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Collaborative and Sustainable Strategies through Geodesign: The case study of Bacoli

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Abstract. The geodesign framework has supported stakeholder engagement in policy-making and planning with its innovative, practical, operational, fast, and participatory tools for a long time. Although geodesign has provided practitioners with systematic and technologically sound solutions for sustainability problems within the International Geodesign Collaboration (IGC) network, a new concept of connectivity among neighbouring cities and the regeneration of landscapes should be more stressed by the participatory workshops. The paper proposes using geodesign system thinking to spark cooperation between Academia and Public Authorities to foster integrated, spatially explicit, and strategic planning. The experimentation presented in this paper aims at providing recommendations for sustainable design with a particular focus on local problems linked to accessibility and reclamation. The peninsula of the city of Bacoli (Italy) has been selected as a best-fit case study for investigating these dynamics by involving a working group of professors, researchers, PhD candidates, and students from the Second Level Master in *Sustainable Planning and Design of Port Areas* of the University of Naples Federico II, along with professionals, citizens, and policy-makers belonging to the Municipality. The workshop experience has demonstrated how collaborative processes between people with different backgrounds and interests can elicit preferences and identify relationships among the recovery of systems connected to landscape regeneration and accessibility infrastructures.

Keywords: Geodesign, Decision-making process, Spatial planning, Collaborative design, Port areas.

1 Introduction

In the last decades, a new approach to planning, integrating multi-dimensional issues and divergent points of view with technological tools, has emerged to resolve wicked and complex decision-making [1]. From an urban and sociological point of view, this is unprecedented [2]. Conventional planning approaches are no longer suited to cope with such multi-dimensionality since they frequently fail to consider the issues endorsed by different stakeholders interested in the planning process [3]. As cities become increasingly complex, planning methods that encourage collaboration among stakeholders are needed to reach a consensus [4–7] in order to pursue the goals of the Agenda 2030 to make cities more liveable through a shared vision of integral sustainability [8].

Although geodesign has provided practitioners with systematic and technologically sound solutions to sustainability problems, new concepts of connectivity among neighbouring cities and the reclamation of landscapes [4,9,10] should be more stressed in specific geographical areas. The concept of sustainability is the crucial theme of territorial development policies with a specific reference to the integration of natural landscape systems with artificial urban systems, balancing public and private stakeholders' cultural backgrounds and visions oriented to priority development strategies [11]. Shared knowledge makes the planning process more effective with today's tools and methods, where teamwork is essential. In addition, geodesign methods can support decision-makers facing new and complex problems like emergency response and public participation [12,13].

The Steinitz geodesign framework implemented into the Geodesignhub.com platform (GDH) offers suitable methods and tools for resolving complex urban problems. Through a systemic and inclusive vision, not only the expert knowledge guides a decision-making process, but all local actors contribute to building knowledge. Two fundamental components of the geodesign methodology are relevant for improving the decision-making process: digital information technology and the active participation of local communities in the planning process [14,15]. While conventional public involvement has proven problematic in many cases [16], geodesign methods have effectively involved local community members in the design phase through virtual collaboration. As a result, the geodesign approach to spatial planning has attracted interest from academics, corporate businesses, and institutional settings [15,17–21].

Based on these premises, the research aims to show and discuss the results of a geodesign workshop referring to the Municipality of Bacoli, in the South of Italy, nearby the City of Naples. In the following paragraphs, development strategies are described for the study area, which were pursued through a two day, iterative, online and in-person workshop that has involved different stakeholders. The geodesign workshop was supported by the online GIS-based platform Geodesignhub.com, allowing for geo-referenced analysis and design, and facilitating communication and negotiation among the stakeholders involved in the decision-making process.

The article is organized as follows: Section 2 shows the selected study area through a short description of its geographical, morphological, social, and cultural features; Section 3 describes the preparatory steps of the workshop and the involved stakeholders; Section 4 discusses the results obtained from the negotiation phase, while the conclusions and open questions are presented in Section 5.

