed from 'Smart Urban Infrastructures' to 'Synergic Urban Infrastructures' due to our interest in focusing on the interactions between different urban systems rather than on data-based planning (the most common meaning associated to the 'smart' term in planning).

After defining the main components of the course, it was agreed to initiate the dissemination of the course and to open the application process through the website of the ENHANCE alliance. The final objective was to have 6 students from each university (36 in total). Each university was in charge of selecting their six students and two applicants for the waiting list according to the agreed selection criteria and the score obtained by each applicant. These criteria were aimed at creating a highly multidisciplinary and international group of students (ideally, 50% from planning or architectural disciplines and 50% from other fields).

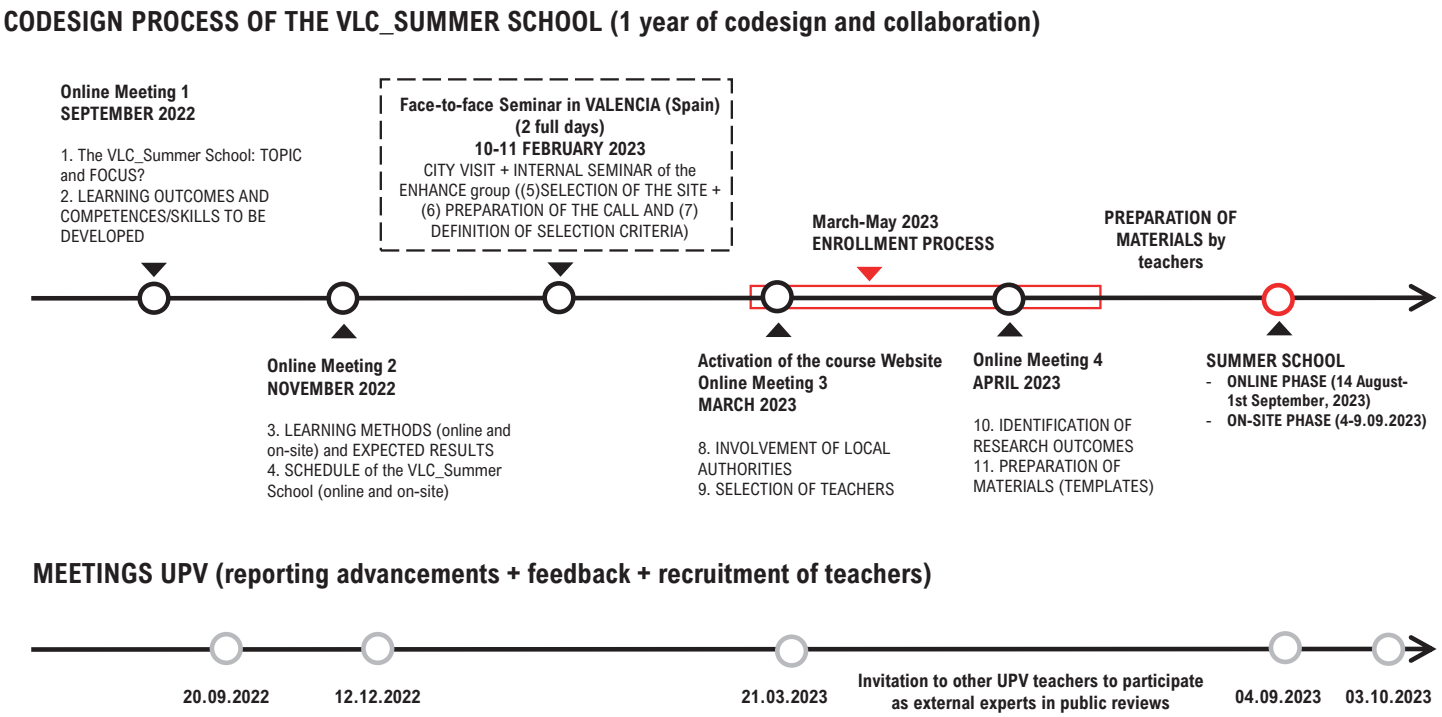


Figure 1.1.1: Chronogram of the codesign process in the VLC_Summer School (upper line) and the dissemination of the process within the UPV community (bottom line) (source: authors)

It must be noted that the ENHANCE alliance includes different technical universities from all across Europe and that one of the few crosscutting pathways chosen by the alliance to start their activity is about urban planning. With these considerations in mind, one of our goals in the VLC_Summer School team was to take advantage of the complementarities and commonalities between our universities (see Figure 1.1.2), also leaving space for other disciplines involved in the evolution and management of cities to join our incipient network.

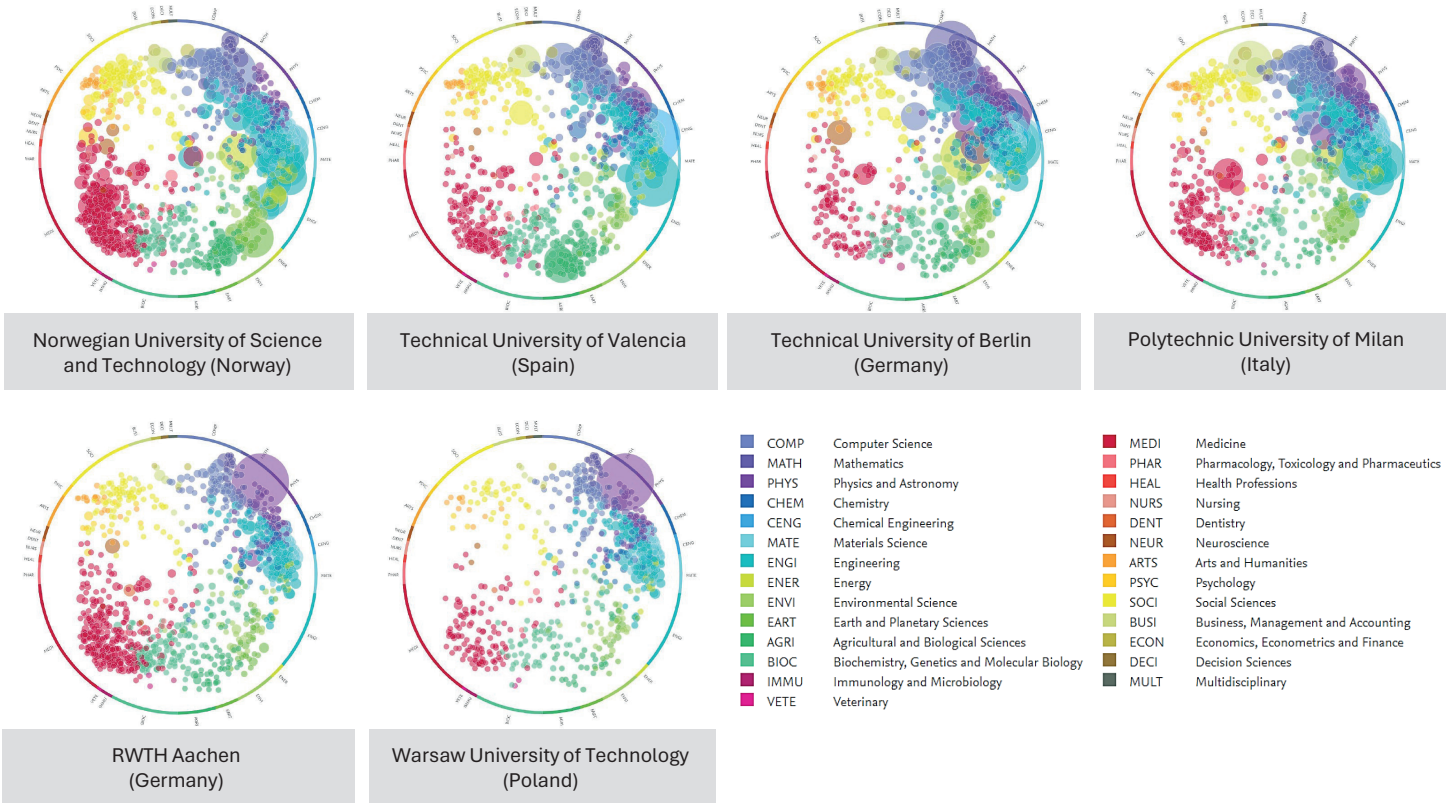


Figure 1.1.2: Fields of knowledge in the universities of the ENHANCE alliance participating in the VLC_Summer School (source: ENHANCE alliance)

1.1.3. Learning outcomes

Upon completion of the VLC Summer School, participants were expected to increase their capacity to:

1) Develop 'planning processes/methodologies' to detect and increase synergies between urban infrastructures (green, blue, social, energy, housing, mobility

2) Apply, validate, and adjust the designed planning process/methodology in a specific site by testing different spatial layouts

3) Develop thematic and specialized knowledge in one of the studied urban infrastructures (green, blue, social, energy, housing, and mobility)

4) Develop integrative and interdisciplinary knowledge in urban planning and design for all the addressed infrastructures

5) Incorporate codesign and participatory processes in urban planning

6) Conceptually and critically address urban sustainability and resilience as systemic and multidimensional qualities that inform the analysis and transformation of cities

7) Develop key soft skills for urban planning

1.1.4. Learning methods

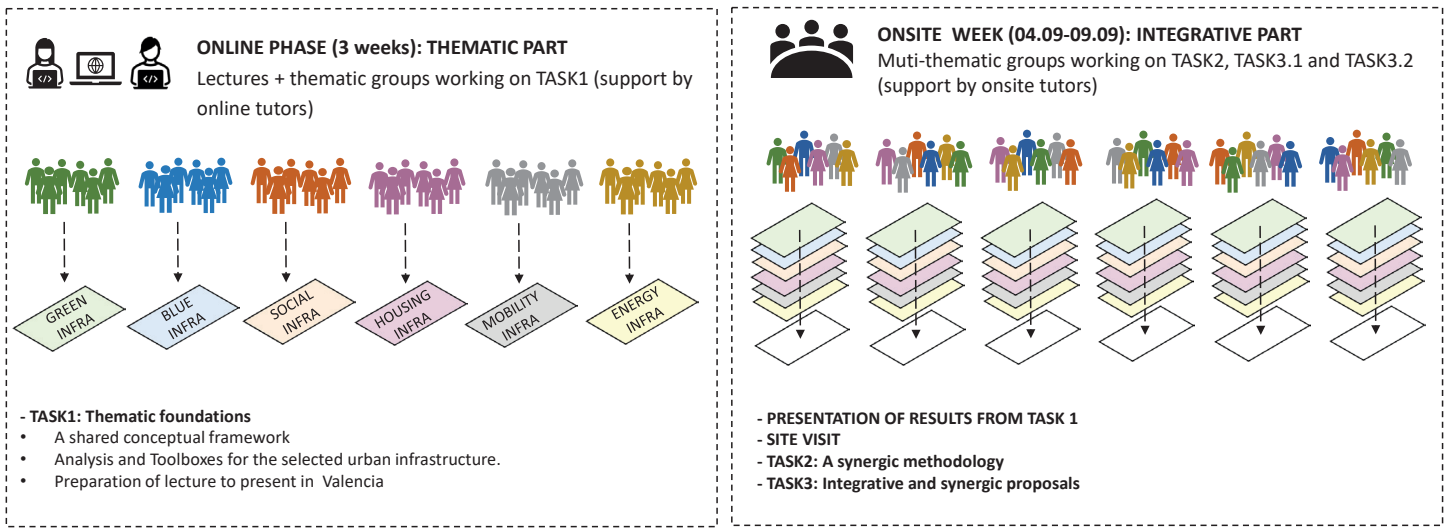


Figure 1.1.3: Structure, types of teams and main tasks included in the VLC_Summer School (source: authors)

As displayed in Figure 1.1.3, the Summer School was divided into two phases: the Online phase, lasting three weeks, was conducted via MS Teams, and the on-site phase took place at the Technical University of Valencia. The eLearning platform from the UPV (PoliformaT) was used to deliver materials and submit Tasks.

During the online phase, students worked in 'thematic teams' to develop analyses and toolboxes for different urban infrastructures in Valencia (TASK1). During the onsite phase, lasting one week, 'multi-thematic teams' integrated by members from previous thematic teams defined together synergic methodologies and highly integrative proposals for Valencia and the selected Pilot Site (harbor area).

Following a Project/Challenge Based Learning approach, participants of the Summer School were supported by teachers from all the participating universities during the development of their practical tasks. These tasks included teamwork (both during the online and face-to-face phases), lectures (mainly concentrated at the beginning of the online phase), and several public reviews (one before the end of the online phase to facilitate the exchange of information between the thematic teams working in their respective infrastructures, and four during the face-to-face or onsite phase to discuss the final results of task1 and the evolution of tasks 2 and 3). Peer-teaching was promoted by incorporating lectures given by each thematic team to the other teams. These peer-lectures covered the results of TASK1 and were scheduled at the beginning of the onsite phase as cross-pollinating activity. The course combined the use of digital and analogic methods but during the onsite phase the manual and hands-on work was favored to promote a deeper interaction between students, tutors, and guests in the studio room. For that purpose, the organizers provided all the necessary materials to develop handmade drawings, arrange interviews and discussions during the participatory workshops, etc.

1.1.5. Schedule and tasks

The VLC_Summer School was conducted according to the following schedule and tasks:

Online PHASE (14.08.2023-01.09.2023)

● **Teaching:** Lectures about the basics of each addressed urban infrastructure and about the city of Valencia (by ***online lecturers*** from each university or the Valencia City Council) + Tutoring of TASK1 (by ***online tutors***).

● **Teamwork and internal workplan**: Each 'thematic team' of students worked in one Urban Infrastructure (Green, Blue, Housing, Social, Mobility, or Energy). At the beginning of the phase, they designed their own workplan to develop the TASK1 and to get the support of their online tutors. Regarding their workplan, all the teams were advised to keep some time for (1) Literature review and analysis of Case Studies, (2) Analytical work, (3) Definition of toolboxes and preparation of their lecture.

● **TASK1: Analyses and Toolboxes for Urban Infrastructures.** This task comprised the following parts:

● Definition of a shared conceptual framework within each thematic team (meaning of their infrastructure and connections to other concepts: sustainability, resilience, adaptation, etc.).
● Analysis of the assigned urban infrastructure (in Valencia and the pilot site).
● Definition of a basic toolbox to improve the assigned infrastructure.
● Exploration of potential synergies with other infrastructures.

● **REVIEWS:** Each thematic team arranged their internal meetings and reviews with their tutors. In addition, at the end of the second week, a joint review was scheduled to let all the thematic teams see what the other teams were producing.

● **OUTCOME:** A summary of the TASK1 to be presented to the other teams during the first day of the onsite phase (peer-teaching)

● **PROVIDED MATERIALS**: The following aterials were provided through the e-learning platform of the UPV (PoliformaT)

● General information (for all the 'thematic teams'):
- Basic cartography of the city and the pilot site (in GIS and DWG formats)
- Basic data and main reports/plans/ strategies about the city of Valencia
- Manuals to get access and download information from the open cartographic platforms and websites of the Valencian Region and the City of Valencia

● Specific information (for each 'thematic team'):
- Specific cartography of the city and the pilot site for each urban infrastructure (in GIS, DWG, or PDF formats).
- Specific data and thematic reports/plans/ strategies for each urban infrastructure.

Onsite PHASE (04.09.2023-09.09.2023)

● **Teaching:** Tutoring of TASK2 and TASK3 (by ***onsite tutors***) and introductory lectures for each new task (by the organizers)

● **Teamwork:** in multi-thematic teams, including one student from each previous thematic team

● **SCHEDULE:**

● **SITE VISIT:** Experimentation of the site and validation of thematic analyses and toolboxes developed during the online phase (Figure 1.1.4).

Figure 1.1.4 Pilot Site visit during the VLC_Summer School (source: author)

• **PUBLIC REVIEW OF TASK 1:**
presentation of results from Task 1 (peer lectures)

• **GENERATION OF MULTI-THEMATIC TEAMS** by merging students from the 'thematic teams".

• **DEVELOPMENT OF TASK 2:**
A synergy-oriented planning methodology and a 'synergimeter.'
This task comprised the following parts:
- Definition of a shared conceptual framework within each multi-thematic group
- Development of a method to generate and assess synergies between different urban infrastructures.
- Participatory workshop with neighbors, external experts, and representatives of the local administration
- Public review of the TASK 2

• **DEVELOPMENT OF TASK 3:** This task comprised the following parts:
- **Subtask 3.1: A Spatial Strategy for the VLC_Pilot Site:** Application of the synergies tool to support the development of a vision and a spatial strategy for the pilot site (approximate scale 1:5000).
- **Subtask 3.2: A Design for the Focus Area selected by each team.** Application of the proposed methodology and the Spatial Strategy defined in subtask 3.1 to develop a detailed proposal for a focus area to be chosen by each team.
- Short participatory workshop to get ideas from the locals for the subtask 3.1
- Public review to discuss the results of subtask 3.1

• **FINAL TASK and FINAL REVIEW: Synthesis of the course**
- Synthesis and public presentation of the work developed in Valencia by each multi-thematic team: TASK2 and TASK 3 (subtasks 3.1 and 3.2)

• **PROVIDED MATERIALS:** In addition to the online materials provided at the beginning of the course, during the onsite phase the organizers provided all the necessary materials to develop handmade drawings and to organize the interaction with the locals during the participatory activities (Figures 1.1.5 and 1.1.6).

Figure 1.1.5: Working in the studio room of the VLC_Summer School (source: author)

Figure 1.1.6: Students, onsite tutors, and local guests in the first participatory workshop of the VLC_Summer School (source: author)

The digital components of the course were delivered through **POLIFORMAT,** the eLearning platform of the Technical University of Valencia, and included RESOURCES, ASSIGNMENTS, and other additional tools (see Figure 1.1.7). The online lectures were delivered and recorded in MS-**TEAMS** allowing for synchronous and asynchronous learning. Each student and teacher received in advance a Manual to navigate through POLIFORMAT.

Tables 1.1.1 and 1.1.2 display in detail the schedule of the course and the activities included in the social program.

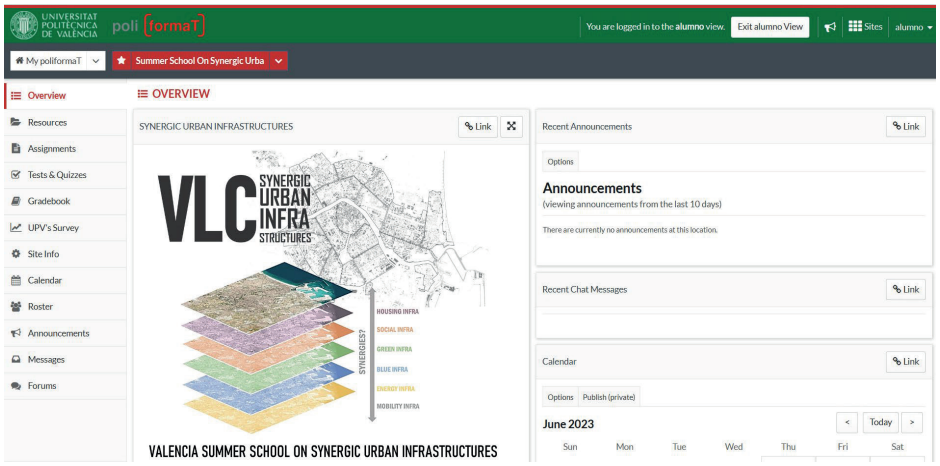


Figure 1.1.7 Front page of the VLC_Summer School in POLIFORMAT

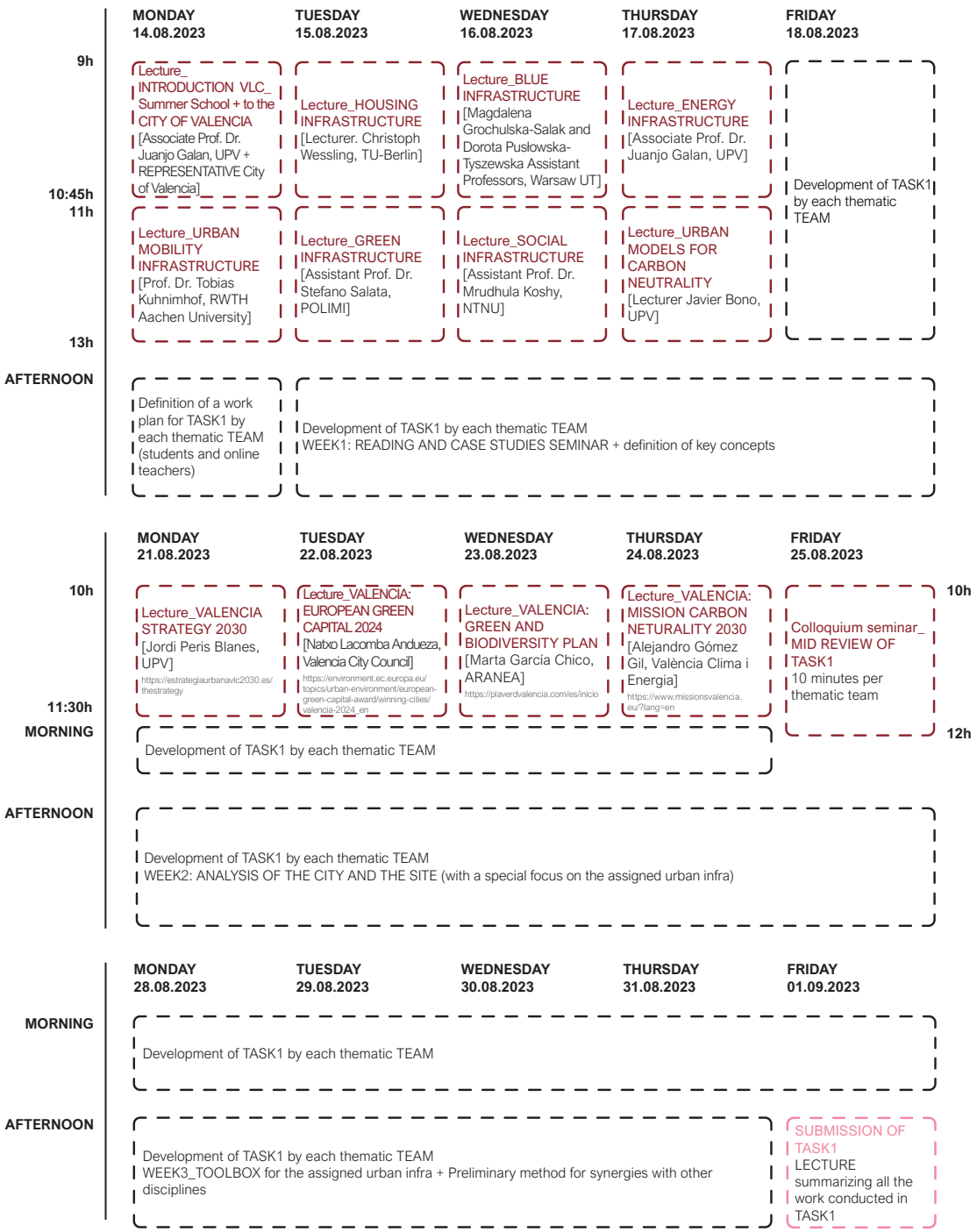


Table 1.1.1: Schedule of the online phase of the VLC_Summer School

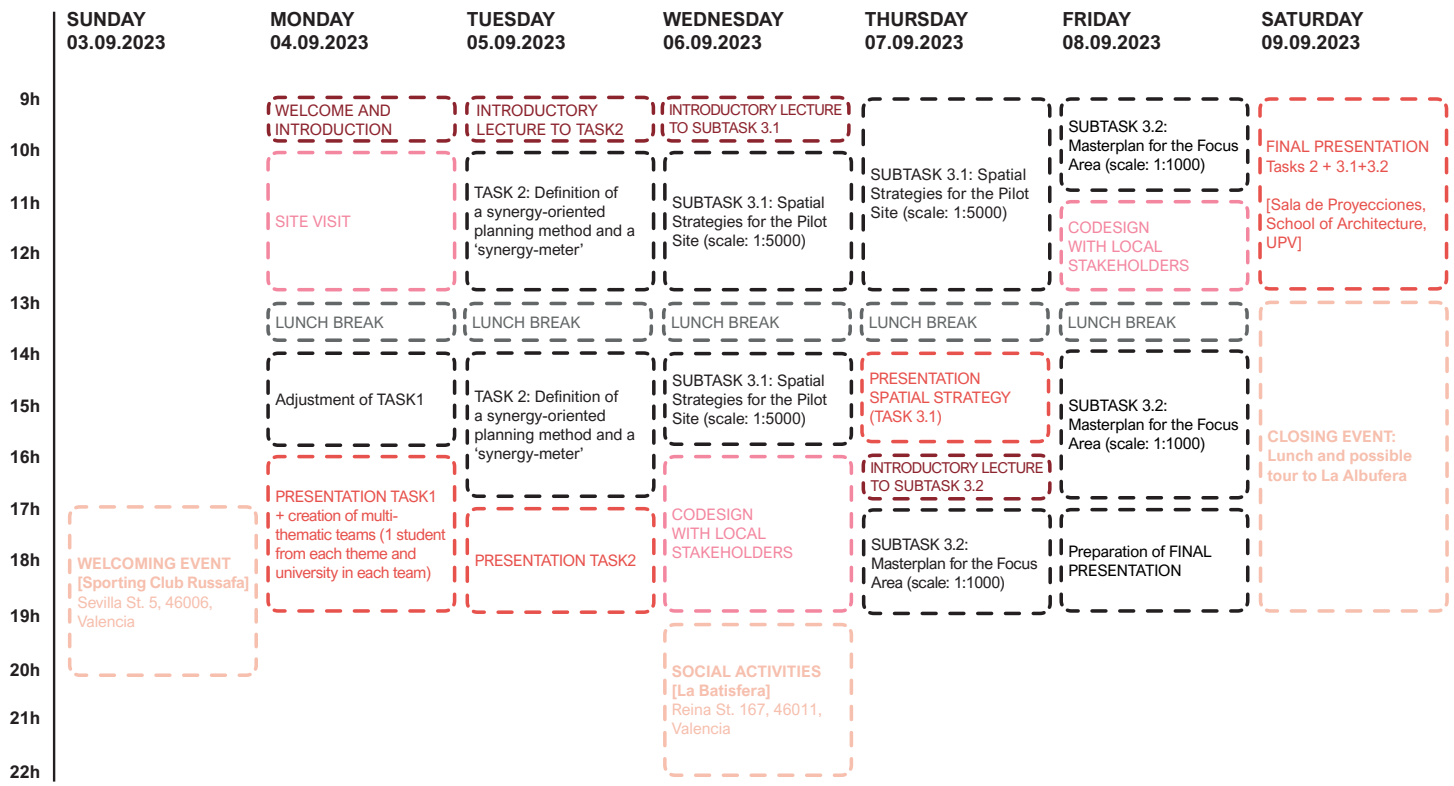


Table 1.1.2: Schedule of the onsite (face-to-face) phase of the VLC_Summer School

1.1.6. Pilot area

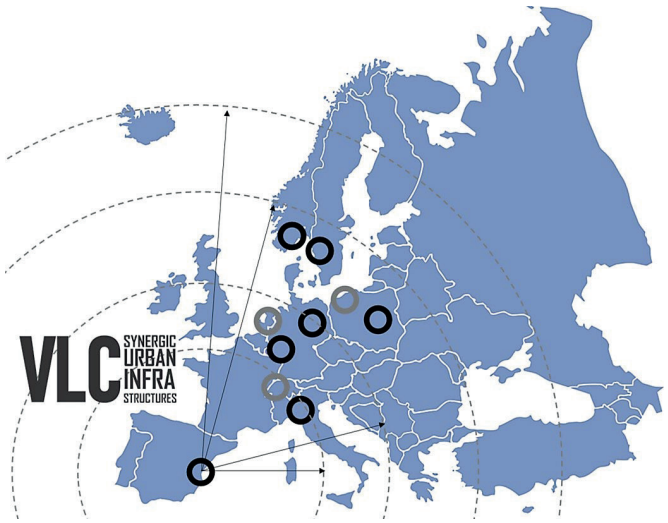
Valencia is the third-largest city in Spain, with over 800,000 inhabitants. It is located on the east coast of the Country, on the Mediterranean Sea. Valencia was founded as a Roman colony in 138 BC on the Banks of the River Turia. In 714, the Arabs took over the city, introducing their language, religion, and customs. They implemented improved irrigation systems and the cultivation of new crops. In 1238 the Christian king James I of Aragon conquered the city. The outline of the Christian walls defines the limits of the historic centre, one of the largest in Europe, with monuments and historical heritage. making it one of Spain's most touristic cities. The weather is pleasant all year round, and it hardly ever rains, but when it does rain, it's heavy. In October 1957, due to the rain, the river burst its Banks, and as a result, there was severe flooding in the city and property was severely damaged. The disaster led to the remodeling of the city and the creation of a new riverbed in its southern part. The old river has been made into an area of parkland, which follows the form of the old river and flows into the sea, meeting the harbour, the busiest container port on the Mediterranean Sea.

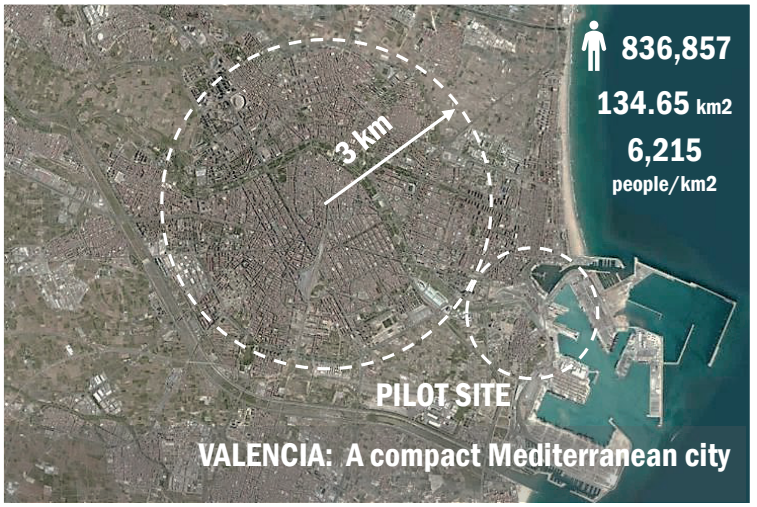
After considering different options, the team of teachers selected a pilot site that covers an area of 300 hectares and includes a wide collage of land uses, urban fabrics, infrastructures, and developable land (see Figure 1.1.8). This area and the City of Valencia comprises:

- A coastal quartier disconnected from the city and the sea (Nazaret)
- An old and extensive industrial area to be developed (El Grao)
- A marina disconnected from the Turia river park
- A new quartier for connecting La Huerta, Nazaret and the city (Las Moreras)
- A protected but declining piece of historical agricultural land (Huerta de La Punta)
- The oldest sections of the Port of Valencia and its Marina

The City of Valencia has recently approved a set of strategies and plans to increase its sustainability and capacity to adapt and mitigate climate change. All these plans and strategies defined a promising and challenging frame for the VLC_Summer School on 'Synergic Urban Infrastructures':

- Valencia Strategy 2030
- Valencia: Mission Carbon Neutrality 2030
- Valencia: Green and Biodiversity Plan
- Valencia: European Green Capital 2024
- Valencia: Special Plan for Urban Quality
- Actions for improving sustainable mobility in the city of Valencia





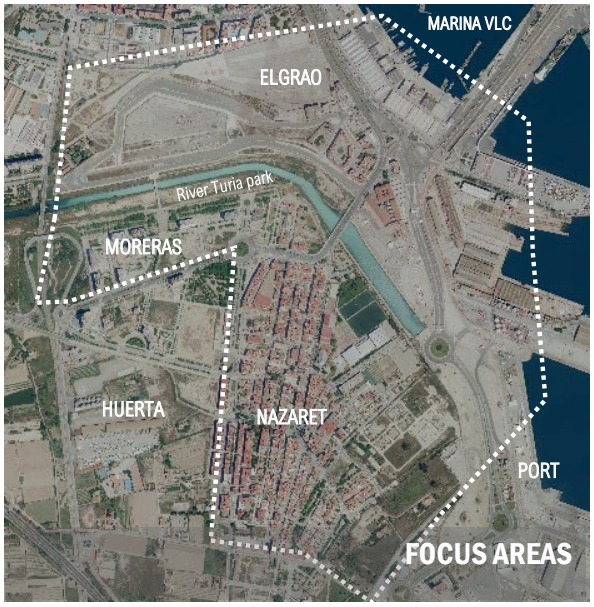


Figure 1.1.8: Valencia and the selected Pilot site (source: author)

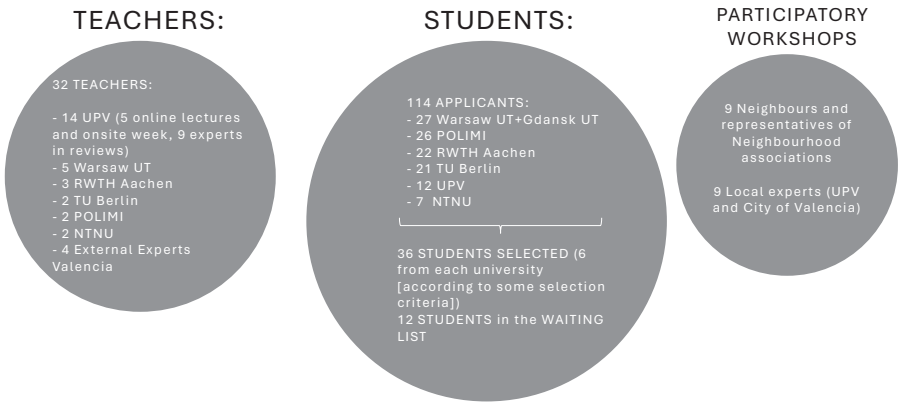


Figure 1.1.9: Participants in the VLC_Summer School (source: author)

1.1.7. Participants

A large number of applicants, students, teachers, and external people (local experts and neighbors) were involved in the VLC_ Summer School (see Figure 1.1.9)

Students: The group of 36 accepted students displayed a wide level of diversity and multidisciplinarity. As displayed in Figure 1.10, the requirement of gender parity was highly exceeded and there was a prevalence of master students although the Technical Universities of Valencia and Warsaw contributed mainly with bachelor students. Regarding multidisciplinary, the 50% objective was almost achieved but there was still a prevalence of students from planning and architectural disciplines (58%). Interestingly, the group also displayed a high level of cultural diversity and most of the students indicated that their main field of interest was 'sustainable and integrative planning', what was an optimal situation for the development of the course.

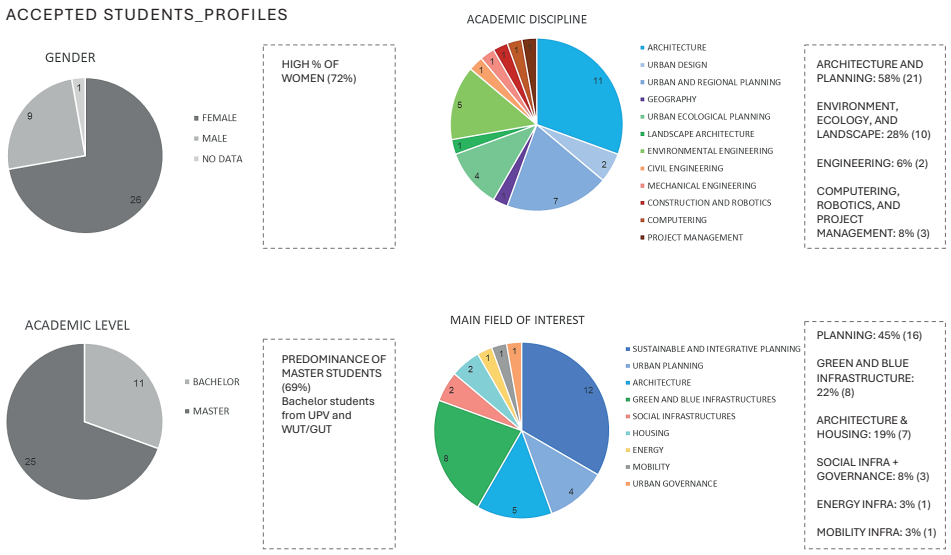


Figure 1.1.10: Profile of the students selected for the VLC_Summer School (source: author)

Teachers: The VLC_Summer School included an international and multidisciplinary team of teachers from different ENHANCE universities. These teachers participated in different ways in the Summer School: as online lecturers, online tutors of the work developed by the thematic teams of students for the TASK1, and as onsite tutors of the work developed by the multi-thematic teams of students for the TASK2 and TASK3. In addition, some additional teachers from the Polytechnic University of Valencia joined as external experts the public reviews that took place in Valencia. The profile and role of the participating teachers can be consulted in below.

CAROLINA PACCHI

(Full Professor, Politecnico di Milano, Department of Architecture and Urban Studies (DAStU), Lab PPTE): Ph.D. in Urban and Environmental Planning, her main domains are planning and policy analysis to develop stakeholder's inclusive strategies and innovative solutions for urban and environmental planning policies.

Role in the VLC_Summer School_Tutor online (Green Infra Team)

STEFANO SALATA

Assistant Professor, Politecnico di Milano, Department of Architecture and Urban Studies (DAStU), Lab PPTE): Ph.D. in Territorial Government and Urban Design. His main field of research is to develop Performance-Based solutions through Ecosystem Service modeling and Green Infrastructures for Decision-Making.

Role in the VLC_Summer School_Lecturer (Green Infrastructures) / Tutor online (Green Infra Team) / Tutor onsite TEAM1

MACIEJ LASOCKI

(Assistant Professor, Warsaw University of Technology, Faculty of Architecture): Licensed architect, lecturer on contemporary urban planning, leading design studio on spatial policy for urban areas. Scientific researcher with special interests in pedestrian traffic and sustainable urban development.

Role in the VLC_Summer School_Tutor online (Blue Infra TEAM)

MAGDALENA GROCHULSKA-SALAK

(Assistant Professor, Warsaw University of Technology, Faculty of Architecture): Advisor in investment processes and Project Manager in development companies. Consultant on sustainable development, climate change adaptation, and green and blue infrastructure issues in urban planning.

Role in the VLC_Summer School_Lecturer (Blue Infrastructure) / Tutor online (Blue Infra TEAM)

DOROTA PUSŁOWSKA-TYSZEWSKA

(Assistant Professor, Warsaw University of Technology, Faculty of Building Services, Hydrological and Environmental Engineering): Ph.D. in environmental engineering. Expert on water management planning, the Water Framework Directive implementation, water balances, environmental flows, ecological aspects of water management, and natural water retention measures.

Role in the VLC_Summer School_Lecturer (Blue Infrastructure)

KINGA ZINOWIEC-CIEPLIK

(Assistant Professor, Warsaw University of Technology, Faculty of Architecture): Landscape architect, paysagiste CESP (ENSP Versailles), academic teacher. Her research focuses on resilience and synergy in a responsible pro-environmental, biophilic, regenerative design, based on Nature Based Solutions.

Role in the VLC_Summer School_Tutor online (Blue Infra TEAM) / Tutor onsite TEAM2

MRUDHULA KOSHY

(Assistant Professor, Norwegian University of Science and Technology, Trondheim, Norway, Department of Architecture and Planning): Her research investigates the concepts of uncertainty, resilience, and contingency at the intersection of spatial planning, climate change adaptation, disaster risk reduction, and humanitarian responses to deal with unprecedented environmental crises.

Role in the VLC_Summer School_Lecturer (Social Infrastructure)/ Tutor online (Social Infra Team)/ Tutor onsite TEAM3

VIJA VIESE

(Research Associate, Norwegian University of Science and Technology, Trondheim, Norway, Department of Architecture and Planning): Urban designer and practice-led researcher. Her work focuses on flood-resilient communities, codesign with marginalized social groups, and conceiving vibrant, inclusive, climate-ready public spaces.

Role in the VLC_Summer School_Tutor online (Social Infra Team)

CHRISTOPH WESSLING

(Lecturer, Technische Universität Berlin, Institute Urban, and Regional Planning): Urban Planner and Architect. Lecturer and researcher at different Universities since 1998, mento for Integrated Urban Development Planning Ukraine 2016 – 2019, Acting Professor Urban Planning and Urban Regeneration, TU Berlin 2020 – 2023. His teaching and research focus on integrated urban development planning and urban design, and revitalization of historic city districts.

Role in the VLC_Summer School_Lecturer (Housing infrastructure)/ Tutor online (Housing Infra team)/ Tutor onsite TEAM4

ALENA COHRS

Research associate; Institute Urban, and Regional Planning. Urban Planner and Ph.D. candidate focusing on the mix-used, productive city and climate-adaptive urban spaces in researching and teaching.

Role in the VLC_Summer School_ Tutor onsite TEAM4

FABIO BAYRO KAISER

(Research associate, RWTH Aachen University, Chair and Institute of Urban Design at the Faculty of Architecture): Architect and Ph.D. candidate researching and teaching urban design, global urbanisation, and geospatial analysis.

Role in the VLC_Summer School_Tutor online (Mobility team) / Tutor onsite TEAM5

CHRISTA REICHER

(Professor, RWTH Aachen University, Chair and Institute of Urban Design and UNESCO Chair for Cultural Heritage and Urbanism at the Faculty of Architecture): Architect and urban planner teaching and researching qualification strategies in urban development, urban land use planning, urban renewal and neighbourhood development, urban and landscape design, and housing.

Role in the VLC_Summer School_Tutor onsite TEAM5

TOBIAS KUHNIMHOF

(Professor Dr., RWTH Aachen University, Chair and Institute of Urban and Transport Planning): Civil and Transportation Engineer, over 20 years of experience in travel surveys, travel data and trend analysis, and travel demand modeling.

Role in the VLC_Summer School_Lecturer (Urban Mobility Infrastructure)

CHRISTIAN LARISCH

(Research associate, RWTH Aachen University, Chair and Institute of Urban Design at the Faculty of Architecture): Urban designer and PhD candidate. His work focuses on Transit Oriented Development, interactions between mobility and the built environment, strategic spatial development and urban/regional planning.

Role in the VLC_Summer School_Tutor online (Mobility team)

JUANJO GALAN VIVAS

Associate professor; Technical University of Valencia, Department of Urbanism, School of Architecture): Ph.D. in Regional and Landscape Planning. Research and teaching: Landscape architecture, Landscape and regional planning, Sustainable urban and regional planning, Circular metabolisms, Green infrastructures, and socio-ecological systems.

Role in the VLC_Summer School_Lecturer (Energy Infrastructure) / Tutor online (Energy team)/ Coordinator workshop onsite

JAVIER BONO CREMADES

(R& D Leader in ARQUEHA) and lecturer (Technical University of Valencia, Dept. of Graphic Expression in Architecture: Architect, teacher, and researcher specialized in BIM, GIS, and Parametric Design oriented to climate neutrality.

Role in the VLC_Summer School_Lecturer (Energy infrastructure and City models for carbon neutrality)

ADOLFO VIGIL DE INSAUSTI

(Assistant professor; Technical University of Valencia, Department of Urbanism, School of Architecture): Ph.D. Architect and professor. He is specialized in landscape research, mostly in the transformation of waterscapes and in lost cultural heritage linked with their rediscovering using virtual models.

Role in the VLC_Summer School_Tutor onsite TEAM6

JULIA DELTORO SOTO

(Assistant professor; Technical University of Valencia, Department of Urbanism, School of Architecture): Architect, Ph.D. in Urban design and planning. National and international professional experience in architecture and urbanism. Her research focuses on urban design and planning, urban history, morphology, sustainability, and economic and industrial areas.

Role in the VLC_Summer School_Tutor onsite TEAM6

LUIS BOSCH ROIG

(Associate professor; Technical University of Valencia, Department of Architectural Projects, School of Architecture): Architect, Ph.D. His research focuses on Contemporary Architecture and Art and on Heritage restoration.

Role in the VLC_Summer School_Tutor onsite TEAM6

ONLINE LECTURERS

“Valencia: Plans and Strategies”

- Jordi Persi Blanes (UPV)
  “Valencia Strategy 2030”
- Marta García Chico (ARANEA)
  “Valencia: Green and Biodiversity Plan”
- Natxo Lacomba Andueza (Valencia City Council)
  “Valencia: European Green Capital 2024”
- Alejandro Gómez Gil (València Clima i Energia)
  “Valencia: Mission Carbon Neutrality 2030”

Additional TEACHERS and EXPERTS in PUBLIC REVIEWS:

- **Green Infrastructure:** Maria Vallés (Associate Professor, Dept. of Rural and Agrifood Engineering, UPV); Hugo Merle (Professor, Dept. of Agroforest Ecosystems, UPV); Maria Ferriol (Professor, Dept. of Agroforest Ecosystems, UPV)

- **Blue Infrastructure:** Juan Manzano (Professor, Dept. of Hydraulic Engineering and Environment, UPV)

- **Social Infrastructure**: Inés Novella (Lecturer, Dept. of Urban Planning, UPV)

- **Housing Infrastructure:** Carla Sentieri (Professor, Dept. of Architectural Projects, UPV); Clara Mejía (Professor, Dept. of Architectural Projects, UPV)

- **Energy Infrastructure:** Ignacio Guillén Professor, Dept. of Applied Physics, UPV), David Alfonso Solar (Lecturer, Dept. of Applied Thermodynamics, UPV)

Local neighbors and experts: During the participatory activities of the VLC_Summer School, the students had the opportunity to talk and contrast their ideas with d the following neighbors, local stakeholders, and local experts who kindly accepted the invitation to join the course:

- Alejandro Gómez Gil
Engineer and Climate Neutrality expert at Valencia Clima i Energía, Foundation of the Valencia City Council

- Amparo Medina Piles
Neighbour Pla del Real District, architect and former Head of the Planning and Urban Parks Department of the City of Valencia

- Ana Pilar Pacheco Campos
Neighbour of the Nazaret quartier

- Begoña Ruiz
Secretary of the Neighbourhood Association of les Casetes de la Punta

- Carmen Albors Ramos
Treasurer of theNeighbourhood Association of La Punta La Unificadora

- Francisco Juan Vidal
Full Professor of the Universidad Politécnica de Valencia, Dept. of Graphic Expression in Architecture

- Gustavo Vivas Rebolledo
Representative of the PELPAP platform (Plataforma El Litoral per al Poble), architect

- Juan Manzano Juárez
Professor of the Universidad Politécnica de Valencia, Dept. of Hydraulic Engineering and Environment

- Mamen Soler Bayona
Secretary of the Neighbourhood Association of La Punta La Unificadora

- María Ferriol Molina
Professor of the Universidad Politécnica de Valencia, Dept. of Agroforest Ecosystems

- Paula Cardells Mosteiro
Architect and International Officer at the School of Architecture, Universidad Politécnica de Valencia

- Ramón Marín Tomás
Neighbourhood Association of La Unión de la Punta

- Santiago Hernández Puig
Environmentalist, Collaborator in the Green and Biodiversity Plan of the City of Valencia

- Tomás Gómez Navarro
Professor of the Universidad Politécnica de Valencia, Dept. of Engineering Projects

- Vicent Martínez i Sebastià
Vicepresident of the Neighbourhood Association of El Grau-Port

- Vicente Romeu Ibáñez
President of the Neighbourhood Association of La Unión de la Punta

1.1.8. Outcomes

The outcomes of the VLC_Summer School are presented in the following chapters of this book. As displayed in Figure 1.1.11 and Figure 1.1.12, these outcomes are associated with the presentation submitted by the students for the TASK1 (online phase) and for the TASKS2 and 3 (onsite phase).

The presentations of the students can be consulted on the website of the VLC_Summer School (available at: https://enhanceuniversity.eu/vlc_summer-school/) together with a video kindly prepared by one of the students of the course (M. Reza Movahedi) (available at https://youtu.be/2k9SKAYQHTM).

In addition, the group of teachers are working in the preparation of different research outcones related with the pedagogical findings extracted from the course and about the potentials of a synergy-based approach in urban planning.

GREEN INFRA TEAM (POLIMI)
- Tutors: Stefano Salata and Carolina Pacchi
- Students from POLIMI:
  - Anushka Anand
  - Aliaksandra Rameika
  - Vilmante Daulenskyte
  - Cecilia Trobbiani
  - Isabella Valarezzo
  - Birsu Kambur

SOCIAL INFRA TEAM (NTNU)
- Tutors: Mrudhula Koshy and Vija Viese
- Students from NTNU:
  - Reza Movahedi
  - Atena Asadi Lamouki
  - Aksel Fosshagen
  - My An Dinh
  - Karl Vidvuds Schulz
  - Genelou Posadas

MOBILITY INFRA TEAM (RWTH AACHEN)
- Tutors: Fabio Bayro and Christian Larisch
- Students from RWTH AACHEN:
  - Yanran Chen
  - Christiane Gerwenat
  - Jinyu Zhu
  - Mariia Polyakova
  - Dóra Farkas
  - Raveena Gadkar

BLUE/WATER INFRA TEAM (WARSAW UT)
- Tutors: Maciej Lasocki and Magdalena Grochulska-Salak
- Students from WARSAW UT / GDANSK UT:
  - Alicja Sutkowska
  - Paweł Szymański
  - Mateusz Szabra
  - Zofia Gancarczyk
  - Monika Urbaniak

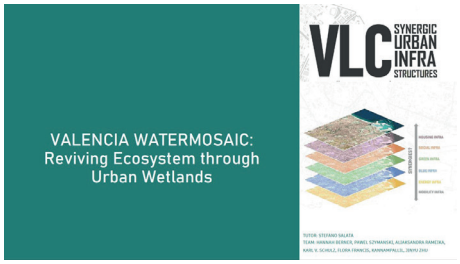
HOUSING INFRA TEAM (TU BERLIN)
- Tutor: Christoph Wessling and Alena Cohrs
- Students from TUBERLIN:
  - Hannah Berner
  - Lea Marcella Eleonora Fast
  - Dilara Ucar
  - Christoph Hoppenstedt
  - Olesia Sakhareva
  - Liva Roze

ENERGY INFRA TEAM (UPV)
- Tutor: Juanjo Galan
- Students from UPV:
  - Ignacio Del Rio
  - Gamir Cubel Lilan
  - Flor Francis Kannampallil
  - Mohamad Hamdache
  - Amina Zannouti Jarradi
  - Adela Archiles Segarra

Figure 1.1.11 Thematic teams (theme, students, and tutors) during the online phase of the course and the preparation of TASK1 (analysis and toolboxes for different urban infrastructures in Valencia and the pilot site) (source: authors)

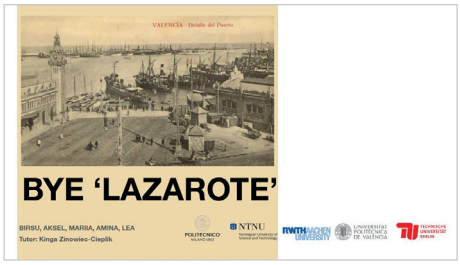
MULTI-THEMATIC TEAM 1
PROJECT: **VALENCIA WATERMOSAIC**

- Tutor: Stefano Salata (POLIMI)
- Students:
  - Aliaksandra Rameika (POLIMI)
  - Flora Francis Kannampallil (UPV)
  - Hannah Berner (TU Berlin)
  - Jinyu Zhu (RWTH Aachen)
  - Karl Vidvuds Schulz (NTNU)
  - Paweł Szymański (Warsaw UT)



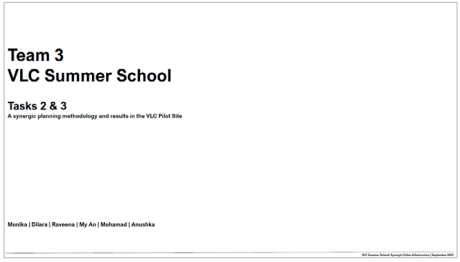
MULTI-THEMATIC TEAM 2
PROJECT: **BYE 'LAZAROTE'**

- Tutor: Kinga Zinowiec-Cieplik (Warsaw UT)
- Students:
  - Aksel Fosshagen (NTNU)
  - Amina Zannouti Jarradi (UPV)
  - Birsu Kambur (POLIMI)
  - Lea Marcella Eleonora Fast (TU Berlin)
  - Mariia Polyakova (RWTH Aachen)



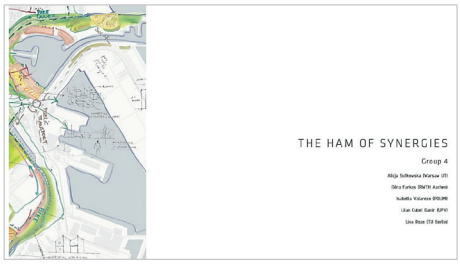
MULTI-THEMATIC TEAM 3
PROJECT: **SYNERGY-SCAPE**

- Tutors: Christoph Wessling and Alena Cohrs (TU Berlin)
- Students:
  - Anushka Anand (POLIMI)
  - Dilara Ucar (TU Berlin)
  - Mohamad Hamdache (UPV)
  - Monika Urbaniak (Warsaw UT)
  - My An Dinh (NTNU)
  - Raveena Vijay Gadkar (RWTH Aachen)



MULTI-THEMATIC TEAM 4
PROJECT: **THE HAM OF SYNERGIES**

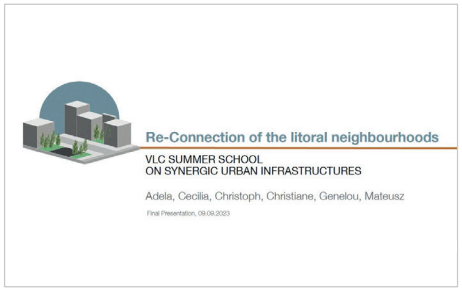
- Tutor: Mrudhula Koshy (NTNU)
- Students:
  - Alicja Sutkowska (Warsaw UT)
  - Dóra Farkas (RWTH Aachen)
  - Isabella Valarezo (POLIMI)
  - Lilan Cubel Gamir (UPV)
  - Liva Roze (TU Berlin)



MULTI-THEMATIC TEAM 5

PROJECT: **RECONNECTION OF LITORAL NEIGHBOURHOODS**

- Tutors: Fabio Bayro and Christa Reicher (RWTH Aachen)
- Students:
  - Adela Archilés Segarra (UPV)
  - Cecilia Trobbiani (POLIMI)
  - Christiane Gerwenat (RWTH Aachen)
  - Christoph Hoppenstedt (TU Berlin)
  - Genelou Posadas (NTNU)
  - Mateusz Szabra (Warsaw UT)



MULTI-THEMATIC TEAM 6

PROJECT: **BRING BACK THE SEA TO THE CITY + DOWN THE RIVER WE GO**

- Tutors: Julia Deltoro, Luis Bosch, Adolfo Vigil (UPV)
- Students:
  - José Ignacio Del Río Pérez (UPV)
  - Mohammadreza Movahedi (NTNU)
  - Olesia Sakhareva (TU Berlin)
  - Vilmante Daulenskyte (POLIMI)
  - Yanran Chen (RWTH Aachen)
  - Zofia Gancarczyk (Warsaw UT)

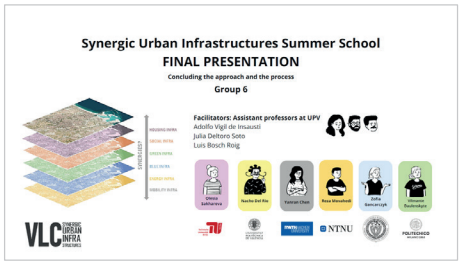


Figure 1.1.12. Multi-thematic teams (students, tutors, and title of their final proposal) during the onsite phase of the course and the preparation of TASK2 (synergy-meter) and TASK3 (spatial strategy for the pilot area) (source: authors)

VLC SUMMER SCHOOL on “Synergic Urban Infrastructures”

• Data Literacy: Summer school, blended course
• Dates: 14.08.2023-01.09.2023 (online via PoliformaT and MS Teams) and 04-09.09.2023 (onsite UPV Technical University of Valencia)
• Course level: B.Sc. and M.Sc.
• Course type: Hybrid mode
• ECTS: 4,5 credit points (adjustable)
  o ONLINE LEARNING (64,5 hours): Learning activities: online lectures (24h) + development of TASK1 (40,5h)
  o ONLINE LEARNING (48 hours): Learning activities: Lectures + Site Visit + presentation of results from TASK1 + development of TASKS2 and 3
• Organizing unit: Technical University of Valencia
• Contact coordinator: Juanjo Galan (juagavi@urb.upv.es)

2 URBAN INFRASTRUCTURES: ANALYSIS AND TOOLBOXES

2.1_GREEN INFRASTRUCTURES: PRINCIPLES, DIAGNOSIS AND TOOLBOX IN VALENCIA

Stefano Salata | Assistant Professor, Politecnico di Milano
Carolina Pacchi | Full Professor, Politecnico di Milano

2.1.1. Understanding ecosystem services and green and blue infrastructures

In recent years, the concept of Ecosystem Services (ES) has assumed an increasing relevance in planning processes, raising important issues and challenges that deserve careful consideration (Hansen et al. 2019). ES represents an anthropocentric evolution of traditional ecological functions developed in urban areas, offering solutions to biodiversity loss (Mander and Uuemaa 2015). Rather than focusing on function, ES reflects the biophysical processes carried out by nature (among others oxygen production, carbon sequestration, particulate matter removal, water filtration, and temperature reduction…), making potential outcomes of land-use changes on human health more evident. The anthropocentric perspective contributes to highlighting, even with econometric parameters, the benefits offered by nature to human well-being (Weichselgartner and Kelman 2015).

This innovative perspective has been widely adopted as it provides new information to support decision-making processes, distinguishing itself from traditional approaches, especially when ecosystem analysis occurs during the urban planning process. Given the growing uncertainty related to environmental changes, integrating spatial modeling related to ES in planning can help identify adaptation and mitigation strategies, making communities more resilient to climate change and environmental disturbances (Burkhard et al. 2012).

Although there is a general orientation towards preserving, enhancing, and increasing urban greenery, it is not yet clear which tools are necessary to identify priority areas for de-sealing projects or installations for natural solutions that increase provided ES and biodiversity. The added value of ES lies in the ability to map areas most vulnerable to multiple stressors empirically measuring the potential benefits of different intervention scenarios in urban contexts.

Integrating ES into planning allows for a better understanding of the interrelationship between humans and nature, necessary to reduce vulnerabilities and create livable and safe territories. Spatial planning plays a key role in improving or worsening the state of natural capital through specific development choices/strategies. The strategic integration of ES into the planning process is emphasized in scientific documents and is widely shared at the political-institutional level, even though the recognition of the added value of ES-based approaches is still limited.

Recent experiences have highlighted the various roles ES can play in the planning and environmental assessment process, serving as a cross-cutting approach for procedural aspects (supporting decision-making processes, stakeholder involvement) and substantive aspects (knowledge system construction, alternative definition, support for Green and Blue Infrastructure - GBI - design) (Cortinovis and Geneletti 2018).

GBI, considered as a "strategically planned network of natural and semi-natural areas, designed and managed to provide a wide range of ecosystem services" are crucial in the evolution of ecological urban planning paradigms (Grabowski et al. 2022). They contribute to mitigating the effects of climate change, improving stormwater management, preserving urban biodiversity, and enhancing human health benefits.

GBI design, based on a detailed knowledge of urban soil ecosystems, involves ecosystem modeling analysis, making the concept of ES more operational and integrated into traditional ecological and environmental planning techniques. GBI serves as guidelines for ecologically oriented urban planning and can have significant regulatory implications, incorporating requirements for defining vegetative systems, ecosystems to be found, developed, and protected, and Nature Based Solutions (NBS) to be adopted in urban areas.

Considering key principles such as integration, multifunctionality, connectivity, multi-scalarity, and object plurality, GBI should harmoniously merge green and gray spaces, host various ecosystem functions, promote connectivity within the network and ecological resilience, be dimensioned at different scales, and offer a variety of options for urban environmental conservation and improvement (Holing 2001).

The main goal of GBI is to enhance the quality of life in cities, making urban areas more sustainable and resilient against climate change.

GBI is recognized as a fundamental strategic project to address climate change in urban areas, and its integration into planning tools ensures the operability of the strategy and effective implementation. Nature-based solutions, based on the precise identification and measurement of ES, are crucial for assessing the reversibility of planned urban transformations and the expected impact on ecological functions and ES. Compensation mechanisms should be conceived as operational tools for urban planning and Strategic Environmental Assessment, aiming to protect and restore threatened ecosystem capacities, maximizing ecological and environmental components in land-use change dynamics.

2.1.2. Environmental digital assessment

During the online phase, students worked in thematic groups to develop analyses and toolboxes for different urban infrastructures in Valencia (TASK1). While developing TASK 1, students did general research and analysis of the assigned urban green infrastructure (in Valencia and the pilot site) while defining a toolbox to improve it. Attention has been paid to defining a preliminary methodology to generate synergies with other infrastructures. It has been commonly agreed that it was necessary to understand the existent biophysical condition (ecosystems, biodiversity, water) of Valencia and the pilot site while also considering the planning conditions (strategies, norms, rules, and prescriptions) in the area of interest.

Concerning the analysis and diagnosis of the Green Infrastructure of Valencia and the Study area, and in order to begin with basic biophysical analysis, the team from Politecnico di Milano made a Land Use Land Cover Classification based on Copernicus Sentinel L2A İmage (Date of acquisition 04 July 2023) using ESRI ArcGIS Pro (ver. 3.2.1). We employed the composite band tool (Band 4 Red, Band 3 Green, Band 2 Blue, Band 8 NİR and Band 11 SWİR) to obtain the basic land cover classification and two biophysical indexes: the Normalized Difference Vegetation Index (NDVI - that measure the green healthiness) and the Soil Moisture Index (that measure the humidity of topsoil).

These indicators were used to make a preliminary environmental assessment of the city.

The Imperviousness degree in the urban blocks' ranges between 0,55 and 0,98. Although the city has many open green spaces the private surfaces are highly sealed (Figure 2.1.1).

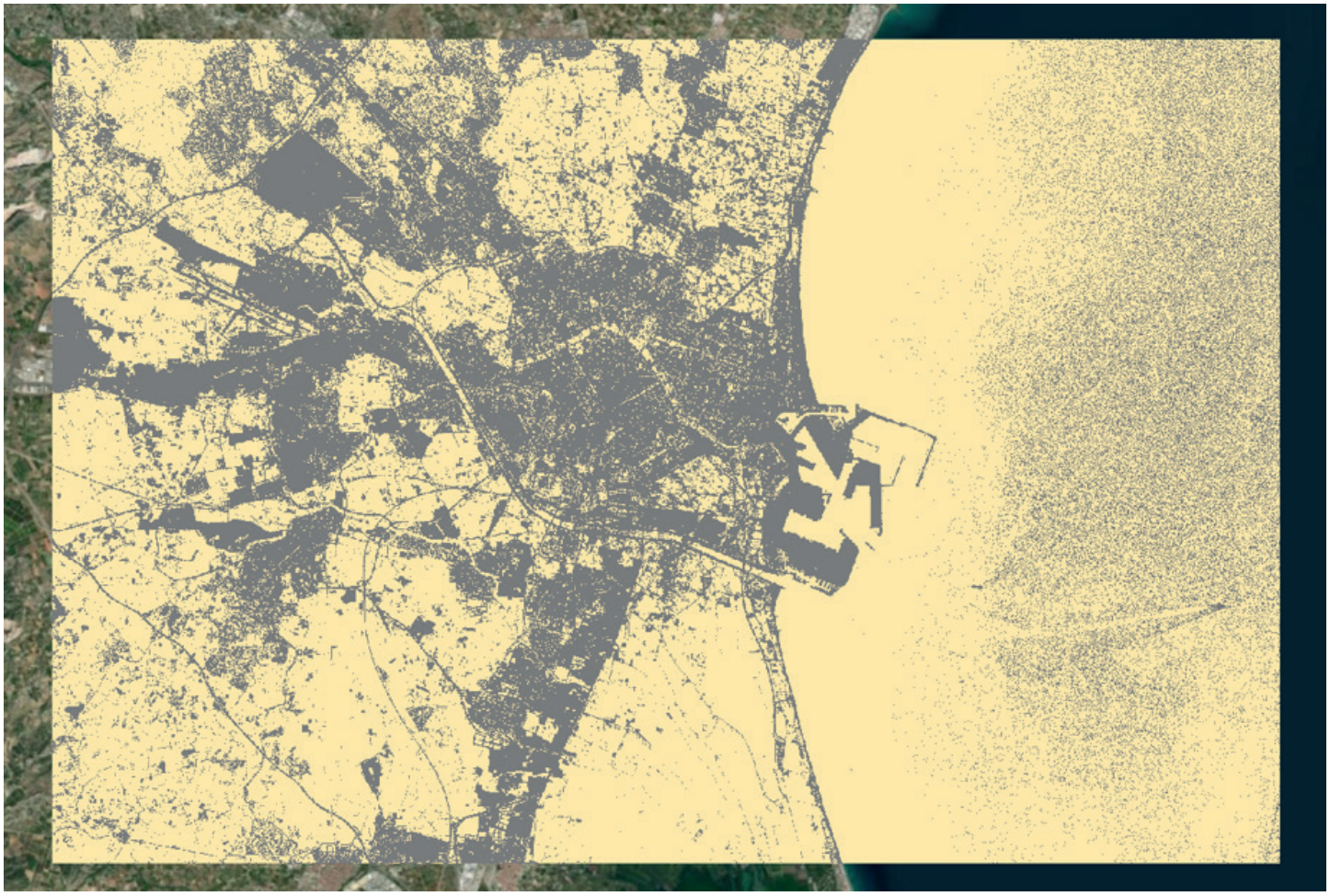


Figure 2.1.1: Imperviousness degree

The NDVI was used to define the sensitivity table of the Habitat Quality model (InVEST) and visualize the green healthy connections of the city (Figure 2.1.2).

Figure 2.1.2: Normalized Difference Vegetation Index (values above 0.5)

As it can be seen, despite the presence of a long linear park in the former bed of the river Turia, the densely inhabited city suffers from a lack of linear internal connections and porosity that can facilitate the habitat connection from southward to northward.

NDVI was also used to visualize what is the average green health of the public spaces, discovering that despite the southern reserve, and the Ex-Turia linear park, the suburban green spaces suffer from poor vegetation health, thus needing some actions to increase their biodiversity and biomass (Figure 2.1.3).

Figure 2.1.3: Average value of NDVI in the Public Green Areas

Valencia also suffers from a limited drainage capacity, even though its soil condition is not critical in the flat landform.

The stormwater model (InVEST) has been used inputting the annual average rainfall (450 mm) while obtaining that on the entire catchment, only 31% of rain volume infiltrates, while 69% goes in runoff… only the 5% of the infiltrated water goes to recharge the aquifers (Figure 2.1.4).

2,8 million cube meters of water go to recharge the aquifers, but the demand only for civic uses is 118.000 cube meters. Unfortunately, we couldn't quantify if the aquifer recharge is enough to satisfy the agricultural water demand.

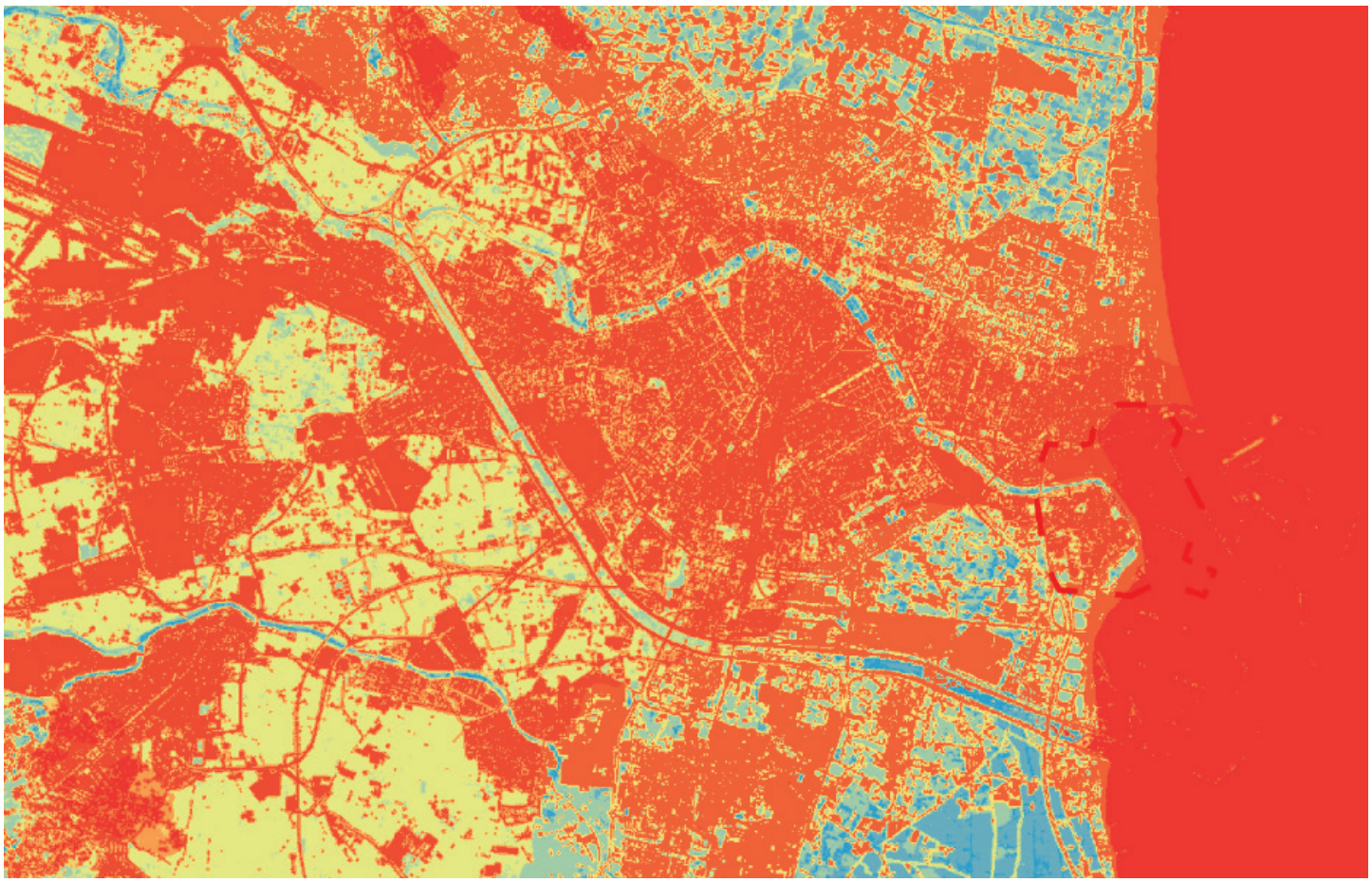


Figure 2.1.4: Rainwater Infiltration Capacity

According to modeling results, below are the priority areas to define performance based NBS for water management (Figure 2.1.5).

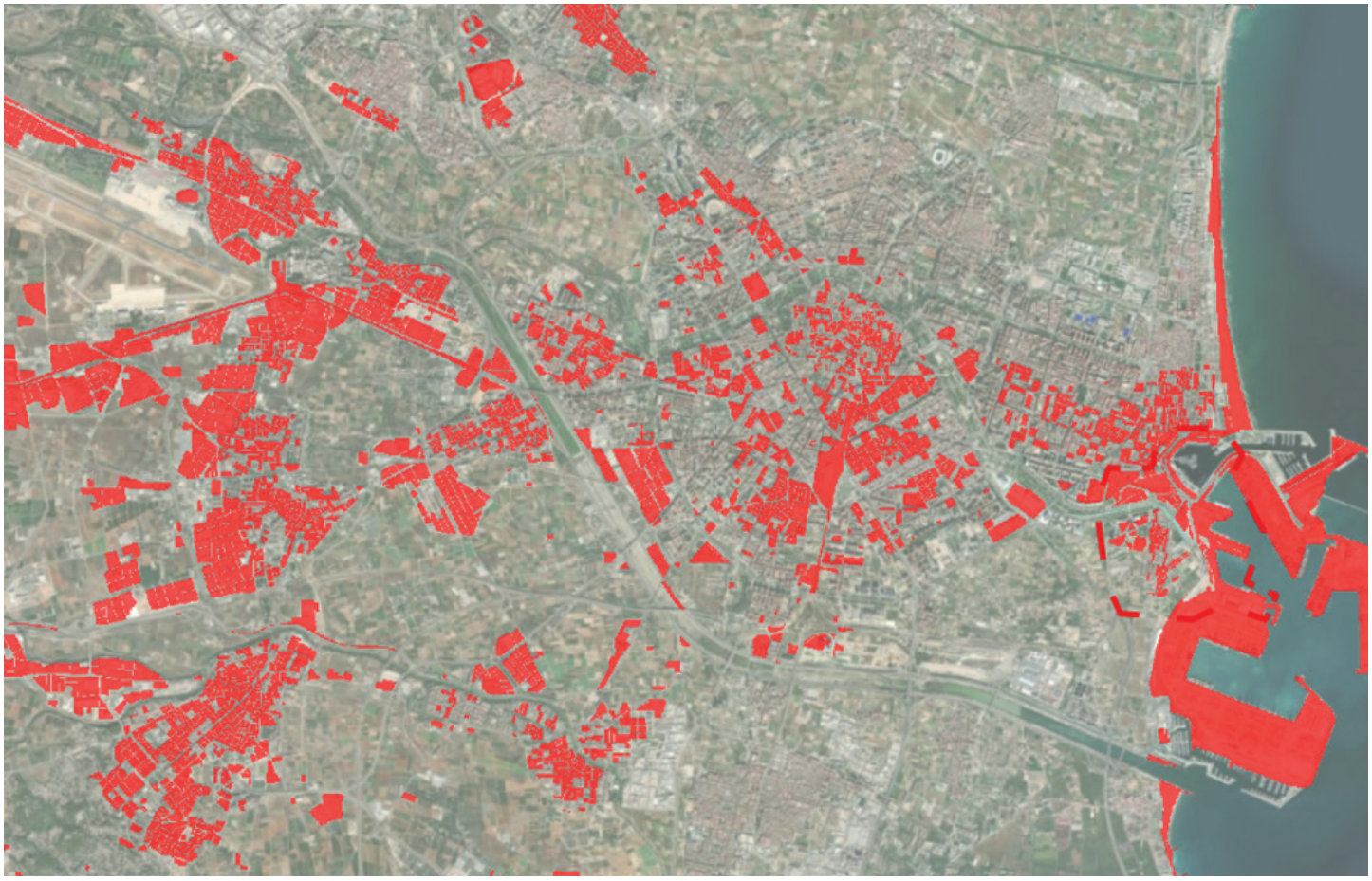


Figure 2.1.5: Potential Priority Areas for De-sealing interventions

To be more consistent, the flow accumulation model has been implemented using the LIDAR scheme.

This allowed us to see with higher precision where minor interventions (such as filter strips or permeable pavements) can be implemented to maximize the benefit of intercepting higher rainwater volumes (Figure 2.1.6).

Figure 2.1.6: Runoff accumulation in the city of Valencia

2.1.3. Work developed by the Green Infrastructure team

The Green Infrastructure team was composed by six students (Anushka Anand, Aliaksandra Rameika, Kambur Birsu, Vilmante Daulenskyte, Cecilia Trobbiani, and Isabella Valarezzo) from different master's degree programs from the Politecnico di Milano (urban planning and policy design, architecture and urban design, sustainable architecture and landscape design, and landscape architecture). Their work was tutored by professors Stefano Salata and Carolina Pacchi (Department of Architecture and Urban Studies - DAStU), and as displayed in Figure 2.1.7, the students design their own work plan for the online phase.

As displayed in Figure 2.1.8, the application of the methodology explained in 2.1.2, allowed the students to generate additional cartographies and understandings of the city of Valencia and the study area. In a later stage, the students used this information to define a Toolbox for Nature-Based Solutions at different levels: building scale interventions, urban scale interventions, Water bodies and drainage system Despite its generic character, the Toolbox was designed to be adapted to the specific characteristics of the pilot site (Figures 2.1.9 and 2.1.10).

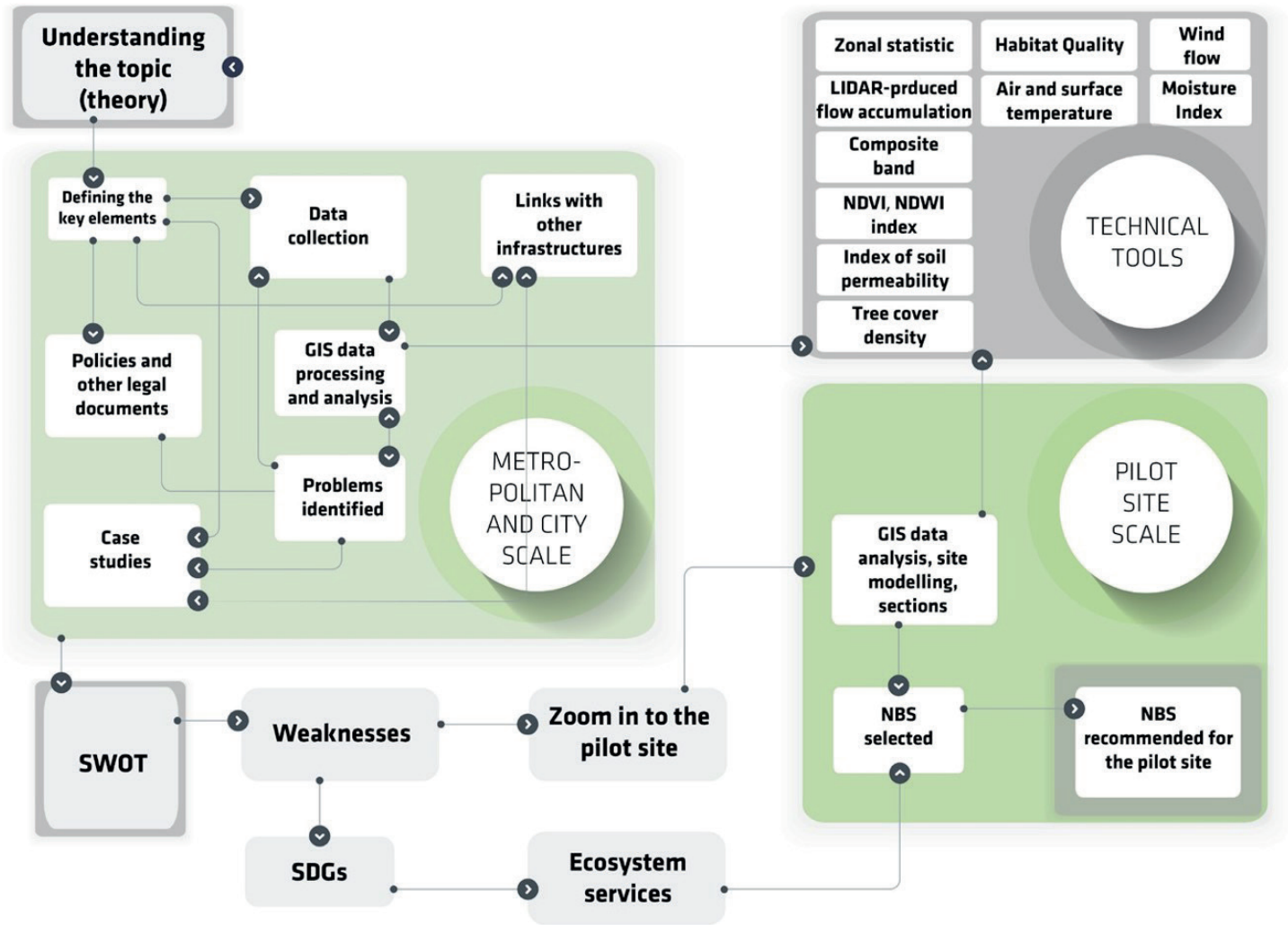
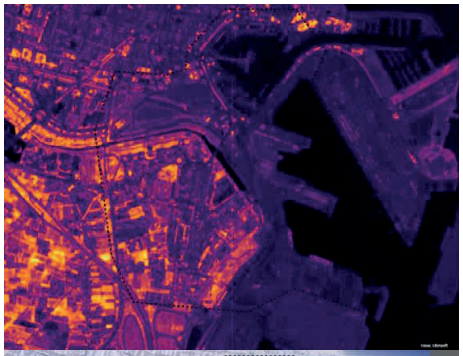
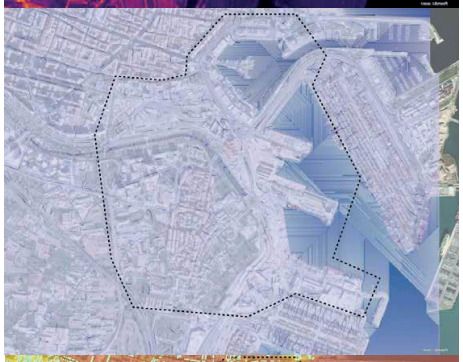


Figure 2.1.7: Work plan designed by the Green Infrastructure Team for the online phase (source: Anand, Rameika, Birsu, Daulenskyte, Trobbiani, & Valarezzo, 2023)



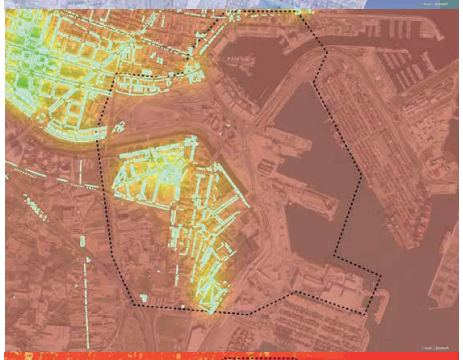
Soil Quality Map (Moisture)

Permeable Lands
Agricultural Lands
Parks
Small Concrete Surfaces
(Concrete density is not so high)

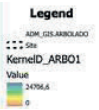


Water Flow Accumulation

Top Water Accumulation
Streets
Canals
Parks
Plain Surfaces
- *Storage Surfaces in Dock*
- *Concrete Surfaces*

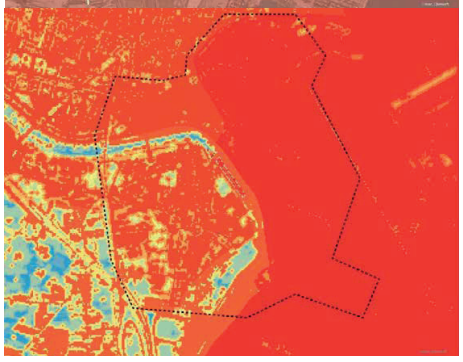


Tree Cover Density



Tree Top Density
In built neighborhoods through out the streets

Problem: Agricultural Lands have no trees.
- *No shade*
- *No biodiversity*
- *In Harbor Area: no wind protection*
- *Generation of barrier*
- *Propose Agroforestry*



Water Runoff

Water Runoff
Chance for flooding
Opportunity for water recolection

Concrete Surfaces have a high water runoff index due to impermeability.

Figure 2.1.8: Cartographies generated by the Green Infrastructure Team in their analysis of the Pilot Area (source: Anand, Rameika, Birsu, Daulenskyte, Trobbiani, & Valarezzo, 2023)

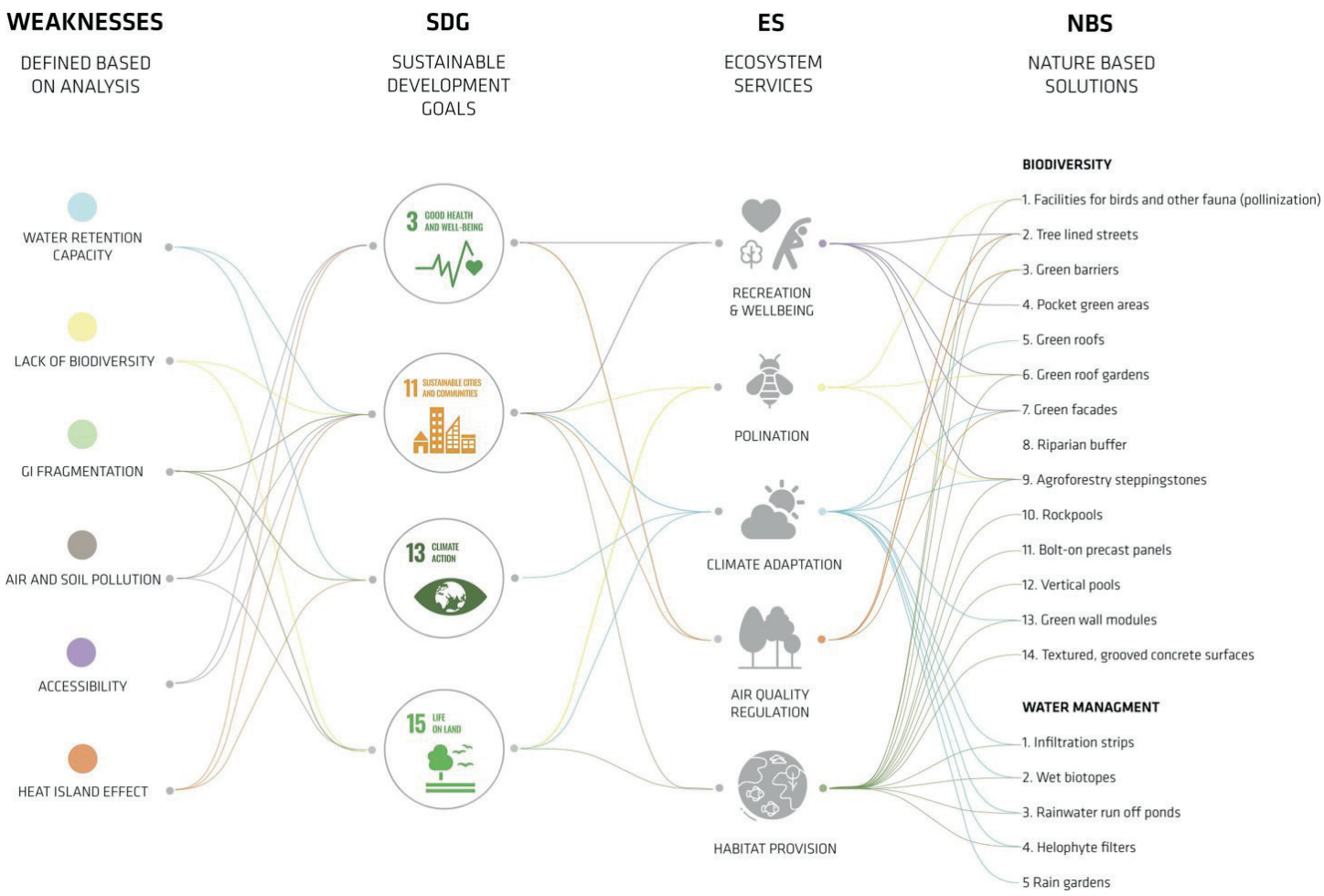


Figure 2.1.9: Toolbox for Nature Based Solutions: Diagram linking the SWOT analysis, the Sustainable Development Goals, the generation of Ecosystem Services and the introduction of Nature Based Solution in the Study Area (source: Anand, Rameika, Birsu, Daulenskyte, Trobbiani, & Valarezzo, 2023)

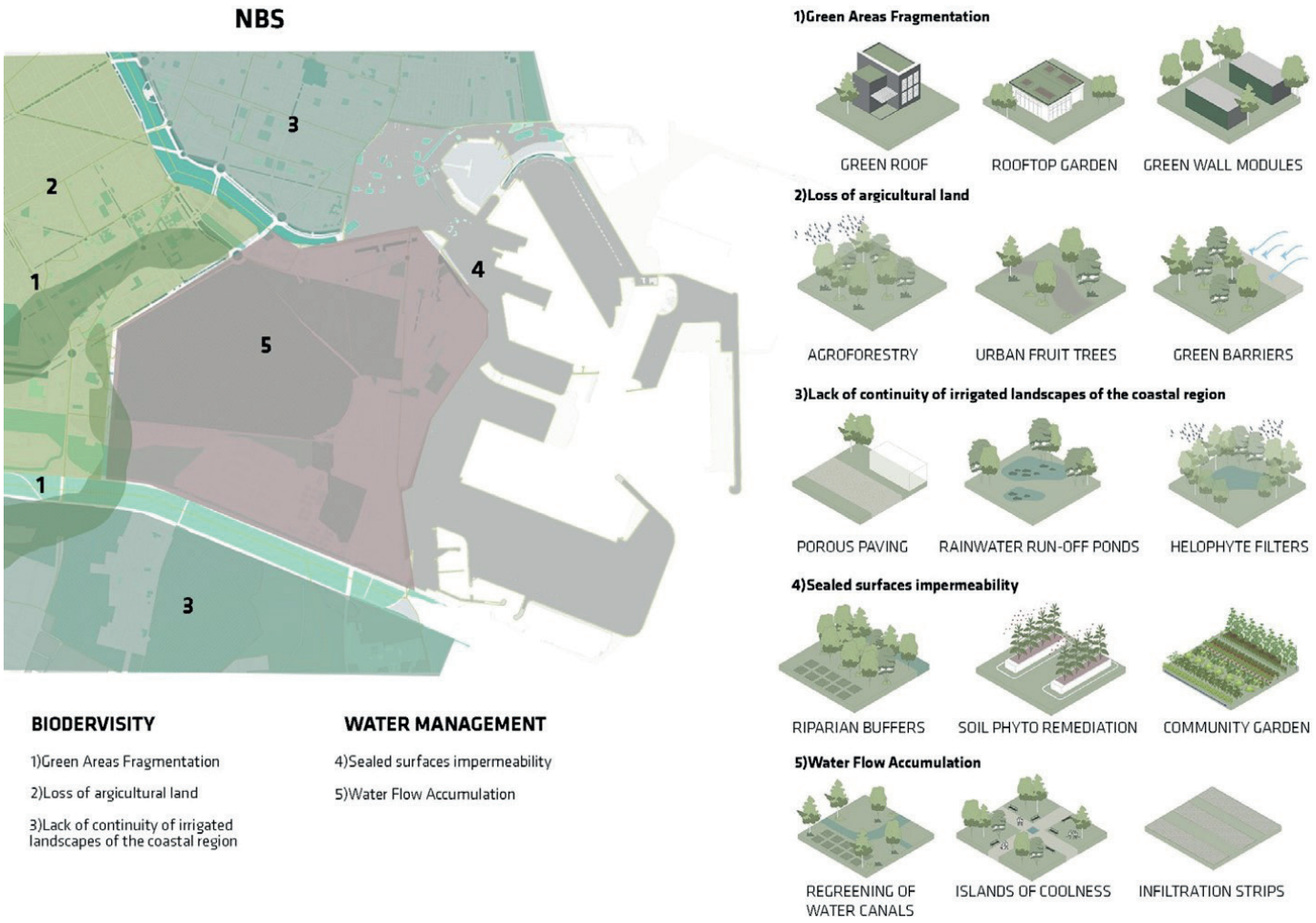


Figure 2.1.10: Toolbox for Nature Based Solutions: Application in the Study Area (source: Anand, Rameika, Birsu, Daulenskyte, Trobbiani, & Valarezzo, 2023)

In order to prepare the interaction with other teams during the on-site phase, the Green Infrastructure team also explored the potential synergies that the introduction of Nature Based Solution could generate with other urban infrastructures addressed in the course (Figure 2.1.11).

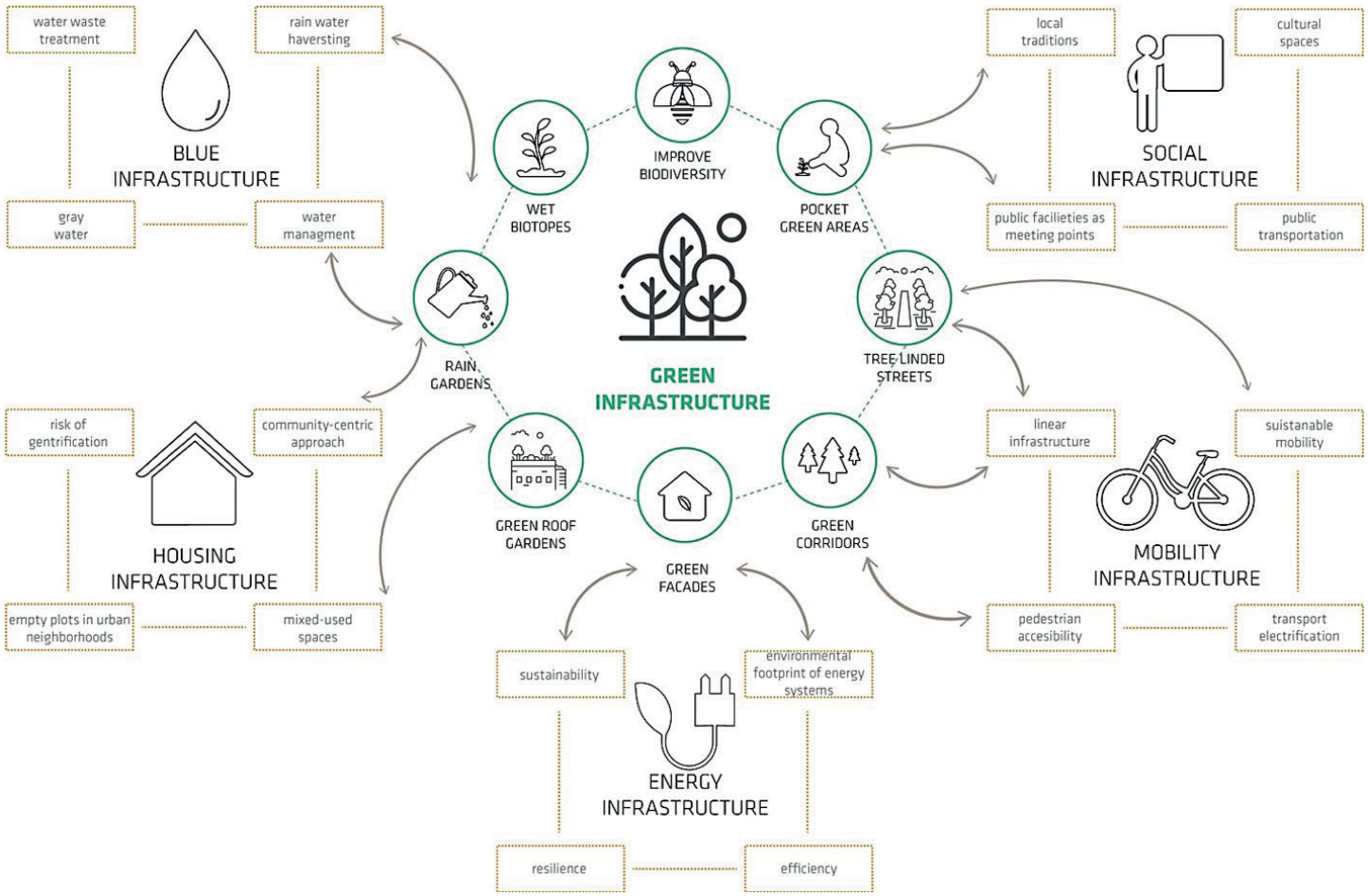


Figure 2.1.11: Potential Synergies between the Green Infrastructure and other urban infrastructures addressed in the course (source: Anand, Rameika, Birsu, Daulenskyte, Trobbiani, & Valarezzo, 2023)

REFERENCES

Burkhard, Benjamin, Franziska Kroll, Stoyan Nedkov, and Felix Müller. 2012. "Mapping Ecosystem Service Supply, Demand and Budgets." *Ecological Indicators* 21:17–29. doi: 10.1016/j.ecolind.2011.06.019.

Cortinovis, Chiara, and Davide Geneletti. 2018. "Ecosystem Services in Urban Plans: What Is There, and What Is Still Needed for Better Decisions." *Land Use Policy* 70(October 2017):298–312. doi: 10.1016/j.landusepol.2017.10.017.

Grabowski, Zbigniew J., Timon McPhearson, A. Marissa Matsler, Peter Groffman, and Steward T. A. Pickett. 2022. "What Is Green Infrastructure? A Study of Definitions in US City Planning." *Frontiers in Ecology and the Environment*.

Hansen, Rieke, Anton Stahl Olafsson, Alexander P. N. van der Jagt, Emily Rall, and Stephan Pauleit. 2019. "Planning Multifunctional Green Infrastructure for Compact Cities: What Is the State of Practice?" *Ecological Indicators* 96 (November 2016): 99–110. doi: 10.1016/j.ecolind.2017.09.042.

Holing, C. S. 2001. "Understanding the Complexity of Economic, Ecological, and Social Systems." *Ecosystems* 4(5):390–405. doi: 10.1007/s10021-00.

Mander, and E. Uuemaa. 2015. "Landscape Planning." *Encyclopedia of Ecology* 532–44. doi: 10.1016/B978-0-12-409548-9.09478-1.

Weichselgartner, Juergen, and Ilan Kelman. 2015. "Geographies of Resilience: Challenges and Opportunities of a Descriptive Concept." *Progress in Human Geography* 39(3):249–67. doi: 10.1177/0309132513518834.

2.2_BLUE INFRASTRUCTURES: PRINCIPLES, DIAGNOSIS AND TOOLBOX IN VALENCIA

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2.2.1 The team

Water management is an essential element in spatial planning, but it is not given much attention in urban planning education. This topic is perceived as too specific and covering just technical issues, but also as one that can be easily adapted to any functional and spatial concept after its completion. For students, water is usually a decorative element that adds landscape value to the spatial composition. It is also often perceived through the prism of flood risk or high groundwater, which complicates land development. The reason for this approach is certainly the climate zone in which we live, where there is (seemingly) no shortage of water. Experts know, however, that the central regions of Poland are home to one of the largest water deficits in Europe, and as the climate warms, they will be at risk of steppe formation. This makes it even more necessary to include the topic of blue infrastructure in urban planning education. The initiative of a summer school, which seeks synergy between various fields of knowledge, should be perceived then as a great opportunity to strengthen skills and exchange knowledge in international cooperation. The team of teachers from Warsaw University of Technology was led and coordinated by Dr. Maciej Lasocki (Assistant Professor, , Faculty of Architecture), whose work was supported by Dr. Dorota Pusłowska-Tyszewska (Faculty of Building Services, Hydro and Environmental Engineering, Chair of Environmental Protection and Management), and by Dr. Kinga Zinowiec-Cieplik and Dr. Magdalena Grochulska-Salak, specialized respectively in landscape architecture and pro-environmental design. When selecting students from among those who applied, it was tried to maintain the principle that half of the participants came from outside the field of architecture and urban planning, and had competences in the field of blue infrastructure. The team of students was finally composed by Paweł Szymański and Mateusz Szabra from the 3rd and 4th year of the bachelor's degree on Environmental Engineering studies, respectively, by Monika Urbaniak from the 4th year of Civil Engineering in Transport, and by three students from the bachelor's degree on Architecture: Zofia Gancarczyk (3rd year), Alicja Sutkowska (4th year), and Julia Sobieraj (4th year). Assessing the composition of the team, it can be said that the students seemed interested in the mixed composition and the opportunity to learn from each other. They were also motivated to demonstrate their range of skills well in front of the others. However, there was some difficulty in adapting competencies. Environmental engineering students demonstrated technical knowledge to design detailed infrastructure solutions. However, they did not have the ability to look at the infrastructure design on a larger scale, at the level of city-wide systems. Architecture students were unable to relate such detailed considerations to a very general view of the city and the analysed area. On the one hand, it was a learning experience for both parties. On the other hand, it made it difficult to analyse phenomena together.

2.2.2 The workflow

The online work phase took place in accordance with the summer school schedule, and the work process was adapted to the willingness and capabilities of the participants within the freedom left by the organizers. In a series of lectures, we proposed two views on the role of blue infrastructure in the functioning of the city: from the point of view of technical solutions and parameters that are relevant when estimating the supply and demand of water, as well as from the point of view of the impact of water on the development of the city. Then, we organized the online workshop part, which was divided into three stages carried out over the next three weeks.

In the first one, students, based on preliminary information obtained from lectures, were invited to find interesting examples of blue infrastructure solutions. Since the topic of water retention seemed to be less familiar for the students and the solutions were new to them, we focused on various forms of retention. Each student received a separate topic: (1) open reservoirs and water gardens, (2) underground, closed reservoirs, (3) underground reservoirs with infiltration, (4) “hydroboxes” using substrates, composite materials retaining water, (5) temporary water reservoirs, rain gardens (6) retention on flat roofs, marsh roofs (see examples in Figures 2.2.1 & 2.2.2). In addition, each student received a second general, cross-sectional topic, in which they were expected to look for solutions in the field of water management that help solve a specific problem or potential in urban areas: (1) the use of water to improve thermal comfort in public spaces, (2) the use of surface water in cities for recreational

OPEN-AIR RETENTION TANKS / WATER GARDENS

GOALS

Open-air retention tanks and water gardens exhibit urban resilience by absorbing disturbances and adapting to environmental stresses.

These systems effectively absorb water and neutralize pollutants, contributing to cleaner urban water sources.

They are self-sufficient, managing stormwater while reducing urban temperatures.

URBAN FACTORS

Open-air retention tanks often require a large space and strongly influence the city landscape. The factors that need to be taken into account when designing such tanks are: biologically active area, site area, watershed area, functional public space index

SOLUTION EXAMPLE

France, Boulogne, Billancourt Park, designed by Agence Ter,

https://landezine-award.com/boulogne-park/

Figure 2.2.1: Example of water retention infrastructure (source: Szymański, Szabra, Urbaniak, Gancarczyk, Sutkowska, & Sobieraj, 2023)

SHARING THE FUNCTIONS OF URBAN SPACE (WATER RETENTION)

GOALS

Counteracting the effects of flooding and more efficient use of space by sharing various functions by the area (e.g., retention, recreation, transport). Designing a city which allow to retain, purify and reuse rainwater.

URBAN FACTORS

lack of recreational space by the water, need to reducing the effects of extreme weather conditions, dense urban space

SOLUTION EXAMPLE

Water Plaza Rotterdam, Roads and ground level parking (sponge city Wuhan)

Example source:

https://www.mdpi.com/2073-4441/13/4/576

https://iopscience.iop.org/article/10.1088/1755-1315/295/3/032019/pdf

https://link-1springer-1com-1000096ut2a70.eczyt.bg.pw.edu.pl/article/10.1007/s12517-021-07706-y

Figure 2.2.2: Example of temporary rainwater retention (source: Szymański, Szabra, Urbaniak, Gancarczyk, Sutkowska, & Sobieraj, 2023)

purposes, (3) natural methods of wastewater treatment, (4) sharing space with functions related to water management, floodplains, (5) renaturalisation of watercourses in cities, (6) use of water for energy generation (see example in Figure 2.2.3). All examples were to be accompanied by comments regarding design conditions and the advantages and disadvantages of using the presented solutions. Students were asked to look for examples from regions with a climate like that of Valencia. The aim of the students' work was to familiarize themselves with the topic and prepare preliminary material for the development of a "Toolbox".

The second stage consisted of analysing the conditions for water management in the study area. We divided the students into three interdisciplinary architect-engineer pairs. The aim was to facilitate the analysis by combining different approaches to the issue: engineering - prone to examining indicators, making calculations, and applying specialized knowledge, and urban planning - prone to generalization and to consider the spatial and functional context. Students analysed three issues: (1) water supply, its sources, including grey water sources, (2) water demand resulting from various land functions, (3) possibilities of collecting and utilizing sewage and rainwater, including its retention. This stage was intended to examine the conditions for land development in a typical way, but with a special focus on water.

In the third stage, the students prepared a "toolbox", which we interpreted as a universal set of tools and design solutions that can be used to shape blue infrastructures in any context, and a localized set of specific indications for the potential development of the study area, which were based on the relationships between blue infrastructure and other elements of the analysed space. This stage of the activity was intended to prepare students to think about synergistic connections between various types of urban infrastructure.

During these three weeks, we met 3-4 times a week to discuss the scope of tasks, the expected method of their implementation, necessary corrections, and work progress. Students prepared for classes by developing presentations that were shown at the international review at the end of the 2nd week and were used in the final Task 1 presentation.

USE OF CANALS FOR RECREATIONAL PURPOSES

GOALS

Enhancing quality of life, creating community gathering spaces, promoting tourism and improving the city's attractiveness, creating a new landmark in urban structure, promoting green transport (kayaks, canoes)

URBAN FACTORS

The presence of a canal and access to water; Historical and cultural context; functional public space index;

SOLUTION EXAMPLE

Belgium, Bruges; The Floating Island / OBBA & Dertien12

https://www.archdaily.com/899820/the-floating-island-obba-and-dertien12

Figure 2.2.3: Example of water use in urban space (source: Szymański, Szabra, Urbaniak, Gancarczyk, Sutkowska, & Sobieraj, 2023)

2.2.3. The knowledge

During the online phase, we tried to equip students with appropriate knowledge, with which they would join the work of international teams during the on-site phase. During our experts' lectures on blue infrastructure, a number of issues were discussed: (1) the water cycle in nature, (2) hydrological aspects of rainwater management and its benefits, (3) the concept of blue infrastructure, (4) methods of estimating blue infrastructure parameters and demand for it: the volume of rainwater and sewage, the capacity and absorption capacity of various forms of rainwater and sewage management, (5) various forms of water retention, (6) methods of reusing sewage, (7) the definition of the water footprint and the problem of sustainable development in water management, (8)

ecosystem services provided by water. In addition to the theory, it was important to provide information about Valencia and the studied area. From the materials provided, students were to obtain information on water and wastewater management: (1) water sources, including canal irrigation system, (2) water supply network, (3) grey water sources, (4) retention reservoirs, (5) data regarding rainfall, (6) water demand for various land uses, (7) legal, environmental, logistic, social and spatial conditions for the development of various functions in the study area that differentiate water demand, (8) soil conditions related to water infiltration, (9) urban sewage system and sewage treatment, (10) potential wastewater recipients. This stage of work was understandable and easy for the students because they had studied this type of issues during previous classes. The excellent availability of materials allowed us to sketch a comprehensive picture of the city and external conditions for the study area (see example in Figure 2.2.4). It should be noted, however, that there was some difficulty in transferring general data into the specific conditions of the study area. For example, assessing the feasibility of expanding the water or sewage system for the area was beyond our capabilities. To achieve synergistic connections between various urban infrastructures, the costs of implementing different variants of blue infrastructures and the savings this may bring in the implementation of other types of infrastructure, should also be analysed. This type of estimates is not fully developed on economic research and that is why it is difficult to obtain expert support in this area. However, this would be an important direction for expanding the scope of interdisciplinarity on similar courses in the future.

2.2.4. The toolbox

The assessment of the study area, in terms of the development of blue infrastructures, turned out to be much more difficult for students. Students were faced with many variables and unknowns. First, they had to refrain themselves from designing a proposal for the site. However it would be helpful to assess the suitability of analysed areas for implementing specific solutions, but this stage was waiting for them in the on-site phase. Therefore, they had to estimate the suitability of these areas for various potential forms of development. At the same time, they had to focus only on the blue infrastructure. This situation, combined with the lack of detailed knowledge about the local conditions inside the study area, made the work less understandable to the students. They rightly felt that the analyses performed were quite general and the results did not seem satisfactory enough. Despite its general nature, assessment revealed the dependencies between blue infrastructure and other types of infrastructure. Students identified areas with various potentials for the development of: (1) functions requiring expansion of the water supply or sewage system, (2) gardening fed by canals, (3) urban greenery requiring irrigation, (4) housing generating demand for utility water, (5) industrial functions with high demands for water, (6) grey water management, (7) rainwater management through retention and infiltration. In this way, not only were the interdependencies of individual types of urban infrastructure identified, but the spatial occurrence of these dependencies was indicated (see examples in Figures 2.2.5, 2.2.6, 2.2.7 & 2.2.8). Despite its general nature, the set of produced maps were deemed useful for assessing the spatial solutions to be proposed during the development of the masterplan (on-site phase).

The second part of the “toolbox” contained more precise tools for estimating the parameters of blue infrastructure: (1) calculating the demand for irrigation of agricultural fields, (2) calculating the demand for usable water for residents, (3) dimensioning areas for water retention, including roofs, (4) calculating the efficiency of the sewage system, (5) estimating the capacity of water infiltration into the ground. This was the contribution of our environmental engineering students, which could also be useful in estimating the feasibility of some solutions in the masterplan (see algorithm in Figure 2.2.9). However, it was evident that the use of algorithms would demand much effort – exceeding the available time for the on-site workshop. It would also require quite detailed designs that would allow for strict calculations.