2 The case study of Bacoli (Italy)

The Municipality of Bacoli (Fig. 1) near Napoli is located in a complex landscape system with a high intrinsic environmental value. It originated from an eruptive phase of a volcanic formation during the “Third Phlegraean Period”, approximately 8.000 years ago. It stands on an alignment of seven volcanoes (dating back to two different historical periods), arranged on a single axis, and comprising the volcanoes of Capo Miseno, Miseno harbour. The relief characterises the entire ancient centre of Bacoli, from Punta del Poggio and Piscina Mirabile to Centocamerelle. The craters of Baia stand at the Aragonese Castle of Baia and goes up the provincial road that leads from Pozzuoli to Bacoli; the Gulf of Baia has almost wholly dismantled the remains of the volcano recognisable in Punta Epitaffio, and in the yellow tuff ridge that looks towards Lucrino. These are in the northern area outside the inhabited centre.

Fig. 1 The Bacoli case study (Source: the authors).

The Campi Flegrei area shapes an environmental system of exceptional value, consisting of an inseparable interweaving of natural and anthropic structures, historical formation, and agricultural land uses. Over time, these four systems have created a complex ecosystem that is constantly evolving but whose fragility appears even more exposed today after the ongoing transformations between the 1960s and 1990s. At the beginning of the twentieth century, large industrial plants and specialised infrastructure boosted mono-functional urbanisation. Consequently, the Phlegraean territory has gradually lost its peculiar character because urban growth has taken place without planning and control of land use, upsetting and destructuring the traditional character of many Phlegraean towns. In Bacoli and neighbouring municipalities (Monte di Procida, Quarto and Pozzuoli), the natural boundaries - characterised by particular geomorphological-structural features - have been overtaken and partly eroded by an exponential increase in new buildings, some of which are linked to a structured planning design. This has led to the uncontrolled development of infrastructures linking land and sea, resulting in the gradual loss of Mediterranean scrub and terrace cultivation, compromising the landscape and generating degraded and disfigured places. Nowadays these places are characteristic elements of the urban system of Bacoli and need recovery, regeneration, and reclamation. Given their importance, they have been identified as one of the systems of interest to be analysed and assessed in the study. Urban sprawl has modified first the morphology of the Pozzuoli area and then Bacoli, chosen as the site for the development of some industrial plants, such as the Selenia plant at Lake Fusaro and the Baia shipyards, determining a discontinuity in the development of the coastal area and making the territory even more problematic and critical.

3 The workflow of the geodesign workshop

The geodesign workshop for Bacoli was organised in November 2021 by the Second Level Master in "Sustainable Planning and Design of Port Areas" of the University of Naples Federico II. The workshop began with an introduction to the study area, the goals of development scenarios, and the presentation of ten evaluation maps developed by the coordination teams as a digital collective knowledge base from which to begin the design. Geodesign is a process that relies on the use of geographical knowledge to solve planning challenges from an interdisciplinary perspective and to produce informed and evidence-based designs and choices. The organising team devised a workshop program that condensed complicated design tasks into a time-constrained and intensive workflow agenda. As a result, the geodesign workshop is most beneficial when used at the start of research of significant complexity [20,22]. Given the breadth and complexity of the Bacoli area and the number of people engaged, the conductors underlined that rapid, strategic thinking and decision-making is essential rather than precision.

Next, Section 3.1 explains the evaluation and impact geodesign models performed in the preparatory phase of the workshop, while Section 3.2 introduces the design, the negotiation, and preliminary results.

3.1 The workshop preparatory phases

The workshop's preparatory phases started in May 2021, creating local knowledge of the context with a specific focus on citizens' needs. Local stakeholders, students, researchers, and professors of the Second Level Master in "Sustainable Planning and Design of Port Areas" at the University of Naples Federico II took part in a Living Lab workshop to learn the criticalities and potentials of the study area by exploring peculiar geographical locations. Several sources of geo-referenced information have expanded the local knowledge, including official databases of the Campania Region, of the Basin Authority, and the Copernicus Urban Atlas provided by the European Environment Agency. In addition, further spatial-explicit information was collected from the database provided by the Regional Park Authority of Campi Flegrei and the Municipality of Bacoli. These knowledge streams have highlighted landscape-environmental, historical-cultural, and economic systems. Data collection and analysis represented the base for the construction of the geodesign evaluation model [23], and ten evaluation maps were placed in Geodesignhub software. In the first phase, three main objectives have been targeted in a time horizon to 2030:

1. Port development;
2. Connectivity with neighbouring landscapes;
3. Recovery, regeneration, and reclamation of degraded and abandoned landscape linked to the infrastructure network.