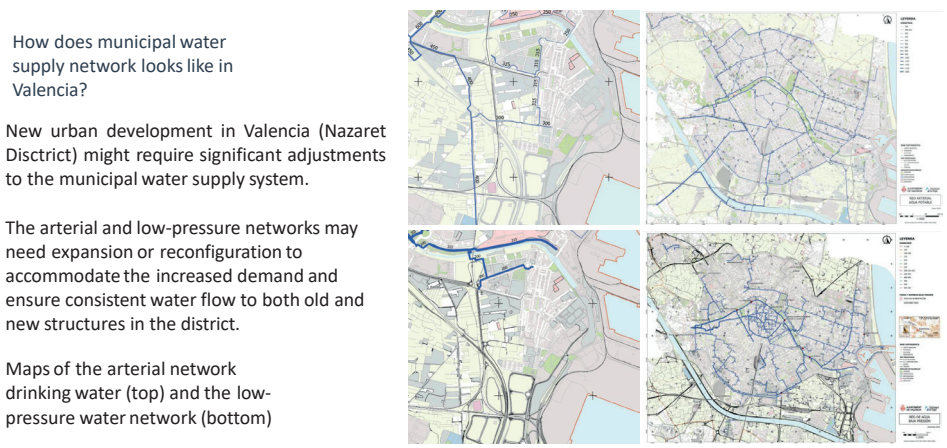


Figure 2.2.4: Analysis of the water supply network in the Nazaret area (source: Szymański, Szabra, Urbaniak, Gancarczyk, Sutkowska, & Sobieraj, 2023)

WATER DEMAND - URBAN GREEN SPACES

Figure 2.2.5: Assessment of areas suitable for new green spaces (source: Szymański, Szabra, Urbaniak, Gancarczyk, Sutkowska, & Sobieraj, 2023)

WATER DEMAND - RESIDENTIAL DEVELOPMENT

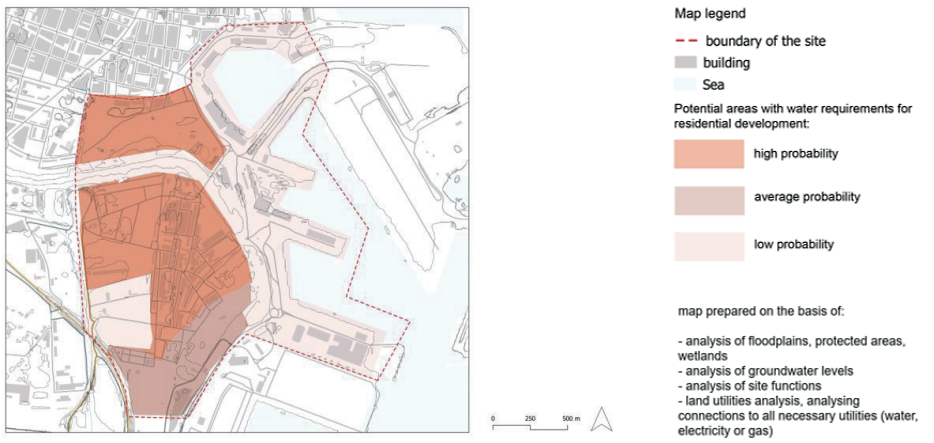


Figure 2.2.6: Assessment of areas suitable for new housing (source: Szymański, Szabra, Urbaniak, Gancarczyk, Sutkowska, & Sobieraj, 2023)

PURIFIED WASTEWATER MULTIPURPOSE USE

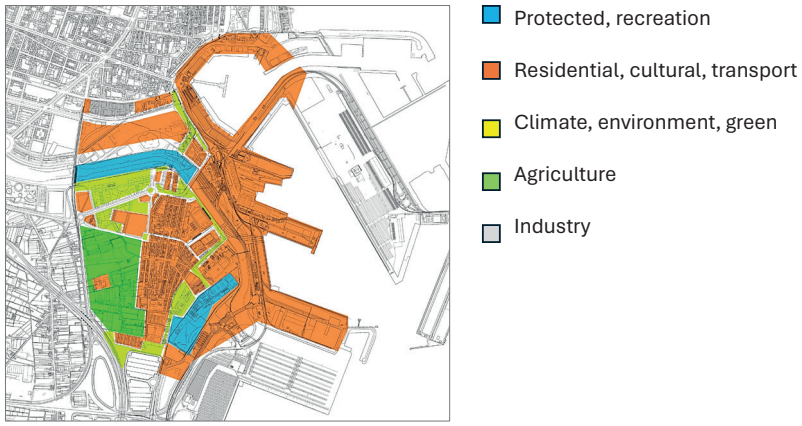


Figure 2.2.7: Assessment of areas according to possible grey water consumption (source: Szymański, Szabra, Urbaniak, Gancarczyk, Sutkowska, & Sobieraj, 2023)

INFILTRATION MAP
(based on topography, green areas and soil permeability)

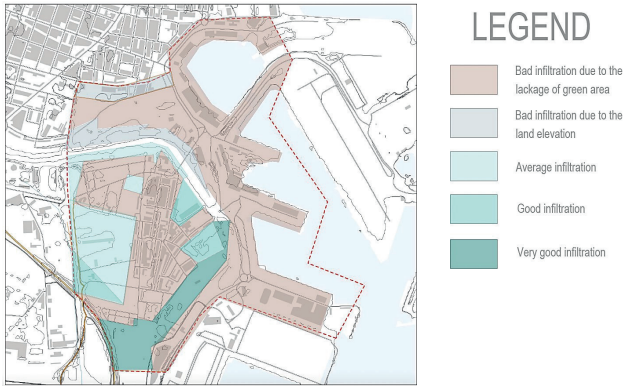


Figure 2.2.8: Assessment of areas according to infiltration potential (source: Szymański, Szabra, Urbaniak, Gancarczyk, Sutkowska, & Sobieraj, 2023)

MODELING THE WATER DEMAND OF AN IRRIGATED FACILITY

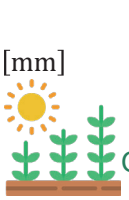
$$POM = \frac{10^{-3} \cdot POM_{net}[mm] \cdot 10^{4} \cdot F[ha]}{\eta[-] \cdot \Delta t[s]} \left[\frac{m^3}{s}\right]$$

TABLE 2. Average ET_o for different agroclimatic regions in mm/day

Regions	Mean daily temperature (°C)		
	Cool ~10°C	Moderate 20°C	Warm > 30°C
Tropics and subtropics			
- humid and sub-humid	2 - 3	3 - 5	5 - 7
-arid and semi-arid	2 - 4	4 - 6	6 - 8
Temperate region			
- humid and sub-humid	1 - 2	2 - 4	4 - 7
-arid and semi-arid	1 - 3	4 - 7	6 - 9

1. $\mathbf{POM_{net}} = \mathrm{Ret_{max}} - \mathrm{Ret_{F*}}$ [mm]

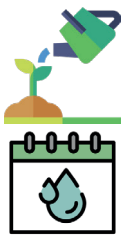
2. F[ha] – field of the crop



Green infrastructure

3. $\boldsymbol{\eta}[-]$ – efficiency of water use by the plant (0,7) (depending on the method of irrigation)

4. $\Delta \boldsymbol{t}[s]$ - length of time interval (day/month/year)



- $\boldsymbol{Ret\_max}$ = 60 mm
- $\boldsymbol{Ret_{F*}} = P - ET_l\ [mm]$

(final retention forecast)

P- average precipitation (day/month/year)

$\mathbf{ET_l}$ - Initial crop evapotranspiration

- $\boldsymbol{ET_l = k_c \cdot ET_0}\ [mm]$

ETo - Reference crop evapotranspiration (based on meteorological parameters)

kc - crop coefficient [dimensionless] (for grass = 1)

Figure 2.2.9: Algorithm of irrigation water demand calculation (source: Szymański, Szabra, Urbaniak, Gancarczyk, Sutkowska, & Sobieraj, 2023)

2.3_SOCIAL INFRASTRUCTURES: PRINCIPLES, DIAGNOSIS AND TOOLBOX IN VALENCIA

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In contrast to blue and green infrastructure presented earlier in this publication, social infrastructure comprises the intangible, fuzzy aspects of the city. It is often not immediately apparent, yet is considered crucial for the functioning of a city and the well-being of its inhabitants. In his book 'Palaces for the People', the sociologist Eric Klinenberg (2018) discusses how a whole range of physical and institutional infrastructures underline the development and maintenance of social connections. Social infrastructure counters social isolation, enables the negotiation of socio-cultural differences, and facilitates inclusive and welcoming spaces for all, notwithstanding intersectional aspects such as age, race, gender, sexuality, or income. It constitutes the socio-spatial framework which allows strangers to freely interact with people with whom they share their neighbourhoods and public spaces. Social infrastructure therefore enables community connections by increasing wellness, inclusion, and belonging. It contributes to better neighbourly relations through collective adaptive capacity and leadership. Lastly, it prioritises safety, equity, and accessibility; aspects that are vital for place keeping.

Urbanists are not strangers to seminal social movements and grassroots efforts that triggered public imagination in support of inclusive social infrastructure. The most well-known among this is the movement instigated by Jane Jacobs in the United States against 'slum clearance' plans framed as urban renewal plans by Robert Moses. In her fundamental book, 'The Death and Life of Great American Cities', Jacobs highlights how a livable place should prioritise car-free neighbourhoods, walkable streets, and eyes on the street which encourages social life and interaction in safe environments (1961). Similarly, the right to the city conceptualisation extended by David Harvey professes that '*The right to the city is far more than the individual liberty to access urban resources: it is a right to change ourselves by changing the city…The freedom to make and remake our cities and ourselves is, I want to argue, one of the most precious yet most neglected of our human rights* (Harvey, 2010). Having an inclusive social infrastructural system is therefore an important determinant for freedom and rights of use in the city.

The lecture on social infrastructure delivered during the online phase of the VLC_Summer School addressed the key definitions, theoretical background, and characteristics of social infrastructure. Furthermore, through an interactive session, students were encouraged to give their perspectives on what could be considered social infrastructure in a city, which urban challenges could potentially be addressed through social infrastructure, and finally, what goals could be promoted through good social infrastructure. The theorisation of social infrastructure was based on two perspectives. The first perspective focussed on the physical manifestation of social infrastructure based on the work of urban geographers Alan Latham and Jack Layton (2019, 2022). They wrote extensively about how understanding social infrastructure could provide vital insights regarding urban sociality, urban vitality, equity, inclusion, and diversity in a city. Social infrastructure is defined by them as 'the networks of spaces, facilities, institutions, and groups that create affordances for social connection' (Latham and Layton, 2019).

The second theoretical perspective on social infrastructure was based on the influential work of Abdoumalik Simone who conceptualised 'people as infrastructure' (2004). In this perspective, people themselves can be understood as infrastructure: They help the economy, communications, power, and water of cities to function (McFarlane and Silver, 2017; Simone, 2021). Based on empirical observations from the Global South, he highlighted how informal relations, mutual trust, and solidarity often compensated for the lack of physical manifestations of social infrastructure (ibid.). This conceptualisation also ties closely with Putnam's work on social capital which details three different types of social ties, namely bonding ties, which connect people to close family and friends, bridging ties, which connect people through shared interests, workplace, or place of worship, and lastly linking ties, which connect them to people in positions of power (Putnam, 1995). The importance and influence of aspects such as livelihoods, social safety nets, cultural heritage are paramount under this perspective.

The lecture concluded by emphasising that the physical manifestations of social infrastructure and the idea of 'people as infrastructure' are closely intertwined and should be analysed parallelly for in-depth contextual understanding. This also enables urbanists to plan, design and strategise in ways that makes sense also for the communities who reside and use the space. It is also important to acknowledge that a good provision of social infrastructure does not necessarily solve structural and inherent inequalities. This needs a systematic and holistic attention also at a policy and governance level.

During the development of the online phase of the course, the teaching staff and NTNU students from the 'Social Infrastructure' team met 2-3 times a week to discuss the work progress. Based on the presented theorisations, the NTNU team mapped relevant social infrastructure in the case study area in Valencia. This included existing shops, restaurants, libraries, cafes, schools, green spaces, health centres, hotels, sports facilities, bus stops and ferry stops (Figure 2.3.1). To illustrate the fuzzy and intangible nature of social infrastructure, they mapped 'hot' and 'cold' spots in the case area to showcase areas with intensified social activity and areas that are isolated (Figure 2.3.2). To showcase large scale urbanisation patterns, they also indicated industrial, active, green, and relatively empty spaces (Figure 2.3.3). They also analysed the city through the 'people as infrastructure' theoretical lens. They noted the vibrant social life, deep community engagement, and the plethora of associations catering to sports, health, environment, education, and tourism. All of this contributes to the well-being of the residents in the area. Traditional festivals are widely celebrated in Valencia which also brings together people from all walks of life. Prominent among this is the Las Fallas, celebrated in March. The city's commitment to public participation in the planning processes was also evident from the strategic agendas of the 'Mission Valencia 2030' which includes regulations for transparency and citizen participation (Dinh et al., 2023) as indicated in Figure 2.3.4. The Valencia 2030 strategy is also keen to highlight the larger presence of Valencia in Europe through various social and urban innovation initiatives involving schools and universities.

Figure 2.3.1: Main Physical social infrastructures in the Case Study Area of Valencia. Source: Dinh et al (2023)

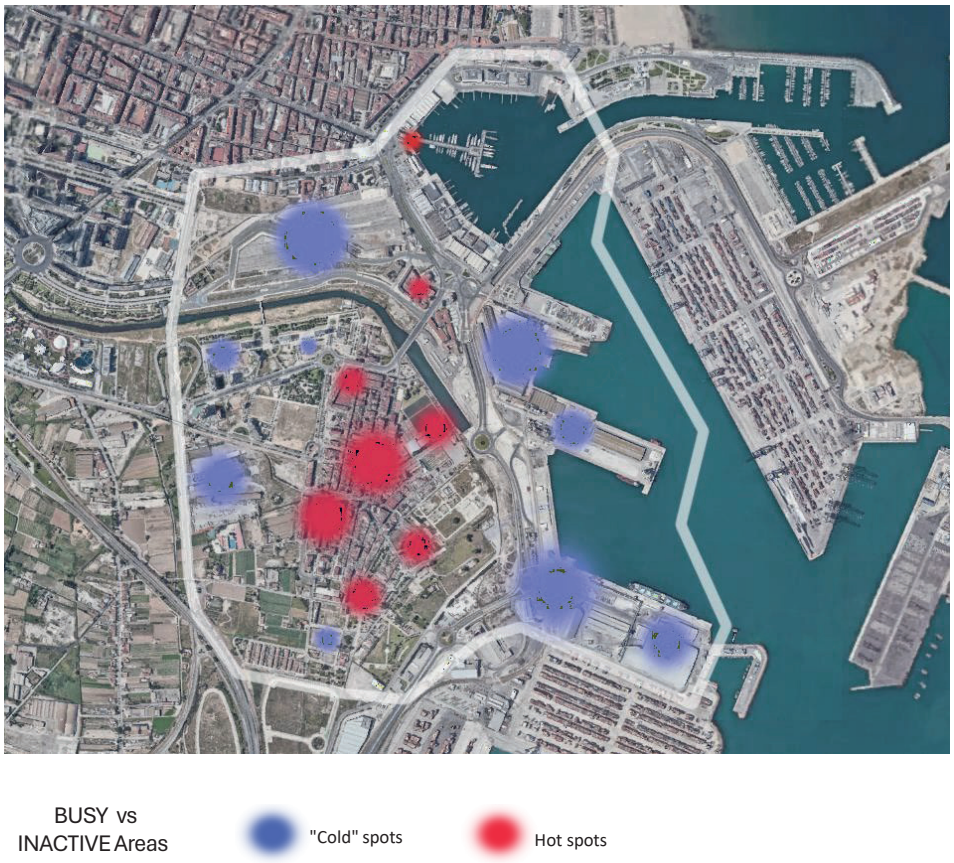

Figure 2.3.2: Busy and inactive zones in the Case Study Area of Valencia. Source: Dinh et al (2023)

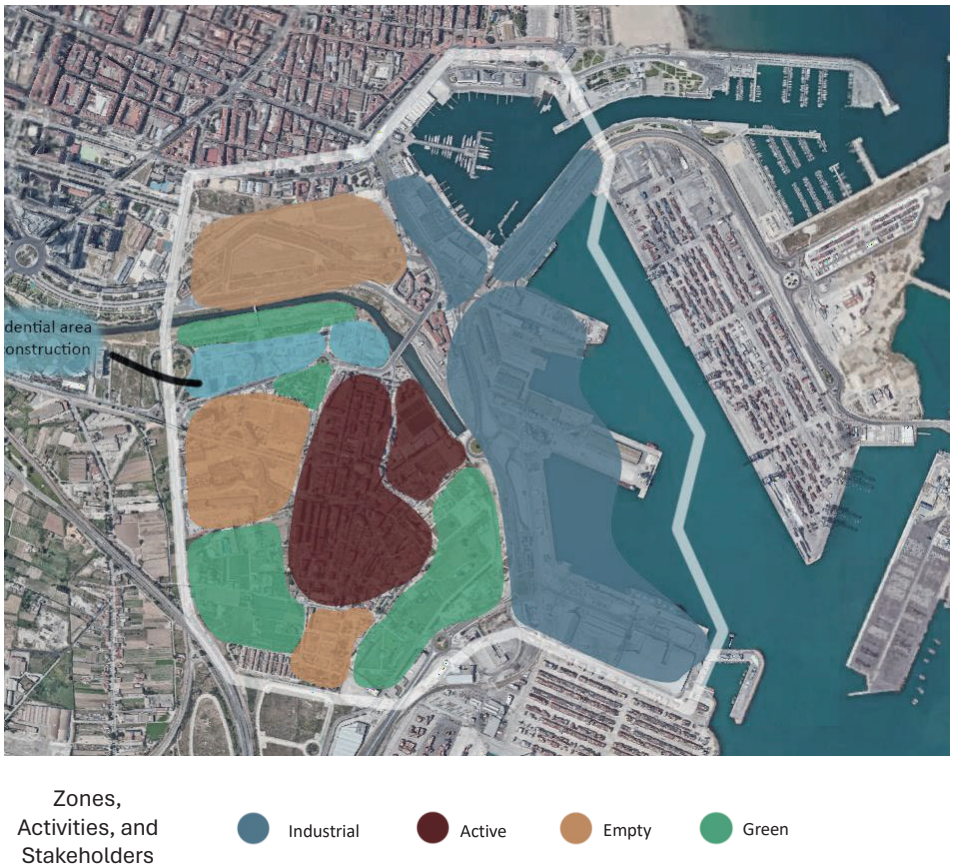

Figure 2.3.3: Main Zones and Activities in the Case Study Area of Valencia. Source: Dinh et al (2023)

Figure 2.3.4: Overview of ongoing participatory initiatives in various neighbourhoods in the city. Source: Valencia City Council

However, the students also noted the existing socio-spatial fragmentation in the neighbourhood of Nazaret, pointing out its isolation from other nearby urban areas, its lack of urban vitality, the nostalgia associated with the lost beaches, and lack of inclusive spatial strategies to integrate a diverse population (Figure 2.3.5). They also extracted evidence from the database provided by the case owners that the people living in the case area reported lesser feeling of inclusivity, safety, and higher degree of discrimination. At the same time, insights from the data showed that residents also valued their sense of community, and the cultural and educational facilities provided by the city. These pluralistic insights formed the base for task 2 and task 3 in embedding a value-based social infrastructural system with the other physical infrastructures. Below are a few accompanying images of the case area from the students.

Figure 2.3.5: Pictures taken by the students during initial site visits in the case area. Source: Dinh et al (2023)

REFERENCES

Dinh, M. A.; Posadas, G.; Lamouki, A. A.; Movahedi, M. R.; Fosshagen, A. T.; Schulz, K. V. (2023). *Social Infrastructure.* Presentation. Norwegian University of Science and Technology.

Harvey, D. (2010). The right to the city: From capital surplus to accumulation by dispossession. *Accumulation by dispossession*, 17-32.

Jacobs, J. (1961). *The Death and Life of Great American Cities.* SD Books.

Klinenberg, E. (2018). *Palaces for the people: How social infrastructure can help fight inequality, polarization, and the decline of civic life*. Crown.

Latham, A., & Layton, J. (2019). Social infrastructure and the public life of cities: Studying urban sociality and public spaces. *Geography Compass, 13* (7), e12444.

Latham, A., & Layton, J. (2022). Social infrastructure: Why it matters and how urban geographers might study it. *Urban Geography, 43* (5), 659-668.

McFarlane, C., & Silver, J. (2017). Navigating the city: Dialectics of everyday urbanism. *Transactions of the Institute of British Geographers, 42* (3), 458-471.

Putnam, R. D. (1995). Tuning in, tuning out: The strange disappearance of social capital in America. *PS: Political science & politics, 28* (4), 664-683.

Simone, A. (2004). People as infrastructure: Intersecting fragments in Johannesburg. *Public culture, 16* (3), 407-429.

Simone, A. (2021). Ritornello:"People as infrastructure". *Urban Geography, 42* (9), 1341-1348.

2.4_HOUSING INFRASTRUCTURE: PRINCIPLES, DIAGNOSIS AND TOOLBOX IN VALENCIA

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2.4.1. Introducing the housing infrastructure

Housing infrastructure is an integrated, essential, and significant part of the urban development. It is and always have been reacting on and interacting with the ongoing economic, ecological, and societal trends and challenges of each period of the city.

As an introduction, the first part of the online lecture on housing infrastructure given by the authors, provided insights into the different housing typologies, structures and their urban planning and architectural characteristics, how the different historical development phases have shaped our cities, and the respective social, political, and economic contexts and framework conditions. Learning from historic city development, it can be concluded the benefits of small-scale development approaches based of an iterative development. This 'cell by cell' - developments are rather more sustainable than instant large-scale interventions.

In the second part of the lecture, the most important urban challenges and resulting conflicts were summarized to create an idea of the influences and demands on the housing infrastructure today and in the future. Looking at the urban challenges coming with the growing urbanization and the effects of the climate crisis, some current urban design approaches were introduced. It is to be highlighted that all of these concepts are strongly connected to the other urban infrastructures, such as the compact, mixed-used, and blue-green city or the concept of cities for people. In terms of solutions, new housing concepts with community-based strategies were introduced as alternative form of producing housing - focusing on co-living and co-creation. These new approaches reflect the shift on housing production as today people are actively shaping their city by participating in housing with their personal values. Still there is the strong need of new planning instruments to support such new forms of housing.

After the lecture, there was the impression that the students were already highly aware of the ongoing urban trends, especially of gentrification, the rising housing cost, and the effects of climate change. The interest on new types of the production of housing was high and broadly used by the students in the development of the following tasks.

2.4.2. Valencia case study

Workflow, process, and teamwork

The group of the TU Berlin consisted of six students, mostly Master students of Urban planning (Lea Marcella Fast, Christoph Hoppenstedt, Olesia Sakhareva), two Master students of Urban design (Hannah Berner, Dilara Ucar) and one Bachelor student of Architecture (Liva Roze). As they came from different degrees and some of them were Erasmus students from other universities, they had different focal points and perspectives on topics and also different access methods to participate in the collective development of task 1.

For their process of working, they decided to use a hybrid format, having some appointments online but also in person meetings in the TU Berlin, sometimes watching the online lectures together.

Spatial analysis of Valencia

As none of the students has ever developed a project in the city of Valencia before, it was from a professional perspective a completely new city and case study for them. In the beginning of task 1 the students analyzed the current situation of the housing infrastructure of Valencia by doing internet research and by using the provided housing infrastructure dossier. The main result from this analysis was the general inaccessibility of housing due to e.g. the rise of rents and the lack of protected housing supply.

This was followed by the analysis of the spatial structure of the city using satellite pictures from goggle maps and a figure-ground plan of the city. From this, they defined three different typologies depending on their urban character and their associated type of housing (Figure 2.4.1). The multi-family housing is differentiated between historic multi-family houses that are defining the street frontage through their closed block character (red) and modern multi-family houses with free position on the site (orange). The third typology includes single-family houses (green). Collecting this information of Valencia as a first step helped them to get an integrated understanding for the next analysis step concerning the study area or pilot site.

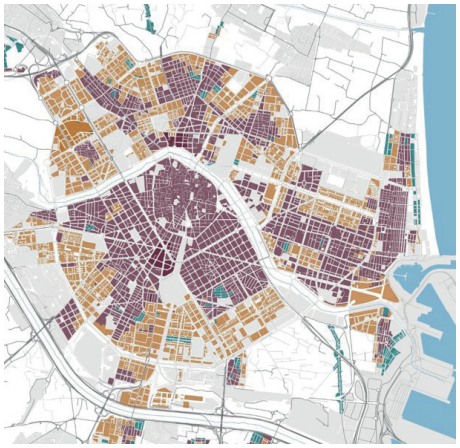

Figure 2.4.1: Housing typologies of Valencia (source: Hernandez Aja et al., 2022)

Spatial analysis of the site

Until the first mid-review the students worked on a general understanding of the case study area, its role in the urban fabric and its functions. The students decided to analyze the case study starting by its built structure and the housing typologies, dividing between single-family houses and multi-family complexes (Figure 2.4.2).

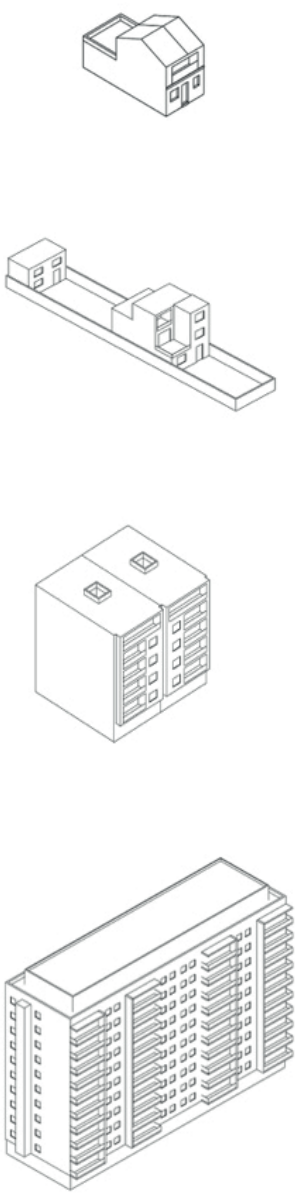

Figure 2.4.2: Single-family houses without backyards; Single-family houses with backyards; Multi-family complex (4-6 stories); Multi-family complex (7 and more stories)

This was followed by a strategic analysis of different topics. They looked at the different types and the conditions of the public space such as the central square on the main street of the Nazaret district. As they elaborated the topic of vacancy as an overall issue in some parts of Valencia, they also investigated the site on this. At last, they marked the urban borders that are formed by natural elements like the Turia riverbed but also are artificial like the wall that separates the harbor from the site (Figure 2.4.3).

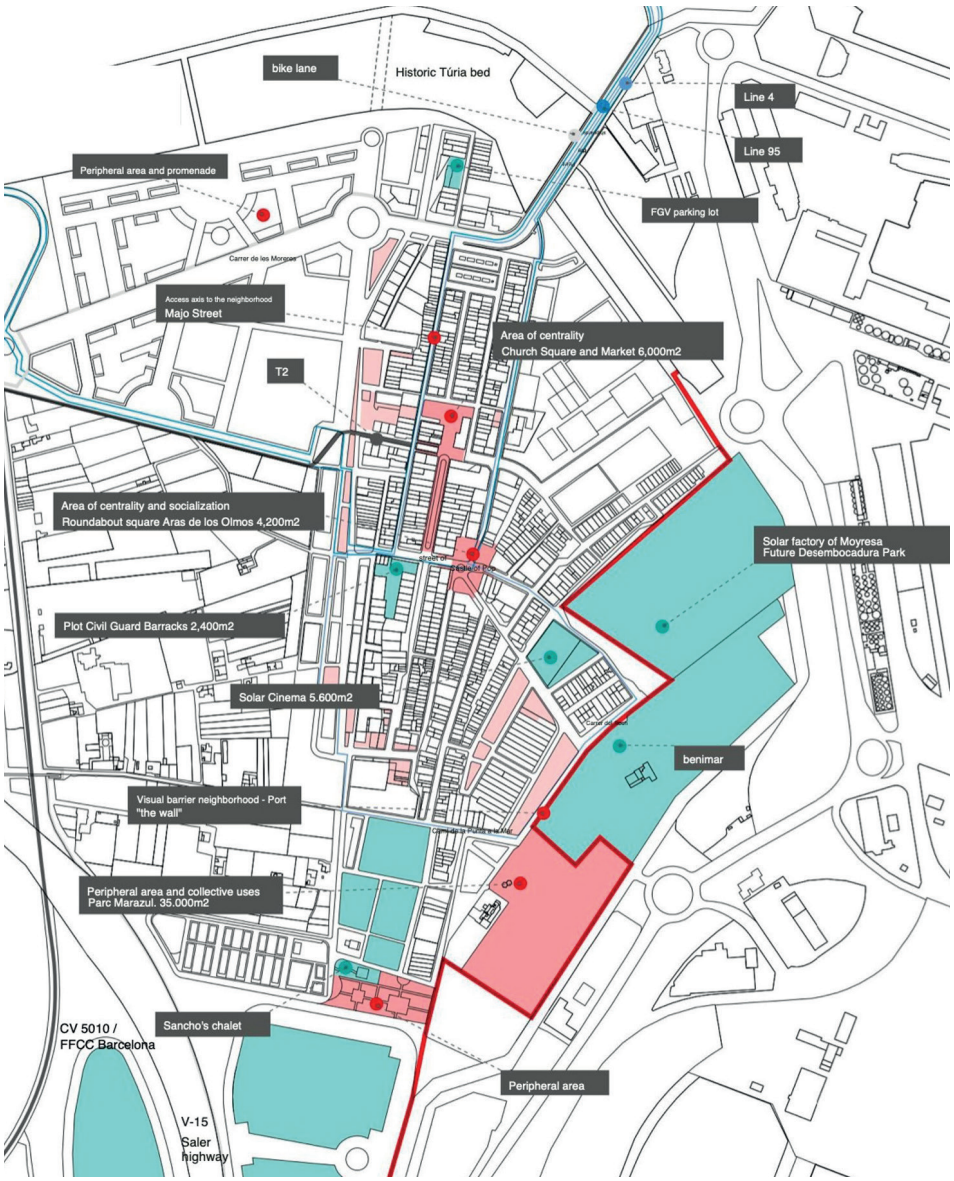

Figure 2.4.3: Analysis of the existing public space (source: Fast, Hoppenstedt, Sakhareva, Berner, Ucar, Roze, 2023)

Coming from the evaluated characteristics at that point, the group decided to divide the site in three sub-areas depending on their urban character and their functions: the northern part as the 'Harbour and Industry', 'Nazaret' and last the 'Surrounding Brownfields'.

For the mid review the students created a vision for the area within the city of Valencia as the summary of the work that they have developed so far. As part of this vision, the students developed some principles for new Housing focusing on mixed-use, social, and inclusive aspects. For the next step after the mid-review – the creation of the toolbox – they collected some questions around the topic of how to deal with gentrification and eviction, the protection of existing built and social structures, the right amount of density, and the creation of community bonds and connections.

Also, after the mid review, the students adjusted their process and their division of the site. Firstly, they decided to define four instead of the former three sub-areas of the site: El Grau in the north, Las Moreras, Nazaret and the Brown fields in the south (la Huerta). Again, they analyzed these four sub-areas from the perspective of the following topics: public spaces and green areas, borders and connections, housing typologies, and functions and usages (Figure 2.4.4). As a result, and to define the housing infrastructure toolbox, they identified the key problems of each sub-area. The issues of disconnection from the city and disintegration into the surrounding urban context were identified as overarching problems. In the area of Nazaret, as the only established larger neighborhood on the site, there are also problems concerning social structures, the state of the existing housing stock but also the increasing rents.

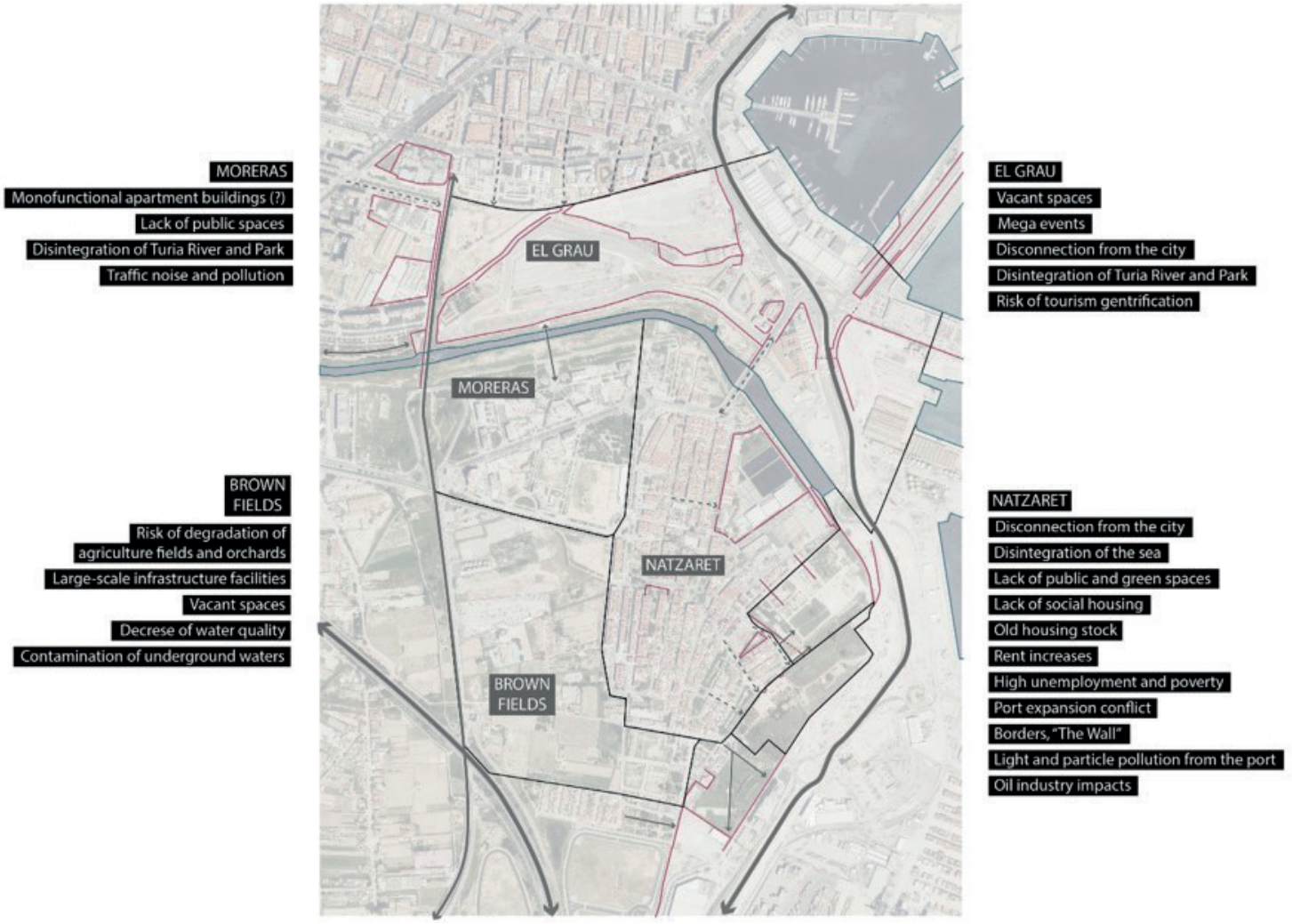

Figure 2.4.4: Definition of the key problems of each sub-area (source: Fast, Hoppenstedt, Sakhareva, Berner, Ucar, Roze, 2023)

Topics and solutions in the housing Infrastructure Toolbox

In the process of developing the housing infrastructure toolbox, the students first defined principles out of the identified key problems e.g. *connecting through housing.* Then they applied these principles on the case study area. This led to a broad collection of spatial and procedural tools e.g. *implementing cooperative housing* (procedural tool). To organize the tools the students sorted the tools by their place of action: policies and laws, spatial tools, community-based tools, and tools for process design / procedural tools (Figure 2.4.5). Then the tools were selected and applied on each sub-area including the resulting action from that tool. Some of the tools just apply to one area, for example the *Protection of existing built structures* (spatial tool) only concerns the structures of Nazaret. Some other tools apply to all the sub-areas such as *Elaborating new financial models* (policies & laws) or *Small cell development* (procedural tool).

Figure 2.4.5: Toolbox for the housing infrastructure (source: Fast, Hoppenstedt, Sakhareva, Berner, Ucar, Roze, 2023)

Potential synergies

As a last step, and in preparation of task 2, the proposed housing infrastructure tools were analyzed regarding their interconnection and interfaces with the other urban infrastructures addressed in then course (from the smallest to the biggest overlap: energy infrastructure (e.g. community-based infrastructures), blue green infrastructure (e.g. climate adaption on public spaces), mobility infrastructure (e.g. new bridges to surrounding neighborhoods) and its largest interconnection with the social infrastructure (e.g. support structures for communities).

Reflections on task 1

As urban planners and architects, the students were familiar with the kind of methods that they were asked to use in task 1. The analysis of the housing infrastructure was very comparable to their regular seminars. Still there was the challenge to do this by using only satellite images and google street view.

There was a high awareness between the students on the topics of housing and renting cost, gentrification, and eviction, perhaps because these are also current and concerning issues in the urban development of Berlin.

2.5_MOBILITY INFRASTRUCTURES: PRINCIPLES, DIAGNOSIS AND TOOLBOX IN VALENCIA

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2.5.1. Introduction

Mobility infrastructure is an integral part of cities. In the past, transport connections were often catalysts for the emergence of cities, but, more recently, transport infrastructure - and the opportunities it offers – has contributed significantly to the further development of urban structures. On the one hand, as a physical element in the form of major roads and railways, the significantly increased amount of space required for parking, and, on the other hand, in a more subtle way, through technological advances, increasing micro-logistics or a greater emancipation from the location within the urban fabric. At the same time, the greater range of vehicles and shorter travel times have allowed cities to expand and become more connected to their surroundings. Urban development and mobility infrastructure are inextricably linked. On a smaller scale, the existing mobility infrastructure influences the living environment, our everyday journeys and, last but not least, the local quality of life. Thereby, the importance of active mobility (walking and cycling) and proximity is becoming increasingly important in the professional and public discourse.

2.5.2. Methodological approach

The different backgrounds and levels of knowledge of the students had to be considered during the online phase. In order to provide the mobility team with an overview of key concepts and, at the same time, to prepare them for the upcoming analysis of the Valencia case study, the students were asked to analyze several pre-selected case studies and then present them to the team. The objective of the first week was formulated as follows:

> "Develop a basic understanding of different planning/mobility concepts and principles and their impact on cities and neighborhoods, based on the exploration of different good practice case studies."

The selected case studies included good practice examples from different European countries. The idea was to convey different approaches (both in terms of scale and strategy) and different thematic focuses in order to provide a more comprehensive overall picture. However, all the case studies share the objective of reducing car use, improving quality of life, and putting people back at the center of urban development.

2.5.3. Case studies

1. Paris, France: The 15-Minute City
2. Copenhagen, Denmark: "Copenhagenize"
3. Pontevedra, Spain: Pioneer of car free city centers
4. Barcelona, Spain: Superblocks
5. Houten, Netherlands: Holistic car- and pedestrian oriented design
6. Vienna, Austria: Redesigning *Mariahilfer Straße*

In order to better structure the results, the students were given different objectives and themes to analyze the case studies. These included, among others:

- Spatial and strategical context
- Objective of your case study + key implemented actions including timetable
- Push & pull factors (e.g. parking management & comfortable cycle lanes)
- The strategic implementation
- Space requirements & dealing with limited public space
- The impact of the project (for instance, on modal split or life quality)
- The role of e-mobility
- The role of settlement structures (density, typologies, land use, etc.)
- Possible synergies with other infrastructures

There were three guiding questions that the students had to address in their case studies:

- How are the three basic objectives of mobility planning addressed? (avoiding traffic, shifting traffic (to more sustainable modes) and reducing emissions)
- What makes your case study special and what design principles and potentials do you derive for future projects?
- What might limit the realization or successful transfer of ideas in general?

An interim seminar was organized to present the results of the analysis of case studies. During the 15-minute presentations, the students were urged to identify strategies and principles that could be relevant to the pilot area in Valencia. After the presentations, the case studies were discussed and important aspects were emphasized by the tutors (also in the light of the upcoming task in Valencia). Through the case studies, the students were exposed to different measures and strategies for different scales, both for public space design and for the consideration of the overall city structure. In addition, this approach helped to sensitize the students to different topics and issues, which were then reflected in the definition of proposals (see section 5).

2.5.4. City of Valencia

The detailed analysis of case studies led to numerous questions regarding the status quo in the city of Valencia. The analysis this city was based on a large amount of data and documents that had already been gathered in the run-up to the Summer School. This was supplemented by the students' own research and the analysis of geodata (e.g. for the calculation of isochrones or travel times).

The compact, dense structure of the city center provides good conditions for sustainable and active mobility. Many points of interest are spatially clustered due to the existing building structure, resulting in shorter distances (<15 minutes walking) and fewer incentives to use the private car. This is also reflected in the high share of walking and cycling (53%) in the city's internal modal split. This is expected to increase to 62% by 2030.

Valencia has a well-developed network of cycle paths and a high level of accessibility for pedestrians in many areas. It is noteworthy that walking dominates for journeys of less than 5 km. Here, cycling accounts for only 4% of journeys made. Despite the ongoing development of cycling infrastructure, the modal split remained relatively constant between 2009 and 2017.

In addition to its compact urban structure, Valencia also has a good public transport network. Besides numerous bus lines, the city is served by 9 metro lines (see Figure 2.5.1). While railways connect the different areas of the city, the bus system provides a more refined service. The result is a dense public transport network. Over 90% of residents can walk to a bus stop in less than 10 minutes, and over 80% can walk to a metro station in less than 15 minutes.

Due to the importance of Valencia, there are numerous connections to the outskirts. The regional rail network is characterized by many radial connections linking the surroundings with the city center. While there is a good connection to the city center, the connections between the radial axes are poorly developed (see Figure 2.5.1.).

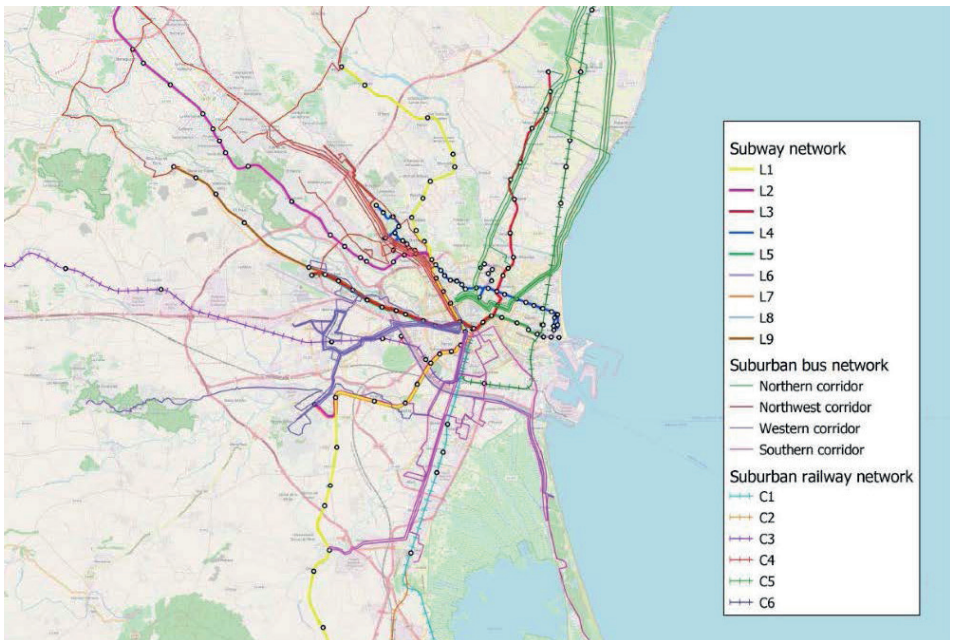


Figure 2.5.1: Public Transport Network of Valencia (Source: Gerwenat, Gadkar, Polyakova, Chen, Farkas, & Zhu, 2023)

Despite the numerous radial lines, Valencia's external modal split is still heavily dependent on private motorized transport. The decline in density and the increasingly dispersed settlement structure in the metropolitan area play a key role on this.

By 2030, public transport is expected to account for 55% of external trips, up from 22% in 2013.

The students have categorized different types of districts/urban elements in terms of their mobility and infrastructure requirements (see Table 2.5.1).

This overview not only served to reflect on the different mobility needs and the strong interaction between space and mobility, but also laid the foundation for deriving conceptual ideas for the transport infrastructure in the pilot site.

Type	**Transport Hubs**	**Central Business District**	**Residential Areas**	**Recreational and Entertainment Zone**	**Industrial Zones**	**Educational Institutions**	**Medical Facilities**
Example	Mercat Central, Aeropuerto	Benimaclet	Ruzafa	Jardines del Real, Marítimo	Poligono Vara de Quart	Blasco Ibáñez	Hospital Clinic Universitari
Requirements	Access to various modes of transport and good connections between the modes	Accessible and convenient public transport	Adequate roads, sidewalks and cycling lanes	Accessible and convenient public transport	Efficient transportation network	Safe pedestrian and cyclist routes and a well-organized PT network	Good accessibility for ambulances and visitors (PT access)
Primary travel purpose	Mixed	Commuting	Commuting and Leisure Traffic	Leisure traffic	Freight and logistics traffic	High traffic volume during specific times of the day	(Leisure) traffic

Table 2.5.1: Urban areas according to their mobility and infrastructure requirements (Source: Gerwenat, Gadkar, Polyakova, Chen, Farkas, & Zhu, 2023)

2.5.5. Pilot site

The pilot site to the south-east of the city center is currently spatially isolated. There are numerous spatial barriers (river, motorway, railway line) to the adjacent neighborhoods. Only three access points to the study area could be identified (Figure 2.5.2). This particularly affects pedestrians and cyclists. However, the proximity to Turia Park - as one of the most important axes for active mobility - is a strength of the area.

The study area itself is connected to the metro system and to the bus network at various points. The students investigated the travel times to different central points in Valencia (Table 2.5.2).

	Car	Public Transport	Bike
City Center	22 Min	40 Min	19 Min
Politécnico VLC	10 Min	34 Min	12 Min
Beach	6 Min	33 Min	9 Min

Table 2.5.2: Travel Times from the Pilot Site (Source: Google Maps)

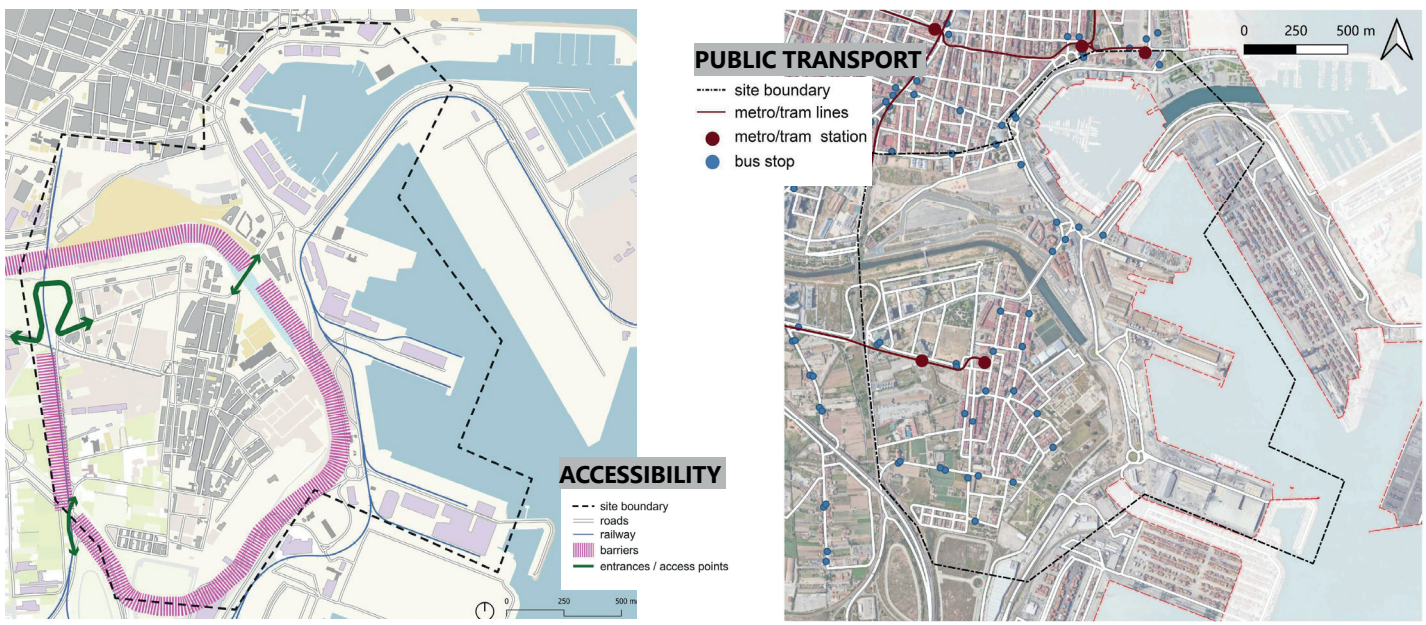


Figure 2.5.2: Accessibility and Public Transport Network of the Pilot Site (Source: Gerwenat, Gadkar, Polyakova, Chen, Farkas, & Zhu, 2023)

Bicycles are proving to be particularly competitive with cars here. Public transport connections to the university and the beach are currently in need of improvement. In terms of design, the students observed that the streets in the study area are heavily dominated by motorized traffic, with little space for pedestrians and cyclists.

Based on these findings and the analysis of good practice examples, the following key aspects for the design phase in Valencia were formulated:

- Accessibility
- Speed restrictions
- Materials
- Cycle routes
- Shared space
- Public transport
- Smart solutions
- Bike and car sharing

2.5.6. Toolbox development

Based on the findings, the students developed a mobility toolbox. This toolbox addressed general and specific objectives and formulated qualitative and quantitative approaches for a detailed analysis of the status quo. Intersections with other infrastructure layers were also outlined.

Goal 1: Sustainable modal split

The modal split should be balanced between cars, bicycles, pedestrians, and public transport. To achieve this, a dense public transport network needs to be developed and a variety of transport options should be available. Mobile stations and sharing services were identified as an important urban building block. Furthermore, the cost of sustainable modes of transport should be affordable for all and the design should be inclusive. Ensuring a sense of security for all target groups is emphasized (Table 2.5.3).

Goal	Aspects	Measurement of status quo	Tools	Relation to other infrastructures
Sustainable Modal Split	**Accessibility**	How many people have access to the public transport system within 150 m?	**Have at least one accessible public transport system within 150m.**	
		How many different networks of modalities are there?	**Providing more options, developing micro-mobility, car/bike-sharing, jeli station**	Social infrastructure
		Costs	**Have a balance between affordable public transportation costs & usage of sustainable energy**	Social Infrastructure
	Sustainability	Ratio of Pedestrian – cars – bikes – public transport	**25/25/25/25**	
	Time	How much time differences do we have in-between the different modals?	**Have a balanced network, emission free networks should be more attractive**	
	User Groups	Who is Using the different networks?	**Create a safe space for all categories, including women, elder generation, kids, disabled etc**	Social Infrastructure

Table 2.5.3: Overview goal 1 (Source: Gerwenat, Gadkar, Polyakova, Chen, Farkas, & Zhu, 2023)

Goal 2: Strong public transport network

Similar to the sustainable modal split, a dense public transport network is the backbone of a more sustainable urban mobility system. Furthermore, travel and transfer times need to be optimized in order to keep public transport as competitive as possible with private transport. In addition to travel costs and ticketing models, the students also highlighted soft factors such as safety, comfort (e.g. Wi-Fi and charging facilities) and accessibility. In addition to traditional forms of service, ride-sharing concepts were also mentioned as a way to complement the public transport system (Table 2.5.4).

Goal	Aspects	Measurement of status quo	Tools	Relation to other infrastructures
Strong Public Transport Network	Speediness	Average travel time, On-time performance	**Calculating departure and arrival times and defining acceptable thresholds**	Energy infrastructure
		Average frequency and waiting time	**Identifying discrepancies for the actual and estimated travel time**	Energy infrastructure
	Convenience	Number of shared vehicles	**Planning more integrated modes of travel**	Blue and Green infastructure
		Coverage percentage of transport network	**Making every (key) area well-connected**	Social and Housing infrastructure
	Security and Comfort	Incident rate, Number of vandalism and crime	**Implementing more security measures**	Social inrastructure
		User Experience	**Providing amenities like Wi-fi, charging station**	Energy and Social infrastructure
	Expense	Ticket fees	**Evaulating and adjusting the fare structure (Regular commuters, student, seniors)**	Social infrastructure
		Tourism	**Ensuring public transport is the most desirable option for (Transport Pass)**	

Table 2.5.4: Overview goal 2 (Source: Gerwenat, Gadkar, Polyakova, Chen, Farkas, & Zhu, 2023)

Goal 3: Attractive walkable network

An attractive pedestrian network is based on several measures. On the one hand, there is the provision of wide footpaths and the implementation of traffic-calmed zones, as well as the reduction of driving speeds - especially in the inner-city neighbourhoods. Here, too, the aim is to minimize through traffic. The redesign of the street space should strengthen human interaction on the street and increase the safety of all participants in traffic. It is important to ensure that there is sufficient shade in the summer. The students also stated that the benefits of walking should be communicated more clearly (Table 2.5.5).

Goal	Aspects	Measurement of status quo	Tools	Relation to other infrastructures
Attractive Walkable Network	**Diversity**	Density of Opportunities/Activities for human social interaction	**Pacification of internal roads**	Social Infastructure
		Ease of walking (Ratio of faciltation & obstructions)		
	Comfort	Percentage of shaded areas	**Expand areas devoted to pedestrians on streets**	Social Infastructure Green Infastructure
		Width of sidewalk		
	Safety	No. Of crosswalks/intersections around educational buildings	**Safe mobility for children**	Social Infastructure
		No. of streets with reduced vehicle speed	**Implement 30 zones**	Housing Infrastructure
	Convenience	Tracking pedestrian usage on internal streets	**Reduce external vehicles in residential areas by rerouting traffic**	Housing Infrastructure
		Percentage of people choosing to walk – before and after	**Publicise Benefits of Walking**	Social Infastructure

Table 2.5.5: Overview goal 3 (Source: Gerwenat, Gadkar, Polyakova, Chen, Farkas, & Zhu, 2023)

Goal 4: Attractive bicycle network

The requirements for an attractive cycle network are similar to those for an attractive pedestrian network. The different types of cycle lanes need to be emphasized for their variety of capacity and possible speeds, while still being safe for all users. In addition, more infrastructure is needed, such as nearby bicycle parking or services. The design of multimodal hubs should also encourage easy transitions from cycling to public transport and vice versa. As with paths, attractive routes, such as through parks or along blue infrastructure, can attract more cyclists and improve the cycling experience. Signposts can also help, especially in dense urban areas (Table 2.5.6).

Goal	Aspects	Measurement of status quo	Tools	Relation to other infrastructures
Attractive bycicle network	**Convenience**	Coverage percentage of parking space (Length of cycling paths/number of parking spots)	**Parking Space**	Housing infrastructure Social infrastructure
		Coverage percentage of cyclist service facilities (Length of cycling paths/number of service points)	**cyclists service**	Energy infrastructure Social infrastructure
		Riding accessibility to metro and bus stops	**Transition possibility**	
		Condition of a cyclist hitting a red light	**Riding-friendly traffic light**	
	Diversity	Coverage percentage of green interfaces in bike lanes	**Green interfaces**	Green infrastructure
		Coverage percentage of blue interfaces in bike lanes	**Blue interfaces**	Blue infrastructure
		Coverage percentage commercial interfaces in bike lanes	**Commercial interfaces**	Social infrastructure
	Safety	Occupation condition of road space by cycling and driving	**Different types of cycling lanes**	
		Percentage of number of two-, three-, and four-lane roads	**Number of cycling lanes**	

Table 2.5.6: Overview goal 4 (Source: Gerwenat, Gadkar, Polyakova, Chen, Farkas, & Zhu, 2023)

Goal 5: Reduce the number of cars

At the forefront are push & pull actions. On the one hand, there is the provision of different sharing schemes and a pedestrian and cyclist first approach regarding all actions taken. This is also reflected in the safe and convenient design of the necessary infrastructure. On the other hand, there are speed limits and filtered permeability for streets, neighborhood garages, car free zones and parking management. A key component for both sides is the street network layout, which enables and promotes different strategies (e.g. Super Blocks) (Table 2.5.7).

Goal	Aspects	Measurement of status quo	Tools	Relation to other infrastructures
Attractive Car Sharing Systems (Non-Traffic	**Convenience**	Number of shared vehicles	**In each neighborhood there's a carsharing point and charging piles**	Housing & Energy & Social infrastructure
		Number of parking space	**Use neighborhood's garage**	Housing & Social infrastructure
		Traffic light timing	**Improvement of the traffic signal timing on individual roads**	Social infrastructure
	Expense	Parking fees	**Parking fee discount for shared vehicles**	Social infrastructure
	Speediness & Traffic	Separating slower and faster modes of transport	**Use span to separate slower and faster modes**	
			Speed limitation in some roads (Filtered Permeability)	
	Safety	Integrated with pedestrians and cyclists	**Pedestrian and cyclist first rule**	Social infrastructure
			Car free zone	Housing & Social infrastructure
			Transition zone to other modals	Housing & Social infrastructure

Table 2.5.7: Overview goal 5 (Source: Gerwenat, Gadkar, Polyakova, Chen, Farkas, & Zhu, 2023)

Goal 6: Sustainable and eco-friendly cargo & delivery systems

In addition to a strategic framework that includes emissions monitoring, route optimization and certification schemes, the integration of multimodal freight terminals (on a larger scale), micro-hubs (on a smaller scale) and the strengthening of environmentally friendly last-mile delivery models are key to making freight transport more sustainable. Innovations such as drones or autonomous deliveries should also be considered (Table 2.5.8).

Goal	Aspects	Measurement of status quo	Tools	Relation to other infrastructures
Sustainable and eco-friendly Cargo & Delievery Systems	**Sustainability**	Number of certified companies & Number of emissions from delivering	**Green Certification System / Emission Monitoring**	Energy
		single-use plastic waste	**Eco-Friendly Packaging Materials**	
		usage of sustainable delivery methods	**Behavioral Mobile Apps**	Social
	Efficiency	travel time, fuel consumption	**Smart Route optimization**	
		travel time, fuel consumption	**Multi-Modal Freight Terminals**	
		delivery time, cost, and emissions	**Last-Mile Delivery Robotics and Drones**	

Table 2.5.8: Overview goal 6 (Source: Gerwenat, Gadkar, Polyakova, Chen, Farkas, & Zhu, 2023)

2.5.7. Synergies with other infrastructures

The emergence of e-mobility plays a key role in the search for synergies with energy infrastructure. The upcoming need for charging infrastructure (cars and bicycles) needs to be addressed and should be considered in any planning project. Existing electricity grids, especially at medium voltage level, offer a good opportunity to implement fast charging infrastructure in public spaces.

Waterways are part of the transport network, especially in coastal cities. Although their potential for public transport is somewhat limited, they can play a key role in logistics. In addition, blue infrastructure offers great opportunities for attractive cycling routes through the city or along the coast (for commuting or recreation).

Green and mobility infrastructure are essential parts public spaces and can easily create synergies, making walking and cycling more attractive, absorbing air pollutants from adjacent streets, cooling public spaces, or enhancing local biodiversity. Mobility infrastructure can always be enriched with green space, be it grassed tracks or green roofs on bus stops, for instance.

Accessibility is key to social infrastructure. Whether it's a safe journey to school or the ability to visit public facilities with a low threshold. Mobility ensures social participation and inclusion and should always be considered when planning social infrastructure. Here, low-cost alternatives contribute significantly. In addition, the appropriate design of public spaces can also strengthen social interactions in neighborhoods, for example through traffic-calmed areas.

Housing infrastructure and mobility patterns are directly linked. Housing ensures the sustainability of mobility infrastructure, especially public transport (more users, more revenue, and better service, among others). Density plays a central role and should not be underestimated in its impact on an attractive public transport network. In particular, mixed-use areas can provide short travel distances and help reduce car dependency. Bicycle parking and good pedestrian accessibility can improve the local quality of life.

2.5.8. Reflection

Activating the topic by conducting short case study analyses proved to be a sensible approach for the mobility infrastructure. Even with just a few meetings, it was possible to provide the students with a lot of information in a short timeframe. The formulation of key questions was essential for an efficient approach and to ensure comparability between different case studies. In addition, the students could already become aware of possible synergies between the various infrastructures through a targeted discussion after each presentation.

2.6_ENERGY INFRASTRUCTURES: PRINCIPLES, DIAGNOSIS AND TOOLBOX IN VALENCIA

Juanjo Galan | Associate Professor, Polytechnic University of Valencia

2.6.1. Urban energy infrastructures and the energy team

The energy infrastructure of the city of Valencia and its pilot area (El Grau-Nazaret-Moreras-La Punta) was analyzed by the Energy team as part of their TASK1 during the online phase of the VLC_Summer School. The team was composed by six students from the Technical University of Valencia (UPV) with different backgrounds and levels of expertise. Lilan Cubel, Mohamad Hamdache, Adela Archiles and Amina Zannouti were all students from the bachelor's degree in the fundamentals of architecture, Flora Kannampallil was coming from the master´s degree in architecture and Jose Ignacio del Río was a student from the bachelor's degree in environmental and agricultural engineering.

The urban energy infrastructure can be conceptualized as the material and immaterial components and processes permitting the production and use of energy in the city. Since energy is required in any natural or human process, the energy infrastructure affects all activities and function happening in the city and could be associated to its basic metabolism (Ferrao & Fernandez, 2013; Galan & Perrotti, 2019). Following the logics of a metabolic approach, the flow of energy in the city has usually involved an external production, a transportation, an internal consumption, the dissipation of wasted energy (usually in the form of heat), and different types of emissions (CO2, pollutants, etc.). However, in contrast to the highly linear, inefficient, and fossil fuel-based energy cycles that have characterized traditional cities, new urban paradigms advocate for a more circular and efficient metabolism based on the use of renewable sources (Foster, 1997) and for carbon neutrality as a necessary precondition for climate change mitigation. In this context, energy transitions appear as a systemic and crosscutting transformation affecting all the levels of our daily lives and all the other urban systems or infrastructures. This is precisely why the search of synergies, and the avoidance of conflicts, become critical when dealing with urban energy and why social issues like energy justice or spatial issues like the levels of energy production- consumption associated with different urban patterns or building types becomes not an option but a necessity to be explored in this course.

2.6.2. Task1: workplan and initial information

In order to self-organize their work during the online phase and after attending a series of introductory lectures about the different infrastructures addressed in the course (green, blue-water, energy, mobility, social, and housing), the energy team and their tutor arranged an online meeting to define a preliminary structure for their task, to analyze the provided data and cartographies, to schedule their internal workflow and reviews with the tutor during the online phase, and to divide the work within the team. Two major deadlines were kept in mind during the process: the mid-review (25.08.2023), in which each thematic team would present the state of their work to other teams, and the final submission on the 1st of September 2023.

The availability of adequate, sufficient, and updated information was considered essential to initiate the course, and more critically, to activate an online phase in which students did not know each other (even coming from the same university) and had to start working in topics which were not fully familiar for them. In particular, the energy team was provided with the following information:

- Introductory session to Urban Energy Infrastructures (by Assoc. Professor Juanjo Galan Vivas). As for the other thematic sessions, this session was delivered to all the students of the course through the e-learning platform of the UPV (PoliformaT) and was aimed at providing a basic understanding about the use of energy in a generic city. Later, the energy team was expected to apply and extend this knowledge to the city of Valencia. The session included a lecture of 45 minutes and a short and practical exercise.

- General information about the City of Valencia (available to all teams): This information included the main city plans and strategies as well as basic cartography in different editable formats (shp and dwg), orthophotos, and a manual to visualize and download information from the cartographic platform of the Valencian Region.

- Specific information about urban energy infrastructures and about this infrastructure in the city of Valencia. This information was specifically aimed at the energy team and included European, national, regional, and local strategies, reports, and guidelines for carbon neutral cities, together with additional data and maps about the energy infrastructure in the city of Valencia.

After the initial meeting, the energy team organized their online work into three stages:

- The *stage1* included a literature review, search of case studies, and the development of a conceptual framework including the basic vocabulary and concepts to be used in task1. This stage 1 was carried out during the first week and included two meetings with the tutor, an initial one to discuss the workplan, and a second one at the end of the week to discuss the results. In the meantime, students worked independently, and the assistance of the tutor was only required to confirm some selected case studies.

- The *stage 2* included the analysis of the energy infrastructure in the city of Valencia and the pilot site. This stage was implemented during the second week and included two tutored sessions, one at the beginning and one in the middle to get some support in the elaboration of a conceptual energy model for the city of Valencia. At the end of this week the energy team presented the state of their work to other teams during the mid-review seminar.

- The *stage 3* was implemented during the third and last week of the online phase of the course and comprised the elaboration of a generic toolbox to improve the energy infrastructure of Valencia, and a preliminary identification of potential synergies between the energy infrastructure and other urban infrastructures addressed in the course. Two tutoring sessions were scheduled, one to initiate the stage, and one to make a rehearsal of the final presentation of the elaborated materials.

Students worked autonomously during the task 1, but after detecting an excessive tendency to divide the work into individual subtasks, the tutor encouraged the team to arrange daily only meetings to facilitate the exchange of ideas. These internal meetings were essential to construct a common understanding of the task, of the key concepts and of the expected outcomes.

2.6.3. Results

STAGE 1: A conceptual framework to operate with the Urban Energy Infrastructure

The analysis of the selected literature and case studies led to the decision to approach the energy infrastructure from a metabolic perspective. According to this perspective, by understanding the flows of energy in a city (production, transportation, consumption), it would be impossible to improve its efficient and sustainable use. At this point it became also necessary to develop a common vocabulary to make sure that all the students were operating within the same conceptual framework. What is a 'energy infrastructure'? what is a 'more circular energy metabolism'? what are energy production and energy consumption? is the city a homogeneous structure or a collage of different urban fabrics with different energy profiles? Which actors or stakeholders were involved in the metabolism of the energy in one city? How could these actors contribute to a positive energy transition? Which kinds of physical transformations and changes in the ways of living can support that transition?

The main outcome of this stage was a conceptual model in which the key components of the energy infrastructure of Valencia were identified: energy production (inflows), energy consumption (considering different sectors or activities, urban typologies, and consumers' socio-economic profiles), and emissions. As an overarching framework, the students positioned the network of actors and governance systems affecting the performance and evolution of this energy structure (international, national, and local regulations, energy suppliers and other economic actors, media, and the citizens). This model was perceived as an empty structure to be filled with specific information and data from the city of Valencia.

STAGE 2: An energy model of the City of Valencia: an analytical and diagnostic tool to support decision making and definition of solutions

With the available information, the energy team was able to concretize and fill in their model in the city of Valencia. Sometimes the information was very precise, and some other times the students had to make considerable extrapolations from different sources (Figure 2.6.1). As displayed in Figure 2.6.2, the result was a qualitative model which helped students understand: (1) the main types of energy currently consumed in Valencia. This analysis revealed a high rate of consumption of non-renewable energy. Secondly, the model analyzed how this energy was consumed in different sectors (private and public transport, domestic uses, services, etc.) and how different urban typologies and socio-economic profiles could be associated with different levels and patterns of consumption. In addition, the study made evident to the students the low rates of self-production and self-consumption of energy in the city. The 'emissions' component of the model disclosed the inefficacies in the energy infrastructure and the liberation of greenhouse gasses and pollutants in the city because of the use of fossil fuels. Finally, the analysis of the actors and governance system of the energy infrastructure was essential to understand the main stakeholders and frameworks involved in the functioning and future evolution of the energy infrastructure. With this information in mind, the students were able to identify the main challenges affecting the "production/consumption/emissions/actors components" of the energy system.

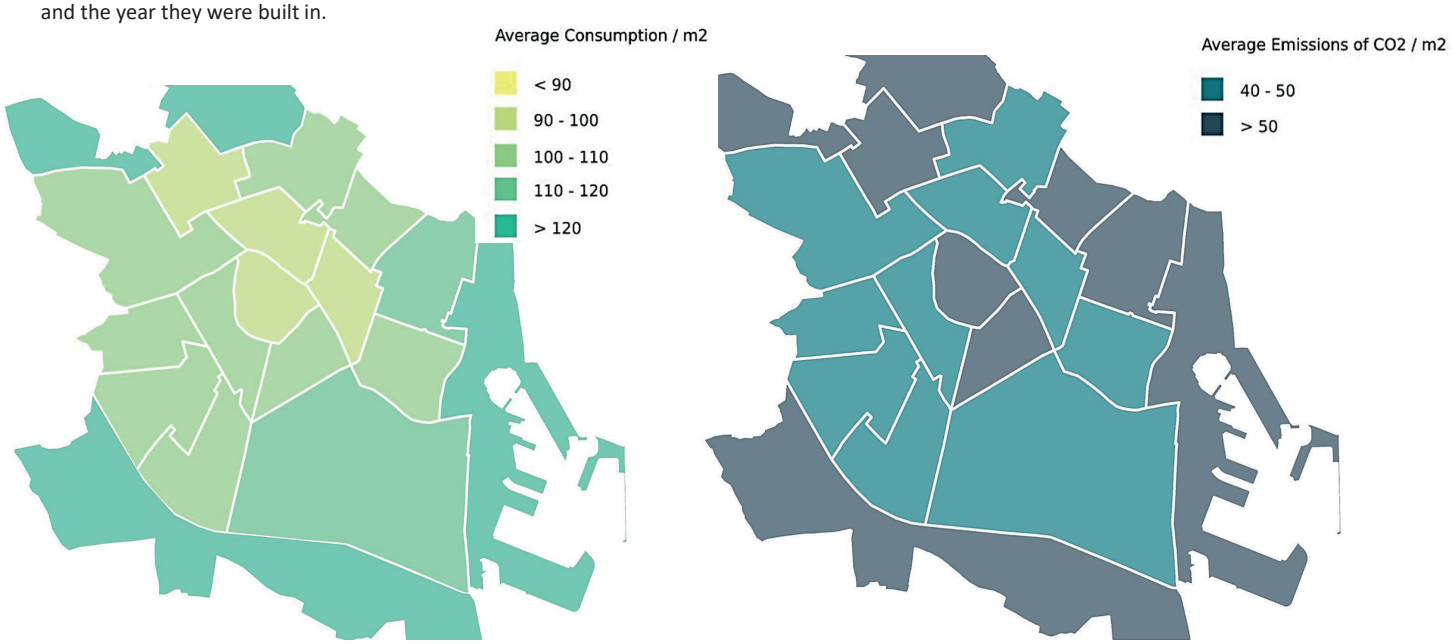
As displayed in Figure 2.6.3, the identification of actors was an important step to detect potential collaborators and resources for an energy transition in Valencia. As showed in Figure 2.6.4, the existing energy objectives and goals included in the Mission for Carbon Neutrality Valencia 2030, were also fundamental inputs to help the students align their work with the city plans.

STAGE 3: A generic toolbox for urban energy infrastructures

Based on the challenges identified in the energy model (Figure 2.6.2) and in the Carbon Neutrality Mission of the city of Valencia, the energy team proposed a more elaborated and interconnected map of challenges (Figure 2.6.5). This map was essential to define a generic toolbox (Figure 2.6.6) organized around the for components proposed in the energy model (production, consumption, emissions, and actors). The specific tools included in each sector were proposed after a second and extended analysis of the available literature. Interestingly, some of the tools were related to technical solutions, but many others were connected to changes in ways of living, urban transformations, etc. Finally, and to prepare the energy team for their interaction with other teams, the students elaborated a preliminary analysis of the potential synergies of the energy infrastructure with other urban systems (green, water, mobility, social, and housing). This step was considered crucial to activate the inter-infrastructural way of thinking that was going to be required during the face-to-face phase of the course (Figure 2.6.7). According to the course schedule, the energy team, as all the other teams, presented the results of their task1 during the first day of the onsite week in Valencia.

ENERGY CONSUMPTION AND EMISSIONS - VALENCIA PER DISTRICT

In Valencia, buildings with narrow, elongated plots and low-rise structures (1-3 floors), commonly found in *village districts*, exhibit elevated rates of consumption and CO2 emissions, attributed to their *"energy-inefficient structure ¨* and the year they were built in.



SOURCE: OWN BASED ON CARTO MAP

Figure 2.6.1. Energy consumption and emissions per district in Valencia (source: Cubel, Hamdache, Archiles Zannouti, Kannampallil, & Del Río, 2023)

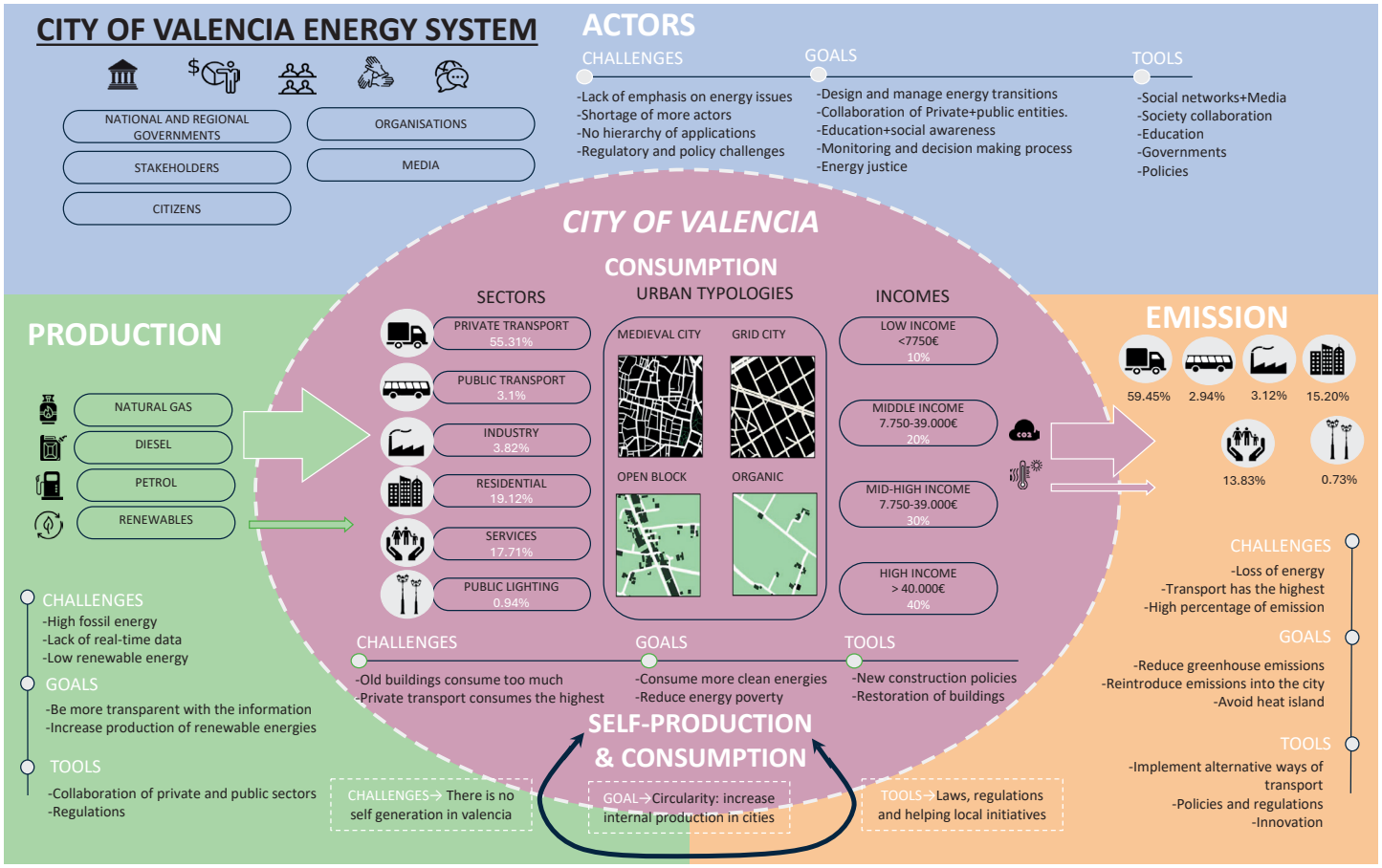


Figure 2.6.2. Energy model for the city of Valencia Valencia (source: Cubel, Hamdache, Archiles Zannouti, Kannampallil, & Del Río, 2023)

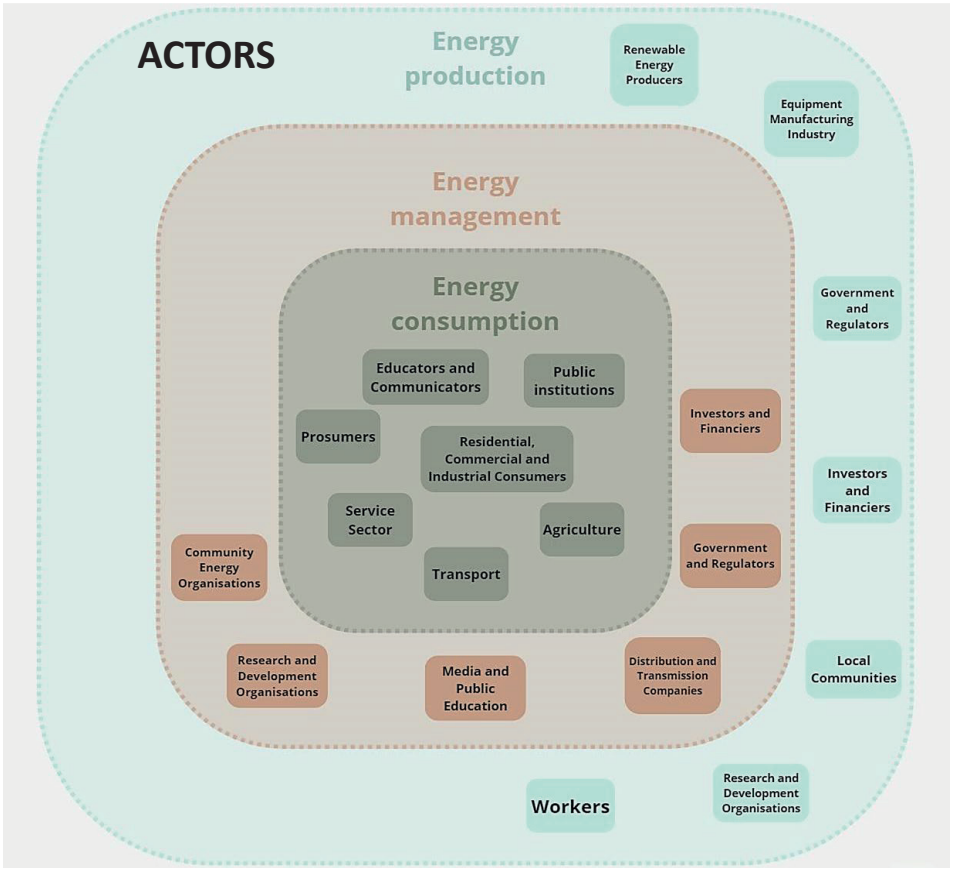


Figure 2.6.3. Main actors involved in the functioning of the energy infrastructure in Valencia Valencia (source: Cubel, Hamdache, Archiles Zannouti, Kannampallil, & Del Rio, 2023)

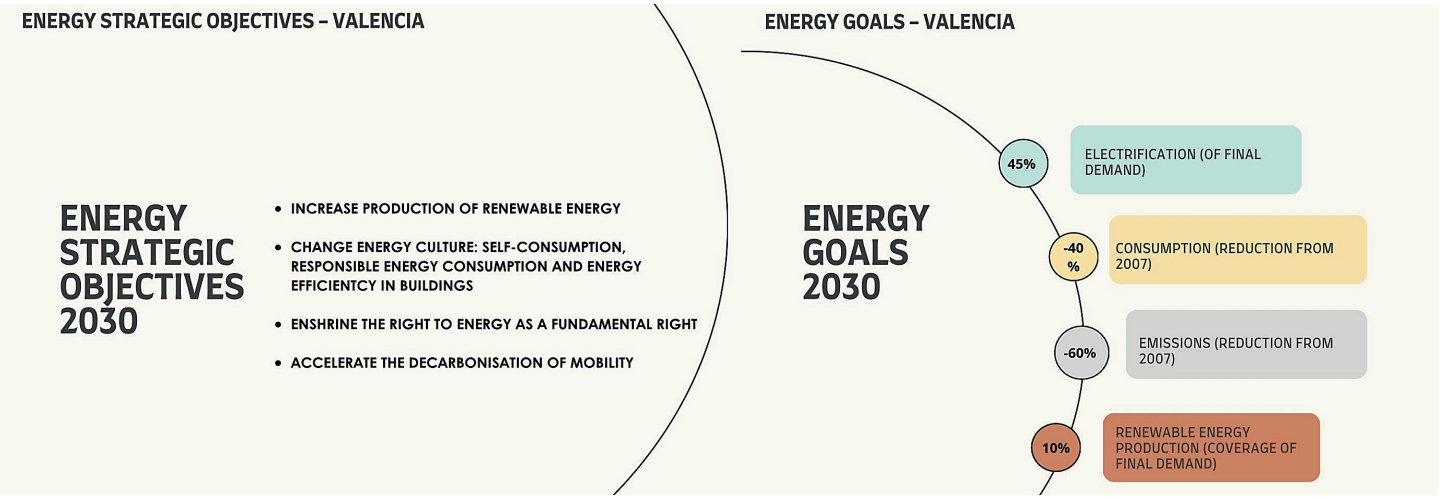


Figure 2.6.4. Main energy goals defined in the Mission for Carbon Neutrality Valencia 2030 Valencia (source: Cubel, Hamdache, Archiles Zannouti, Kannampallil, & Del Río, 2023)

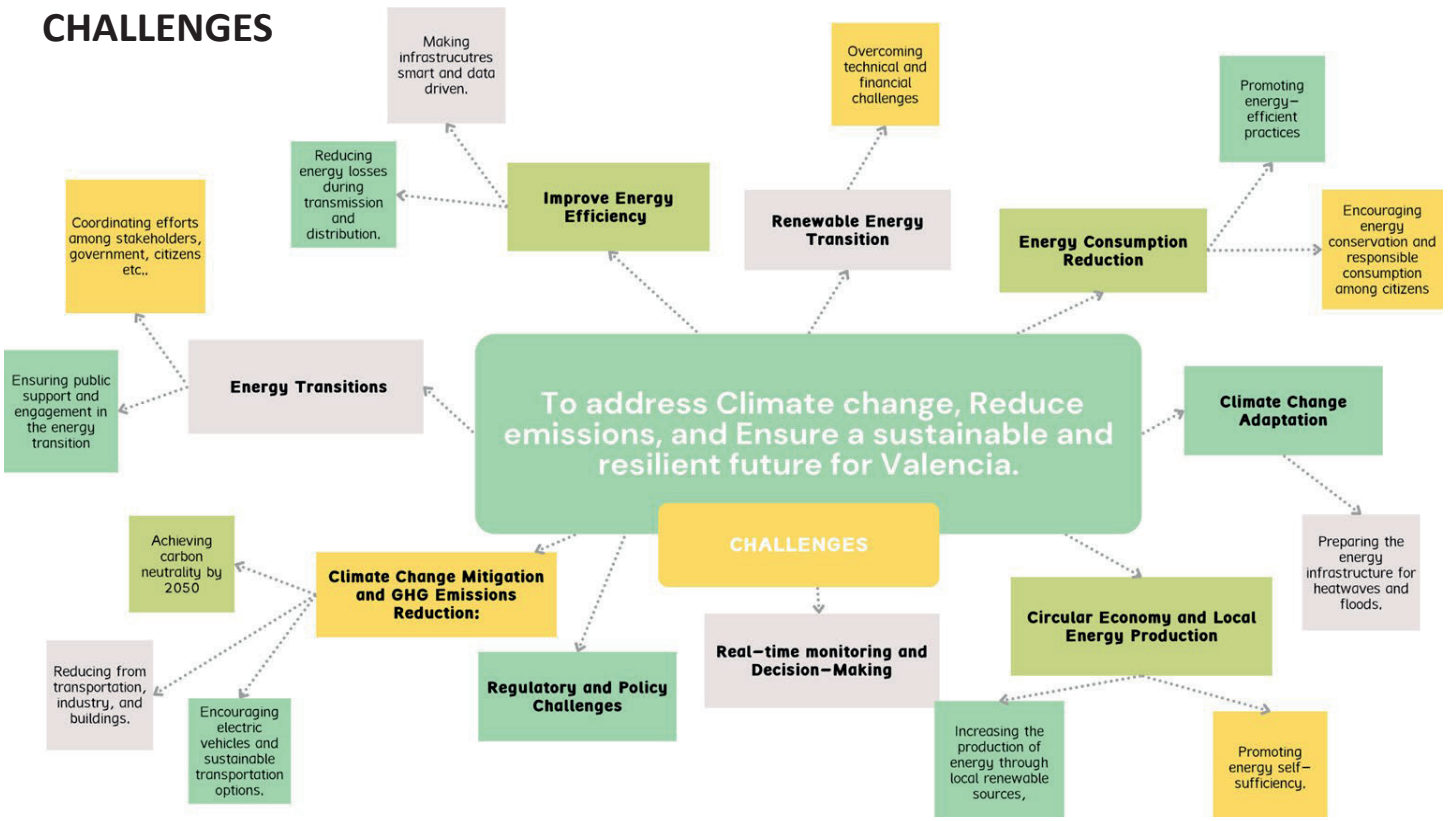


Figure 2.6.5. Main challenges affecting an energy transition in Valencia Valencia (source: Cubel, Hamdache, Archiles Zannouti, Kannampallil, & Del Río, 2023)

2.6.4. Final reflections

The conceptual model was probably the most valuable outcome and a key instrument to evolve in the development of task1. However, it was difficult to produce it due to the tendency of the students to urgently collect and combine solutions from different sources without understanding the real functioning of the whole energy infrastructure. In this regard, the conceptual model was essential to structure the analysis, to identify and understand the magnitude of the challenges and potentials (diagnosis), and to select the solutions in answer to the analysis and diagnosis. Moreover, the model was especially useful to promote a genuine Challenge/Problem Based Learning process grounded in a real understanding of the addressed system (energy system in this case). Moreover, considering the time given and that the energy infrastructure was not very familiar for any student, the students were able to qualitatively identify the key issues affecting urban energy infrastructures and to get some basic data to support evidence-based decisions.

Finally, regarding the online work, it was a observed a tendency in the students to work individually by subdividing or compartmentalizing their work. This prevents a real interaction between students and makes it necessary to create the right conditions to promote formal (tutored sessions) and informal (workshop sessions self-organized by the students) interaction between all the members of the group.

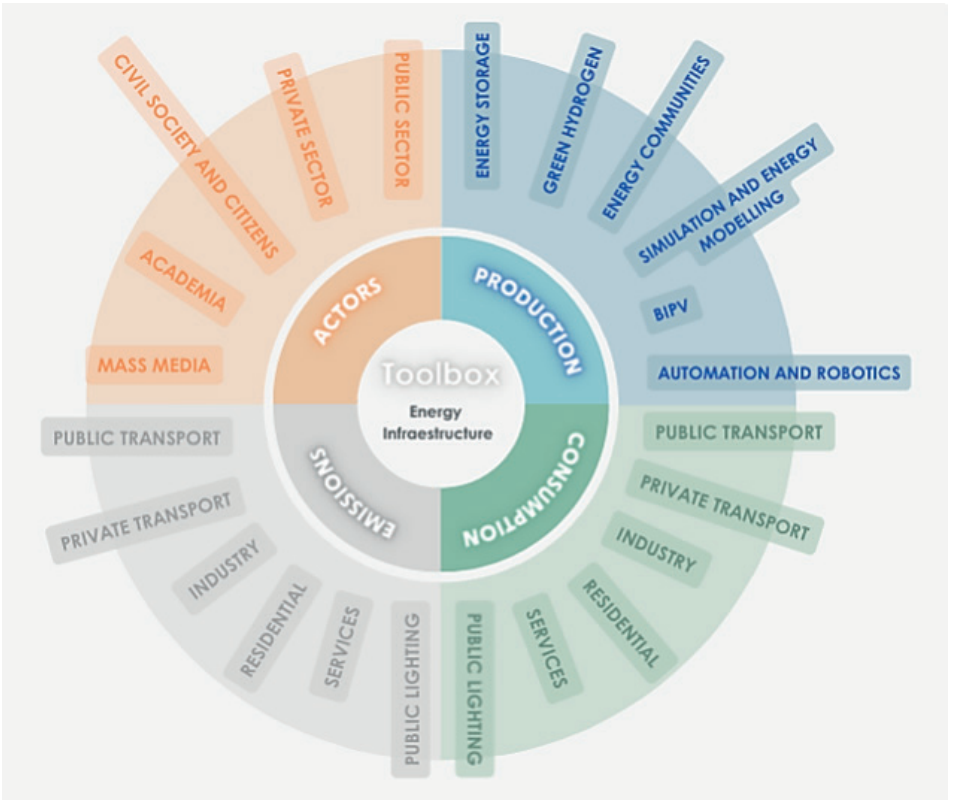


Figure 2.6.6. Generic Toolbox for an energy transition in Valencia Valencia (source: Cubel, Hamdache, Archiles Zannouti, Kannampallil, & Del Río, 2023)

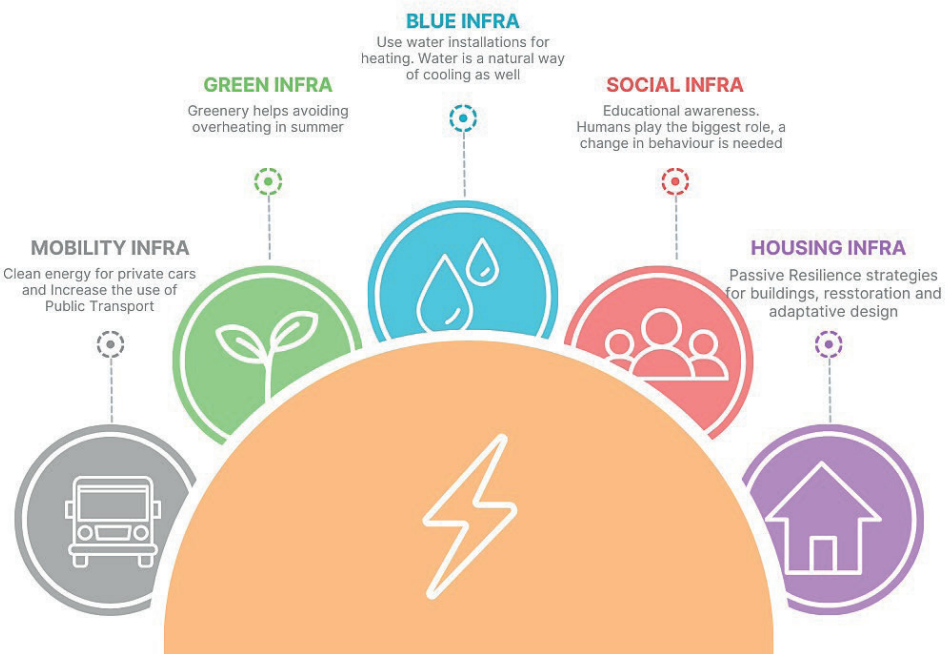


Figure 2.6.7. Preliminary identification of synergies with other urban infrastructure Valencia (source: Cubel, Hamdache, Archiles Zannouti, Kannampallil, & Del Río, 2023)

REFERENCES

Ferrão, P., & Fernandez, J. E. (2013). *Sustainable urban metabolism*. Cambridge, MA: MIT Press

Foster, R. (1997). Cities for a small planet. London: Faber & Faber

Galan, J. & Perrotti, D. (2019). Incorporating Metabolic Thinking into Regional Planning: The Case of the Sierra Calderona Strategic Plan. *Urban Planning* 4(1)

2 SYNERGY METHODS & TOOLS IN URBAN PLANNING

3.1_SYNERGY TOOLS: DETECTING, ASSESSING, AND INCREASING SYNERGIES BETWEEN URBAN INFRASTRUCTURES

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3.1.1. Introduction

The VLC_Summer School aimed to explore a critical issue in urban planning education: How can we promote integrative thinking and practice in an increasingly specialized world? To address this issue, it was decided to create a conceptual and operational framework inviting the students to explore connections between different urban infrastructures (or systems) and, later , to use those connections to support their planning and decision-making processes.

During the VLC_Summer School, the concept used to promote integrative and relational thinking in urban planning was that of synergies, understood as the expanded benefits (1+1=3) that can be obtained by working together with two or more urban infrastructures (green, blue, mobility, social, housing, and energy in this specific case). Synergies were therefore associated with win-win solutions or positive correlations. They were never intended to be a planning method but a tool or instrument to improve the planning process by thinking simultaneously about different urban systems.

The procedure to design such a synergy-oriented tool (or synergy-meter) and its final form was left to each team. Most of them decided to start by identifying good performance indicators for each urban infrastructure, and in a second stage, to analyze their dual interactions through matrices or their multiple interactions through more multidimensional diagrams (e.g. network diagrams). The exercise was conducted using both qualitative and quantitative indicators for each urban infrastructure and their interactions. During the process, the students could discover positive correlations or connections between urban infrastructures and apply this knowledge to propose different types of (spatial) actions. Interestingly, many teams concluded that, to operate in an integrative way with synergies, it was necessary to formulate new types of crosscutting indicators combining aspects relevant to several infrastructures.

During the third and last task, the students used their synergic model or synergy-meter to support the definition of a spatial strategy for the sustainable evolution of the pilot site. The interest and value of the spatial strategies proposed by each team were assessed according to their capacity to generate synergies between their green, blue, energy, mobility, social and housing infrastructures.

The post-course analysis of the synergy-based methods proposed by the students was conducted in an online seminar on the 22nd of February, 2024. The seminar was attended by the following tutors and teachers of the VLC_Summer School: Stefano Salata (Politecnico di Milano), Fabio Bayro Kaiser and Christian Larisch (RWTH Aachen University), Mrudhula Koshy (Norwegian University of Science and Technology), Maciej Lasocki and Kinga Zinowiec-Cieplik (Warsaw University of Technology), and Luis Bosch and Julia Deltoro (Polytechnic University of Valencia). The seminar was organized and facilitated by Juanjo Galan Vivas (Polytechnic University of Valencia) and was also attended by Martina Schretzenmayr (ETHZurich) as an external observer.

3.1.2. Synergic methods for planning proposed by the students

Team1

In contrast to other teams, team 1 followed an inductive method to identify potential synergies between urban infrastructures. For that purpose, they started analyzing and mapping synergies within the pilot site (Figure 3.1.1). These synergies were analyzed more in detail through a matrix and through a series of spider webs linking each urban infrastructure with the others (see Figure 3.1.2). Later on, a set of six super-synergies was distilled and used as a connector between the goals defined by the team for the site and their design strategies (Figure 3.1.3). These six super strategies were associated with quantitative and qualitative indicators that were then used to evaluate the quality of the proposed spatial plan (Figure 3.1.4).

In the post-course seminar organized by the tutors to analyze the results of the Summer School it was raised the difficulties that the students from Team 1 found in conceptualizing and operationalizing the synergy concept and the importance that the definition of hyper or super synergies had to making the synergy-tool more manageable during the planning process. Besides, the use of maps and the location of the interactions between infrastructures in the pilot site were helpful for the students in connecting the synergy concept with a physical reality. Interestingly, this approach led to an 'inductive' approach in which mainly the positive interactions that were intuitively detected on the site were incorporated into the list of synergies. During the post-course seminar, it was also indicated the importance of some graphic tools (e.g. spider graphs) to visualize and synthesize information. In the same line of thought, the freedom to explore visual tools was also highlighted by different tutors as one of the main strengths of the course since it facilitated the development of relational and integrative skills. During the seminar, it was also commented that a preliminary definition by the students of a clearer work process could facilitate the workflow (critical in such an intensive course) and guarantee a stronger connection between inputs (synergies) and outputs (spatial proposals).

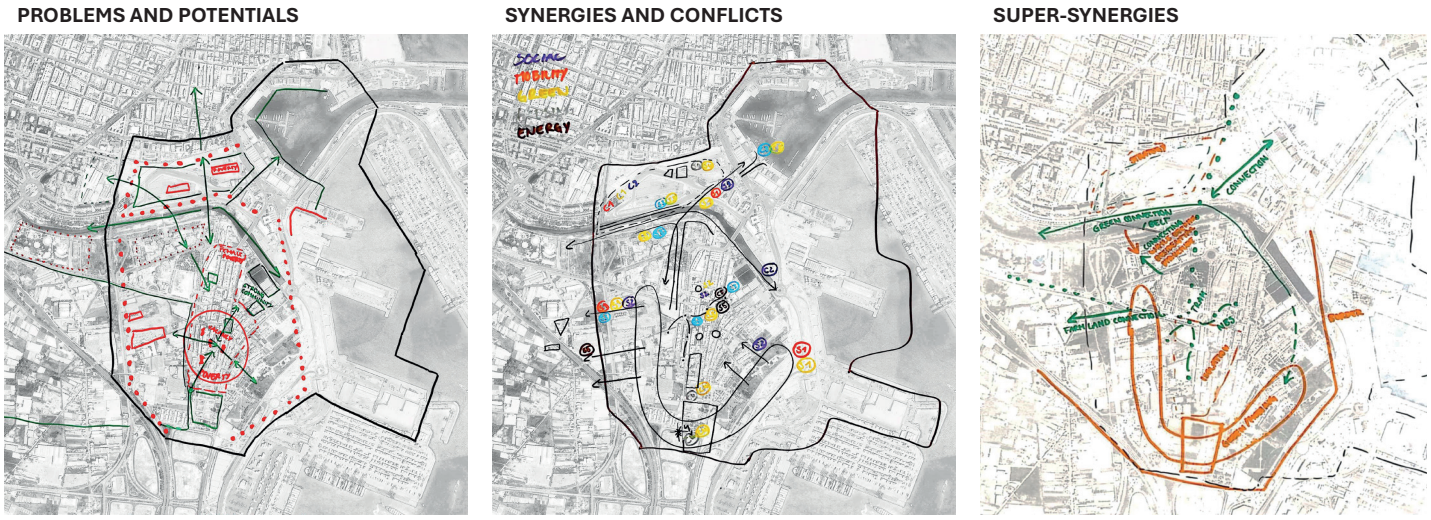


Figure 3.1.1. Preliminary maps locating existing problems, potentials, synergies, and conflicts (source Team1: Berner, Szymanski, Rameika, Schulz, Kannampallil, Zhu, 2023)

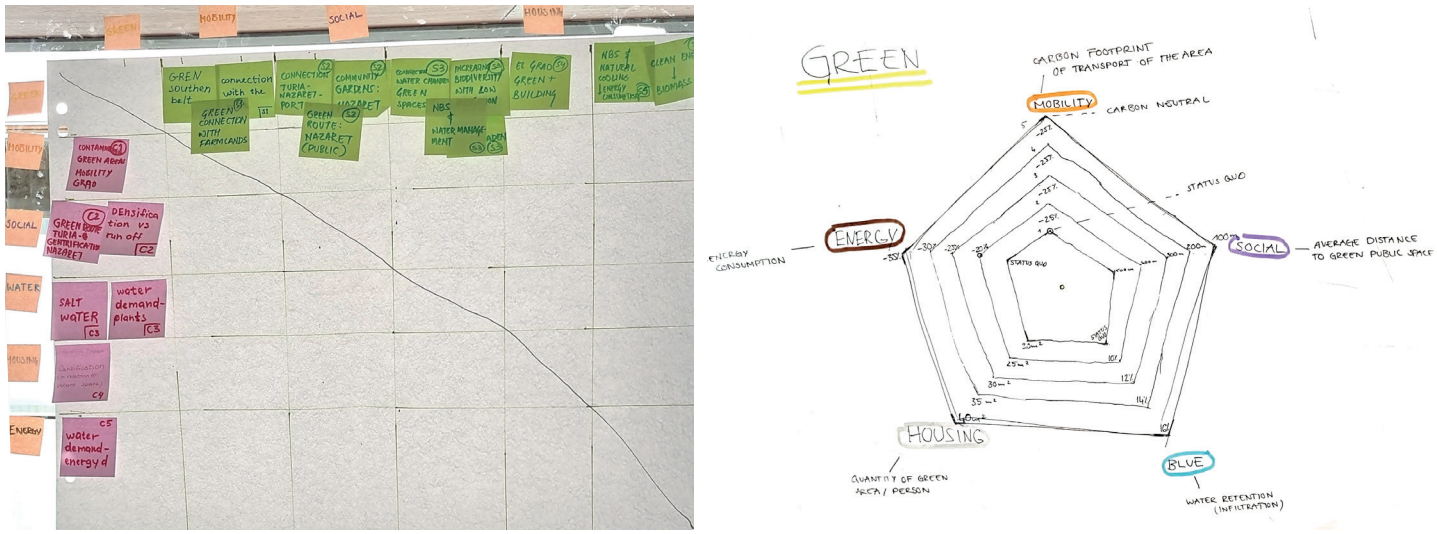


Figure 3.1.2. Matrix and spider graph to identify synergies between urban infrastructures and to propose synergy indicators (source Team1: Berner, Szymanski, Rameika, Schulz, Kannampallil, Zhu, 2023)

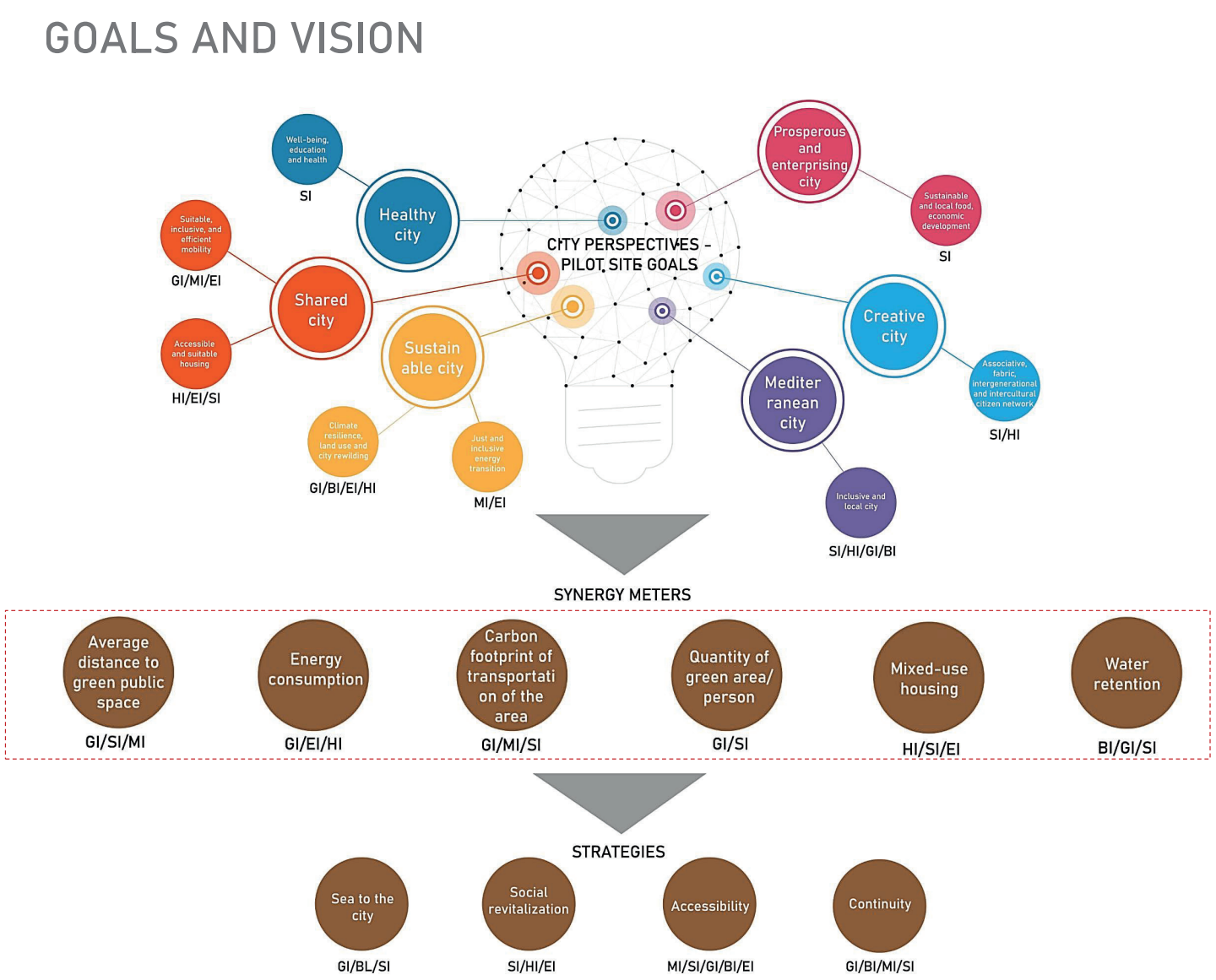


Figure 3.1.3. Definition of six key synergies and a synergy-meter as a bridge between the planning goals proposed by the team and their planning strategies for the site (source Team1: Berner, Szymanski, Rameika, Schulz, Kannampallil, Zhu, 2023)

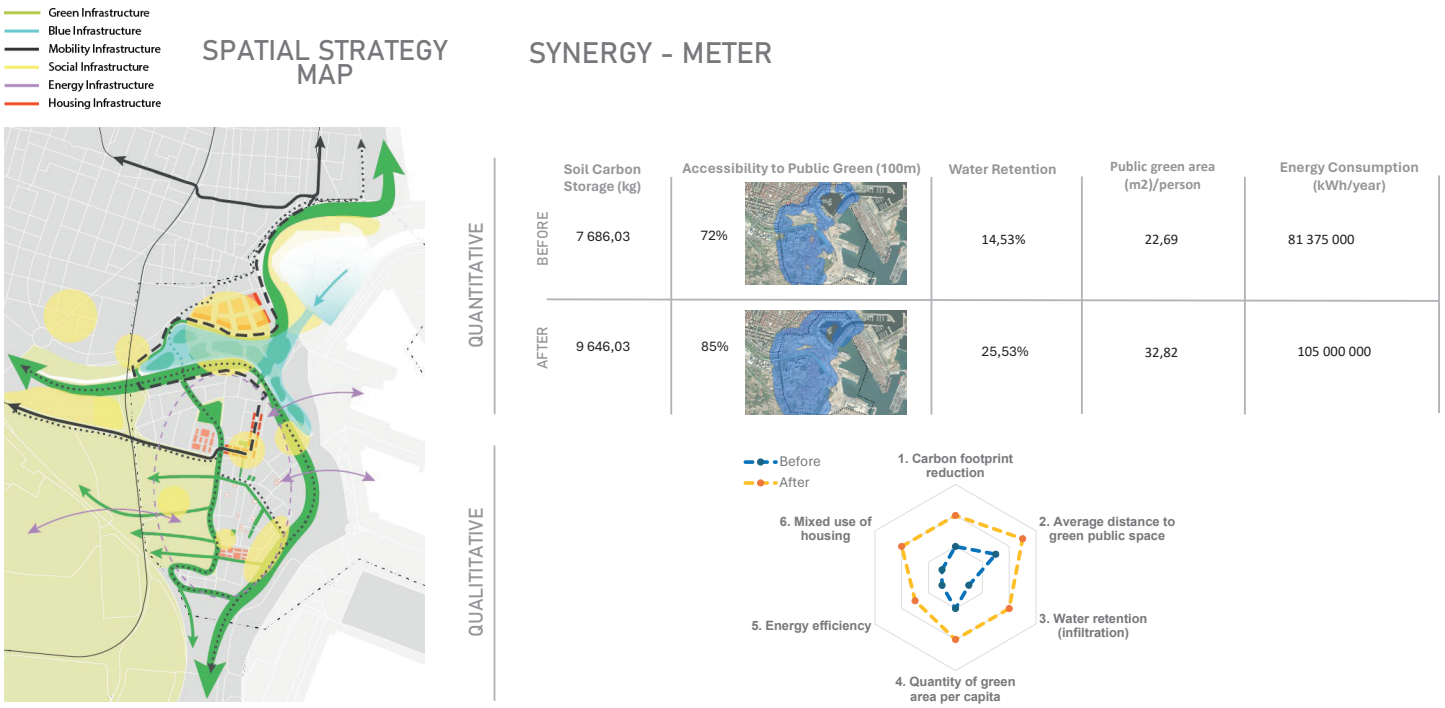


Figure 3.1.4. Use of the proposed synergy meter to assess the increase of synergies in the proposed spatial plan/strategy (source Team 1: Berner, Szymanski, Rameika, Schulz, Kannampallil, Zhu, 2023)

Team 2

Team 2 initiated the definition of their synergy tool by detecting binary or dual synergies and conflicts between the six addressed urban infrastructures with a matrix (Figure 3.1.5). The analysis of synergies was then expanded to multiple infrastructures through a network diagram (Figure 3.1.6). In order to create a more operational tool to inform the planning process, the synergies were synthetized in seven super or supra strategies (Figure 3.1.7) which were then applied to develop and evaluate a masterplan for the pilot site (Figure 3.1.8).

The collective analysis of the work developed by Team2 revealed how important the distillation of super-synergies was also for this team and how critical was for them to transform the synergies into crosscutting and operational planning strategies. Somehow, this distillation implied a certain risk of oversimplification and also revealed the difficulties in finding (or defining) in such a short time adequate indicators to measure and monitor the proposed synergies and strategies. Also in this case, the students made an productive attempt to understand the spatial dimension of the synergies (before and after their proposals).