Ten evaluation maps have supported the choice of change scenarios according to five degrees of suitability, as follows:

1. Dark green represents the highest feasibility for change, as there are prerequisites for new projects.
2. Green represents suitability for a transformation, as the area is already equipped with technologies to support the design.
3. Light green identifies where it is appropriate to envisage changes as far as the means to support interventions are provided.
4. Yellow identifies where changes are inappropriate.
5. Red represents areas where the system is working well, and therefore should not be changed.

The evaluation maps represent the landscape systems' spatial representation related to vegetation, hydrology, cultural and historical landscape resources, accessibility and transportation, commerce, tourist services, urban mix, and reclamation.

The ten evaluation maps (Fig. 2) have helped evaluate the study area's main characteristics. They have referred to as Water (WAT), Agriculture (AGR), Green Infrastructure (GRN), Energy (ENE), Transport (TRAN), Tourism (INDTUR), Mixed-use (MIX), Cultural heritage (CULT), Reclaim (RCLM), and Commercial (COM).

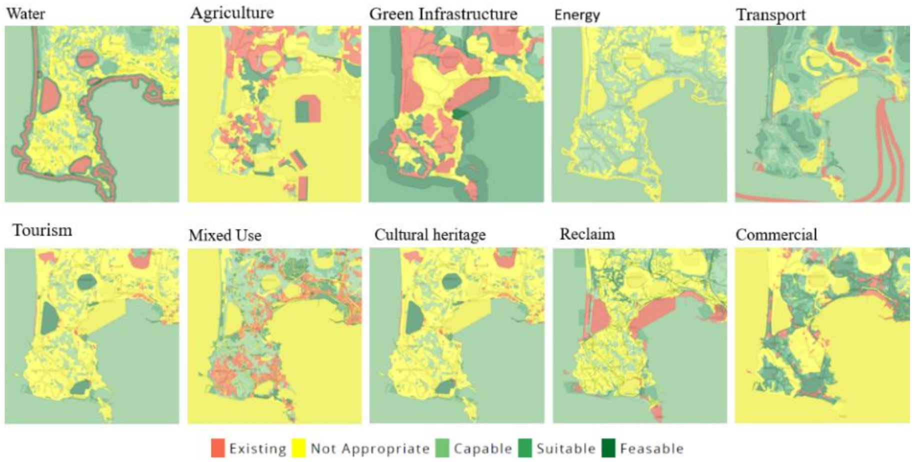

Fig. 2. Evaluation maps for the ten systems (Source: the authors).

An explanation of the meanings of the ten systems follows. The WAT system envisages actions linked to the restoration and improvement of existing water systems or the creation of blue infrastructure.

The AGR system relates to improving and developing the local agri-food sector. The system's actions envisage the creation of new enterprises, brands, circuits and structures dedicated to a market that is not only local but also able to attract tourists towards the knowledge of the local production chain.

The GRN system concerns solutions for protecting and enhancing the natural heritage, both in landscape-environmental-coastal and economic-productive aspects. Such a system encourages the creation of green infrastructures on a metropolitan scale, connecting areas of high naturalistic value and guaranteeing sustainable use of the territory and its resources[24].

The ENE system involves policy and strategies for sustainable energy efficiency, one of the most challenging targets to mitigate climate change impacts and reduce household costs.