Figure 3.1.5. Matrix displaying generic synergies and conflicts between the urban infrastructures addressed in the course (Source Team 2: Kambur, Fosshagen, Polyakov, Zannouti, & Fast, 2023)

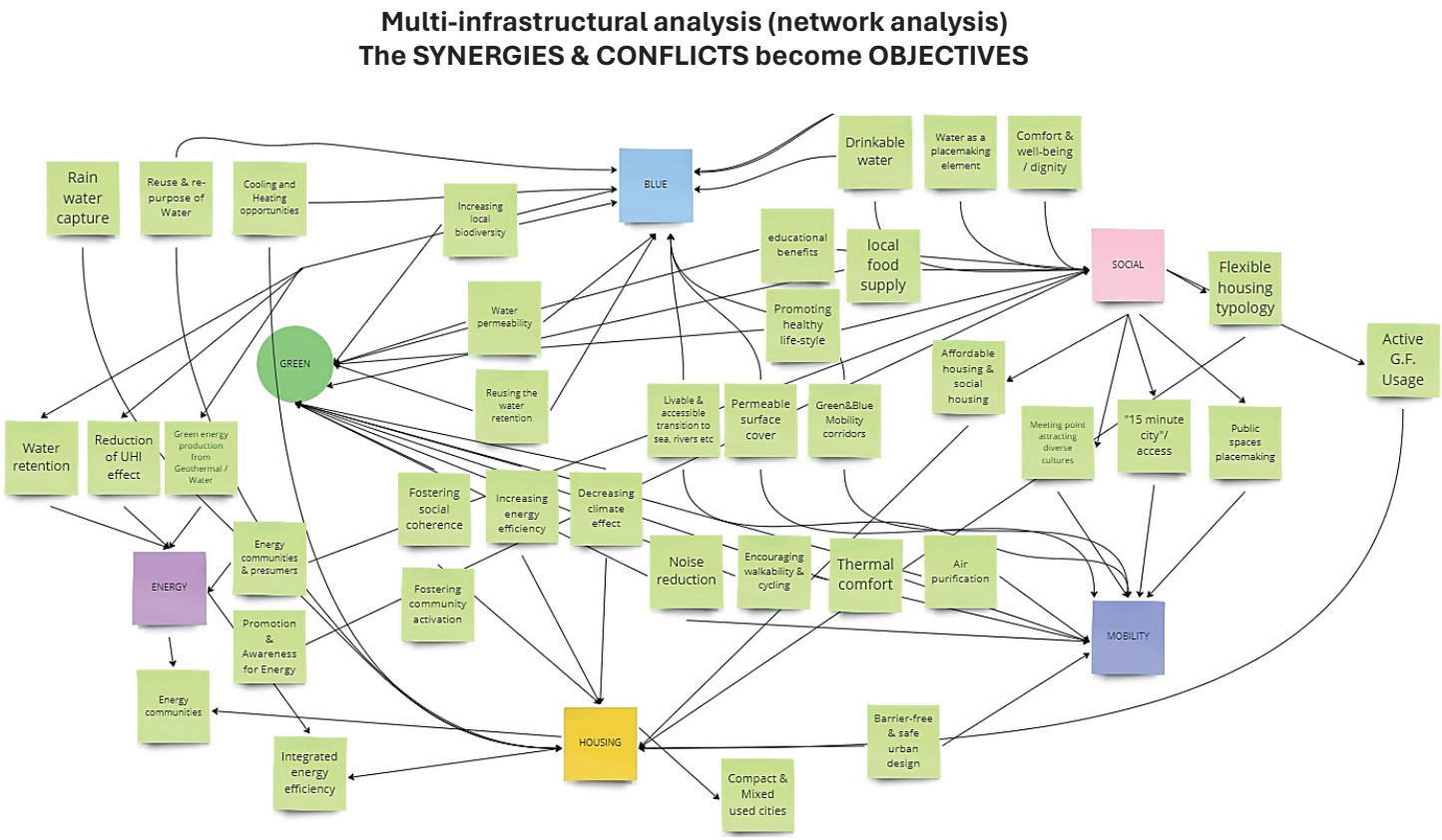


Figure 3.1.6. Network graph displaying generic synergies between the urban infrastructures addressed in the course (Source Team 2: Kambur, Fosshagen, Polyakov, Zannouti, & Fast, 2023)

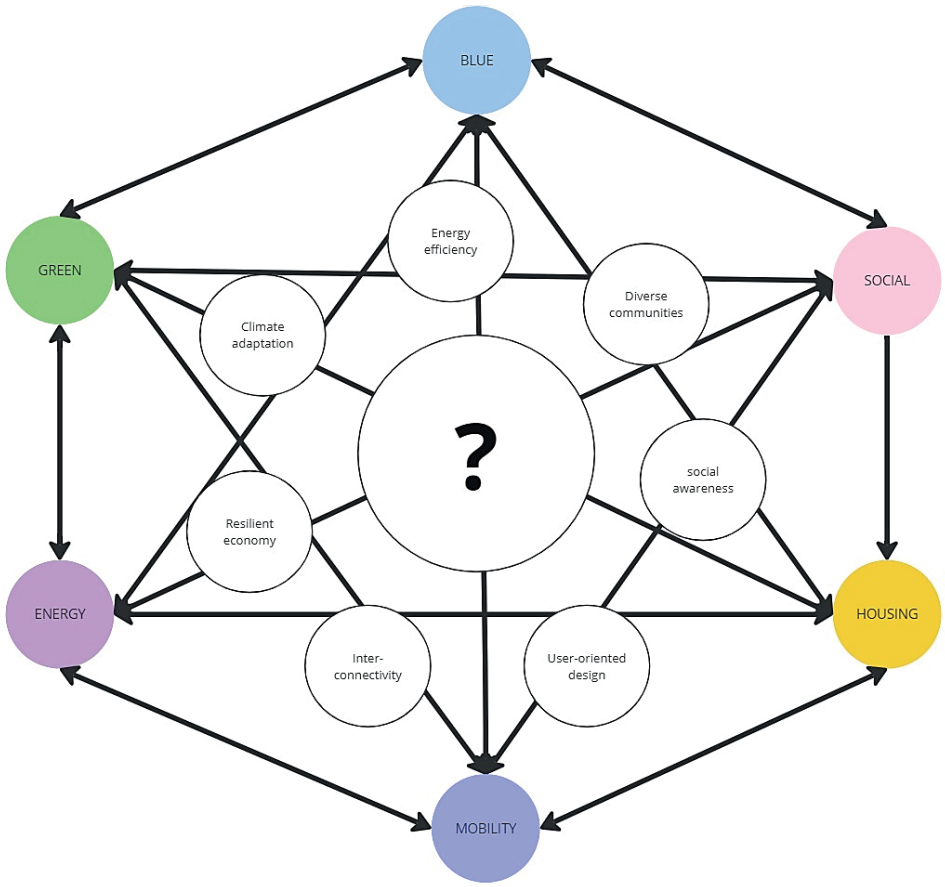


Figure 3.1.7. Definition of seven super synergies connecting all the addressed urban infrastructures (green, blue, social, housing, mobility, and energy) (Source Team 2: Kambur, Fosshagen, Polyakova, Zannouti, & Fast, 2023)

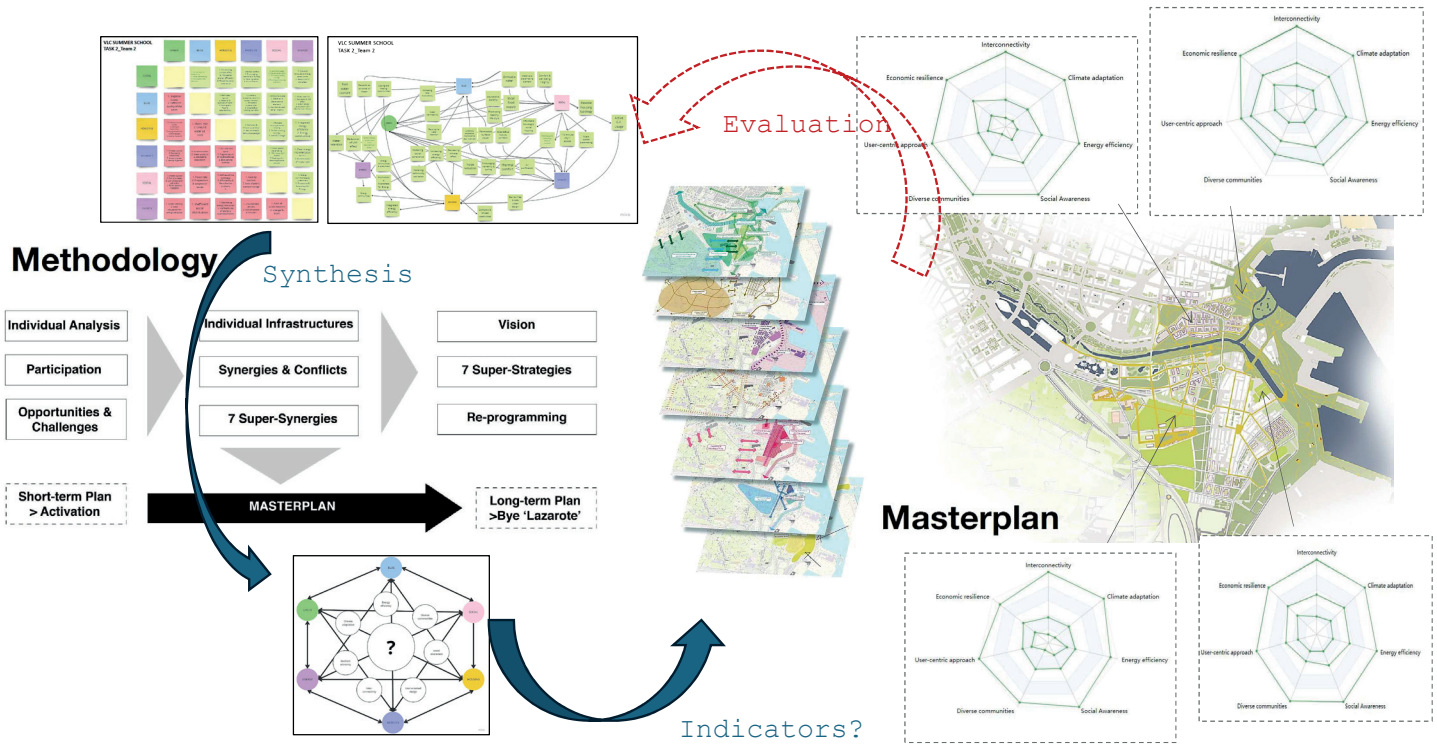
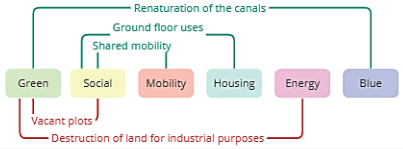
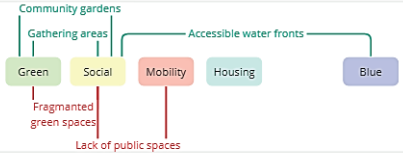


Figure 3.1.8. Diagram showing the whole process followed by Team 2 for the definition and use of a synergy-meter (source: Juanjo Galan based on the work of Team2)

Team 3

Following a goal-oriented approach, Team 3 started their work assuming the 10 goals defined in the official Strategy 2030 of Valencia and detecting with a matrix, in a different process, the main synergies and conflicts between the studied urban infrastructures. The students added an extra goal (#11) related to the reduction of Greenhouse gasses. As displayed in Figure 3.1.9, the students analyzed which infrastructures and which synergies or conflicts between them could be related with each Valencian Goal. The students worked with different pairs of infrastructures and proposed some quantitative and indicators to measure the potential synergies. In a second step, Team 3 clustered the main goals into five overarching goals which were used to advance in the development of the Spatial Strategy for the pilot site. As displayed in Figure 3.1.10 the level of achievement of these five overarching goals was evaluated using the synergy indicators by comparing the 'before' and 'after' situation.

As commented by some tutors in the post-course seminar, the work from Team3 displays a highly theoretical and methodological approach to the use of synergies in planning. This approach was based on a 'deductive' procedure in which the potential synergies were initially theorized and then were tested and identified in the pilot site. The work also reveals a strong connection with the online phase of the course in which each student of the team studied a different infrastructure and in which they got familiar with the official strategies and plans of the city of Valencia. It was particularly interesting to see how the team3 organized their work around the ten goals of the Valencia 2030 Strategy, how they assumed the Valencian Mission for Carbon. Neutrality as an additional goal, and how each team member contributed with a specific field of expertise.

Sr. No.	Valencia Goals Strategy 2030	Urban Infrastructures	Quantitative Indicators	Qualitative Indicators
1	Land-use planning and rational land use, conservation and protection		1. **Ground Floor Utilization Rate** 2. **Canal Renaturation Length**	1. social equity 2. Social inclusivity 3. cultural and recreational impacts
2	Promoting social cohesion and seeking equity		1. Length of waterfront (in km) 2. Ratio of open spaces per capita 3. No. of Gathering spaces for social activities	1. Safety and Comfort 2. Accessibility 3. Social interaction
3	Avoid urban sprawl and revitalize the existing city			
4	Promoting and fostering Urban Economy			

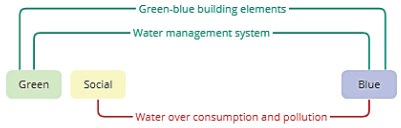
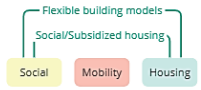
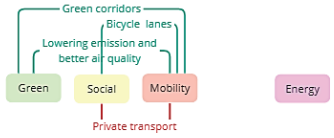
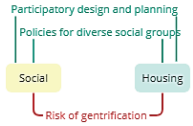
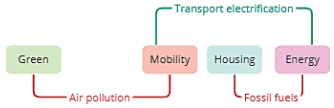
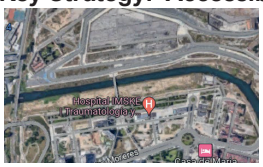
Sr. No.	Valencia Goals Strategy 2030	Urban Infrastructures	Quantitative Indicators	Qualitative Indicators
5	Preventing and reducing the effects of climate change and improving resilience		• The amount of water that is reused in litres • No. of green buildings infrastructures • Efficiency of green building infrastructures	1. **Perceptions of water quality** 2. **Resilience and flooding** 3. **health and well-being**
6	Ensuring access to housing		• How many new housing spaces are provided • Number of social housings available	1. **Affordability** 2. **living comfort**
7	Sustainable resource production/management and fostering circular economy		• Amount of energy that is produced in kW/h • The amount of water that is saved in litres	• Residents satisfaction about resources/ economy savings
8	Leading and fostering digital innovation			
9	Promoting proximity and sustainable mobility		• The amount of travel time saved by creating new communications • Percentages of green corridors • Length of bicycle lanes	• Accessibility to public transportation
10	Improving intervention tools and governance		• Level of participation • Creation of accurate policies	
11	GHGs reduction & Carbon Neutrality		1. GHG Emissions in million tonnes CO2e 2. Miles driven by vehicles 3. Fuel consumption by vehicles Litres/ KM	1. Impact on local economy 2. Perceived air quality 3. Public awareness

Figure 3.1.9. Goals of the Valencian Strategy 2030, urban infrastructures and synergies contributing to the achievement of the goals, qualitative and quantitative indicators (source Team 3: Urbaniak, Ucar, Gadkar, Dinh, Hamdache, & Anand, 2023)

Goal: Improve Social Life

Area: El Grau-Moreras

Key Strategy: Accessibility of Waterfront

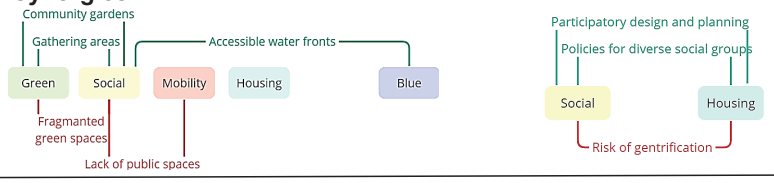


Goals: 2 10

Promoting social cohesion and seeking equity

Improving intervention tools and governance

Synergies:



Before:

Synergy:

Quantitative Indicators:

1.Length of accessible waterfront (in km)	10%
2.Ratio of open spaces per capita	3sqm
3.No. of Gathering spaces for social activities	xx for 5Ha

Qualitative Indicators:

1.Safety and Comfort
2.Accessibility
3.Social interaction

After:

Synergy Potential:

Quantitative Indicators:

1.Length of waterfront (in km)	60%
2.Ratio of open spaces per capita	10sqm
3.No. of Gathering spaces for social activities	xx for 5Ha

Qualitative Indicators:

1.Safety and Comfort
2.Accessibility
3.Social interaction

Figure 3.1.10. Synergies between indicators in one of the key strategies (Accessibility of Waterfront) proposed by the team3. Comparison of the situation 'now' and 'after' the implementation of the proposed spatial plan (source Team3: Urbaniak, Ucar, Gadkar, Dinh, Hamdache, & Anand, 2023)

Team 4

Team 4 started their enquiry by brainstorming potential synergies and conflicts between all the urban infrastructures studied in the course (see Figure 3.1.11). In the second step, this information was synthesized by defining more operational indicators for each infrastructure, identifying more evident synergies, and mapping existing synergies in the pilot site (see Figure 3.1.12). The students used this information to develop their spatial strategy or master plan, although the proposed spatial strategy was not evaluated or mapped with the proposed synergy tool.

An analysis of the work developed by team 4 reveals that the definition and use of maps during the analytical phase could be crucial to spatializing ideas and creating a bridge between conceptual diagrams and tangible proposals. This tendency was foreseeable in a course where more than 50% of the students had an architectural or planning background. In addition, it was observed that, in this case, the connection between the list of potential synergies and the final proposal was not explicitly presented. In this regard, it was agreed that the initial definition (and diagrammatic representation) of a clear method can help students to organize their work more effectively and to keep a stronger connection between the analytical and the propositive phase.

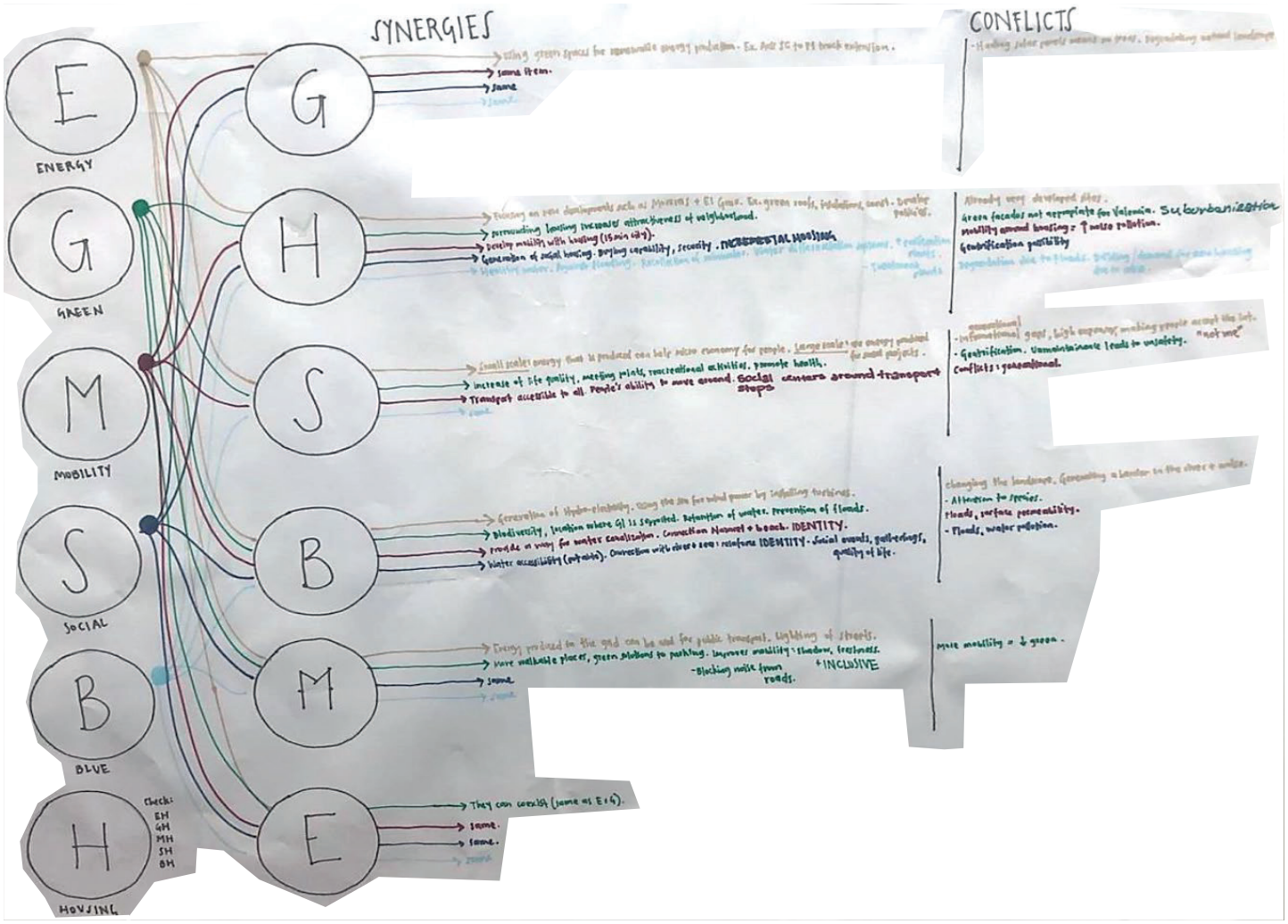


Figure 3.1.11. Synergies and Conflicts between all the infrastructures addressed in the VLC_Summer School (source Team 4: Sutkowska, Farkas, Valarezo, Cubel, & Roze, 2023)

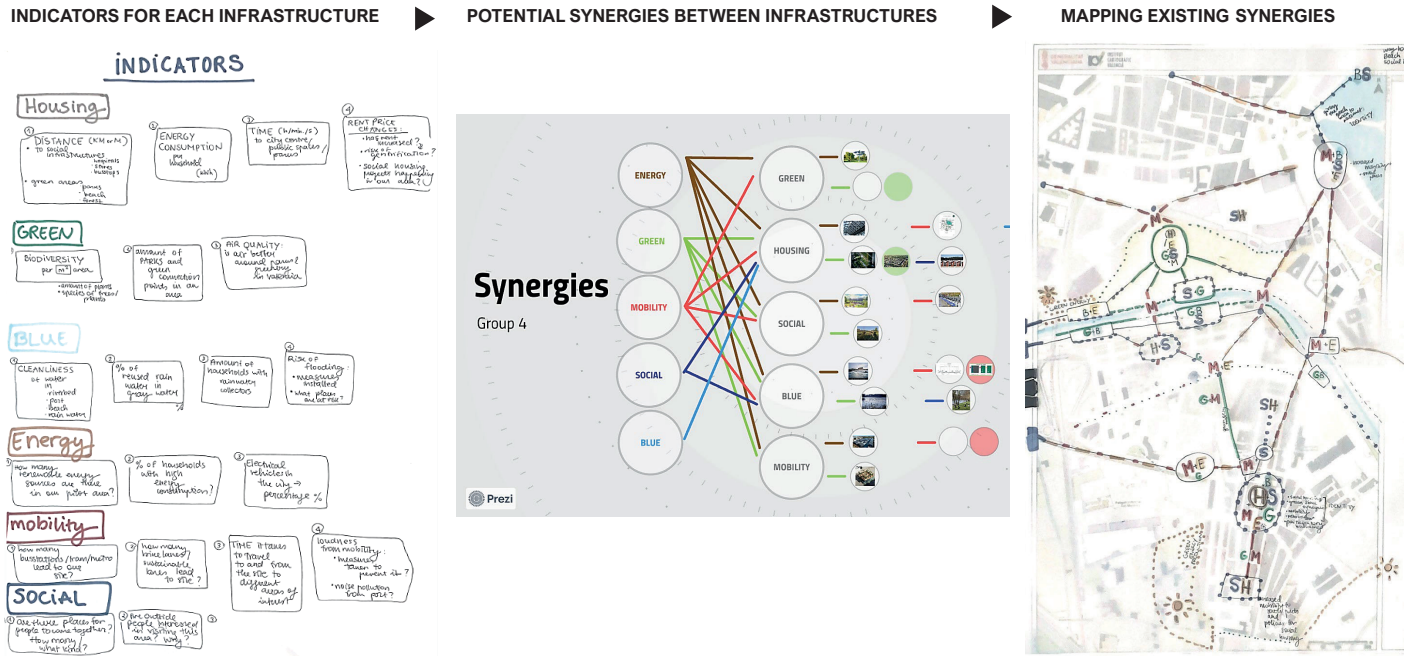


Figure 3.1.12. Indicators for each urban infrastructure, potential synergies between infrastructures and map with existing synergies in the pilot site (source Team 4: Sutkowska, Farkas, Valarezo, Cubel, & Roze, 2023)

Team 5

Following a general trend in the course, team5 moved from the identification of dual connections between pairs of infrastructures to multi-dimensional connections between all the studied infrastructures (see Figure 3.1.13). As displayed in Figure 3.1.14, in a second step, the students defined an overarching goal for the site based on social, spatial, and ecological connection and six synergy generators involving the combined use of different urban infrastructures. These synergy generators were conceived as broad actions or objectives to achieve the overarching goal. In the final step, team5 proposed a spatial strategy based on the use of synergy generators. This spatial strategy was evaluated in different subzones with a circular synergy-meter in which the short and long term of the synergies was estimated (see Figure 3.1.15).

During the post-course seminar, several tutors underlined the high level of conceptualization and abstraction in the process followed by Team5 and the importance of the visual tools that they used to explore and display connections between urban infrastructures. Despite the shortage of time, the final proposal was explicitly informed by the search of synergies and the application of the synergy generators revealed different potentials in different sectors of the pilot site. Interestingly, the initial definition of the 'synergy' concept and its utility in planning paved the way for the work to be developed by team 5. In addition, the exploration of the short- and long-term effect of synergies, added a temporal dimension to their work.

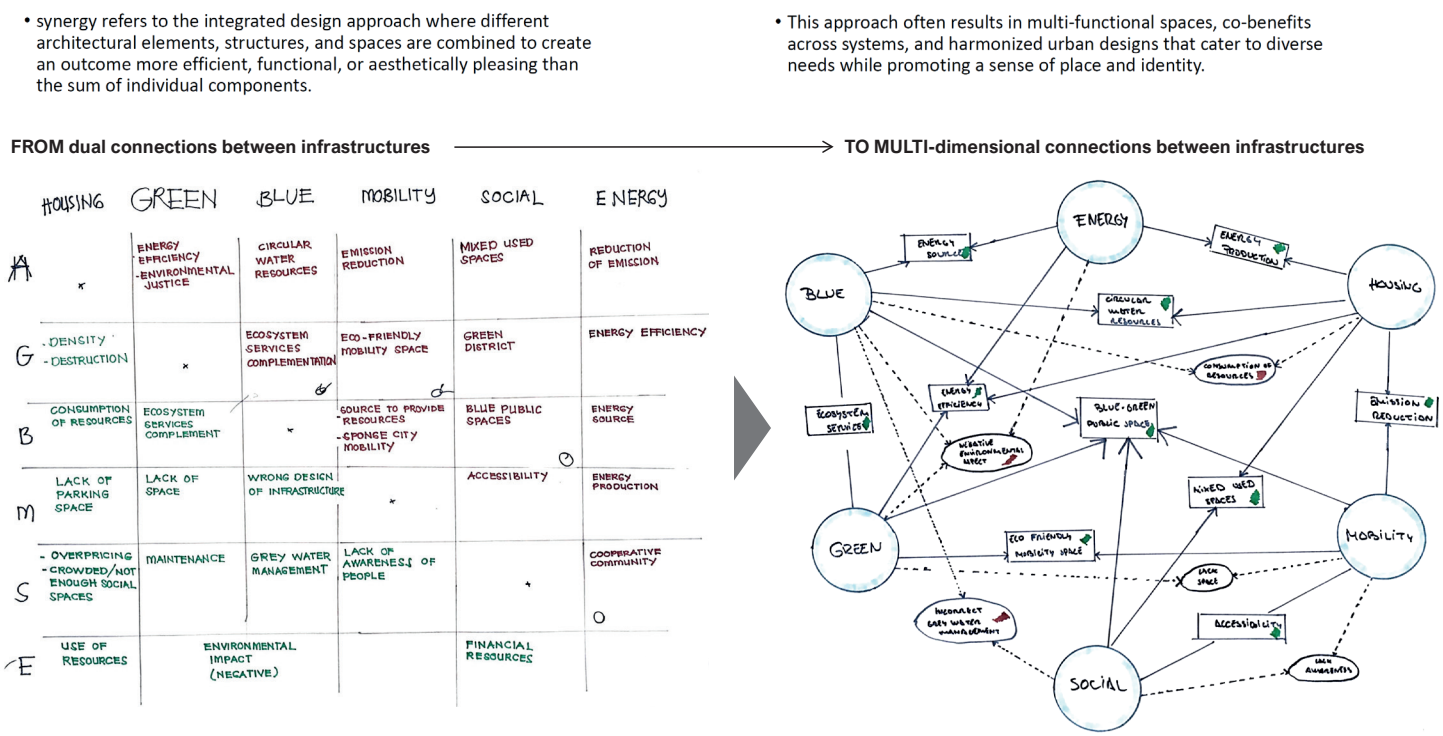


Figure 3.1.13. Defining the synergy concept and Understanding connections between urban infrastructures (source: Team 5: Archiles, Trobbiani, Gerwenat. Hoppenstedt. Posadas. & Szabra, 2023)

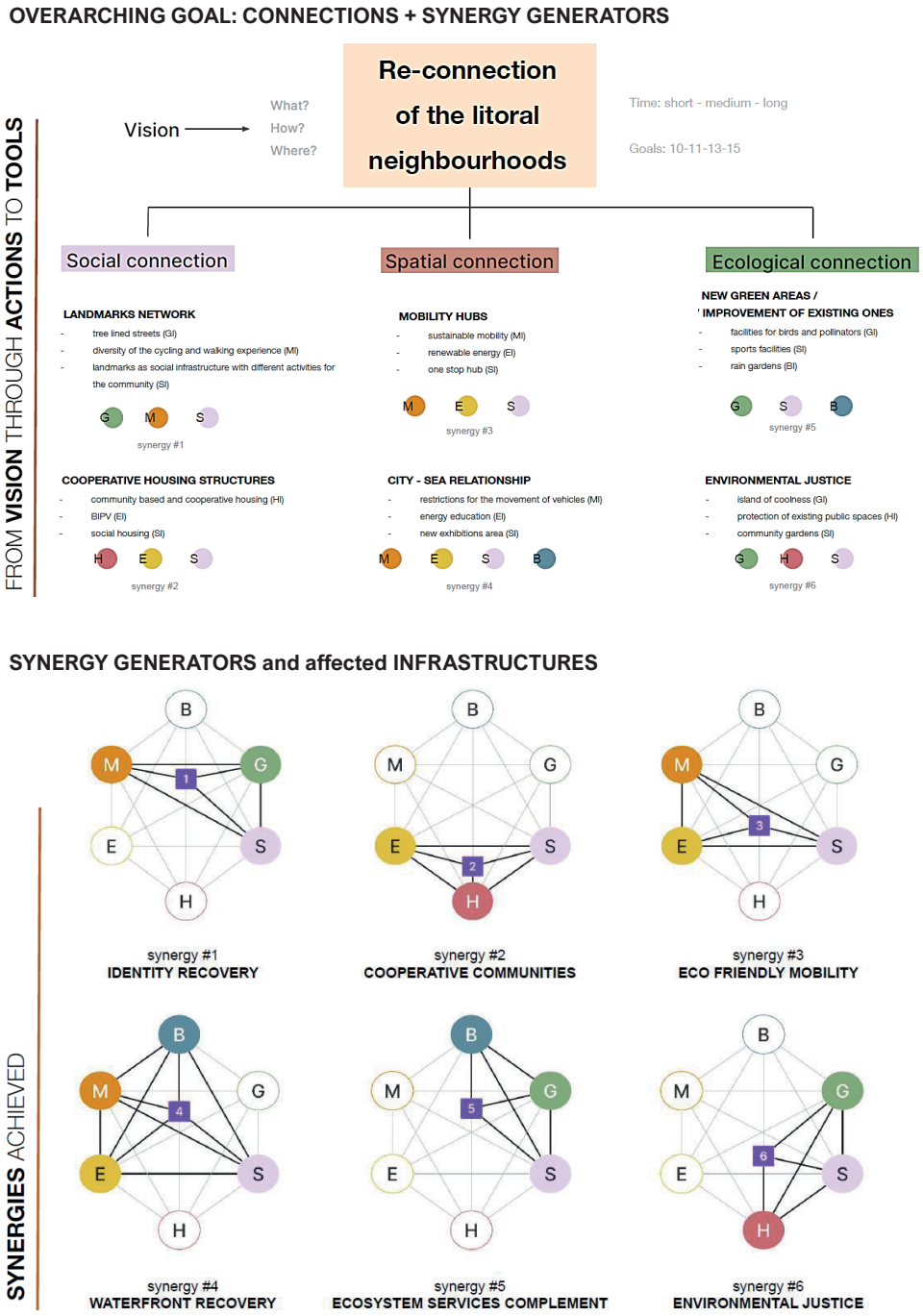


Figure 3.1.14. Overarching goal (connections) and Synergy Generators (source: Team 5: Archiles, Trobbiani, Gerwenat, Hoppenstedt. Posadas, & Szabra, 2023)

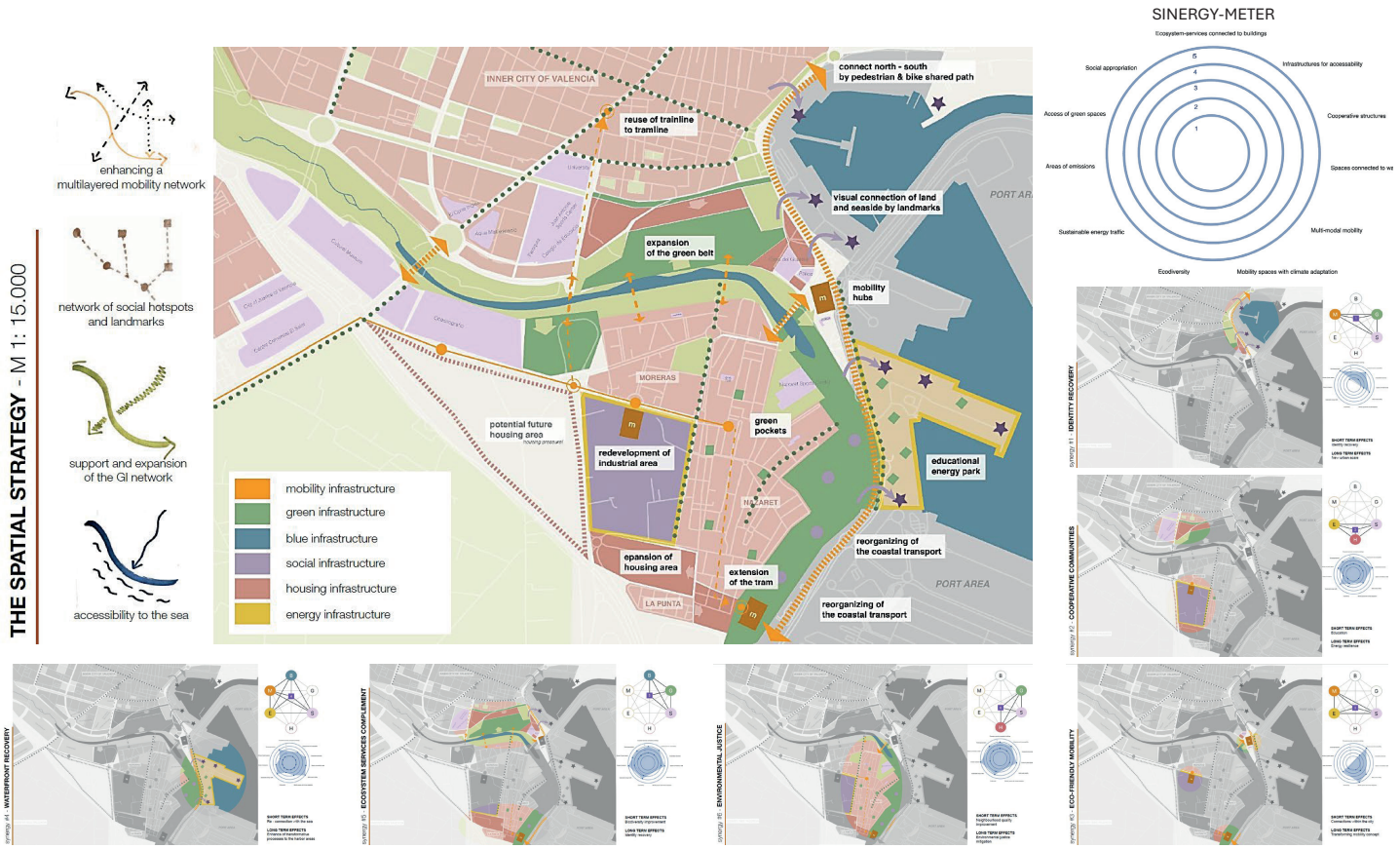


Figure 3.1.15. Spatial strategy, synergy-meter (top-right corner) and maps displaying the synergies generated through the 6 synergy-generators (small maps) (source: Team 5: Archiles, Trobbiani, Gerwenat. Hoppenstedt, Posadas, & Szabra, 2023)

Team 6

The identification by Team6 of potential synergies between different urban infrastructures was activated through the use of different network diagrams and matrices (see Figure 3.1.16). In a second step and in order to develop a more operational tool, the students decided to associate each binary connection between two infrastructures with a single concept. As displayed in Figure 3.1.17, the fifteen resulting concepts (and their indicators) were all arranged in a spider graph or synergy-meter that was later used to compare two alternative proposals for the pilot site and to design and assess the final solution (see Figure 3.1.18).

The analysis of the work developed by Team6 reveals the potential that synergy tools can have to support decision-making processes and self-evaluation. In this case, the self-evaluation potential of the tool was particularly evident since it was used by the students to analyze two alternative proposals and detect the strengths and weaknesses of each of them. In addition, the sectorization of the pilot site into coherent zones became an operative way to promote synergies adapted to the particularities of each sector.

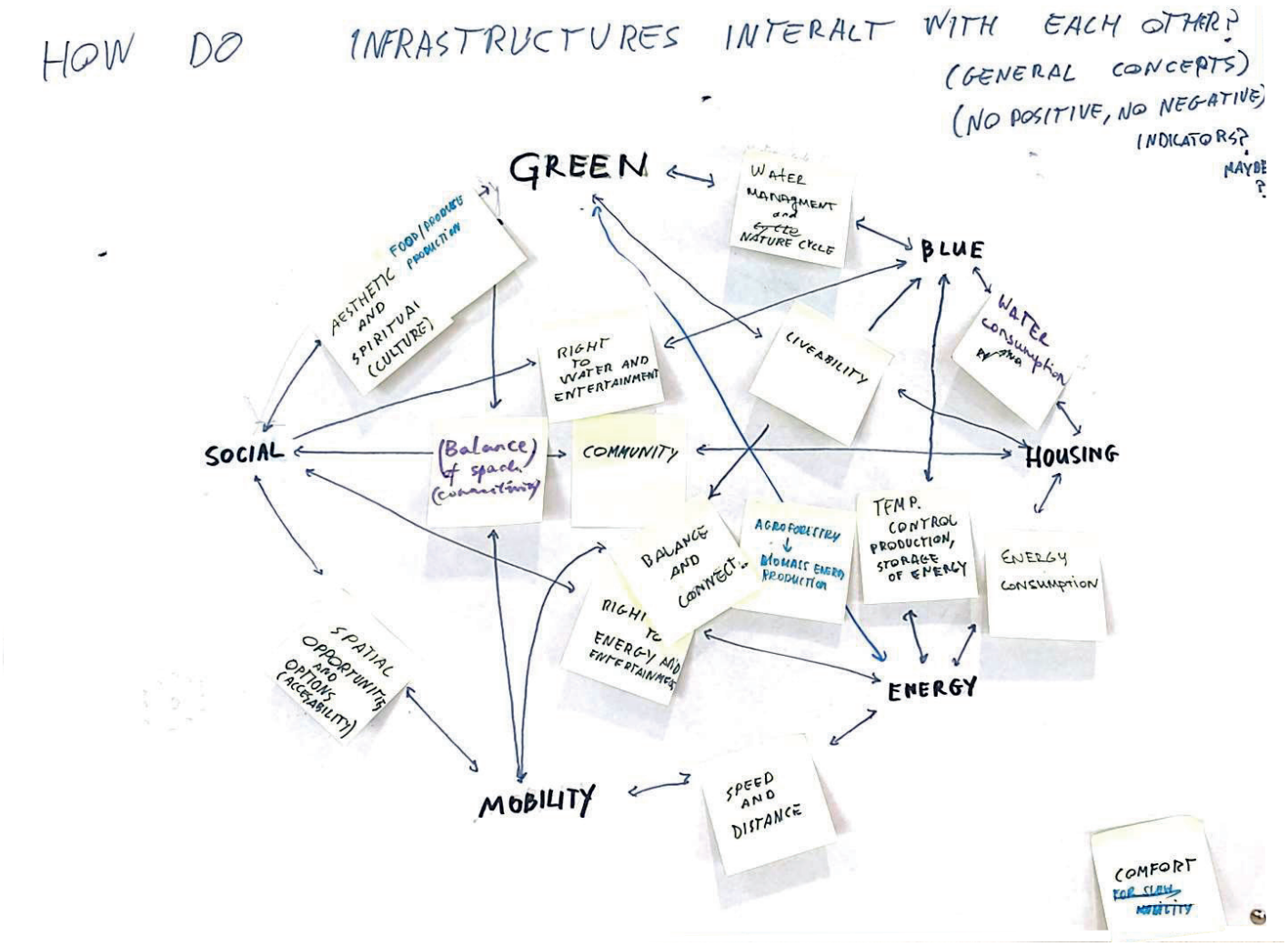


Figure 3.1.16. Initial exploration of interactions between urban infrastructures (small maps) (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

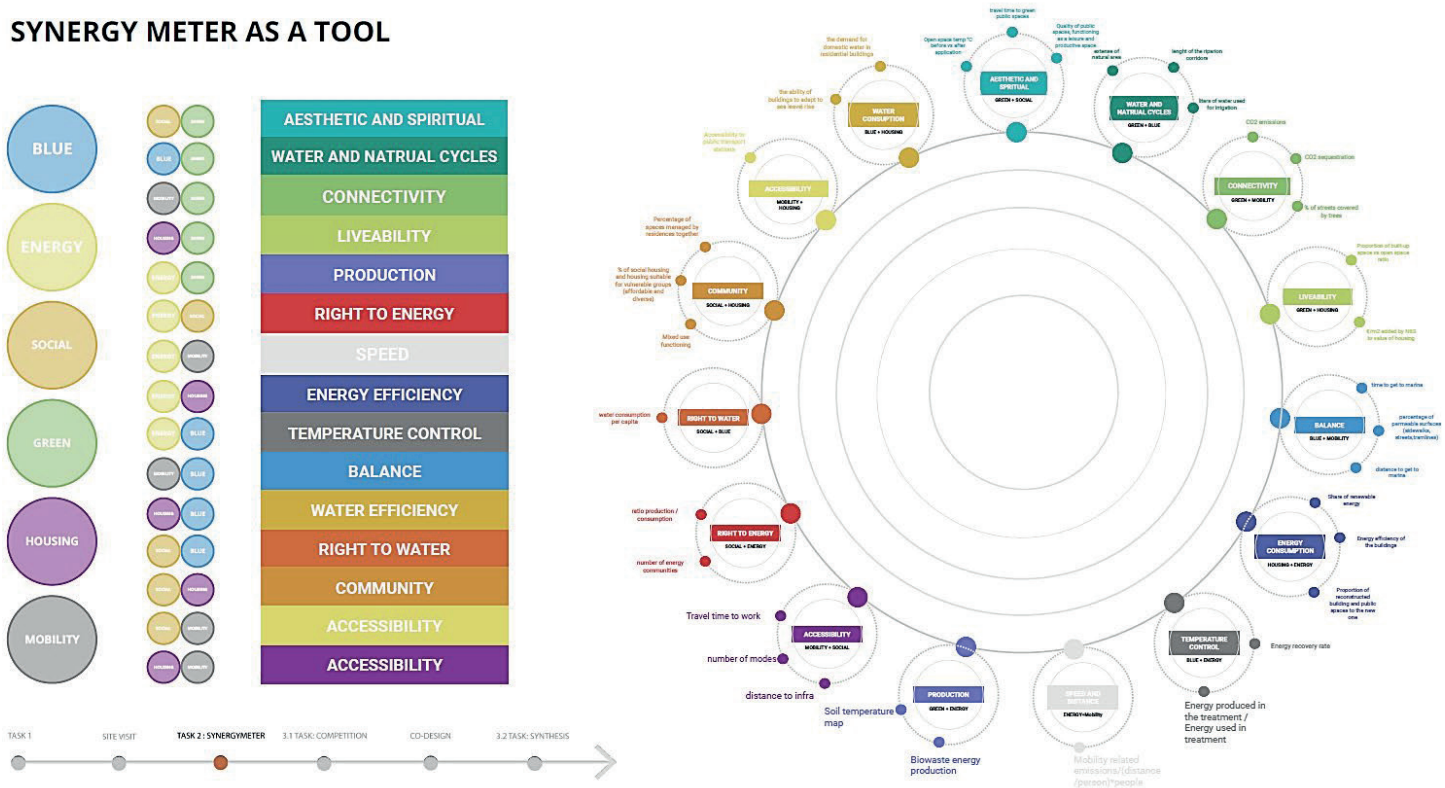


Figure 3.1.17. Concepts associated with the main synergies generated by dual/binary interactions between urban infrastructures (left) and synergy-meter comprising the above-mentioned concepts (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

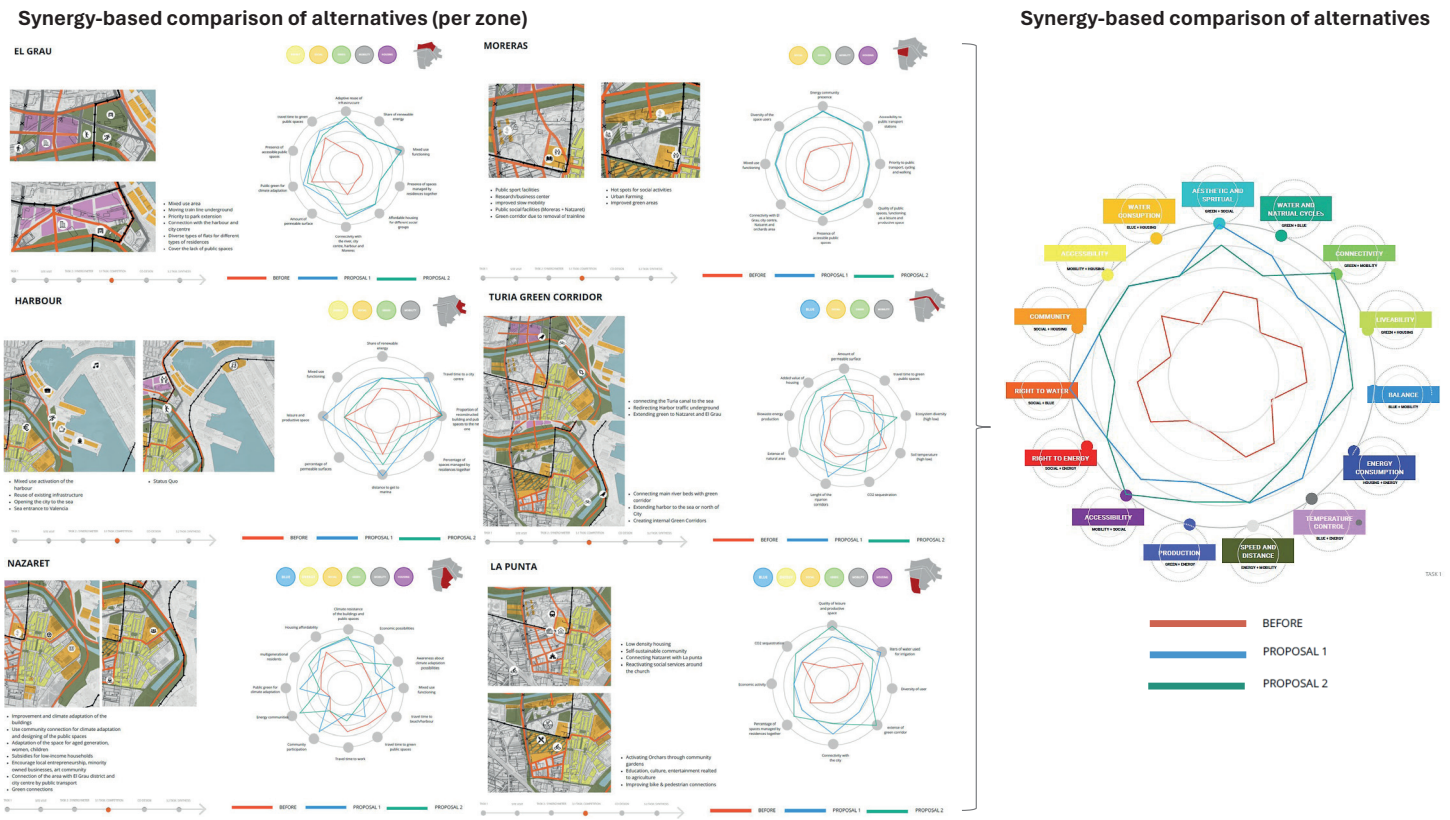


Figure 3.1.18. Use of the proposed synergy meter to compare two alternative proposals for the different areas identified in the pilot site (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

3.1.3. Reflections

Three main topics were proposed during the post-course seminar to critically analyze the design and use of synergy tools during the VLC_Summer School:

- UTILITY: Were the proposed synergy-tools useful to support the planning process?
- CLARITY: Were the proposed synergy-tools understandable and easily connected to the planning process?
- EXPORTABILITY: Were the proposed synergy-tools and the employed methods transferable to other sites and contexts?

In addition, two additional topics or dimensions emerged during the seminar:

- METHODS: What did we learn about methods linking infrastructural synergies and planning processes?
- PROCESS: Which operational issues were critical for the development and use of synergic tools?

Utility / Usefulness of Synergic Tools in Planning

In planning, we are often searching for logical connections between analyses and proposals. By working simultaneously with different urban infrastructures (or systems), the synergic approach proposed in the course can be one of the tools helping us to reinforce that connection and support decision-making processes, systems thinking, and integrative planning. The tutors perceived this approach as an opportunity to add a new and complementary tool to conventional planning processes.

The 'synergy' concept is by definition, an 'active', 'collaborative', and 'positive' concept that, during the VLC_Summer School, activated in the students an explorative attitude. This explorative attitude was crucial to avoid the automatic generation of standard solutions and to support the search for alternative planning methods. However, this type of exercise would typically require more time to sediment and critically analyze the concepts, methods, and final outcomes.

Interestingly, the utility of the synergic approach in the proposed planning exercise derived both from its potential to become an 'assessment tool' (helping the students to evaluate the quality of their proposals from an integrative perspective) and a 'design tool' (opening new design possibilities in the interfaces between urban infrastructures).

From a cognitive point of view, the development of synergy-tools and their application in a specific case was perceived by the tutors as a positive exercise to promote relational, integrative and systems thinking. Besides, from an operational perspective, the synthesis that led to the definition of super-synergies and super-strategies, created, at the same time, some difficulties in defining crosscutting goals and indicators with the capacity to capture the internal complexity of those super-synergies adequately.

Clarity of the proposed Synergic Tools?

The clarity of the synergic tools proposed by the students in the VLC_Summer School was highly connected with the initial definition of a clear process explaining how the synergies between infrastructure could be analyzed and introduced in the elaboration of proposals.

From a practical perspective, the early use of diagrams explaining the workflow and the joint definition of key concepts or terms within each team became crucial to create a common understanding of the task, to support the planning process, and to effectively conduct the work.

In particular, graphic tools were essential to synthesize ideas, to explore connections, and to develop and assess proposals. There was a clear correlation between the clarity of schemes and diagrams and the capacity of the students to define a solid planning process based on the goals of the course.

As indicated above, the generation of super-synergies and cross-cutting strategies were a necessary step to simplify and operationalize the work and to define a clearer narrative. However, some of the newly proposed concepts were so wide that it became difficult for the students to link them with manageable indicators. This is a frequent challenge when working with highly crosscutting concepts such as sustainability or resilience and its resolution usually requires finding a compromise between diffuse integration and specialized sectorization.

Exportability of the proposed Synergic Tools?

During the online phase of the course, the thematic teams were invited to propose generic toolboxes to improve their respective infrastructures in any urban location (green, blue, social, housing, mobility, and energy). This created a decontextualized approach that was also followed by many teams in the elaboration of Task2 during the onsite phase. As a result of this approach, most of the synergy-tools and synergy-meters proposed in the course were quite generic and transferable to any context. However, as the students advanced in the definition of synergy tools, it became evident that it was necessary to understand the spatial dimension of the synergies and, therefore, to concretize the synergy tool in the specific context provided by the pilot site. As presented in section 3.2, some teams decided to link their synergy-tool to the specificities of the site, whereas others decided to stay more general. As a consequence of this, exportability was logically higher in those works that started with a theoretical and deductive approach, or in other words, in those works that defined a generic synergic tool that was then tested and applied in the pilot area.

Methodological reflections

Due to the short duration of the course, the definition of synergic tools was mainly conducted following a linear path or process. However, in a longer course, it would be advisable to keep more time for iterations and for the progressive adjustment of both the synergic tools and the final outcomes. Nevertheless, some teams were able to include some iterations in their work, for instance, by readjusting their goals or by improving their synergy-tools after developing their preliminary proposals for the pilot site or after meeting local actors.

Although each team was able to develop their own synergic tool and their way of using it, it is important to notice that the overarching method was the same in all six teams:

(1) Preliminary brainstorming sessions to identify potential or existing synergies and conflicts between urban infrastructures or systems.
(2) Synthesis and operationalization of synergies through synergy meters, synergic strategies, and linkage to urban goals
(3) Application in planning and validation/ adjustment of the synergy tool

Despite this overarching framework, it was noticed that some teams followed a more inductive method (detecting and conceptualizing synergies by observing how infrastructures interact in the city of Valencia and the pilot site), while many others tended to follow a deductive method (predicting synergies through a theoretical model and confirming in a later stage if these synergies were taking place).

As indicated before, there were several aspects and issues that were relevant to the methodological definition of the synergy-tools. Firstly, the identification of qualitative or quantitative indicators was often perceived as a necessary step to assess synergies and to understand their meanings fully . Secondly, the level of connection of the proposed synergy-tools to the specific conditions of the site affected their universal or contextualized character. Thirdly, the innovative and effective use of graphic tools to represent and explore connections between infrastructures (matrices, network graphs, etc.) and the synergies generated in the proposed solutions (spider graphs, tables with scores for different indicators, etc.) had a clear influence in the capacity of the students to define a solid narrative and an effective work process. Fourthly, the definition of maps was essential to spatialize the location of existing or proposed synergies and to understand more clearly their meaning. Fifthly, the definition of super-synergies opened an effective way to simplify and operationalize the work, but it also required the definition of new and more complex indicators.

The initial brainstorming sessions were an excellent way to activate discussions in a very short time, to reveal different or complementary points of view, to bring to the table different types of knowledge and sensitivities accumulated during the online phase, and to start visualizing within each team the scope of the final task. Conversely, the synthetic sessions that followed were essential to make the task more manageable and were often based on the clustering of ideas or the definition of overarching concepts.

Overall, the synergic approach to planning is a highly data-demanding process. Due to the limited conditions of the course, it was decided to keep, in many cases and for many indicators, the analysis at a qualitative level. However, with more time, resources, and data, it would be possible to operate in a more quantitative way and generate digital models that measure synergies between different urban infrastructures in different scenarios or alternatives more accurately.

To close these methodological reflections, it must be noted that the use of the synergic tool to assess the strengths and weaknesses of different alternatives or the final proposals was found particularly instructive for the students. In addition, it was also interesting to notice that the sectorization by some teams of the pilot site into more homogeneous functional areas proved to be a good way to adjust the application of synergic solutions to the specific programmatic and spatial conditions envisioned for each of these areas.

The Process: additional reflections about the development of task2

Most of the procedural aspects have been commented on above, so this section will focus on some additional and practical reflections. Considering the limited time, all the produced outputs exceeded the initial expectations from the tutors, and all teams achieved the planned learning goals. However, more time would have been needed to reflect and sediment all the developed ideas. At the same time, results reveal how each team decided to put more emphasis on different parts of the task and how this influenced the rigor or quality of the methodological component or the final outcomes. In this regard, the background or personal skills of the students influenced their approach to the task since some of them were more used to get engaged in conceptual, strategic, and planning activities, while others were more design-oriented .

In general, the process was quite transparent, and the linkages between the initial ideas and the final results were evident. However, more steps would have been needed to reinforce those connections (e.g. linkages between preliminary analyses and generation of specific proposals).

The scale and complexity of the pilot site were adequate for the proposed exercise, but it exceeded the usual size for students who did not have much experience in city and urban planning. One issue that was also discussed during the post-course seminar was if the involvement of each student during the online phase in a different type of infrastructure helped them to complement each other and to provide complementary insights in the identification of synergies and conflicts. In this regard, it was detected that the majority of the students really ‘played’ their role of experts in one infrastructure within their teams.

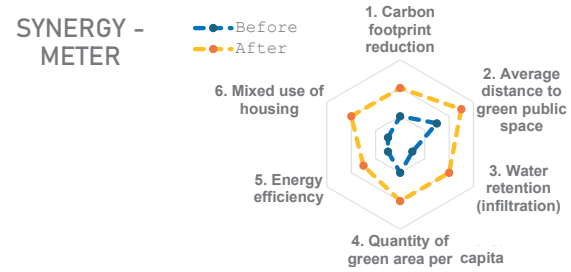
One of the crucial activities during the onsite phase of the VLC_Summer School was the participatory meetings with local people and experts. These meetings were essential to add a human dimension to the course, and from the perspective of task 2, they allowed the students to check if their synergy tools were detecting and addressing all the critical aspects. Similarly, the role of the tutors was crucial to keep a certain level of unity in the course, but at the same time, to take care of what made the work of each team unique and to bring their personal knowledge and sensitivity to the work of the teams that they were tutoring. Somehow the work developed by each team reflects the specific and unique characteristics of their students and tutors.

TEAM 1

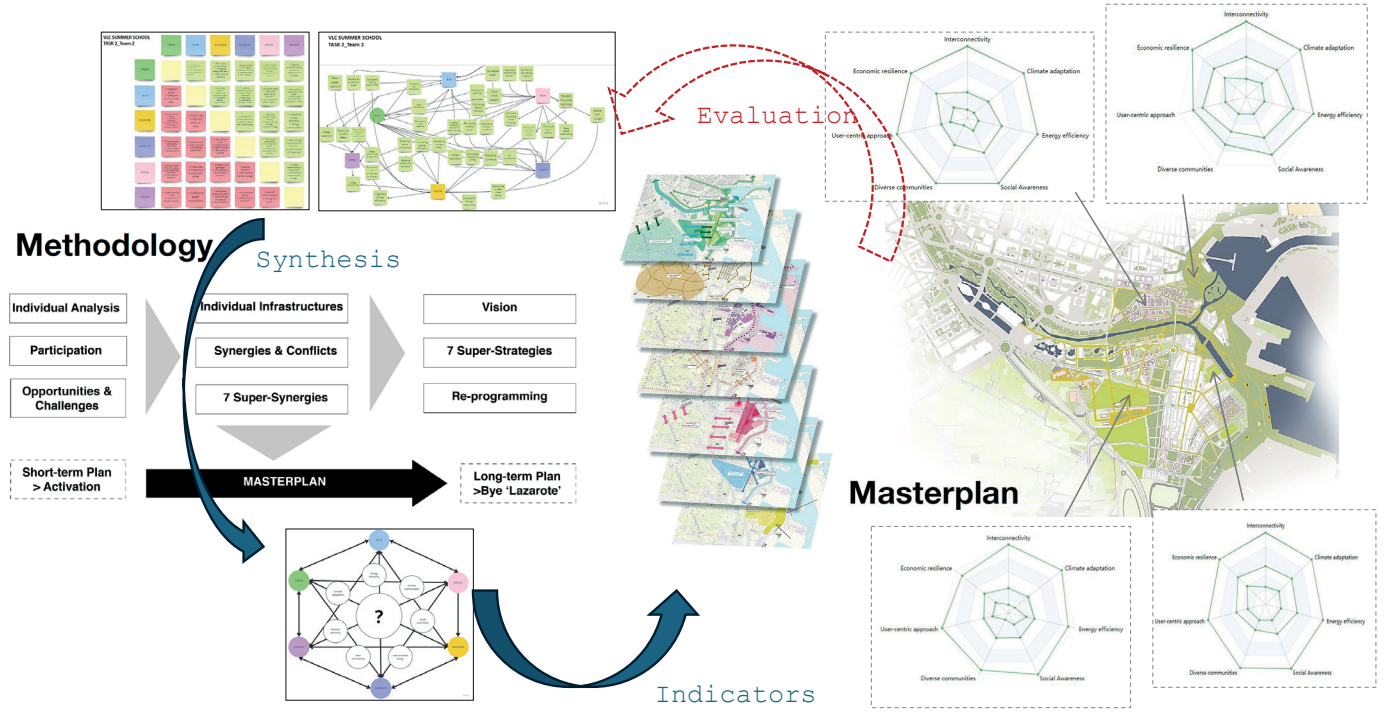
QUANTITATIVE

	Soil Carbon Storage (kg)	Accessibility to Public Green (	Water Retention	Public green area (m2)/person	Energy Consumption (kWh/year)
BEFORE	7 686,03	72%	14,53%	22,69	81 375 000
AFTER	9 646,03	85%	25,53%	32,82	105 000 000

QUALITITATIVE

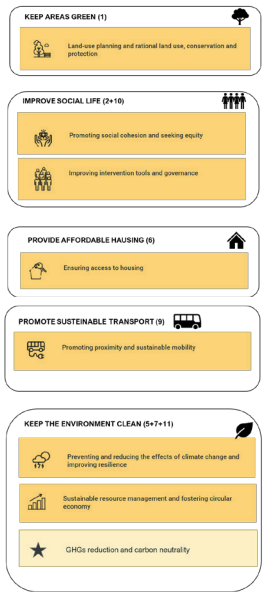


TEAM 2

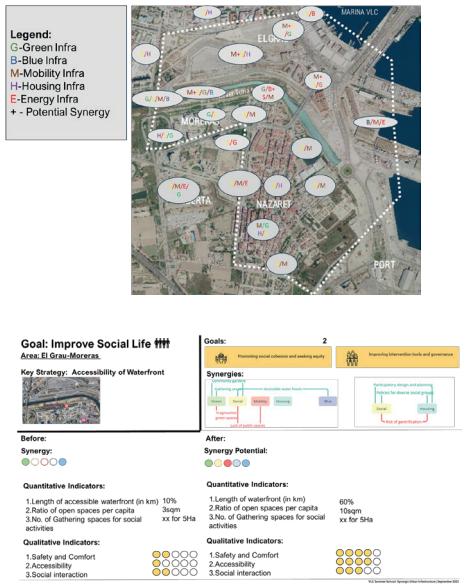


TEAM 3

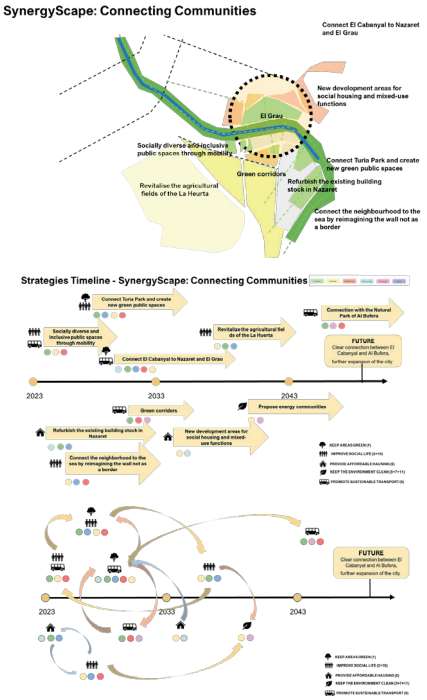
5_Simplification of Valencia Strategy 2030 – Goals



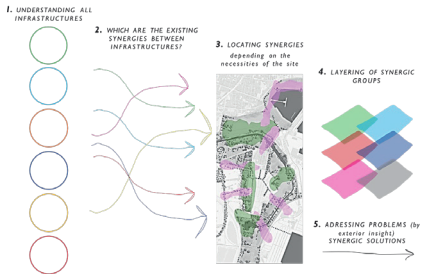
6_Existing synergies and Synergy Potentials

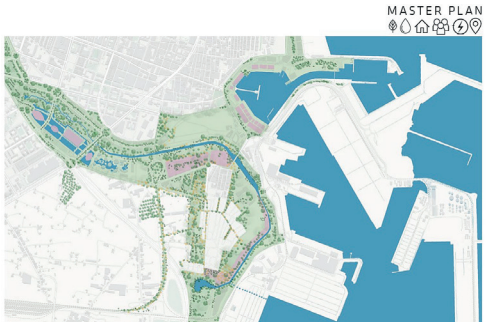


7_Proposal: 10 crosscutting strategies, visions, and timelines



TEAM 4





- **FOCUS ON GREEN SYSTEM**
- **SYNERGIES**

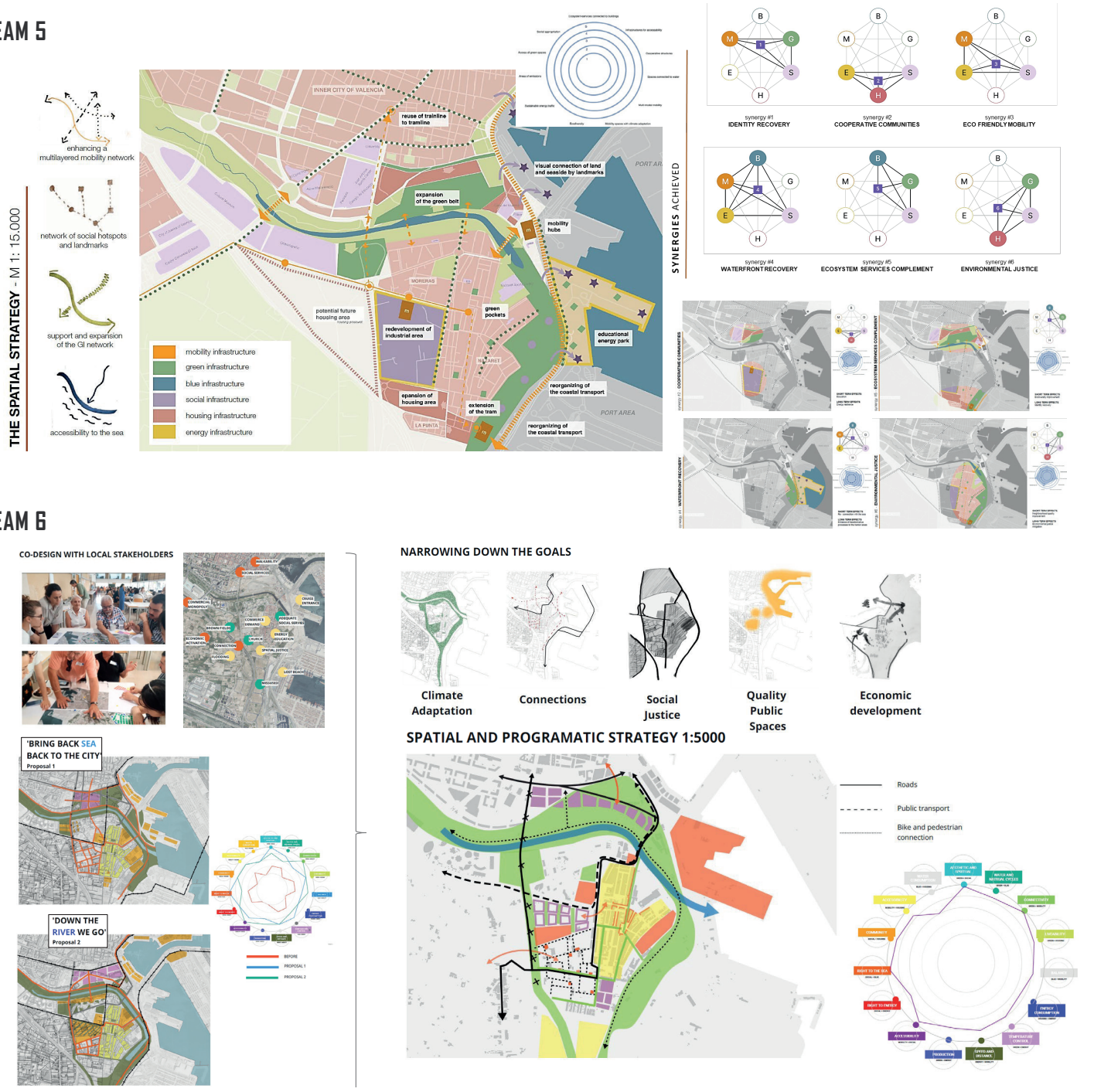


Figure 3.1.19. Collage of the synergy tools defined by each team of the VLC_Summer School and of their application in the pilot site (source: Juanjo Galan, 2024 based on the works prepared by the teams during the on-site phase)

VIDEO displaying a summary of the seminar organized by the teachers of the VLC Summer School in February 2024 to analyze and discuss the methods that were designed and applied by the students during the course .

Film editor: Martina Schretzenmayr, ETH Zurich

http://tiny.cc/2046_Video

4 SYNERGIC PROPOSALS FOR THE VLC PILOT SITE

4.1_TEAM 1. VALENCIA WATERMOSAIC: REVITALIZING ECOSYSTEM THROUGH URBAN WETLANDS

Stefano Salata | Assistant Professor, Politecnico di Milano
Carolina Pacchi | Full Professor, Politecnico di Milano

The final solution made by the multi-thematic Team 1 was built within the framework of the course, with the inclusion of Task 1 and 2 in the Online and Onsite Phase. Within the final proposal, a planning methodology was devised, centering on the concept of synergy. The spatial understanding of six infrastructural components unfolded under the guidance of goals and visions, revealed both conflicts and synergies. Noteworthy recurring relationships were identified, particularly those about social connection, accessibility, and continuity.

Task 2 fostered the introduction of an innovative technique designed to generate super synergies in spatial strategic planning, effectively pushing the conventional boundaries of urban planning. What has been determined as a key aspect in that phase, was that the super-synergistic approach was based on a spatial definition of conflicts and potentialities in the study area. This new perspective led to significant advancements in the way Team 1 approached spatial constraints while designing their solutions. In fact, despite the goal of Task 2 was apparently simple - to develop a theoretical operational framework (tool) to understand how the different infrastructures generate trade-offs or synergies between them – the methodologies to define a super-synergic approach were many, ranging from matrices of binary correlations between design alternatives to the creation of expert focus groups with open discussions. To speed-up the process and develop more concrete and grounded solutions, Team 1 developed a “simplified” method based on a spatial definition in the study area of the “problems and possibilities” intended as a representation of hot and cold spots where multiple solutions were not conflictual in space (possibility) or, on the contrary, where solutions were clashing due to trade-offs. That mid-term task was developed in a slightly different way to other teams, but this difference was key to understanding better the space and the constraints of the proposed solutions (see Figure 4.1.1). With that delivery, then Team 1 jumped immediately into a concrete definition of the Masterplan structure, highlighting the pillars of the design project (Task 3).

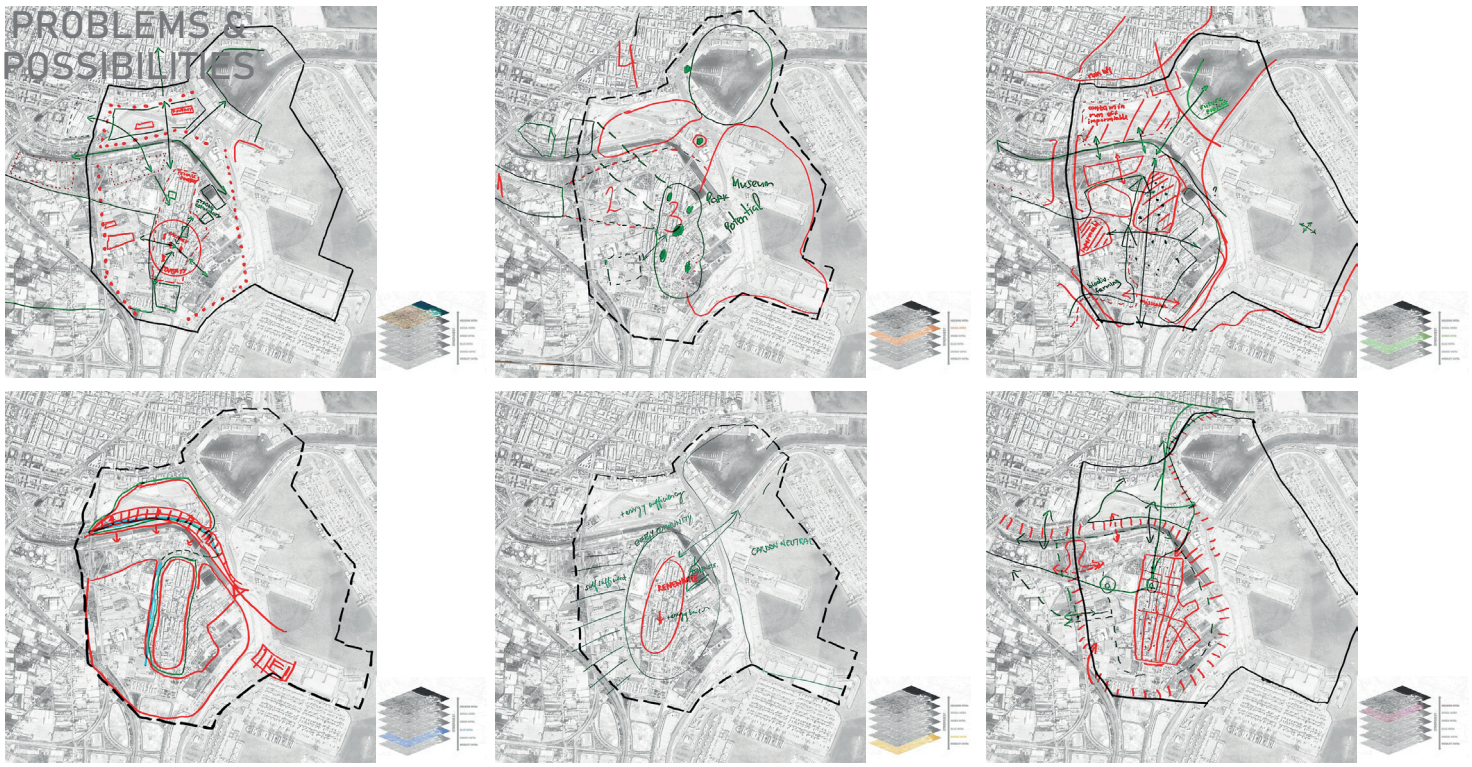


Figure 4.1.1. Spatial definition of the problems and potential in the study area (source: TEAM1: Berner, Szymanski, Rameika, Schulz, Kannampallil, Zhu, 2023)

Subsequently, Task 3.1 witnessed the development of a spatial strategy map for the designated pilot site. This map seamlessly integrated elements such as tram line extensions, connectivity enhancements, green infrastructure, and options for social housing. Task 3.2 delved into the intricacies of the El Grao neighborhood, addressing aspects of accessibility, social rejuvenation, and continuity. The resultant proposal of Team 1 was named "Valencia Watermosaic: Revitalizing Ecosystem through Urban Wetlands" (Vamos a mar), and, synergistically, amalgamated the methodology from Task 2 and the lines of action from Task 3.1. The proposal articulated four overarching strategies: "Sea to City," "Social Rejuvenation," "Accessibility," and "Continuity" (Figure 4.1.2). These strategies not only promoted the generation of super synergies within the intervention area but also significantly enhanced the overall functionality of the locale and its broader urban surroundings.

The design process has been mainly incremental and iterative. Team 1 worked immediately on sketching up the first ideas while sharing their thoughts during the first round of debate. The result of this was the generation of different alternatives that were discussed critically. Once a couple of design alternatives were discussed, the Team had a brainstorming to jot down a final comprehensive solution that amalgamated the different proposals and finally reached the main design solution.

The main idea of the design solution was to bring the sea to the city again, without touching the port area, which remains one of the most challenging and controversial decisions since it depends on the willingness to open a way to the sea in the commercial port area (which seemed to be unreasonable due to the freight transportation that cross all the port area and the intense utilization of the port).

Besides, another important factor drove the decision to create an internal wetland: the simulations made with the digital elevation model of the sea level rise clearly demonstrated that a 1m scenario of seal level rise was enough to have part of the port mouth flooded by sea intrusion. Therefore, while the majority of the design proposals were extending the ex-Turia River park to the sea, Team 1 critically discussed the importance of understanding that the natural dynamic was the opposite: not forcing the extension of the green into the blue but gradually design and plan the intrusion of the blue into the green. This intuition led to a significantly different concept: to use Valencia as a pioneer case of study where the first climate-adaptive neighborhood was designed to regenerate the space while giving the city a significantly different image where the seawater was contaminating the inland areas (Figure 4.1.3).

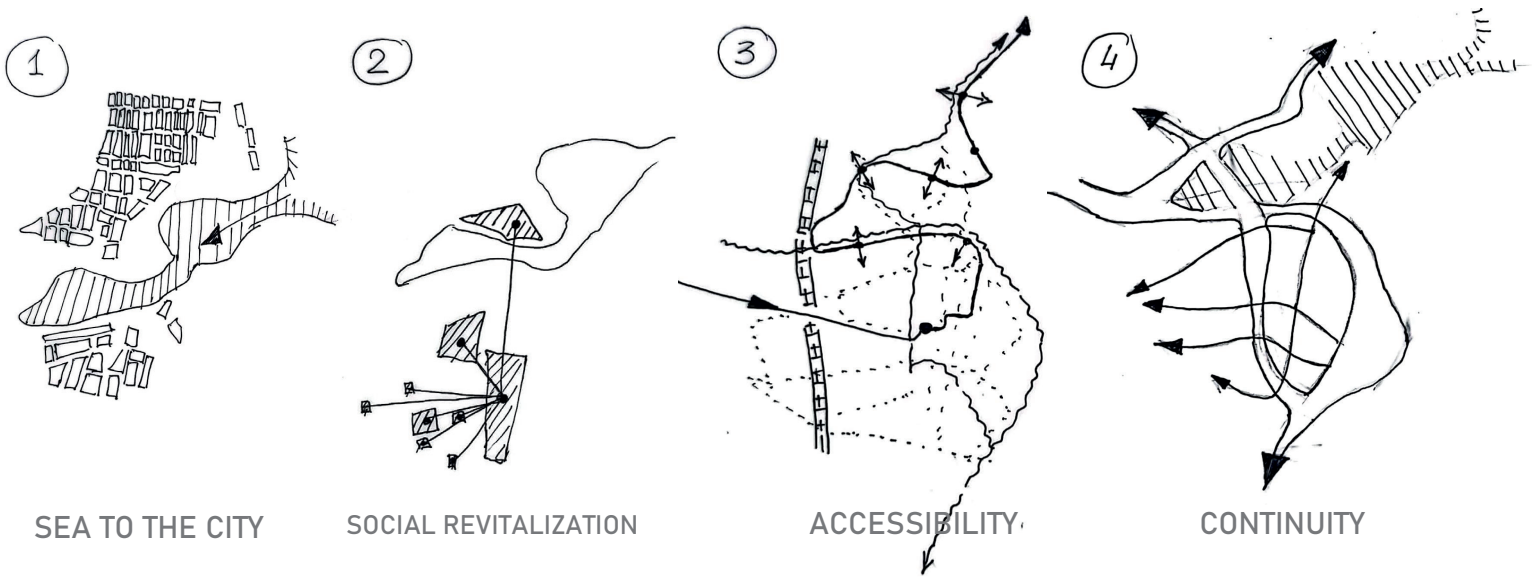


Figure 4.1.2. Conceptualization of the spatial strategy concepts (source: TEAM1: Berner, Szymanski, Rameika, Schulz, Kannampallil, Zhu, 2023)

A critical analysis of the collective experiences within the course, reveal that students' approaches have been transformative. As the course approached its conclusion, anticipation grew for the final task - an open presentation to synthesize the collaborative efforts of the multi-thematic teams throughout our tenure in Valencia. Through "Valencia Watermosaic: Reviving Ecosystem through Urban Wetlands," the objective was to disseminate the successes of the synergic approach to planning and underscore the groundbreaking potential inherent in defining synergy-based design strategies. The insights gained from Task 2, Task 3, and the entirety of the course have equipped the students with a profound comprehension of the transformative influence wielded by the synergy concept in shaping future cities. These valuable lessons and insights extend beyond the confines of Valencia, holding the promise of broader application and transferability in the realm of global urban planning and development.

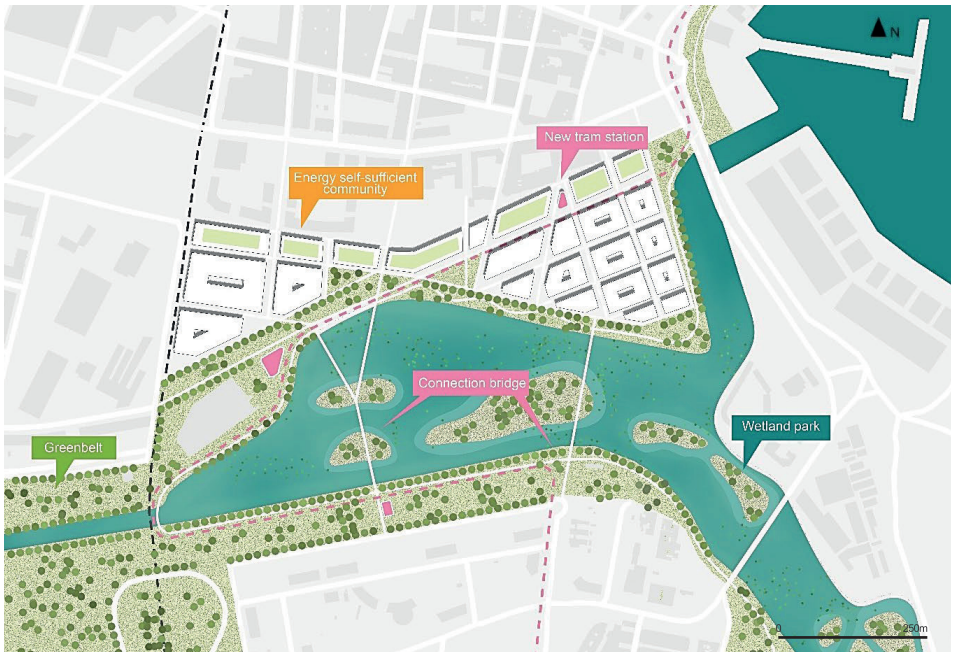


Figure 4.1.3. Detailed representation of the masterplan (source: TEAM1: Berner, Szymanski, Rameika, Schulz, Kannampallil, Zhu, 2023)

4.2_TEAM 2. BYE LAZAROTE

Kinga Zinowiec-Cieplik | Assistant Professor, Warsaw University of Technology

The multi-thematic Team 2 was composed of five students from different European universities from the Enhance Alliance: Birsu Kambur (Politecnico di Milano), Aksel Teig Fosshagen (Norwegian University of Science and Technology), Mariia Polyakova (RWTH Aachen University), Amina Zannouti Jarradi (Polytechnic University of Valencia), and Lea Fast (Technical University of Berlin). During the on-site phase of the VLC_Summer School their work was tutored by: Kinga Zinowiec-Cieplik (Assistant Professor at Warsaw University of Technology, Poland).

4.2.1. Bye 'Lazarote'

The title of the second team's work says a lot about the social commitment and approach to the strategy developed during the course for the undoubtedly conflict-prone area of Nazaret - El Grau - Moreras - La Punta in Valencia, which requires deep changes. This work is an attempt to restore this part of the city to its rightful place in the urban layout as a key district for rebuilding the connections of the former Turia delta with the sea, extending - completing the construction of the green Valencia spine - Turia Park, unblocking public seaside areas (blocked by the industrial harbor), revitalizing "forgotten" districts of the city such as Nazareth or La Punta and indicating the directions and scope of new housing development. All these improvements should be developed in the context of contemporary challenges and threats, while searching for synergy-based infrastructural strategies.

4.2.2. Methodology

In the first stage, following the method proposed within the VLC SUMMER SCHOOL on Synergic Urban Infrastructures, Team 2 focused on assessing the current situation based on the available information:

- materials collected and provided by the organizers (maps, history, legal acts, etc.)
- materials and toolboxes developed by thematic teams during the online phase of the course for specific infrastructures (Task 1)
- local vision.

The second stage involved developing guidelines, defining basic problems and directions for searching for their solutions, and in the last third stage - students presented their proposals for solving the previously diagnosed problems (see Figure 4.2.1).

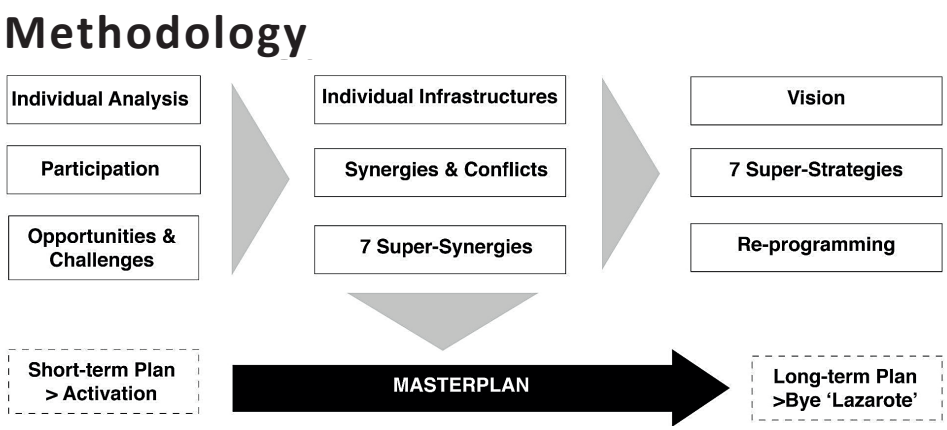


Figure 4.2.1. Work methodology (Source Team 2: Kambur, Fosshagen, Polyakova, Zannouti, & Fast, 2023)

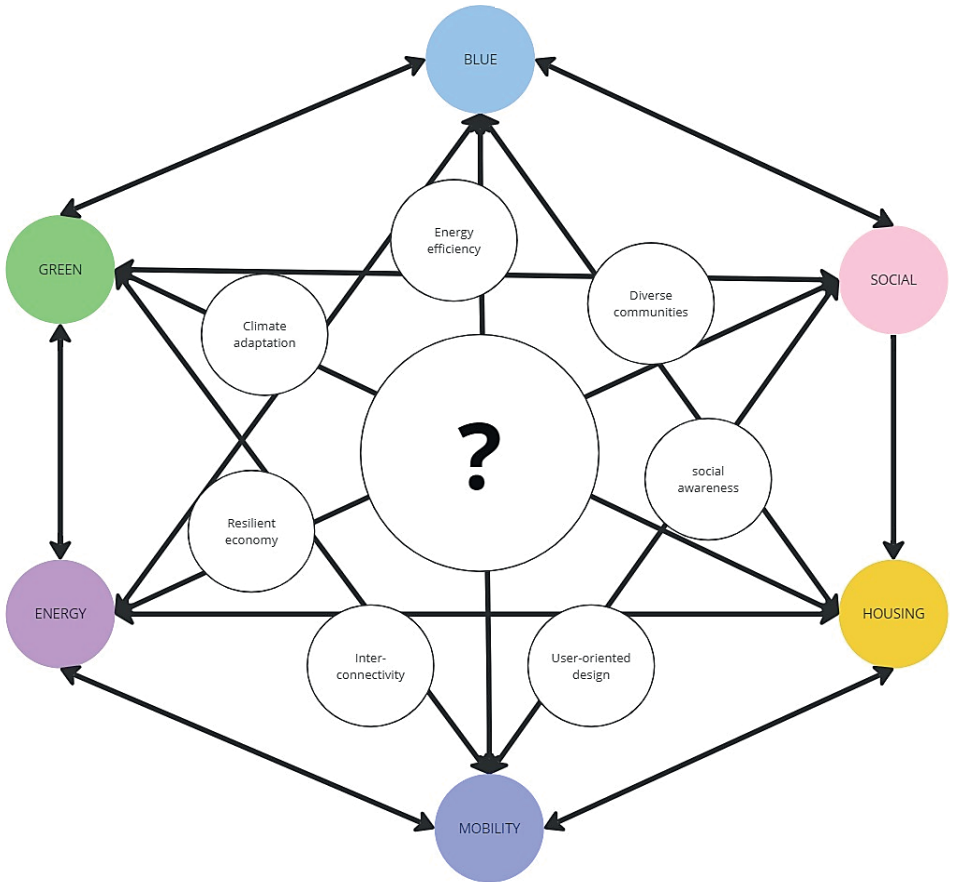


Figure 4.2.2. The basis of the proposed strategy - the 7 super synergies (Source Team 2: Kambur, Fosshagen, Polyakova, Zannouti, & Fast, 2023)

4.2.3. Proposal

The students decided to emphasize and address social issues through their synergistic infrastructural solutions. The significant title "Bye Lazaret" of the team's work indicates the main goal of their central strategy: the 'Revitalization and Liveability' of the forgotten and neglected Nazaret district. The way to develop the strategy was the definition of the following 7 "super synergies": interconnectivity, climate adaptation, energy efficiency, diverse communities, user-centric approach, and economic resilience (see Figure 4.2.2). And it was the creation of connectivity, the removal of barriers, and the strengthening of connections at the level of each infrastructure and between them that allowed to build a coherent solution.

Working in the context of the need to create synergies between various urban infrastructures, students focused on the problem of generating new connections between neighboring, yet separated and isolated zones: Nazaret, El Grau, Moreras, La Punta and Harbor. The students' work focused on searching for links between them in the context of close proximity, as well as in the context of the city's main urban axis, which is the river Turia Park, at the level of interpenetrating infrastructures:

- green infrastructure: by creating and supplementing green corridors, including connecting/extending the river Turia Park to the seafront;
- blue infrastructure: by consciously expanding the retention system in the former Turia riverbed with its connection to the sea, as well as with full respect for the tradition of Valencia's irrigation canals;
- transport infrastructure: by leveling or softening strong edges, for instance by burying the railway line, or by building new streets, pedestrian and bicycle paths or bridges/footbridges over the former riverbed of the Turia river;
- housing infrastructure: by creating residential development systems that respect the green and blue infrastructure, while ensuring strong transport links with the city and neighboring districts;

• energy infrastructure: by incorporating renewable energy resources into public spaces;
• social infrastructure: by providing local communities with communication, mobility and contact in the immediate vicinity and in the context of the entire city.

The proposal of Team 2 includes short-term interventions in the key area of Nazaret, referring to the principles of urban acupuncture allowing for quick actions that give a sense of change, as well as being a catalyst for the reconstruction/ construction in the long run of the urban tissue (see Figure 4.2.3).

In the longer term, the team has prepared 4 proposals for connections. These 4 proposals were all assessed according to their positive impact in the 7 super strategies (spyder webs in Figures 2.4.4, 2.4.5, 2.4.6 and 2.4.7). These 4 proposals were also fully aligned with the main goal of Team 2: the 'Revitalization and Liveability' of the pilot site.

Figure 4.2.3. Urban acupuncture as a catalyst for changes (Source Team 2: Kambur, Fosshagen, Polyakova, Zannouti, & Fast, 2023)

RIVER - SEA CONNECTION – directions for creating connections between the former Turia riverbed and the sea;

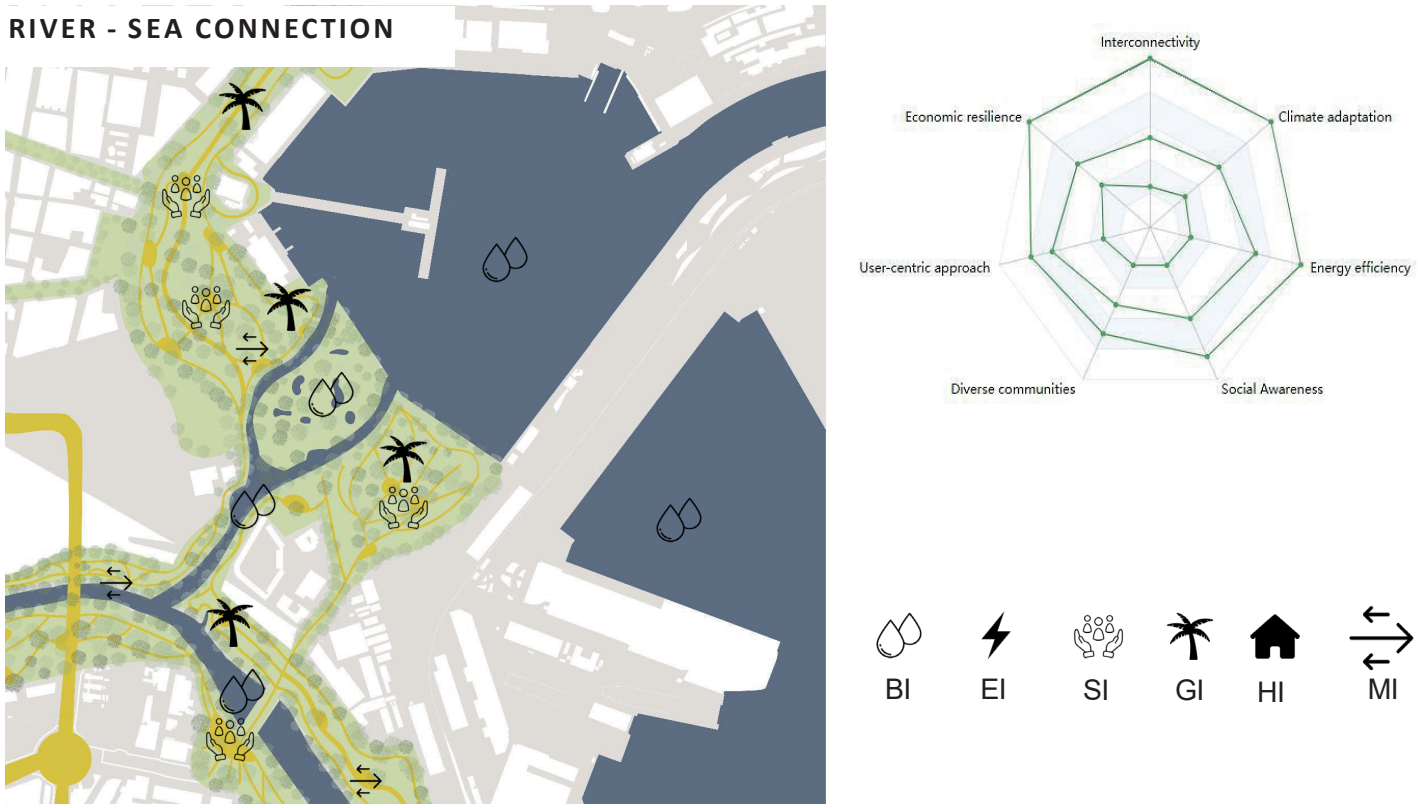


Figure 4.2.4. River and Sea connection (Source Team 2: Kambur, Fosshagen, Polyakova, Zannouti, & Fast, 2023)

HARBOR-NAZARET CONNECTION – directions for creating connections between Nazaret and the harbor area by developing the continuity of the seaside public space in the local context and in the entire city;

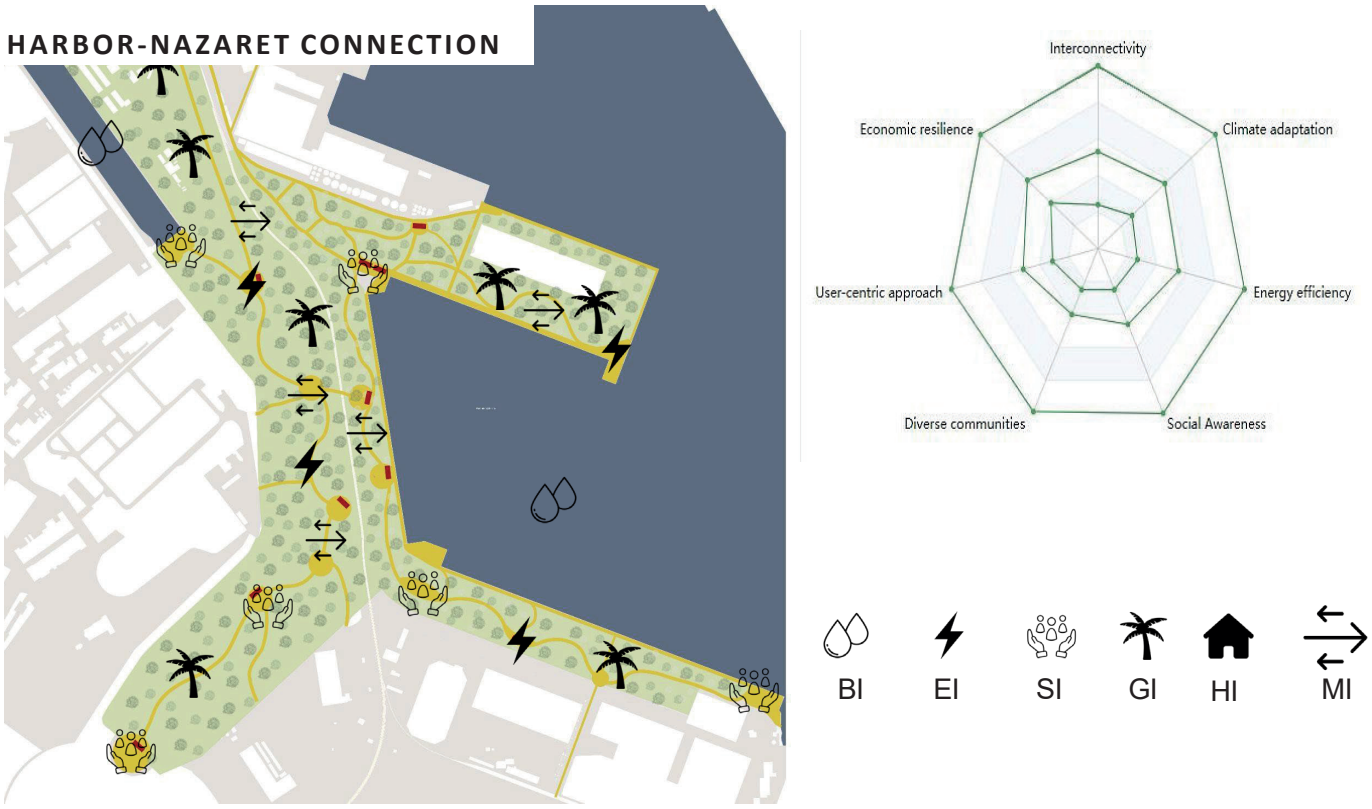


Figure 2.4.5. Harbor and Nazaret connection (Source Team 2: Kambur, Fosshagen, Polyakova, Zannouti, & Fast, 2023)

LA PUNTA-NAZARET CONNECTION – directions for creating connections between La Punta and Nazaret while maintaining their distinctiveness and, at the same time, allowing for the building of stronger social and urban bonds;

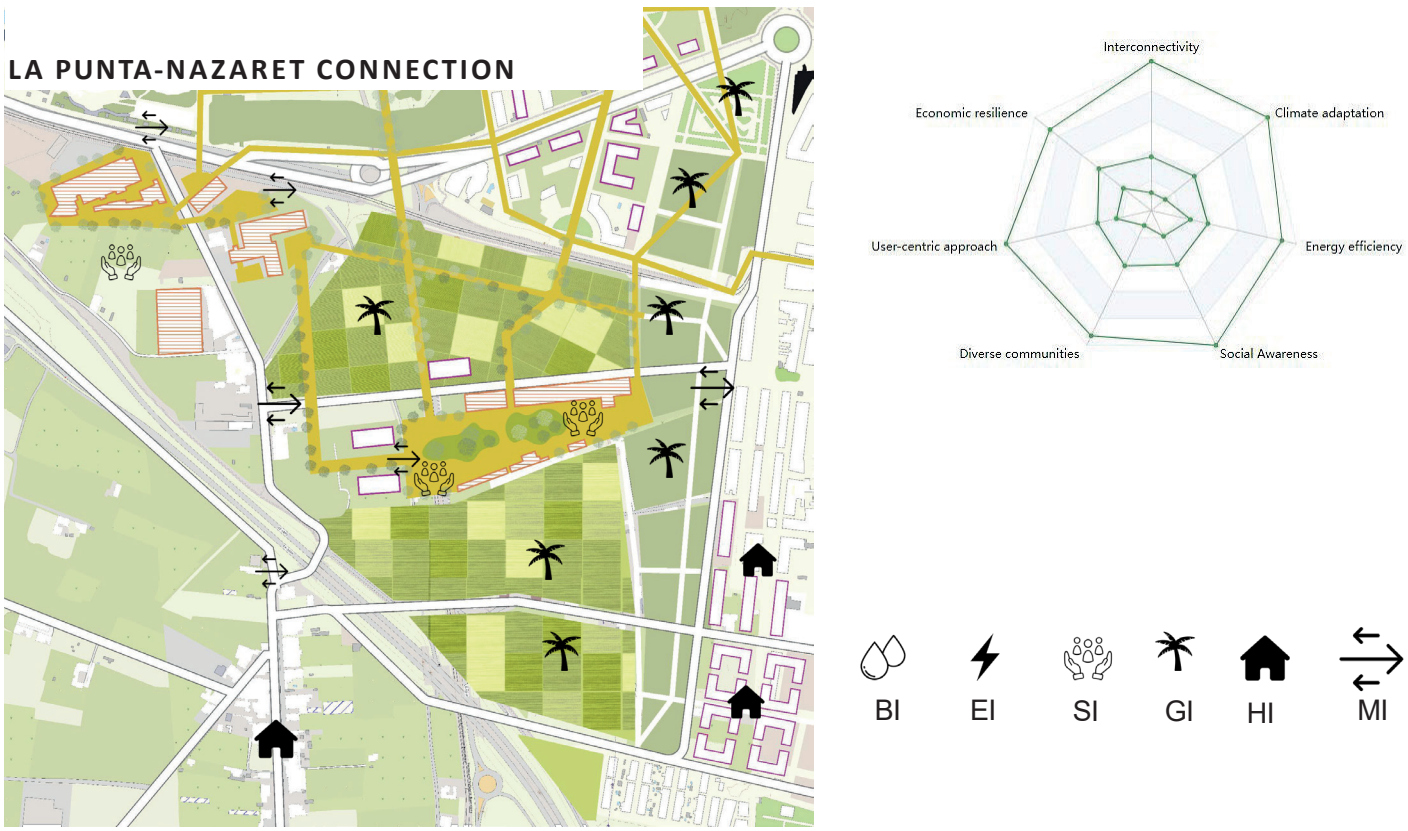


Figure 2.4.6. La Punta and Nazaret connection (Source Team 2: Kambur, Fosshagen, Polyakova, Zannouti, & Fast, 2023)

MORERAS – GRAU CONNECTION – directions for creating connections between Moreras and Grau, offering proposals for the development or intensification of housing development while respecting the city's environmental resources (blue and green infrastructure).

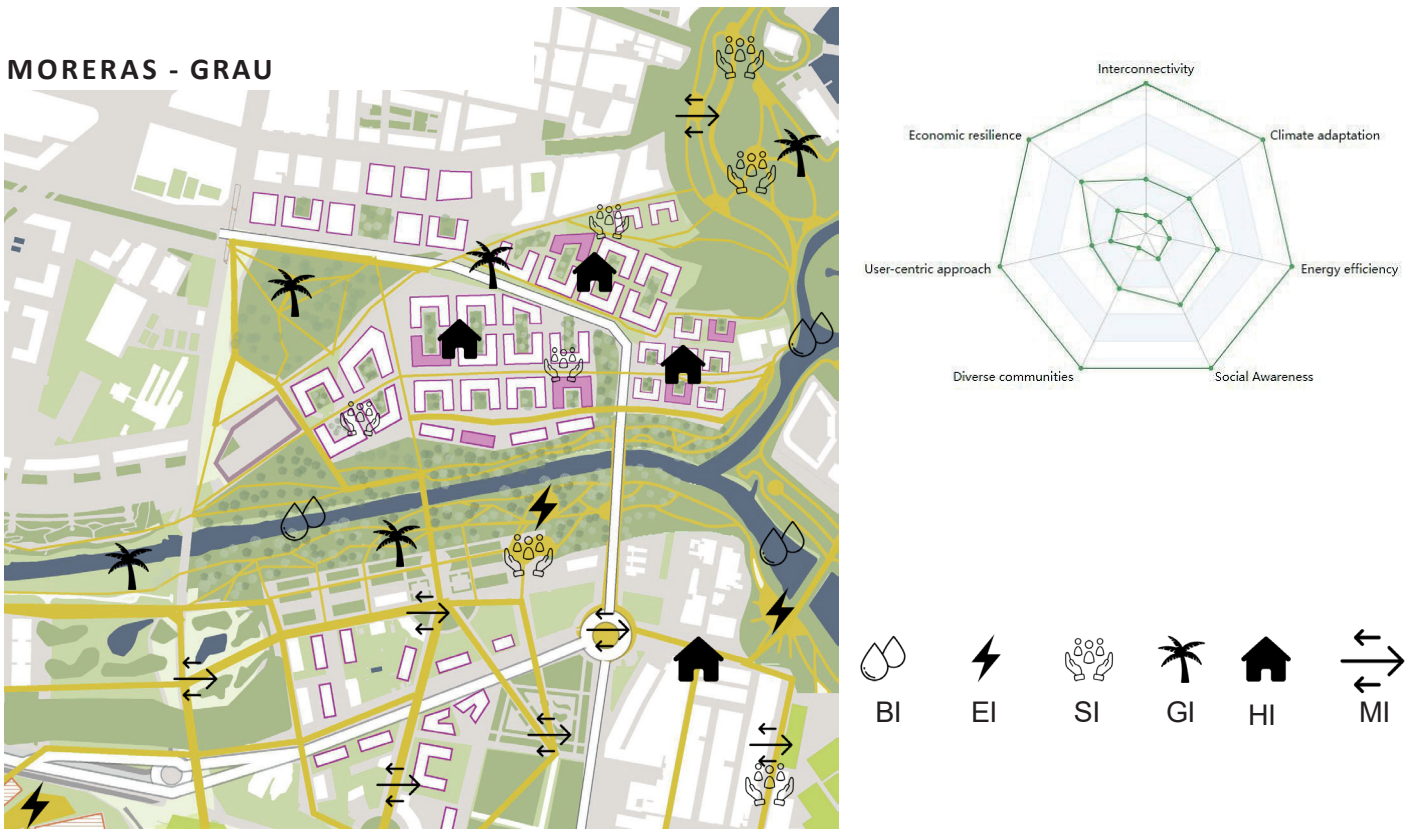


Figure 2.4.7. Moreras and Grau connection (Source Team 2: Kambur, Fosshagen, Polyakova, Zannouti, & Fast, 2023

From an operational perspective, one of the main strengths of Team 2 was the emergence of a leader in the first stages of work - an empathetic, highly organized person who skillfully managed time in the context of the entire process, and at the same time knew the local conditions very well. In the interdisciplinary work of people (in this case - students) from different academic backgrounds and different experiences, it is very important to create a clear platform for understanding and defining common goals. It is very difficult to cooperate in such a team without a leader. Typically, this role is performed by a tutor/university teacher - in the case of team 2, this was not necessary. The students were fully autonomous and prepared their work independently. The substantive assistance from the tutor was limited only to support and facilitate discussions on the considered problems, but it was the students who made the final decisions on their own.

The following lines display a short summary written by the students from Team2 at the end of the course:

For this Summer School we worked with 6 different infrastructure and our goal was to try to find synergies between these. The infrastructures are Blue, Green, Social, Energy, Housing, and Mobility. By identifying and connecting similarities between these infrastructures, we were then able to create 7 "super synergies" to help us tackle the problems in Nazaret, El Grao, Moreras and La Punta. We combined the 7 synergies and decided that our overall vision for the task is "Revitalisation and Liveability". Our 7 super synergies are interconnectivity, climate adaptation, energy efficiency, diverse communities, user-centric approach, and economic resilience.

Interconnectivity for Nazaret is key. We are creating more human friendly streets by creating two main roads where cars are allowed outside of the city. We are strengthening the connection in the area by creating more bridges between El Grao and Nazaret. By moving the railway, we are also connecting Nazaret with La Punta to the west. We facilitate cycling through the field which will create a connection to Ruzafa and to the south towards the New Turia River.

For our climate adaptation we are creating new green connections which will provide cooling for the city and the people. We are strengthening the green connections in the city. The green connection alongside the seafront will work as a meeting place for the people. By establishing more green spaces and renovations in Nazaret, it can help with reduction of the urban heating effect. The new green spaces in El Grao are working as liveable and local parks for the people's well-being. We are creating a green blue eco river corridor that will connect to the sea and strengthen biodiversity. We are also widening the riverbed to make it floodable and, in this way, reducing the flooding risk.

To achieve energy efficiency, we are designing net zero energy housing and creating energy communities. For our Social Awareness we are bridging people together, creating visual connection to the harbor and creating community activities in the fields.

For the diverse communities we are creating affordable and social housing in El Grao. We want to preserve and emphasize the unique identity in Nazaret. Our user-centric approach is to facilitate community centers and local businesses in Nazaret. The people in Nazaret will reclaim the streetscapes and we are shifting the focus from Port-oriented to people-centric.

To achieve economic resilience, we think that first of all it's important to make the pilot area attractive and a destination for the rest of the city. We are creating a new marketplace west of Nazaret and we want to activate the ground floors in Nazaret and El Grao. By using containers from the harbor, we are creating an attraction site alongside the sea front and in this way make the area more alive.

All the measures are based on making the areas more alive and making them part of Valencia. At the same time, we want to focus on the heritage and characteristics of the surrounding areas. It is also important to create living areas around Nazaret and El Grao.).

Authors: Birsu Kambur (Politecnico di Milano), Aksel Teig Fosshagen (Norwegian University of Science and Technology), Mariia Polyakova (RWTH Aachen University), Amina Zannouti Jarradi (Polytechnic University of Valencia), and Lea Fast (Technical University of Berlin).

4.3_TEAM 3. SYNERGY SCAPE

Christoph Wessling | Professor, Technical University of Berlin
Alena Cohrs | Research Associate, Technical University of Berlin

4.3.1. Students, workflow, and process

The Group 3 consisted of six students, coming from all six involved universities: Monika Urbaniak (Bachelor student in Civil Engineering, Warsaw University of Technology), Dilara Ucar (Master student in Urban Design, TU Berlin), Raveena Gadkar (Master student in Transforming City Regions, RWTH Aachen), My An Dinh (Master student in Urban Ecological Planning, Norwegian University of Science and Technology), Mohamad Hamdache (Bachelor student in Architecture, Valencia Polytechnic University), Anushka Anand (Master student in sustainable architecture and landscape design, Politecnico di Milano).

In terms of the working process some points are to be highlighted. They choose a very explorative procedure using diverse methods especially for the definition of spatial scenarios such as cross-sections with zoom-ins and perspectives created with AI-programs. Still, they sticked to a structured processual thinking by integrating the concept of a timeline to their urban strategy. By using these methods, they tried to understand the concept of synergies not only horizontally on the map by connecting spaces, but also in the vertical structure of the city and in the processual concept of time.

By using the key strategies from the different toolboxes generated in the online phase for each urban infrastructure (task 1) and by applying the developed “synergy-meter” from task 2 to check the realizability of their planned interventions in task 3, the group kept a high interconnection between all three tasks and their outcome.

4.3.2 Co-designing with local stakeholders

After sketching the first ideas for the spatial concept, the students started to prepare for the workshop with the local stakeholders. Therefore, they decided to continue to use their main idea from the former task 2: using the Valencia City 2030 goals as reference for the development but reducing their number by combining them. This resulted in five goals for the workshop: 01 Keep areas green, 02 Improve social life, 03 Providing affordable housing, 04 Promote sustainable transport, 05 Keep the environment clean.

In the participatory workshop, they used these goals to let them be placed on the map by the local stakeholders, depending on where they think they are needed the most (Figure 4.3.1). During the workshop the student from Valencia took the role of the moderator, as he was the only one speaking Spanish fluidly. The other students supported him by placing the goals on the map and did the graphic recording on the map with the answers of the local stakeholders. In the sessions with the English-speaking guests all the group members participated in the discussion.

The team used the results of the workshop to define different user groups depending on their personal characteristics, usage of the site, and demands. Based on the information from the workshop, they designed a first version of the spatial strategy that encompasses key strategies (e.g., improving waterfront accessibility, establishing community gardens, etc.) aligned with one of the goals (e.g., enhancing social life). This conceptual plan shows the synergies that can be realized by implementing these strategies, along with indicators to measure their effectiveness.

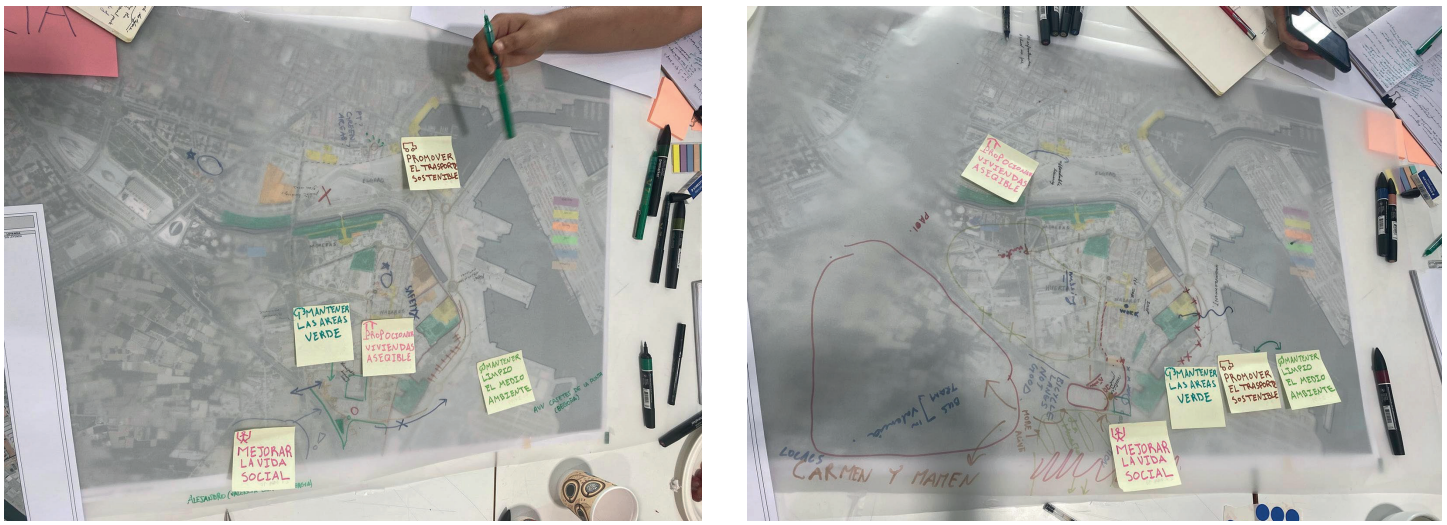


Figure 4.3.1. Graphic recording during the stakeholder (source Team3: Urbaniak, Ucar, Gadkar, Dinh, Hamdache, & Anand, 2023)

4.3.3. Summarizing the spatial strategy

The key strategies are implemented on the area and result in different spatial actions (Figure 4.3.2). One main strategy leads to the generation of local ***connections***, such as between El Cabanyal, Nazaret and El Grau, between Turia Park by creating new green public spaces, and between the neighborhood of Nazaret and the sea by reimagining the wall not as a border. Furthermore, the connection of the site through green corridors with the city of Valencia and the natural park of Albufera strengths the *integration* of the area in its context. Another main action is to *revitalize* existing structures, in terms of the existing building stock in Nazaret, but also the agricultural fields of la Huerta. In addition, new development areas for *social housing and mixed-use* functions combined with *new forms of mobility and transport connections* enhance socially diverse and inclusive (public) spaces. There is also the goal to integrate *energy communities*.