The TRAN system is crucial for the efficiency of the study area. Therefore, it is necessary to envisage direct interventions to create and improve road infrastructures, nodes and mobility routes to support people and goods by land and water and make the territory accessible by decongesting traffic. On the one hand, in the case of transportation systems, technical issues should solve the entanglements and congestion problems. However, on the other hand, the impacts on the surrounding environment and travellers' needs have to be incorporated [25–27].

The INDTUR system relates to tourism services and assets. Therefore, it envisages interventions to protect and develop an integrated supply of cultural and environmental assets, touristic attractions, and services to boost the host capacity and accommodation facilities. These actions aim to support the enhancement of the CULT system and the economic sustainability of the MIX and COM systems.

The RCLM is one of the most vulnerable and, concurrently, potentially important systems for the sustainable development of the study area. This system needs to foresee regeneration interventions, requalification, and recovery of all the currently degraded spaces and buildings.

Afterwards, a five-class impact matrix was filled in Geodesign Hub with the likely consequences - from highly positive (dark purple) to very negative (orange) - for which a solution can affect some of the ten systems (Fig. 3). The matrix is part of the Geodesign Hub impact model.

Implementing this impact matrix, which shows how many interrelated systems are, the project's impacts can be calculated on the Geodesign Hub platform in real-time.

Fig. 3. The Impact matrix (Source: the Authors)

3.2 The geodesign workshop

Thirty-five participants took part in the workshop, including professors and researchers with different affiliations such as TUDelft, University of Genoa, Vanvitelli University and Federico II University, technical staff from the Public Administration of Bacoli, and stakeholders from the private sector.

The participants, most of whom had previous personal knowledge of the local context of Bacoli and the Campi Flegrei area, had various backgrounds ranging from engineering, architecture and urban planning to Geographic Information System/Information Science and Technology creating a good mix of skills for a geodesign studio.

The workshop was in a hybrid format with streaming sessions available for those participating remotely. It began with an introduction to the study area, the goals of development scenarios, and an overview of the geodesign process and the tools which would be used. (Fig 4).

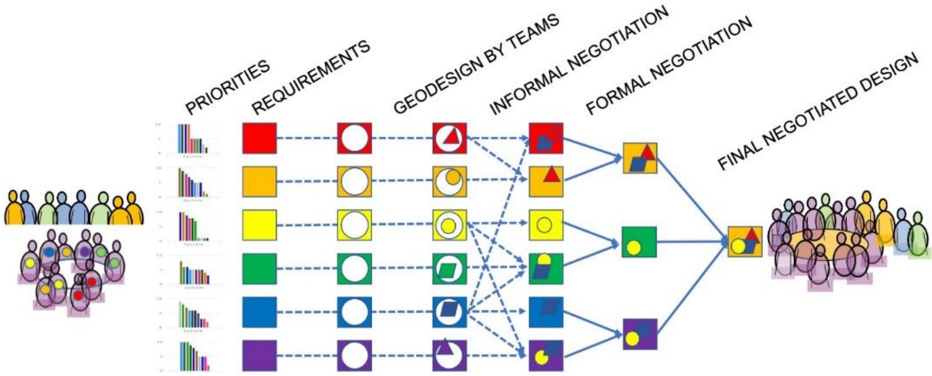

Fig. 4: Collaborative negotiation to a final design (Source: Carl Steinitz).

There then was a presentation of ten evaluation maps developed by the coordination teams as a digital collective knowledge base from which to begin the design. Then, each participant was assigned a system among the ten identified, to draw project or policy diagrams, including IGC System Innovations (https://www.igc-geodesign.org/global-systems-research). Policies are hatched, Projects are solid, and all are color coded by system. All had attributes such as public or private, timing and cost. As a result, about 250 diagrams were collected and shared among the participants by the platform into a matrix arranged by systems, representing specific policies or projects for each of the ten systems (Fig. 5).