These actions and strategies are summarized under the concept title *SynergyScape: Connecting Communities*.

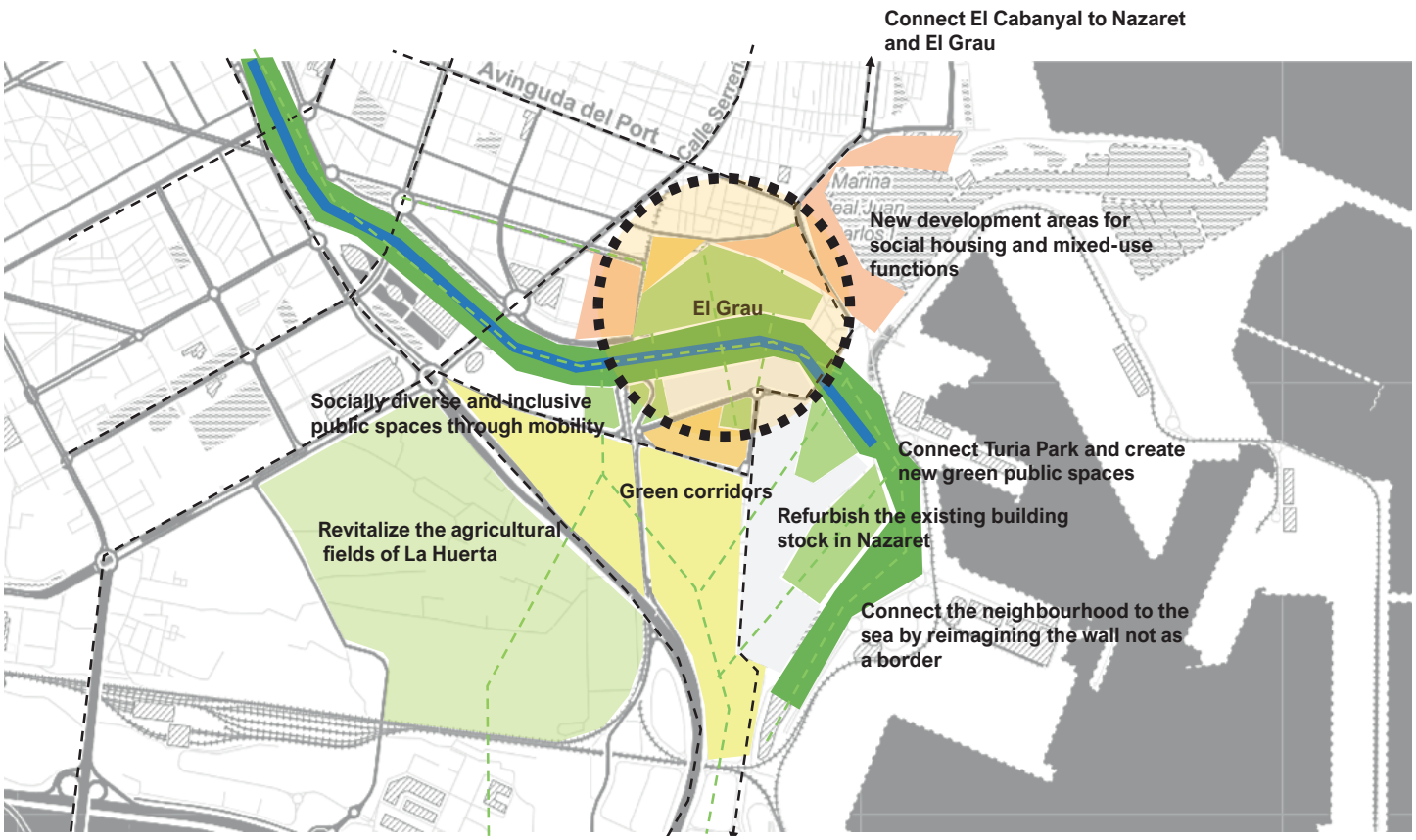


Figure 4.3.2. Spatial strategy (source Team3: Urbaniak, Ucar, Gadkar, Dinh, Hamdache, & Anand, 2023)

Explaining the catalyst El Grau

As the El Grau area is unused by now but also acts as a very important steppingstone between the city of Valencia, Nazaret and the harbor, the students identified El Grau as the first impulse area that can catalyze the urban transformation in the other parts of the site. Consequently, nearby areas will connect to one another through infrastructure synergies. In addition, the revitalization of the Turia riverbed is perceived as a fundamental issue for the connection of El Grau and Las Moreras.

Adding vertical synergies

To expand the idea of synergies, the students generated a cross-section from El Grau to Las Moreras up to Nazaret illustrating both existing and potential synergies and connections in different areas, encompassing both horizontal and vertical synergies (Figures 4.3.3 and 4.3.4).

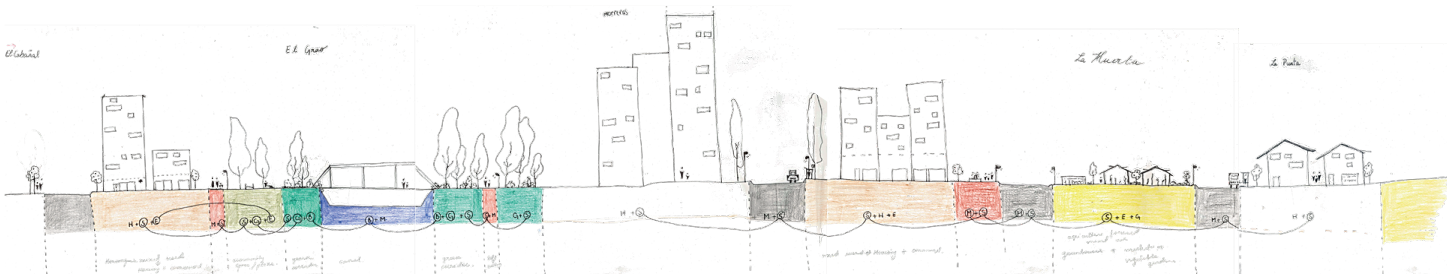


Figure 4.3.3. Conceptual Cross-section between El Grau, Las Moreras and Nazaret (source Team3: Urbaniak, Ucar, Gadkar, Dinh, Hamdache, & Anand, 2023)

Figure 4.3.4: Zoom-in: the new housing concept in El Grau and the generation of synergies between different urban infrastructures (source Team3: Urbaniak, Ucar, Gadkar, Dinh, Hamdache, & Anand, 2023)

Creating a strategy timeline

As displayed in Figure 4.3.5, all the actions included in the spatial strategy are applied on a timeline over a 20-year period, aligning these actions with the defined five goals and the identified synergies.

Conclusion and fields of action

As a conclusion the students of team 3 defined six fields of action to activate the potential of the case study site, also in terms of its added value for the city of Valencia. Each action is belonging to one of the six urban infrastructures, even there are overlaps.

They recommend expanding the continuity of the existing green spaces coming from the city center up to the Turia Park (Green infrastructure). This is followed by an overall better connectivity to the city center and within neighborhoods (Mobility infrastructure). They underline the importance of more access to the seaside (Blue infrastructure). They recommend a housing infrastructure that consists of a diverse and affordable housing stock (housing infrastructure). This can foster diversity and inclusivity by integrating communities (Social infrastructure). As a final point, they suggest sensitizing communities towards renewable energies (Energy infrastructure).

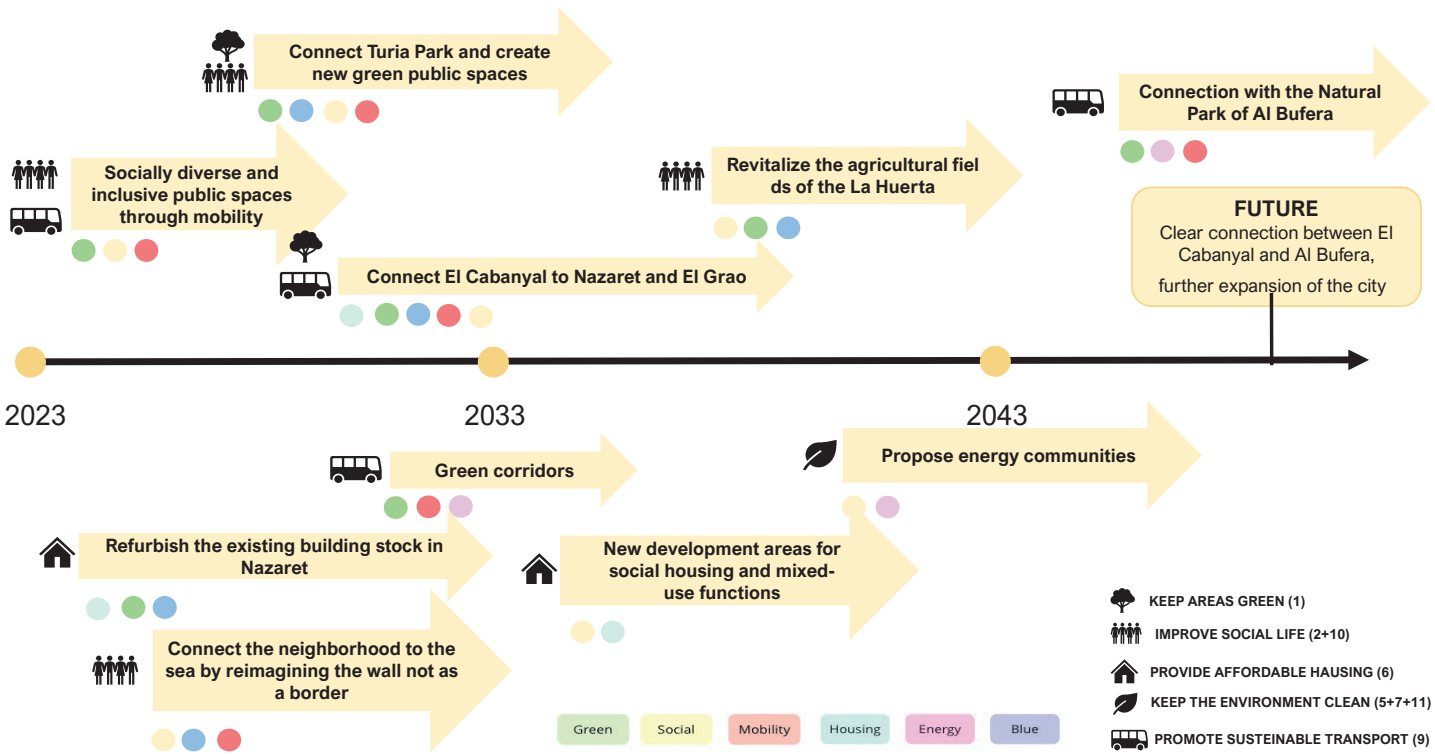


Figure 4.3.5. Timeline of the implementation of the spatial strategy. Symbols represent the five overarching goals defined by the team; colored circles represent the affected infrastructures for each action (the more colors in one action, the more synergies that action generate between different infrastructures). (source Team3: Urbaniak, Ucar, Gadkar, Dinh, Hamdache, & Anand, 2023)

4.4_TEAM 4. THE HAM OF SYNERGIES

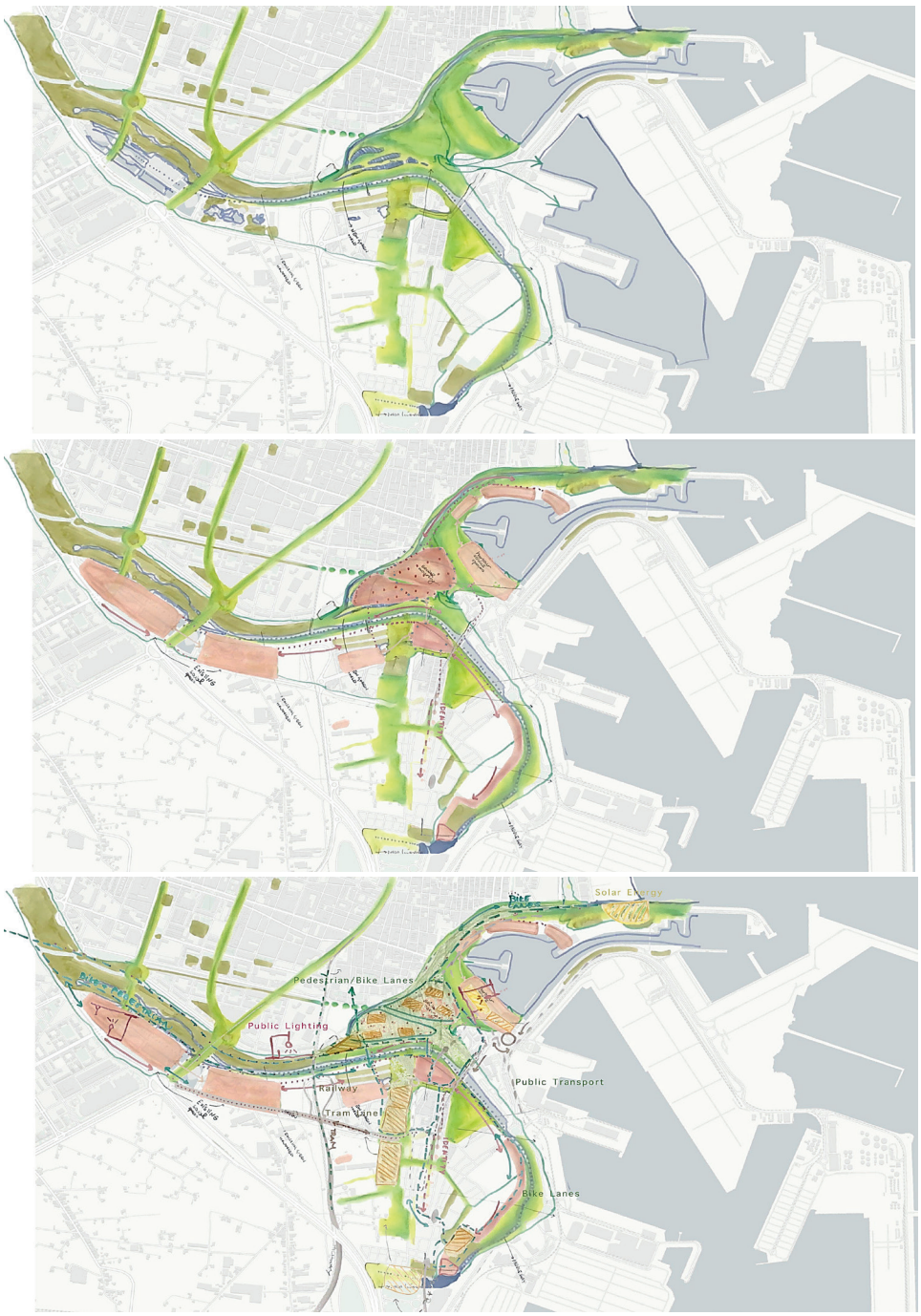
Mrudhula Koshy | Assistant Professor, Norwegian University of Science and Technology

The spatial strategy formulated by Team 4 -titled the 'Ham of Synergies'- paid tribute to the existing potentials of Nazaret, El Grau and the former river Turia delta, and primarily focussed on alleviating the physical borders between these areas that contributed to their socio-spatial fragmentation. This team relied less on the synergy meter as was presented in the Task 2 framework. The students instead used the idea of synergies between infrastructures to understand the existing interdependencies between the various infrastructures, and the contextual embeddedness of the infrastructures ensconced by the spatial-temporal trajectories and necessities of the case area. The site had a curious array of urban morphologies, ranging from the historically dense and depleted neighbourhood of Nazaret, the brownfield left behind after the Formula 1 race event, the slowly declining farmlands, and the globally aspiring science museum which is the legacy of the starchitect Santiago Calatrava. These diverse urban morphologies are located in close physical proximity but are fragmented by large mobility infrastructure and interspersed with patches of neglected water bodies and disparate green areas. Stitching these disconnected urban elements with carefully thought-out spatial strategies informed by the perspectives of the communities were primary for this student group.

Figure 4.4.1. displays the initial conceptual images presented by the students regarding their general urbanism logic for the case.

The students firstly sought to understand the existing contextual synergies between the different infrastructures. The spatial logic demanded by the site motivated the students to enhance the existing infrastructure capacities through a layering and clustering experiment, wherein blue and green formed the base layers, mobility and energy the service-oriented cluster, and lastly, the housing and social infrastructure embedding the value-based morphological dimension. Students envisaged the blue-green fabric as the space for adaptive nature that can deal with potential floods in a resilient manner. Furthermore, the renaturing and reclamation of brownfields and abandoned agricultural areas as an extension of the Turia river delta gave rise to new possibilities for recreation, biodiversity and play. The previously fragmented water systems were connected and seamlessly embedded within the new green fabric. In some areas, this meant that underground water was brought to the surface. Together, this creates an array of parks, sports fields, playgrounds, and outdoor gyms, that serve as flexible and adaptable spaces to host temporary exhibitions, local community events and seasonal food kiosks. Within this newly reconfigured blue-green fabric, the students envisage low-rise housing and energy efficient typologies powered by solar panels. Flexible use is given priority, enabling residents the freedom to imagine and reimagine their living and recreational spaces. Existing mobility systems were complemented by soft mobility walkable and bikeable paths. Figures 4.4.2, 4.4.3 and 4.4.4 show the enhanced clustered systems of blue-green, housing-social, and mobility-energy infrastructures respectively.

Figure 4.4.1. Sequence of conceptual framing and thinking guided by the idea of synergic infrastructures (source: Sutkowska, Farkas, Valarezo, Cubel, & Roze, 2023)



Figures 4.4.2, 4.4.3, 4.4.4 (from top to bottom). Proposed blue-green, housing-social, and mobility-energy infrastructures for the case study area (source: Sutkowska, Farkas, Valarezo, Cubel, & Roze, 2023)

The students from team 4 translated these initial concept sketches into an integrated socio-spatial plan as shown in Figure 4.4.5, indicating the potentialities for new blue-green, housing-social, and mobility-energy configurations.

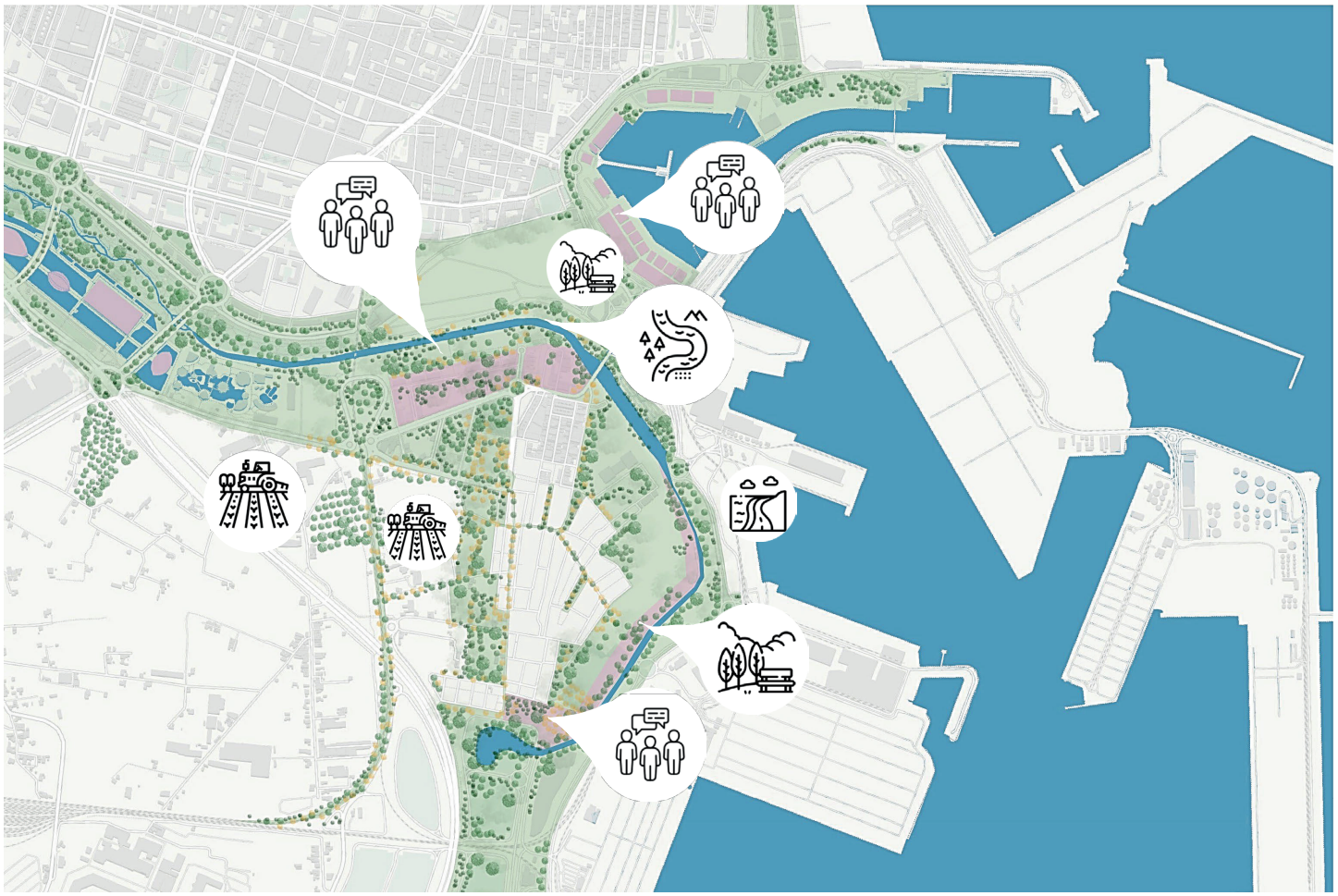


Figure 4.4.5. Proposed socio-spatial plan for the case study area (source: Sutkowska, Farkas, Valarezo, Cubel, & Roze, 2023)

The students also took keen note of the perspectives provided by the various stakeholders and community members. The existing vibrant community engagement is recognised as a strength of the area which the students weaved into their socio-spatial strategy. This led them to focus on the borders between areas and to enhance the transition between the different neighbourhoods to facilitate better interaction among the residents through community centres and recreational spaces. For example, the connection between Nazaret's urban grid with the proposed park was enhanced by a boulevard of orange trees, a key recognizable greening element in Valencia. The connection between Nazaret and La Punta was enhanced by the introduction of vegetation corridors. The existing harbour wall which is currently a barrier is weaved into the spatial strategy by turning it into a graffiti wall showcasing the work of local artists. As a larger socio-economic strategy to revive the agricultural legacy of the area, the students also proposed the restoration of neglected agricultural land and inviting young aspiring farmers to learn about local traditional agricultural practices.

As part of conventional detailing, sectional profiles and schematic collages were used to indicate the spatial quality and the new uses of the redesigned spaces as shown in Figures 4.4.6, 4.4.7 and 4.4.8.

The students' work serves as an inspiring example of how diverse, multi-cultural and multi-disciplinary perspectives can contribute to better education, research and collaboration pathways in urban planning and design.

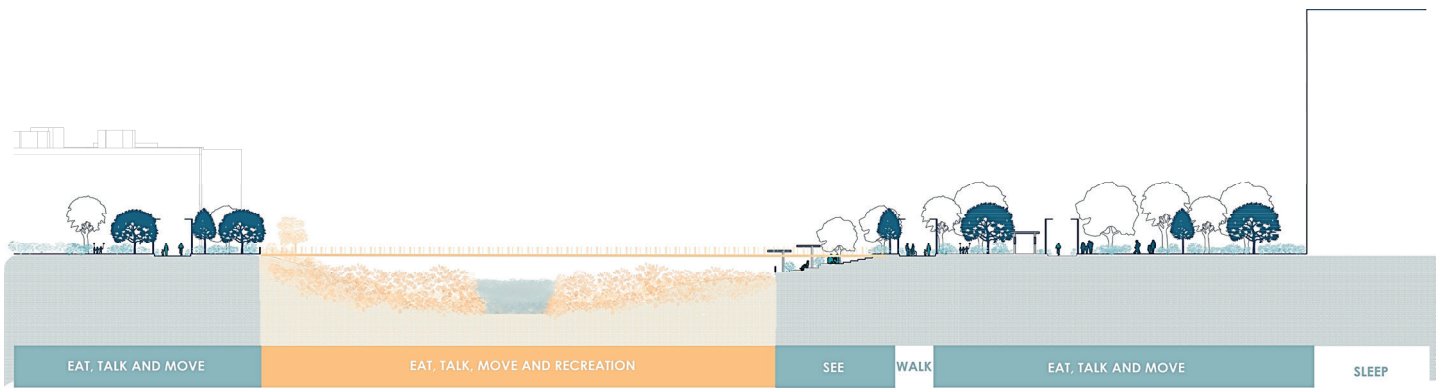
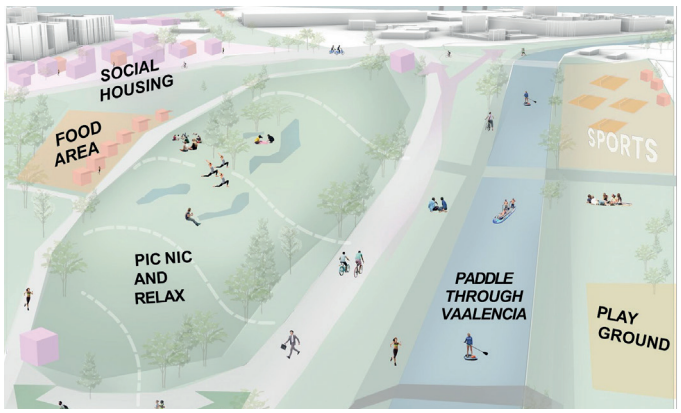


Figure 4.4.6. Profile along the park to be located in the old riverbed of the Turia (source: Sutkowska, Farkas, Valarezo, Cubel & Roze, 2023)



Figures 4.4.7 and 4.4.8. Conceptual collages of the park proposed in the old riverbed of the Turia (source: Sutkowska, Farkas, Valarezo, Cubel & Roze, 2023)

The TEAM 4 and their personal summary

Team 4 was integrated by six master and bachelor students from different ENHANCE universities: Alicja Sutkowska (Warsaw UT), Dóra Farkas (RWTH Aachen), Isabella Valarezo (POLIMI), Lilan Cubel Gamir (UPV), and Liva Roze (TU Berlin). Their work during the on-site week in Valencia was tutored by the author of this chapter, Assistant Professor Mrudhula Koshy (Norwegian University of Science and Technology, Department of Architecture and Planning).

The following lines display a short summary prepared by the members of Team4 at the end of the course.

"The Valencian district of Poblados Maritimos, situated along the picturesque Turia River and city harbor, has long been an emblem of both historical significance and contemporary urban challenges. Over the past decades, this coastal neighborhood has weathered fluctuating municipal priorities and undesirable investments. Local activists tirelessly champion justice, while residents take pride in the district's rich fishing and agricultural heritage. This design project, borne out of the VLC Summer School, seeks to establish a new paradigm of urban development in this cherished but uncertain area.

Our concept aims to generate synergies among key urban elements, pairing the blue with the green infrastructure, social aspects with the housing problems, and energy-mobility systems, to establish a cohesive, interconnected, and community-centric urban enclave. Our spatial strategy is designed not only to revitalize fading historical identities, exemplified by the case of Nazaret, but also to cultivate the novel ones. By fostering a relationship between these pivotal components, we aspired to embody the principles of sustainability, inclusivity, and community engagement.

Firstly, our proposal seeks to extend the green expanse of the Turia River Delta, a hub of natural beauty and recreation. This expansion involves reconnecting the Caterpillar Bridge with the El Grau blocks located across the renatured water lane, effectively dismantling the barriers that have separated the local community from the rest of the city. Additionally, we envision the reclamation of previously abandoned agricultural lands to establish a new park. Within the newly designed greenery we envision small pavilions – adaptable spaces which could become cafes, host temporary exhibitions, and facilitate local gatherings. Furthermore, sports fields, playgrounds, and outdoor gyms are strategically positioned to enhance the recreational facilities and quality of life for the district's residents.

The design introduces low-density multipurpose buildings, carefully integrated into the fabric of the community. These structures offer flexible living spaces while minimizing environmental impact. Nevertheless, in addition to reimagining existing spaces, we advocate for the adoption of sustainable practices for future developments, e.g. using solar energy to illuminate the newly pathed pedestrian and bicycle lanes, thereby enhancing the area's safety.

Amidst the array of tangible transformations, we emphasize the intangible yet invaluable aspects of community engagement. The project invests in the restoration of agricultural soils, providing a platform for intergenerational knowledge exchange. Young farmers are afforded the opportunity to learn from their experienced elders, rekindling the legacy of cultivation. Furthermore, we propose adorning the unattractive harbor wall with captivating graffiti, inviting local artists to weave their creativity into the district's tapestry. This artistic intervention serves as a distinctive landmark, attracting tourists to explore the district's unique character.

As designers, particularly as students, we acknowledge that the realization of our visions is often unreachable. Nevertheless, it is our goal to actively seek innovative concepts and potential transformations of urban spaces, offering glimpses into their prospective forms. We derive great satisfaction from the opportunity to engage with the enchanting Valencian districts and to connect with its inhabitants. Our earnest aspiration is that their articulated needs and aspirations shall resonate and find attentive ears, thereby serving as catalysts for meaningful progress".

4.5_TEAM 5. RECONNECTION OF LITORAL NEIGHBOURHOODS

Fabio Bayro Kaiser | Research Associate, RTWTH Aachen University
Christian Larisch | Research Associate, RTWTH Aachen University
Christa Reicher | Professor, RTWTH Aachen University

4.5.1. Proposal title: re-connection of the littoral neighbourhoods

The rapid urbanisation of the larger metropolitan area of Valencia, coupled with the dominant presence of the port, has led to the neglect and disconnection of smaller neighbourhoods such as the Littoral Neighbourhoods. Team 5 sought to address these challenges, while aligning with fundamental sustainable development goals and fostering resilient communities within the metropolitan area. This is achieved through the introduction of a multi-dimensional planning methodology. The planning methodology involves analysing the context and understanding different perspectives as a starting point, and proposing in a later stage a comprehensive spatial vision that aims to unlock specific synergies between urban infrastructures. The vision is then proposed as a responsive and adaptive approach to future uncertainties, whether these be spatial issues or the changing needs of residents.

This chapter outlines the design process by introducing the methodology, considering the context, and elaborating on the spatial vision and the potential synergies it unlocks. Central to the approach is an emphasis on strengthening connections within the littoral neighbourhoods and with the wider metropolitan area of Valencia.

4.5.2. Towards synergetic infrastructures

Team 5 developed a multi-dimensional approach focusing on the infrastructures of interest to the VLC Summer School, such as green, blue, energy, housing, mobility, and social infrastructure. Furthermore, a systematic assessment is proposed to discuss synergies in the short, medium, and long term. In total, 11 potential indicators of synergies have been identified through different combinations of infrastructures: ecosystem services connected to buildings, infrastructures for accessibility, cooperatives structures, spaces connected to water, multi-modal mobility, mobility spaces with climate adaptation, ecodiversity, sustainable energy traffic, areas of emission, access of green spaces, and social appropriation. As such, the synergies address social, spatial, and environmental issues individually and in combination. The team's methodology ensures a holistic understanding of the challenges and opportunities of thinking about different infrastructures together (Figure 4.5.1).

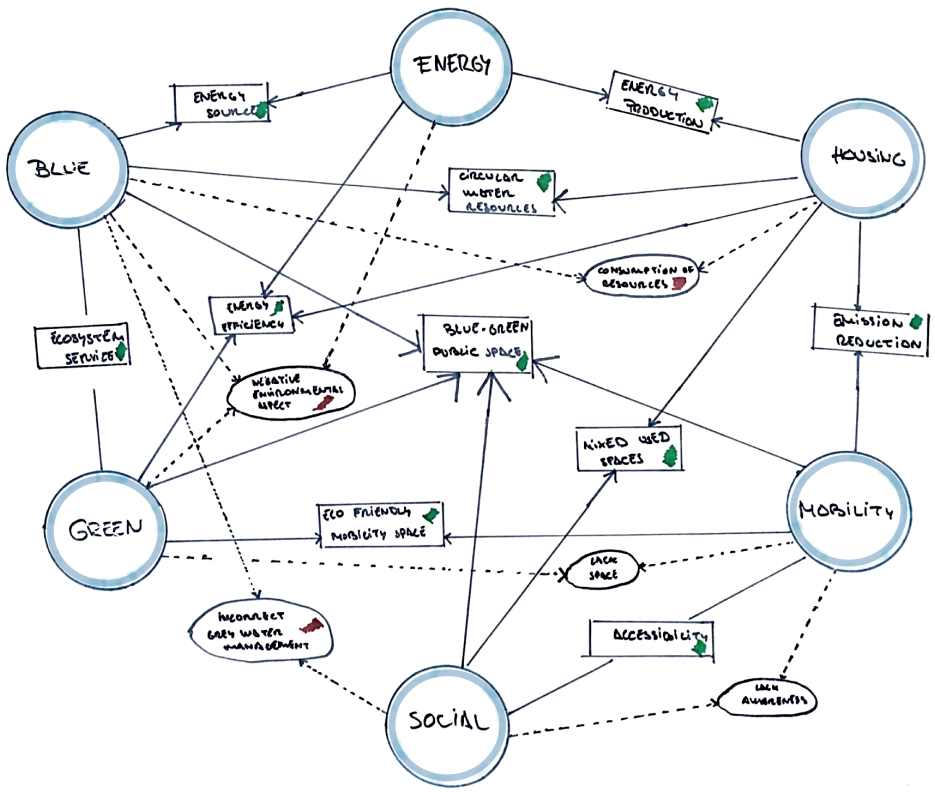


Figure 4.5.1. Towards a multi-dimensional understanding of synergetic infrastructures (source: Team 5: Archiles, Trobbiani, Gerwenat, Hoppenstedt, Posadas, & Szabra, 2023)

4.5.3. Reconnecting the littoral neighbourhoods

The first step taken by Team 5 after defining the methodology was a traditional SWOT analysis of the VLC Summer School pilot site. This was followed by a stakeholder workshop to discuss the preliminary findings and gather different perspectives. Team 5 concluded that the disconnected urban fabric and infrastructure around the site was the main weakness, threatening to further segregate the coastal neighbourhoods spatially and socially. In addition, decay of the urban fabric and loss of identity are identified as potential outcomes of this disconnected situation. The need for new forms of participation and more responsive approaches was also discussed from the residents' perspective. Against this background, the group saw opportunities to counteract such processes through the integrated design of infrastructure and the spatial integration of the littoral neighbourhoods. The main rationale is that their littoral identity could be a potential asset for the larger metropolitan area of Valencia.

The second step was to propose a spatial vision for the pilot site and outline the main strategies, actions, and tools. The core of the spatial vision is to reconnect the coastal neighbourhoods through social, spatial, and environmental links (Figure. 4.5.2). Social connections are achieved through a network of landmarks and cooperative housing structures. Spatial connections are achieved through mobility hubs and the extension of the city's relationship with the sea. Finally, environmental connections are achieved through environmental justice and the creation of green spaces and the improvement of existing ones. In addition, Team 5 mapped the infrastructures that are key to achieving such connections and visualised them in a spatial strategy (Figure 4.5.3). The proposal focuses on improving a multi-layered mobility network, designing a network of social hotspots and landmarks, supporting the expansion of green infrastructure as networks, and providing public access to the sea. The latter, seeks to reconsider the dominance of the port in such a potentially valuable public space for the city.

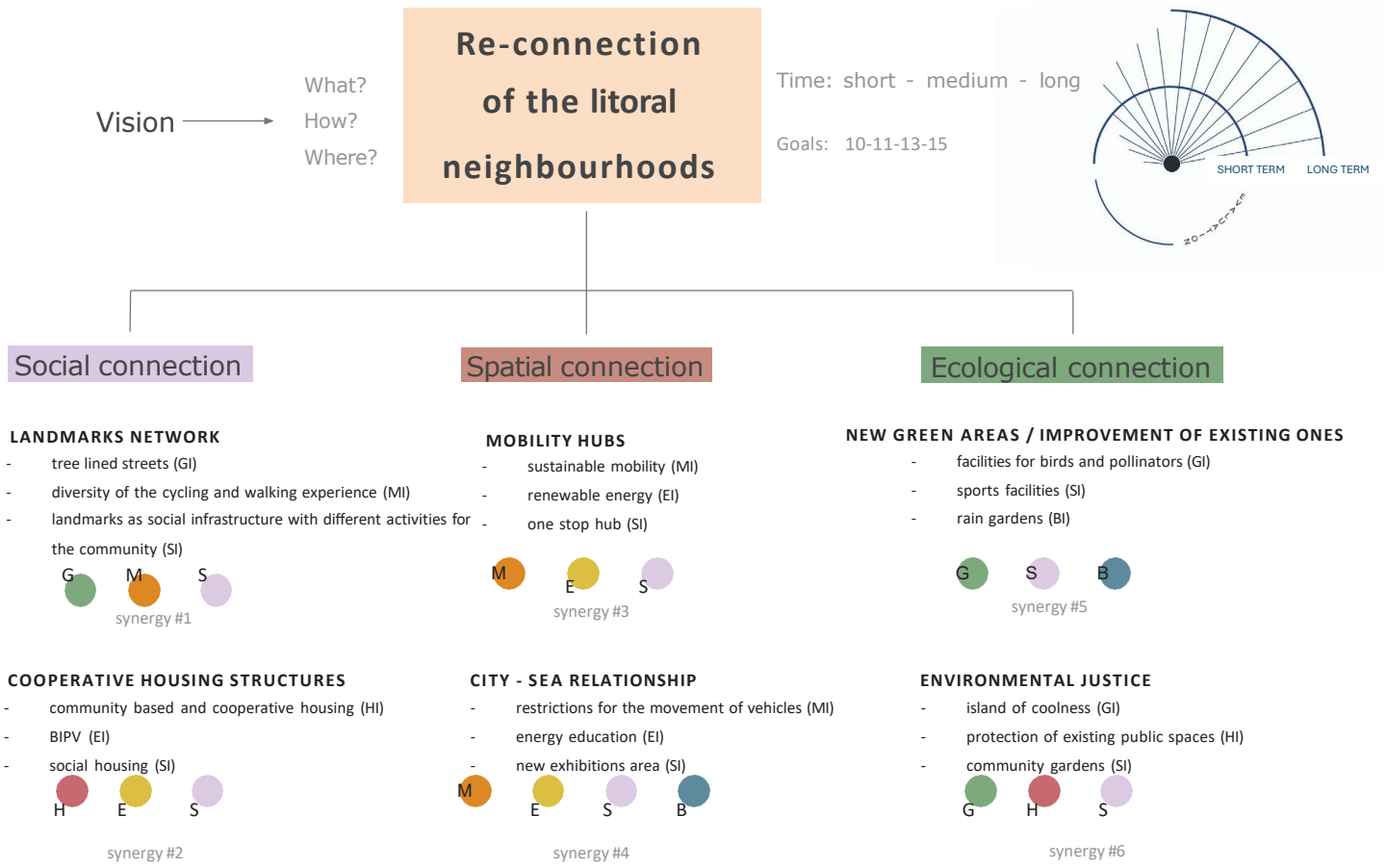


Figure 4.5 2. Reconnecting the littoral neighborhoods through social, spatial, and ecological connections. M: mobility, E: energy, S social, H: housing, G: green, and B: blue-water (source: Team 5: Archiles, Trobbiani, Gerwenat, Hoppenstedt, Posadas, & Szabra, 2023)

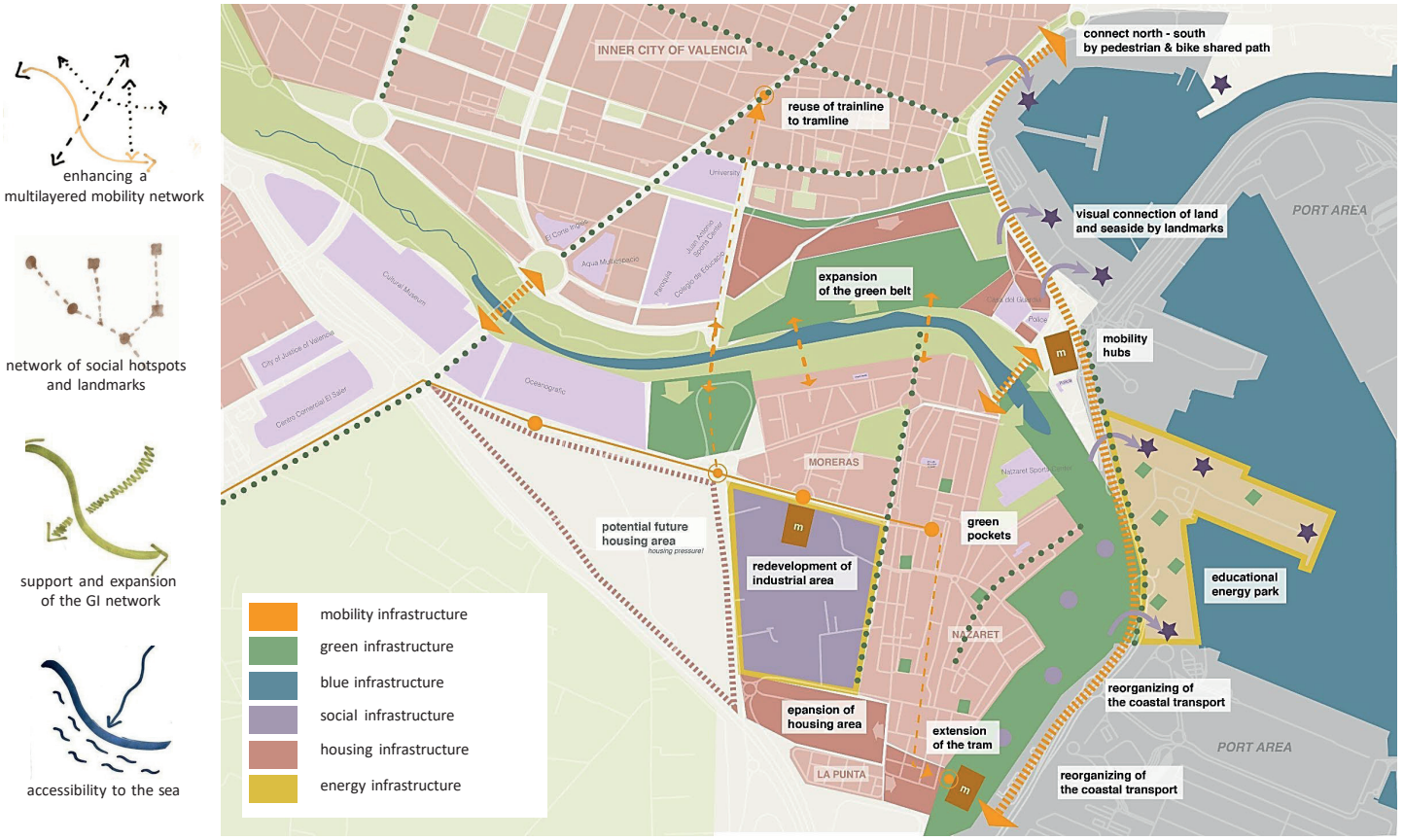


Figure 4.5.3. A multi-layered spatial strategy (source: Team 5: Archiles. Trobbiani, Gerwenat. Hoppenstedt. Posadas, & Szabra, 2023)

The spatial strategy shows a multi-layered approach to infrastructure planning and design. On this basis, Team 5 identified six key synergies through the combination of infrastructures using its multi-dimensional approach. (1) Identity recovery is promoted through the combination of mobility, green, and social infrastructures. (2) Cooperative communities are obtained by combining energy, housing, and social infrastructures. (3) Green mobility is fostered through the combination of mobility, energy, and social infrastructures. (4) Waterfront recovery is achieved through the combination of energy, mobility, blue, and social infrastructures. (5) Ecosystem services complementarity is increased through the combination of blue, green, and social infrastructures. And (6) environmental justice is accomplished through the combination of housing, green, and social infrastructures. The key insight here is that social infrastructures play a crucial and central role in all synergies.

In addition, the group carried out an assessment of their proposal using their indicator-based evaluation method for synergies (Figure 4.5.4). Due to the limited space of this summary, only the impact of two synergies will be discussed. Firstly, the recovery of identity can promote public spaces, accessibility of infrastructures, and multimodal mobility. The short-term effect is, obviously, the recovery of identity and the long-term effect is the perception of a new urban scale. Second, the recovery of the waterfront is achieved through the adaptive reuse of existing structures, the renewal of waterfronts, and the support of energy transitions. The short-term effect is the reconnection of the city with the sea, and the long-term effect is the enhancement of the transformation processes of the waterfronts.

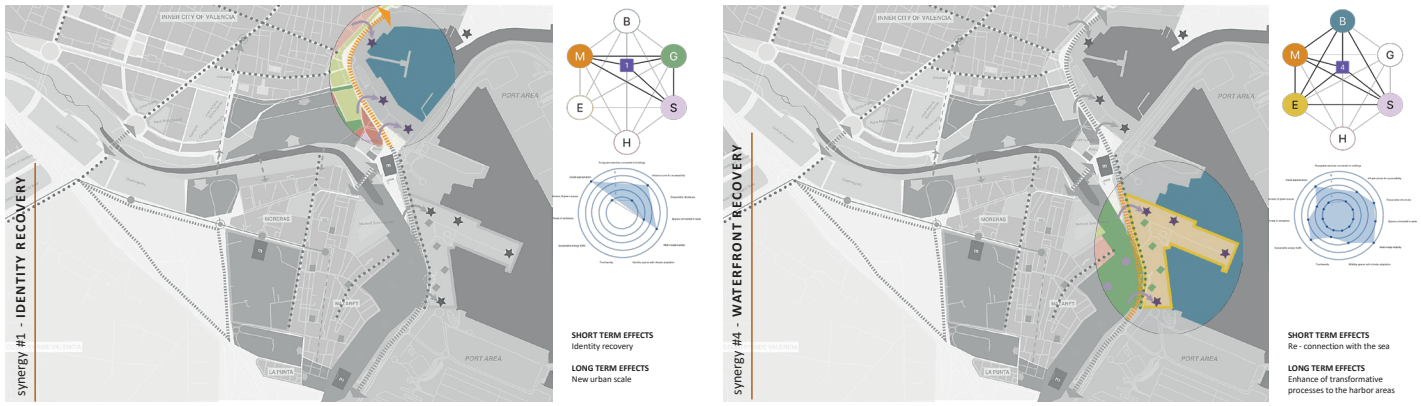


Figure 4.5.4. Synergetic infrastructures impact assessment through indicators-based evaluation (source: Team 5: Archiles, Trobbiani, Gerwenat, Hoppenstedt, Posadas, & Szabra, 2023)

4.5.4. Conclusion

Team 5 argues that by revitalising and reconnecting the littoral neighbourhoods, economic growth, identity recovery, improved quality of life, and increased community participation can be achieved (Figure 4.5.5). This not only contributes to the sustainability of the Valencia metropolitan area, but also promotes resilient spatial and social structures. Moreover, Team 5 suggests that these neighbourhoods are assets rather than burdens, and that similar approaches can be applied to other areas seeking to strengthen their identity and connections within the larger urban fabric. Reflecting on their work, the group's main contribution is the spatial approach to reconnecting the city of Valencia with its waterfront, on the one hand, and the planning and design of synergetic infrastructures, considering their impact over time through an indicator-based evaluation, on the other hand. Finally, through a comprehensive methodology and strategic vision, the group has successfully established a spatial vision for sustainable positive change, ensuring a more vibrant, inclusive, and sustainable future for all residents of the Littoral Neighbourhoods and beyond.

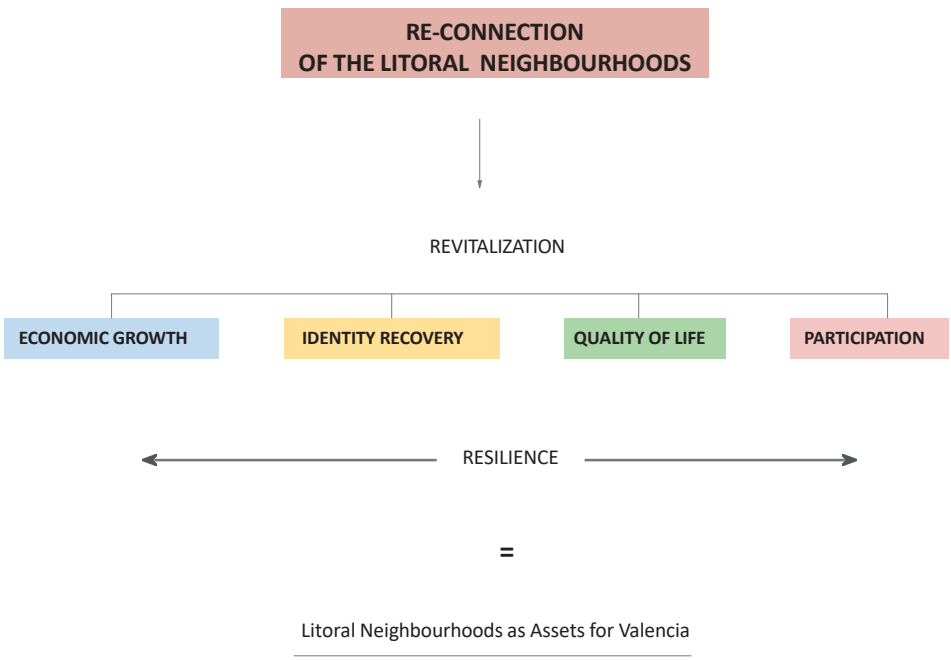


Figure 4.5.5. The littoral neighborhoods as assets (source: Team 5: Archiles, Trobbiani, Gerwenat, Hoppenstedt. Posadas, & Szabra, 2023)

4.5.5. The team and the students' summary

Team 5 was integrated by six master and bachelor students from different ENHANCE universities: Adela Archilés Segarra (UPV), Cecilia Trobbiani (POLIMI), Christiane Gerwenat (RWTH Aachen), Christoph Hoppenstedt (TU Berlin), Genelou Posadas (NTNU) and Mateusz Szabra (Warsaw UT). Their work during the on-site week in Valencia was tutored by Professor Christa Reicher and research associate Fabio Bayro Kaiser (RWTH Aachen University, Chair and Institute of Urban Design at the Faculty of Architecture).

The following paragraphs present a summary prepared by the students at the end of the course.

Re-connection of the Litoral Neighbourhoods: Crafting Synergic Solutions for a Revitalised Valencia

"In Valencia, Spain, we undertook an ambitious initiative to redefine the urban fabric of the littoral neighbourhoods in the coast of the city, leveraging the power of different synergies grounded in diligent research and empathic community engagement.

Our main goal was not to create a defined master plan, but to create a specific framework for future developments or competitions. This way we will ensure that certain aspects are respected in the future. Such as the heritage of la Huerta, the maritime tradition, the connection to the sea, the opinion of the neighbours and the idea of maintaining what is pre-existing.

Our procedural methodology pivoted around identifying synergies and delineating indicators and actionable strategies to harness these symbioses to the fullest. The central actions defining our framework unearthed in our exploration are:

- *Landmarks Network*
- *Cooperative Communities*
- *Eco-friendly Mobility*
- *Cooperative Housing Structures*
- *Ecosystem Services Complement*
- *Environmental Justice*

Armed with this conceptual framework, we envisioned a host of innovative interventions, including redevelopment of historic spaces, fostering eco-friendly mobility solutions, and establishing green pockets, poised to rejuvenate the neighbourhoods sustainably.

A cornerstone of our strategy is a commitment to longitudinal evaluation, utilising the defined indicators to continuously assess the impacts over time, ensuring the adaptive and successful realisation of our objectives in resonance with the evolving needs and dynamics of the community. This evolutionary approach permits organic growth, wherein strategies are nimble and responsive, adapting to the shifting sands of time and providing a blueprint for a future that is as enduring as it is vibrant.

As we journey forward, we are nurturing a dynamic blueprint where Valencia does not just grow but evolves, with a grounded understanding of its historical richness and a forward-looking lens, crafting a living, breathing cityscape that is harmoniously interconnected, richly diversified, and robustly inclusive".

(source: Team 5: Archiles, Trobbiani, Gerwenat, Hoppenstedt, Posadas, & Szabra, 2023)

4.6_TEAM 6. BRING BACK THE SEA TO THE CITY + DOWN THE RIVER WE GO

Luis Bosch | Associate Professor, Polytechnic University of Valencia
Julia Deltoro | Associate Professor, Polytechnic University of Valencia
Adolfo Vigil | Associate Professor, Polytechnic University of Valencia

4.6.1. Introduction

This text introduces the work carried out by group 6 of the Valencia Synergic Urban Infrastructure Summer School. It is worth highlighting the multidisciplinary nature of the group, which comprises students from six different universities from various fields of study, such as Urban Planning, Architecture, Construction and Robotics and Agricultural Engineering. The aim of this workshop, as defined by the students of team 6, was "*to enhance the integration of various urban infrastructures in order to formulate a comprehensive master plan for the future development and transformation of the designated study area.*"

As displayed in Figure 4.6.1. the team was integrated by 6 master and bachelor students with different academic backgrounds and from different ENHANCE universities: Yanran Chen (RWTH Aachen University), Zofia Gancarczyk (Warsaw University of Technology), Olesia Sakhareva (Technical University of Berlin) Nacho Del Rio (Technical University of Valencia), Vilmante Daulenskyte (Politecnico di Milano) and Mohammadreza Movahedi (Norwegian University of Science and Technology). Their work was tutored and facilitated by Associate Professors Julia Deltoro Soto, Luis Bosch Roig, and Adolfo Vigil de Insausti (Technical University of Valencia, School of Architecture).

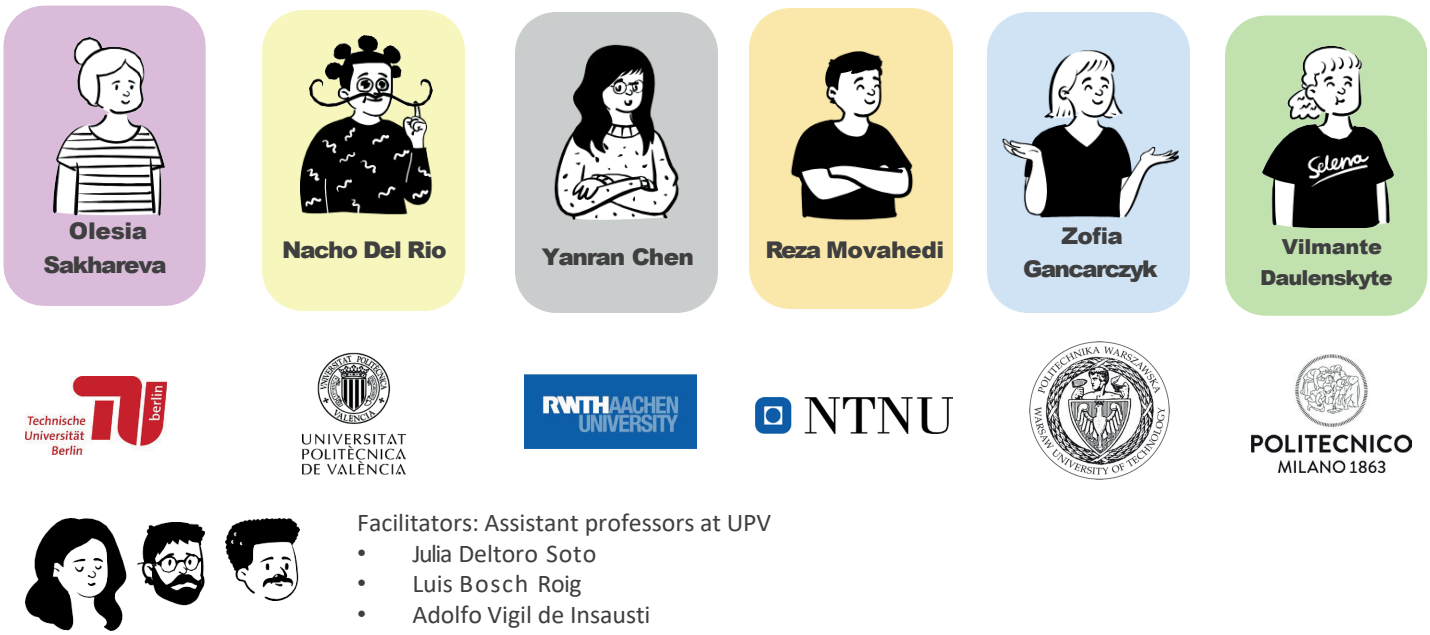


Figure 4.6.1. Team 6: students and tutors/facilitators (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

The team closely followed the methodology proposed in the course, which consisted of creating a synergy meter between infrastructures as a critical tool in the design process of a spatial strategy for the pilot area in Valencia. As shown in Figure 4.6.2, one of the particularities of the team was that in task 3, they made an internal competition to propose two different spatial strategies, which they then tested against the synergy meter. This gave them critical information about which option was working best for each aspect so they could choose the best parts from them to create a final version of the proposal for the site. Finally, it is also important to mention that the input of the representatives from the neighbourhoods allowed them to generate an improved proposal.

As the students said: *"The primary methodology employed in this workshop centres around co-creation. Our proposal is informed by a combination of our own insights and research, as well as the contributions and recommendations provided by representatives from the neighbourhoods within the study area, professionals affiliated with the Valencia municipality, and experienced architects and urban planners who are actively engaged in and knowledgeable about the study area."*

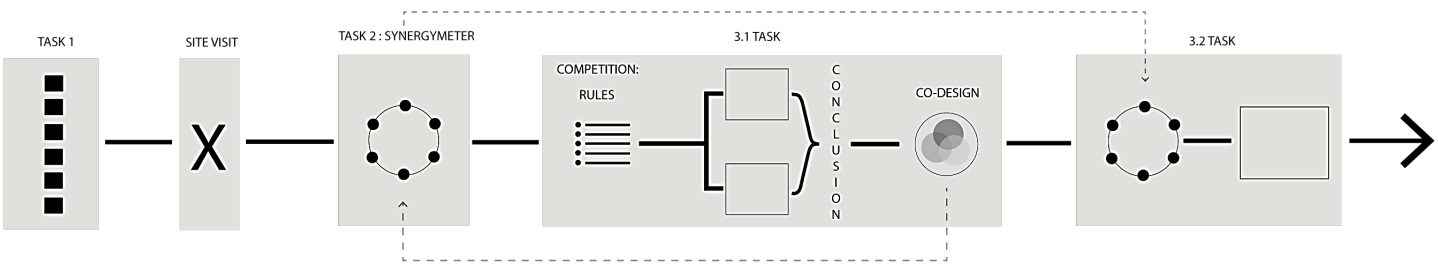


Figure 4.6.2. Team 6: students and tutors/facilitators (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

4.6.2. TASK 2: A synergy-oriented planning methodology and a 'synergy-meter.'

According to the team: *"The initial phase of our methodology involves an organised review of various infrastructural components, with a specific emphasis on comprehending Valencia's diverse objectives and prospective strategies."*

The primary objective of Team 6 in Task 2 was to analyse and elucidate the dynamics and interactions among various urban infrastructures. From a theoretical and qualitative perspective, they categorised the advantages (synergies) and obstacles (conflicts) associated with each binary intersection between the social, mobility, green, blue, housing and energy infrastructures. As displayed in Figure 4.6.3, the analysis was systematised through a matrix in which the upper right section shows the positive interactions that should be emphasised, and the lower right section shows the opposite, interactions that must be treated with special sensitiveness to be minimised.

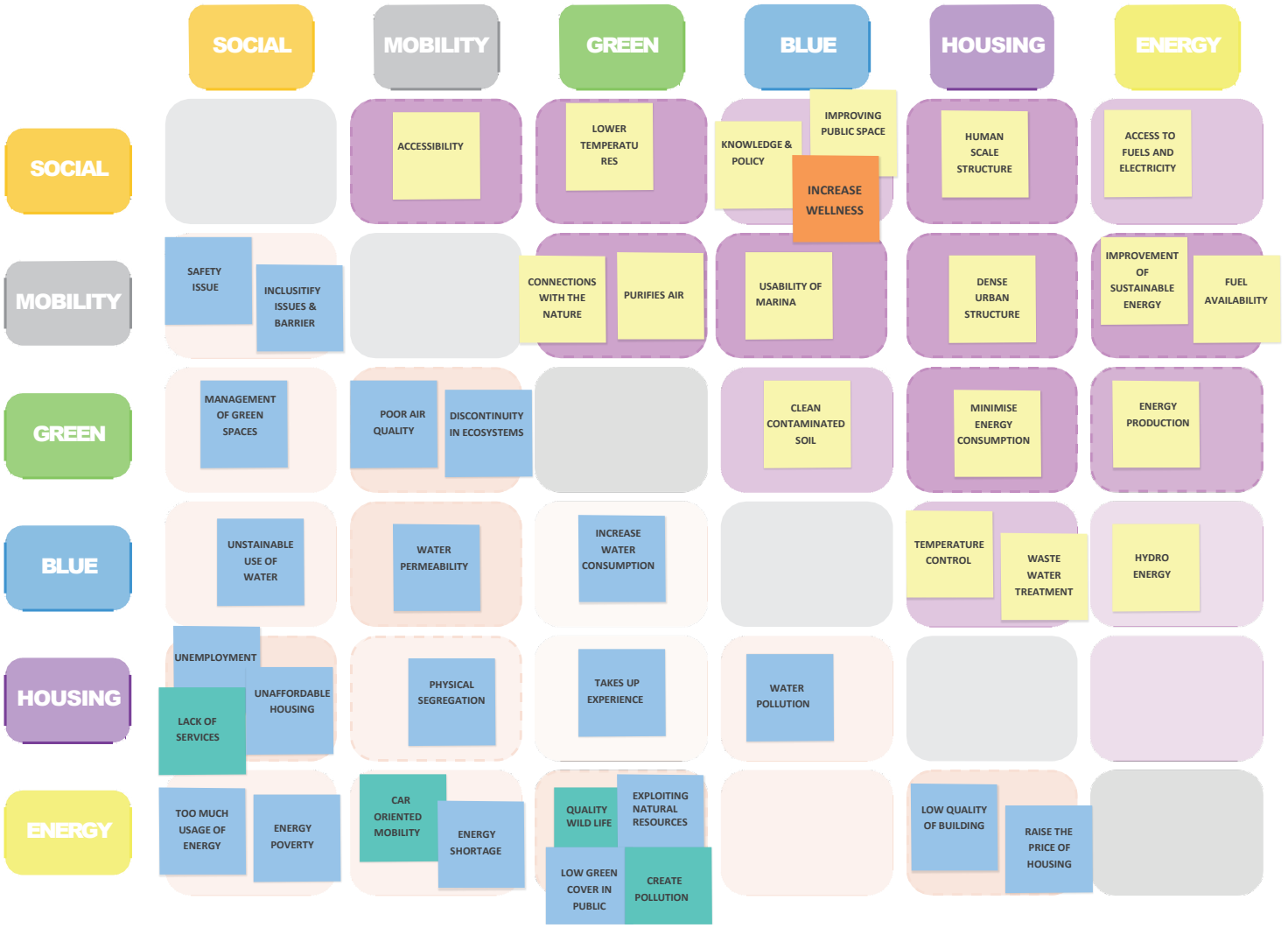


Figure 4.6.3. Conceptual matrix displaying positive and negative interactions between each pair of urban infrastructures (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

In a second step (Figure 4.6.4), these interactions were synthesised and operationalised through a reduced number of indicators.

Managing the grid was somehow complicated, so a more visual and helpful way to represent the main interactions was implemented. As displayed in Figure 4.6.5, each synergic interaction between each pair of infrastructures was conceptualised in one term which were then arranged in a spider graph. This spider graph (or synergy-meter) was perceived as a practical tool to support the planning process.

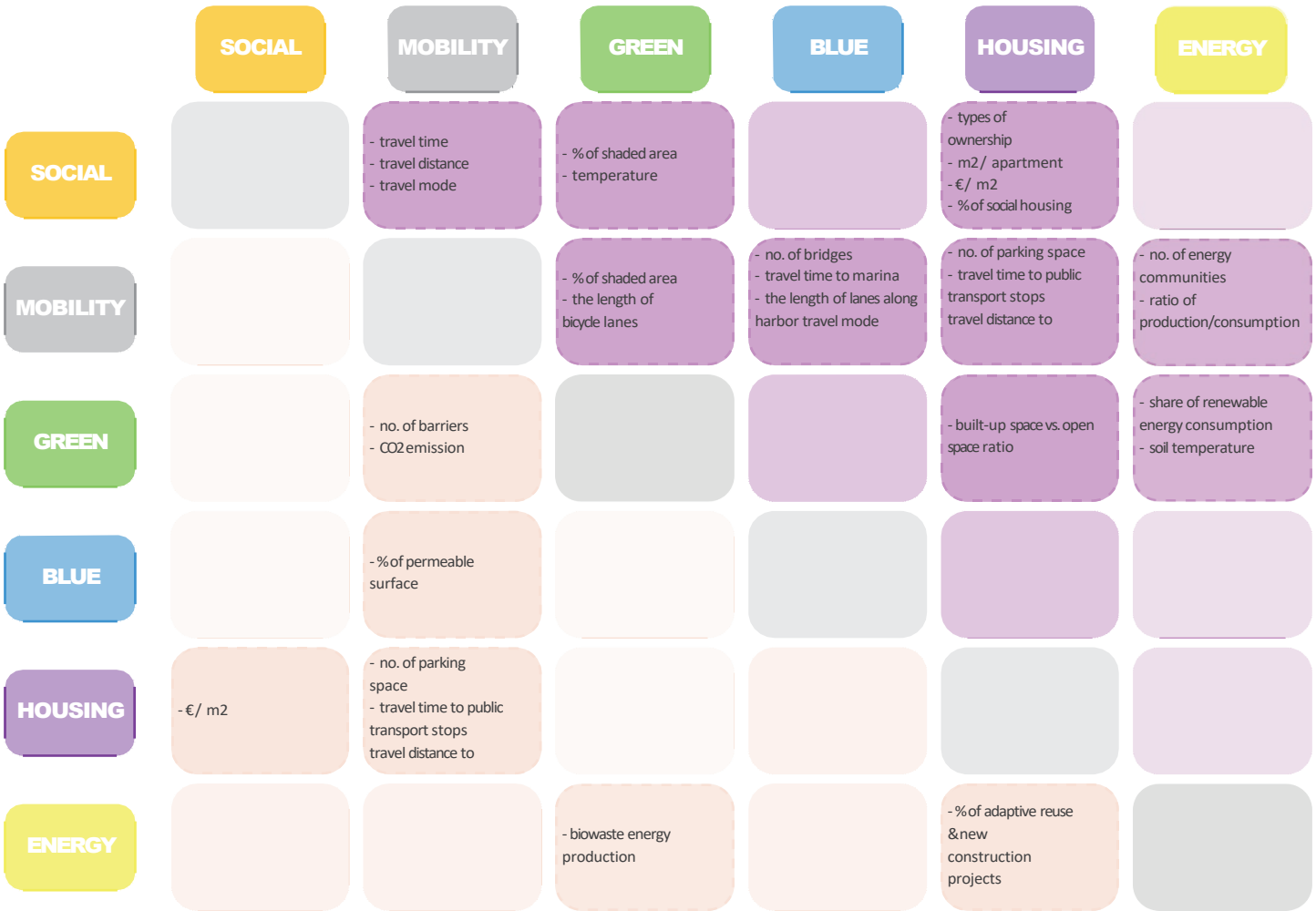


Figure 4.6.4. Main indicators to assess the level of synergy or conflict between each pair of urban infrastructure (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

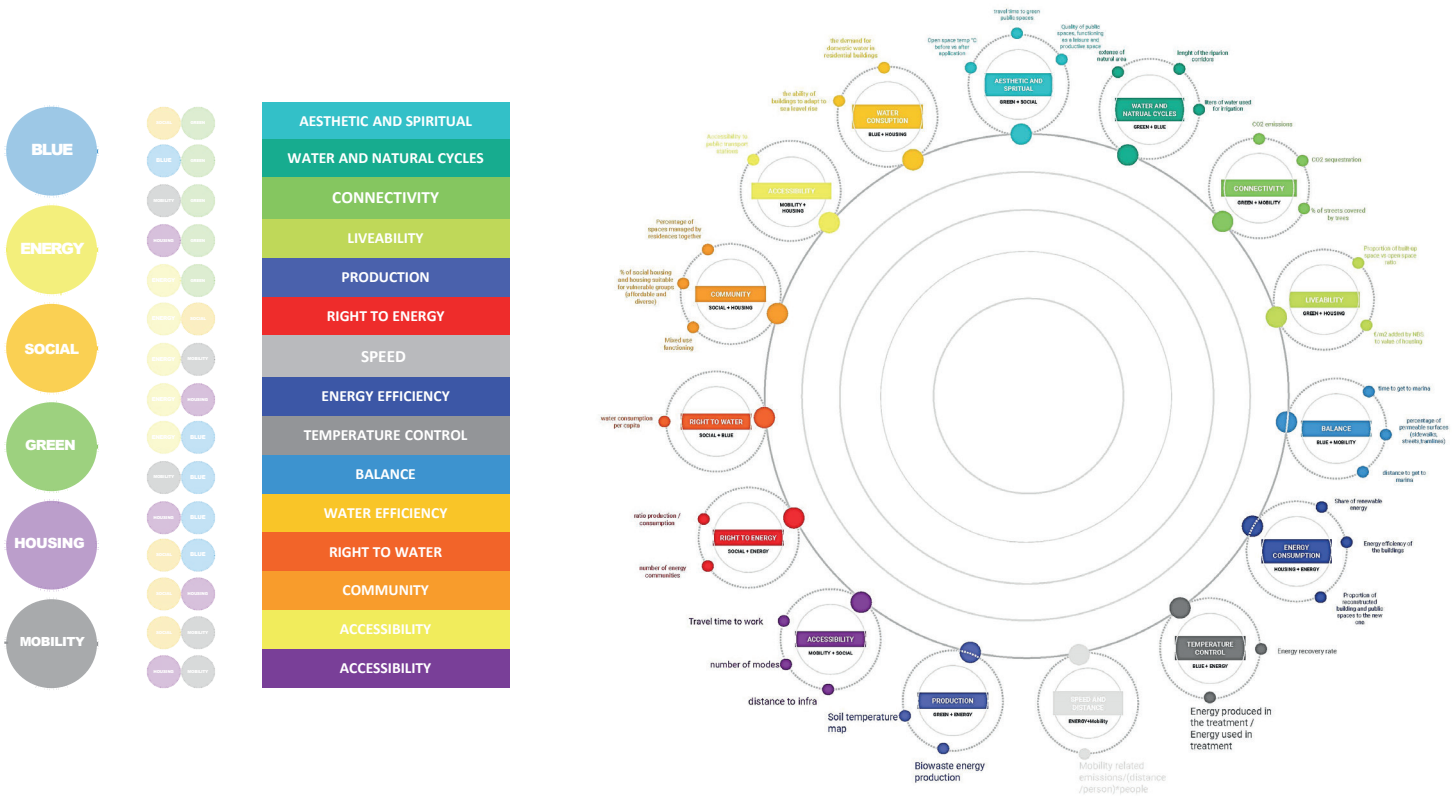


Figure 4.6.5. Synergy-meter (right) displaying the main types of synergies (column to the left) (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

Developing all these synergies in matrices and in a spyder web allowed the students (in a second step) to translate them into design objectives and strategies, but also revealed the lack of some data and how data-dependant was the method.

The definition of design objectives probably became tedious and needed more time than expected. Educative tools linking theoretical instruments (e.g. synergy-meter) and practical applications (e.g. development of a spatial plan) serve not only to test their applicability but also to prioritize actions and to organize them according to a logical timeline. This way, splitting the work was somehow complicated, and the results became hard to be completed in a single session.

4.6.3. TASK 3.1: A Spatial Strategy for the VLC_Pilot Site

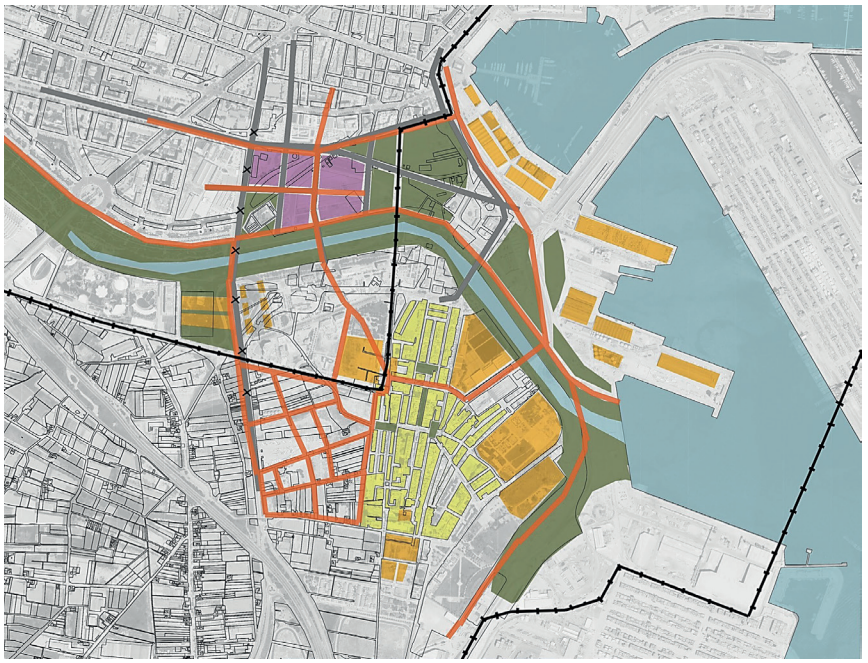
In task 3.1, the students had to define a spatial strategy for the pilot site. After the analysis and visit to the site, the students divided the area into six distinct subareas according to their location, characteristics, and urban structure: the residential area of Nazaret and the new one of Las Moreras, the empty area the former Formula 1 circuit, the harbour and the marina, the agricultural land and houses of La Punta, and the end of the Turia River. They analysed the potentialities and characteristics of the subareas and assessed the existing situation of the whole area with the synergy meter they had created in the previous task. Then, they worked into two smaller teams to develop two alternative proposals (Figure 4.6.6).

Luis Bosch + Julia Deltoro + Adolfo Vigil

'BRING BACK THE SEA TO THE CITY'

Proposal 1

public spaces
residential buildings
green spaces
water
bike paths
train tracks / tramway tracks
roads



'DOWN THE RIVER WE GO'

Proposal 2

public spaces
residential buildings
green spaces
water
bike paths
train tracks / tramway tracks
roads

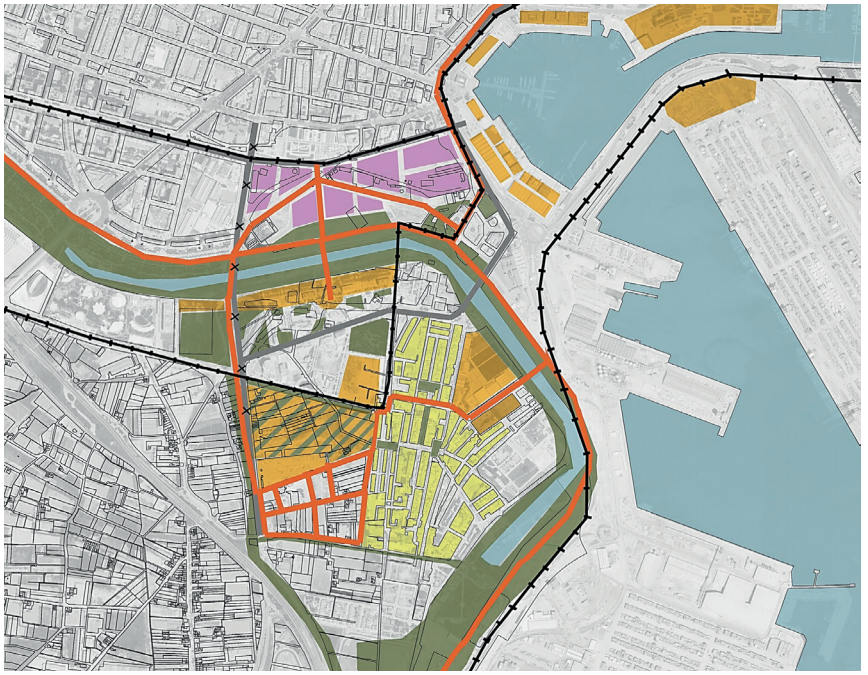


Figure 4.6.6. Proposals developed by two subteams ot Team 6 (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

The main difference in the proposals was that proposal 1 took part of the the space of the cargo harbour and transformed it into a new public area for the enjoyment of neighbours and the city. By so doing, they also connected the old Turia River with the sea, creating new green areas and synergies between the blue and green infrastructures and opening the city to the sea.

In El Grau, both proposals provided new residential areas connecting the existing residential area in the north with Nazaret. Option 1 created a bigger park beside the port area and the proposed new housing. In the harbour subarea, option 1 connected the city to the sea by opening the docks, reusing the existing infrastructure, and creating a mixed-use area. In Las Moreras, both proposals were quite similar; new public sports areas and social facilities were provided. In Nazaret, the existing buildings were improved for climate adaptation with energy communities, new activities and local entrepreneurship were encouraged to attract newcomers to the site, new facilities for the existing residents were included, and public transport system was improved. The Turia Park in option 2 was extended along the wall of the harbour, trying to create a nicer limit with the Nazaret neighbourhood. Finally, for La Punta subarea, in the second option, new areas and activities related to agriculture were contemplated to activate the orchards and offer education and entertainment, always respecting the housing typologies present in the *Huerta*.

As seen in Figure 4.6.7, they compared and analysed more in-depth each of the two proposals for the six distinct subareas and assessed which improvements they were achieved using the synergy meter. This allowed them to better understand which proposals would make a bigger change in the area and which infrastructures they affected, giving them a broader view of each option's implications.

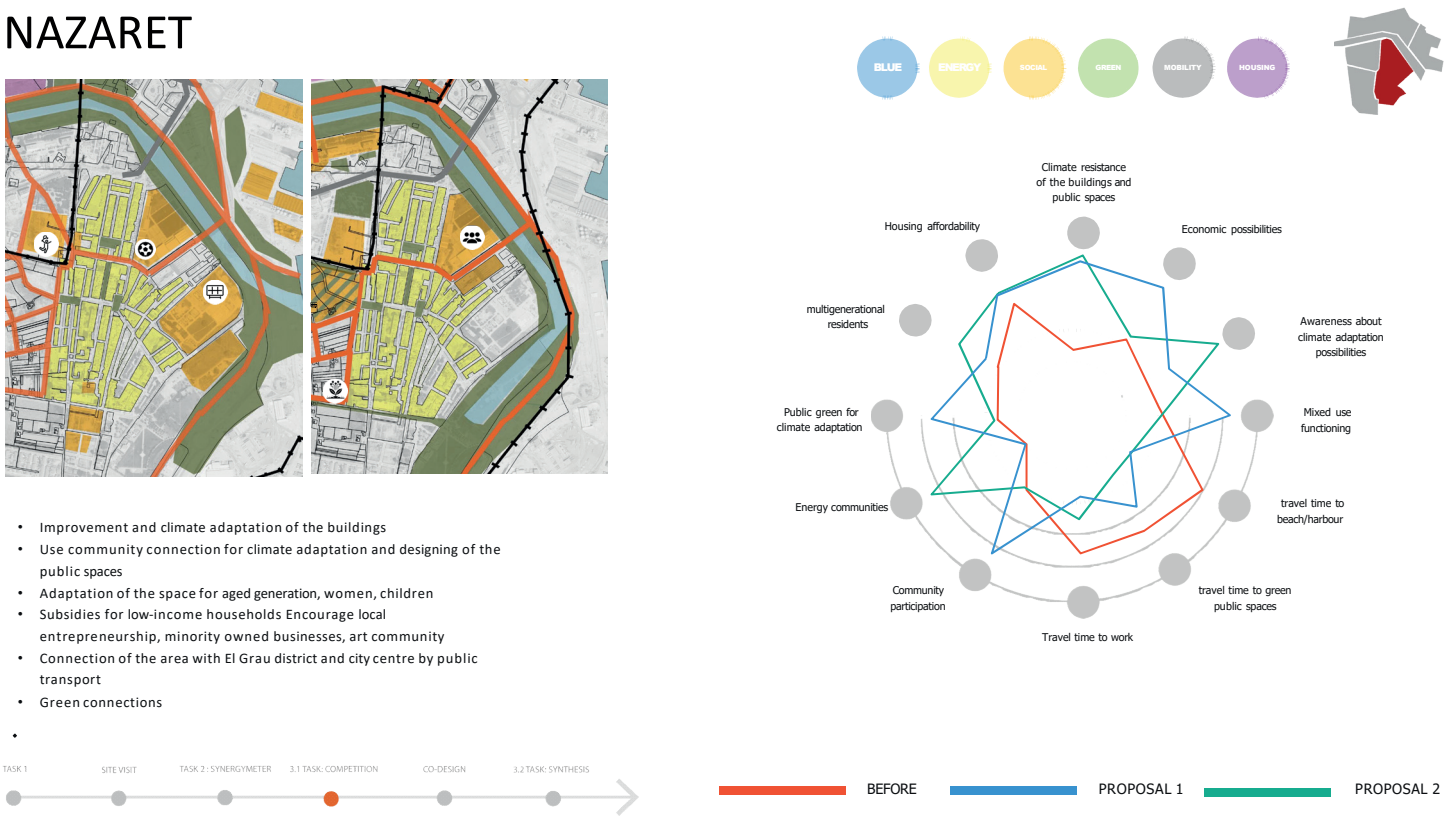


Figure 4.6.7. Comparison of the two proposals in the subarea of Nazaret, and the assessment of both with the synergy meter. They produced similar comparisons for the six subareas. (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

Figure 4.6.8. Presentation of their proposals in the meetings with the stakeholders (Source: Photo by Julia Deltoro. Map: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

At this point, they maintained meetings with the local stakeholders, to which they asked about their needs to acquire a deeper understanding of the site, juxtaposed their ideas with the current circumstances, and presented their proposals to get their feedback. They then readjusted their two proposals, considering the feedback the stakeholders provided (Figure 4.6.8).

4.6.4. Final proposal

Task 3.2 consisted of a synthetic work in which the characteristics with the best indicators of the two proposals put forward in task 3.1 were included based on the evaluation carried out with the synergy meter. This synthesis considered five fundamental objectives: climate adaptation, connections, social justice, quality public spaces and economic development (see Figure 4.6.9).

These objectives were translated into a series of proposals that were defined according to the different infrastructures studied. From the spatial strategy, it is worth highlighting three significant operations that respond to the blue, green and mobility infrastructures: (1) reconnecting the riverbed with the sea through the port, “transforming the harbour into a vibrant public space for the people”; (2) creating a green belt along the old riverbed, surrounding the areas of Nazaret, Moreres and La Punta as a ring, and connecting with the south of the city; and (3) improving the north-south and east-west connections through various operations such as burying the railway tracks, creating new public transport routes as well as pedestrian and cycle routes following the trace of the new green belt (see Figure 4.6.10).

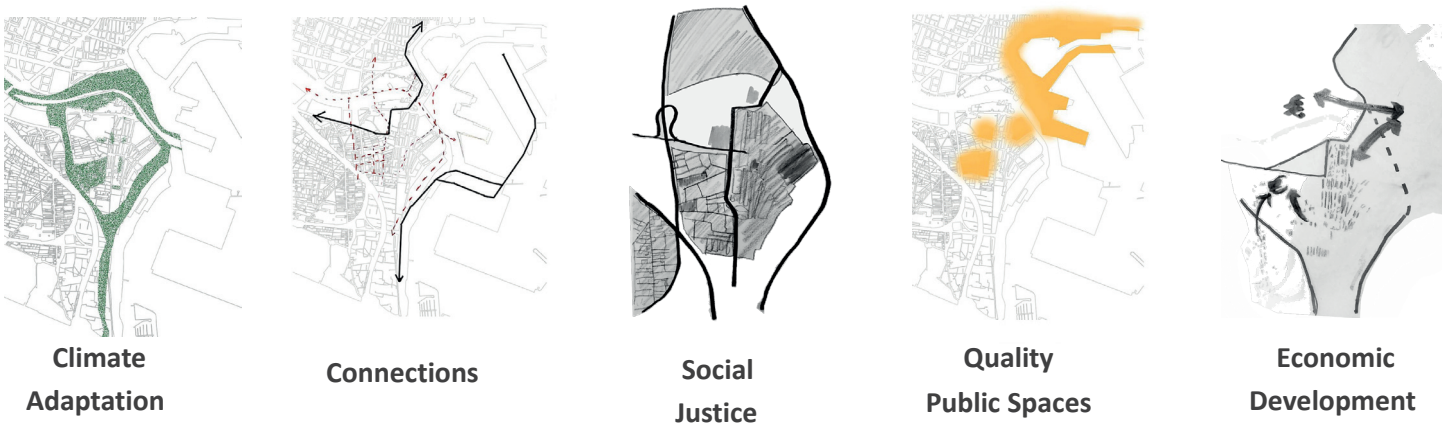


Figure 4.6.9 Narrowing down the goals (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

SPATIAL AND PROGRAMMATIC STRATEGY 1:5000

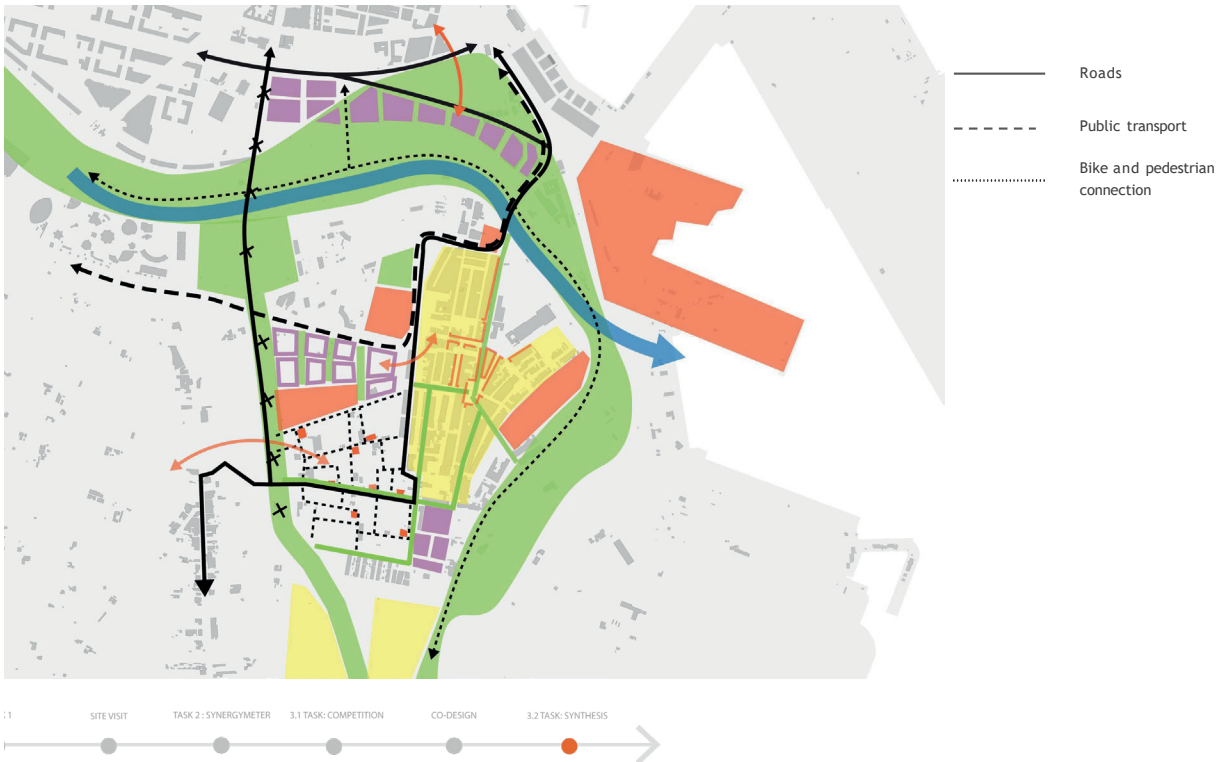


Figure 4.6.10. Spatial and programmatic strategy (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

From a housing point of view, a distribution of buildings of different heights is proposed according to the urban environment: medium-rise buildings are located in the Grau area, with commercial spaces on the ground floor; while low-rise buildings are located in the Punta with flats for different types of families, mixed uses and priority uses. In addition, public orchards and gardens are proposed to connect with the surrounding crop fields (see Figure 4.6.11).

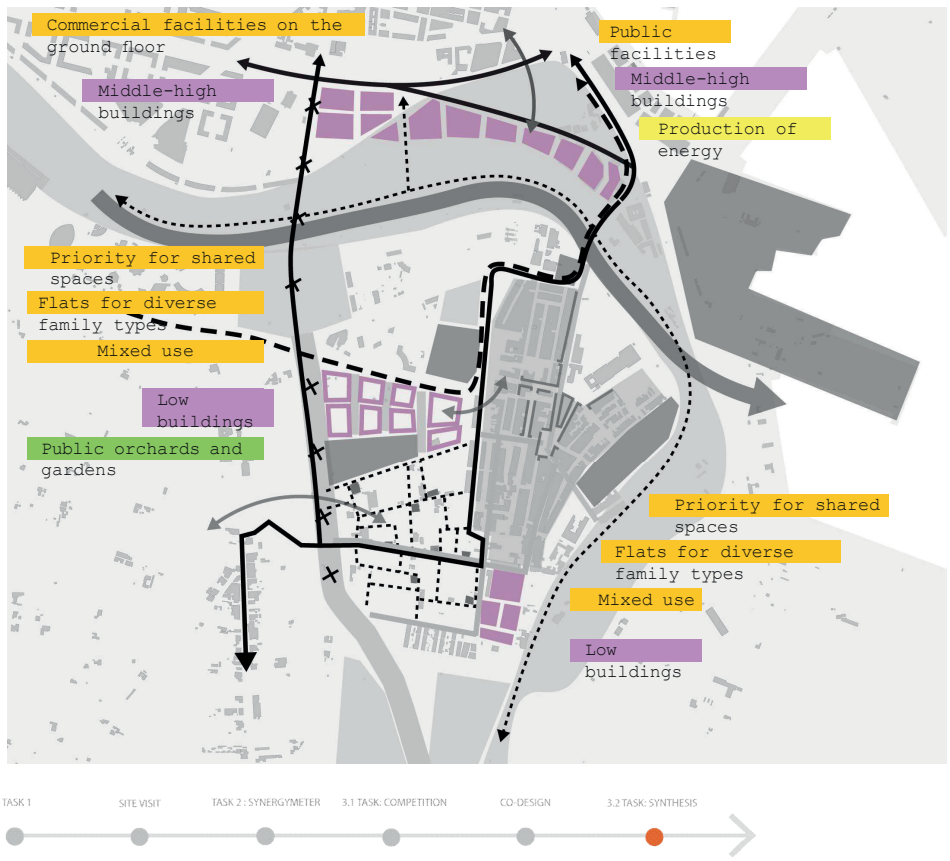


Figure 4.6.11. Housing Infrastructure (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

From the energy point of view, measures such as promoting energy communities, providing information on climate adaptation of buildings, or using industries for energy production are proposed. The inclusion of green elements in small gardens and streets to alleviate high temperatures is also presented (Figure 4.6.12).

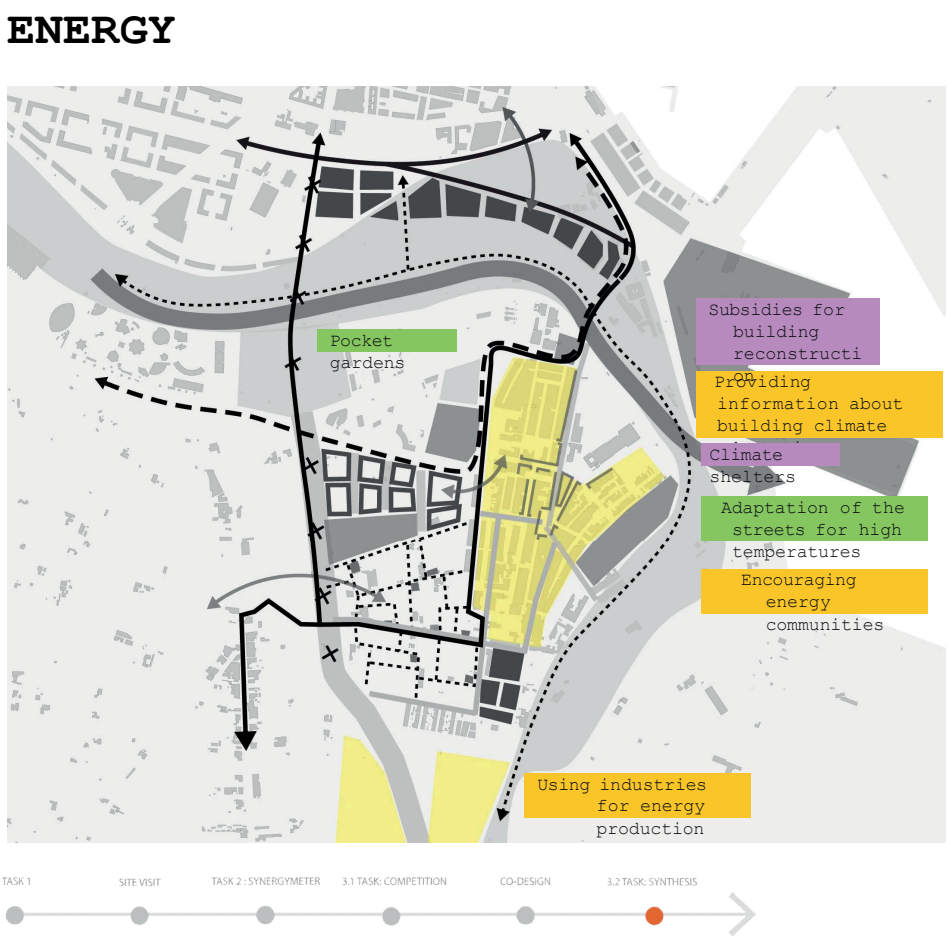


Figure 4.6.12. Housing Infrastructure (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

From a social point of view, it is suggested to encourage the use of public spaces and empty ground floors by residents and local businesses, as well as to promote the relationship with agriculture through cultural events, services, restaurants, agro-tourism and the creation of vegetable gardens, and to promote social cohesion through the creation of creative communities (see Figure 4.6.13).

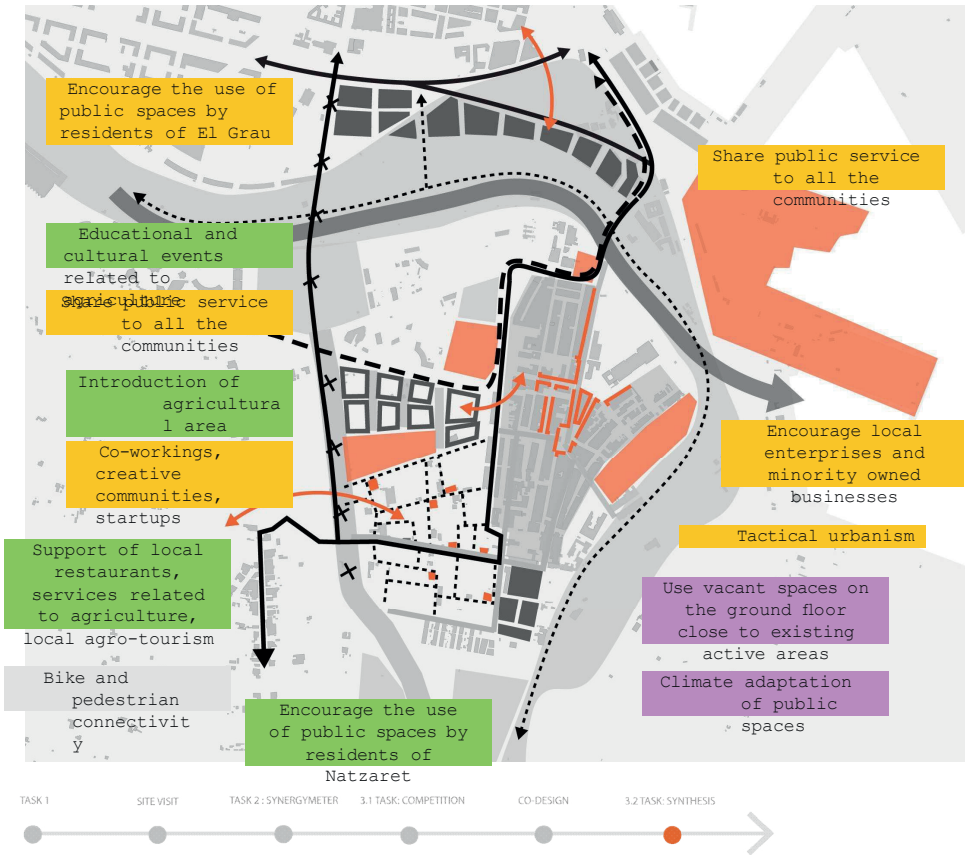


Figure 4.6.13. Social Infrastructure (Source Team 6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

The final proposal was evaluated through the synergy meter to check the improvement of the indicators compared to the initial situation and the two proposals elaborated during the design process (see Figure 4.6.14). Just the students wrote in their final report, the use of the synergy meter was key in their decision-making process: *"The utilisation of this comparative analysis facilitated the development of our ultimate synergistic proposition, which was formulated by integrating the most successful recommended solutions from each respective subarea."*

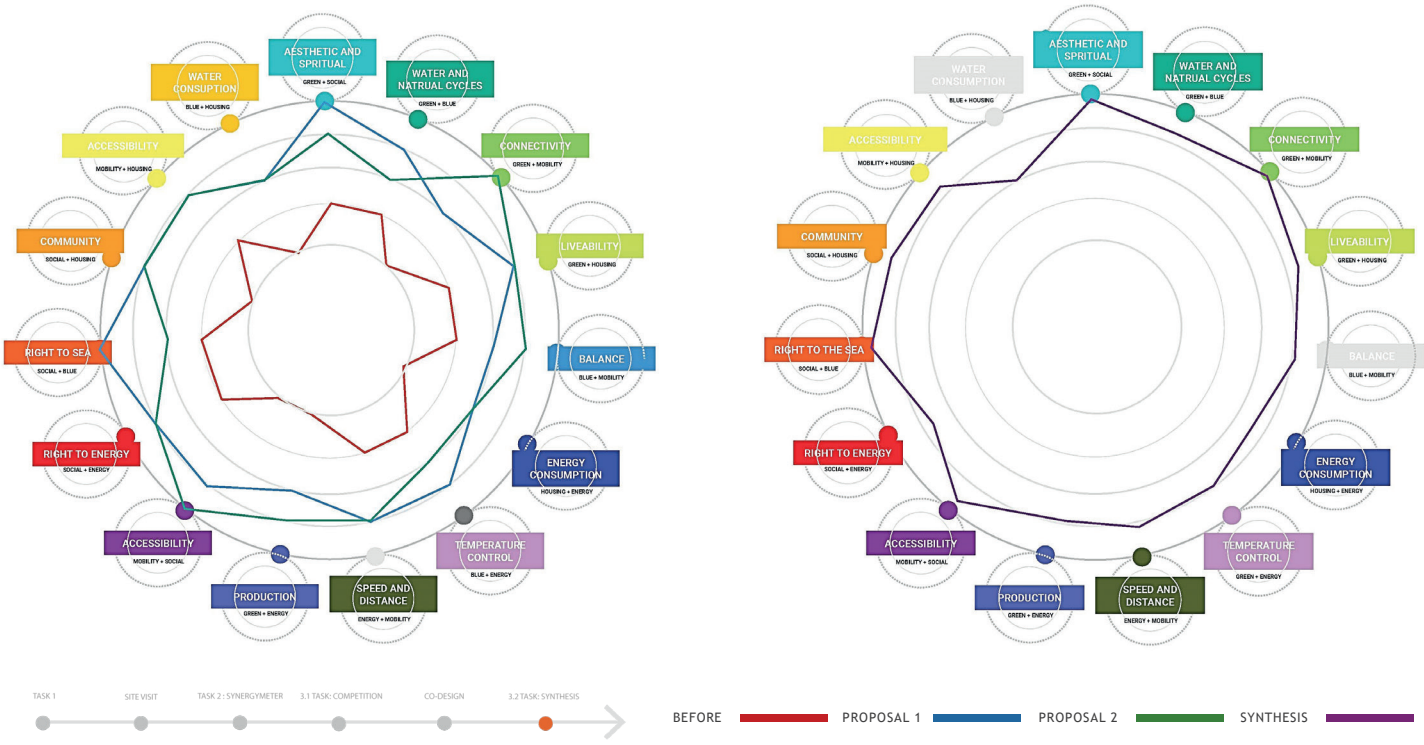


Figure 4.6.14. Analysis with the synergy meter: before, proposals 1 and 2 and synthesis (Source Team6: Chen, Gancarczyk, Sakhareva, Del Rio, Daulenskyte, & Movahedi, 2023)

5 CONCLUSIONS

5.1_DISCUSSION AND SOME FINAL REFLECTIONS

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Stefano Salata | Assistant Professor, Politecnico di Milano
Mrudhula Koshy | Assistant Professor, Norwegian University of Science and Technology
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Alena Cohrs | Research Associate, Technical University of Berlin
Julia Deltoro | Associate Professor, Polytechnic University of Valencia)
Martina Schretzenmayr | Lecturer, ETH Zurich

5.1.1 Discussion

This chapter discusses three main aspects of the VLC_Summer School namely, the course co-creation process, the blended methodology, and the learning outcomes.

Course Co-creation Process

From the point of view of the course design process, the VLC_Summer School proved to be an excellent platform for interaction between teachers from the Enhance Alliance university partners engaged through the Urban Planning Educational Pathway. Thanks to the one-year-long codesign process subdivided into five different meetings, the participating teachers were involved in the course from the beginning. All the aspects of the course were discussed and refined to match the particularities and pedagogical approach of each partner, producing a unique proposal with an "Enhance DNA." The face-to-face meeting was particularly important, not only because the most significant decisions were collectively taken, such as the pilot area selection, but also because it created a sense of cohesion and solidarity between the teachers, enhancing their commitment to the project. The most illuminating evidence of this achievement is that a new edition of the Summer School is scheduled for July in Milan 2024 and will embrace some of the new members of the Enhance+ Alliance.

Blended methodology

The course adopted the format of the Erasmus Blended Intensive Programmes, which had the mandate to include both online and onsite phases in the course structure.
On the one hand, the learning methodology was revealed as a helpful system during the three-week online phase, not only in the analysis process by assigning experts to each infrastructure, but also from the operational point of view by facilitating the interaction between tutors and students from the same university. It was useful to create a local and multidisciplinary network of students within each university and helped them feel committed to the summer school from the beginning. In addition, the specialization of each online team in one urban infrastructure made the students feel relevant in the on-site and multi-thematic teams because of their particular roles as experts in the infrastructures they have studied before. It is also important to note the relevance of the lectures delivered during the online phase. These lectures provided important perspectives regarding the study case and the different infrastructures and helped students to identify and meet all the tutors involved in the course in an in-depth manner.

On the other hand, the onsite phase was fundamental to the learning process. Activities such as the visit to the site were necessary to understand the scale, dimension, and complexity of the case study. The physical interaction between students promoted by the creation of multi-thematic teams and the participatory workshop with locals would hardly have been possible in an online format. From the methodological point of view, the initial brainstorming sessions were fruitful in activating discussions and revealing different points of view, whereas the sessions after each task were essential to extract conclusions.

As a counterpart, the duration of the on-site phase was likely insufficient for deeply developing all the planned contents.

Learning outcomes: exploring synergies for the spatial strategy

The proposal of developing methodologies to detect and increase synergies between urban infrastructures was mainly achieved through the development of synergy meters. This tool helped participants put aside conventional urban design methods and start thinking from a different point of view, finding synergies and conflicts between different urban infrastructures or systems, and introducing indicators to measure them. This alternative resource activated an explorative process that allowed the students to use the synergy meters not only as an "assessment tool" to evaluate the quality of their proposals but also as a "design tool" by suggesting new design possibilities.

As discussed in Chapter 3, several aspects and issues were relevant to the methodological definition of the synergy tools. Firstly, identifying qualitative or quantitative indicators was often perceived as necessary to assess synergies and understand their meanings. Secondly, the level of connection of the proposed synergy tools to the site's specific conditions affected their universal or contextualized character. Thirdly, the innovative use of graphic tools to represent and explore connections between infrastructures and the synergies generated in the proposed solutions influenced the students' capacity to define a solid narrative and an effective work process. Fourthly, the definition of maps was essential to identify the location of existing or proposed synergies and clarify their meaning. Fifthly, the definition of 'super-synergies' opened an effective way to simplify and operationalize the work, but it also required the definition of new and more complex indicators.

However, it should be noted that the time allocated to task 2, just one day, was likely insufficient and did not allow the students explore more connections and formulate refined outcomes. For instance, students needed to simplify the synergies to make the tool manageable, and in doing so, it lost its applicability to some extent. Considering the length of the course, the goal was achieved, and a different way of thinking and approach to the design process was activated in the students. However, in a longer course, devoting more time to exploring synergies could lead to a more refined method for defining synergy tools that could be more helpful in the design process. Issues such as identifying synergies and conflicts among urban infrastructures, producing more precise synergy meters and their application in the design process could be improved. With more time, resources, and data, it would also be possible to operate more quantitatively and generate digital models that measure synergies between different urban infrastructures in various scenarios.
In the spatial strategy design process, the synergic tools or synergy meters were very useful for assessing the strengths and weaknesses of different alternatives. This helped the students to choose the best suited synergies and evaluate the benefits of their final proposals. The scale and complexity of the pilot site led some teams to sectorize the site into homogeneous functional areas, adjusting the synergy meters to the characteristics of each of those areas accordingly.

It is also worth mentioning that the participatory meetings with local people and experts were crucial to foreground the socio-cultural dimension to the course. The local residents' perspectives allowed the students to check if their synergy tools and spatial strategies detected and addressed all the critical aspects. In conclusion, considering the time constraints, all the produced outputs exceeded the initial expectations from the tutors, and all the teams achieved the planned learning goals. The student's and teachers' different backgrounds and skills influenced their approach to the design process, so in some way, the work developed by each team reflects their specific and unique characteristics.

5.1.2 Conclusions and some personal reflections

"The Summer School pursued the key question of the extent to which new, more efficient, and, therefore, more sustainable approaches to urban development projects and processes can be found by identifying and analyzing synergies between important urban structures. The results of the Summer School do not provide such a clear picture that it could be said that these results could not have been achieved with a traditional urban development planning and urban design method. However, it did become clear that the process followed in the course made the step from analysis to conceptualization easier. By identifying and analyzing synergies, a focus is already being placed on areas representing particular development potential and impetus. Otherwise, there would be no synergies. It is already a clear step towards concept development based on existing (infra)structures, which also integrates the utilization of existing (infra) structures into the concept development process, also in terms of resource efficiency. Therefore, this method promises to promote a more sustainable development approach compared to traditional planning approaches with a SWOT analysis."

Christoph Wessling, Technical University of Berlin

"The first edition of the blended intensive summer school on synergic infrastructures offered an opportunity for the teaching staff and students to reflect on alternative starting points for spatial planning and design. Rather than a static master plan, using the synergic methodology allowed the students to wear hats other than that of a planner, designer and architect and think in a dynamic and iterative way. It allowed for systems design thinking and understanding of interdependencies between infrastructures in an abstract manner before contextualizing them. The abductive approach of returning to the synergies to evaluate their final spatial strategic proposals allowed the students to be reflective on their early decisions. The synergic method could be considered complementary to the 'layer approach' and 'systems-oriented thinking'. In this sense, it is not a completely new approach to spatial planning. Nevertheless, the interpretations of the synergy meter by the different student groups based on their educational background highlighted how it can be a useful pedagogical and methodological tool to analyze spatial-temporal conditions."

Mrudhula Koshy, Norwegian University of Science and Technology

"The course on Synergic Urban Infrastructures started with an ambitious goal: exploring new tools and procedures to inform the urban planning process in a time of increasing specialization and scientification of the planning discipline. As presented in this book, the use of the 'synergy' concept provided a useful platform to integrate different urban dimensions by considering how each urban infrastructure or system interacts with each other. However, the design and implementation of the course raised soon some relevant questions: Was the synergic approach opening a significantly different possibility for the planning process? Was the provided knowledge, the available time, and the offered data sufficient to develop in depth the proposed tasks?

These issues have been presented and discussed before in this book, so in this final section, we can concentrate on the main potentials and shortcomings detected on the course. Firstly, one of the strengths was the capacity of the synergic approach to promote systems thinking and integrative thinking. This was favored by the use of the synergy concept as an operational instrument to reflect more concisely and proactively about the interactions between different urban layers. The focus was not on each urban infrastructure but on the connections between them. Secondly, the combination of social, environmental, programmatic, and spatial issues proved to be essential to overcome the conventional and to get a wider perspective. In particular, the social infrastructure and the housing challenge were crucial to provide a human dimension and a critical problem that could be recognized by everyone in the course. In this regard, it must be noted that the physical visit to the site and the face-to-face interaction with the locals were particularly valued by the students. Somehow, it seems paradoxical, that in the time of the virtual, the scarcity of the physical gives it more importance and relevance.

Regarding problems, the wide and multi-disciplinary character of the course and the shortage of time made it difficult to gain depth. In addition, the preexisting mental frameworks that inevitably we all have, and the tendency to follow conventional planning processes and to produce conventional outcomes when the time is short, affected the capacity to think out of the box. Nevertheless, the course clearly opened new possibilities and activated new ways of thinking. Quite probably, the main challenge now is to decide how to give continuity to this initiated process.

Last but not least, it must be highlighted that the codesign and implementation of the course created an opportunity to establish a community of teachers and students in the ENHANCE alliance interested in exploring new conceptual and operational frameworks for the planning discipline. This in the end can be the most important outcome of all."

Juanjo Galan Vivas, Polytechnic University of Valencia