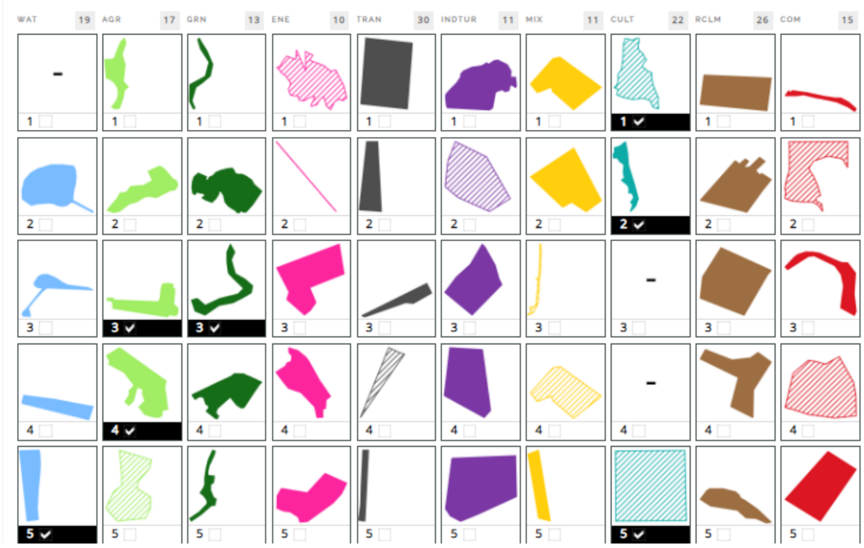

Fig. 5. Examples of policy and project diagrams (Source: the authors)

The second phase started by dividing the participants into six different stakeholder groups (Table 1) with specific roles in decision-making. The six stakeholder groups, or design teams included the metropolitan city administrators (METRO), the cultural heritage conservators (CULT), the developers (DEVE), tourism industry (TOUR), the ecologists (GREEN), and the farmers (FARM).

Groups of stakeholders

1	Metropolitan administrators	METRO
2	Cultural heritage conservation	CULT
3	Developers	DEVE
4	Tourism	TOUR
5	Green	GREEN
6	Farmers	FARM

Table 1. The six stakeholders' groups

According to their objectives, each group defined its priorities by assigning each system a value from 1 (low priority) to 10 (high priority). Then, the groups were allowed to review the incorrect diagrams, modify them, or draw new ones (Fig. 4). The GDH interface allows to view the diagrams proposed by one's group and those proposed by members of other groups.

Afterwards, each group selected diagrams of interest to compose an integrated scenario, or synthesis, to meet its required objectives (Fig. 6). Finally, each of the syntheses was subjected to an evaluation of impacts that the various transformations might generate so that weaknesses could be detected and choices remodelled by selecting those that would minimise negative impacts and reduce implementation costs.

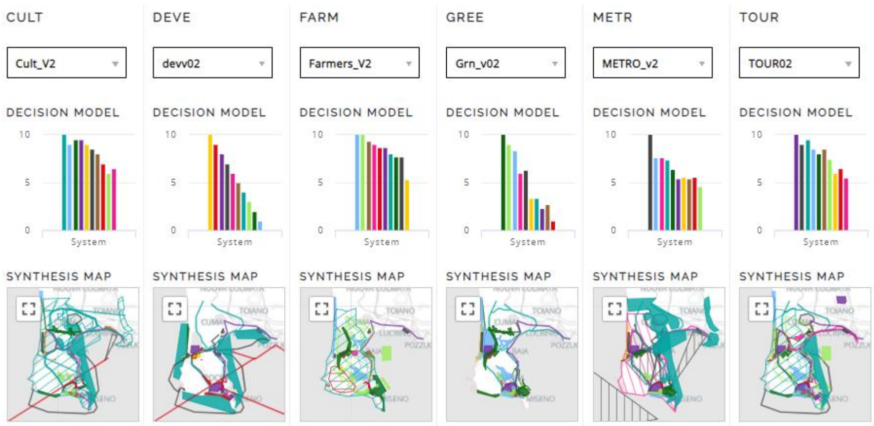

Figure 6. The comparison design of scenarios 2 (Source: the authors).

The last phase of the workshop involved the shared construction of a project proposal by all the stakeholders involved through negotiation. Through a sociogram (Fig. 7), the affinities between the various project proposals of the six stakeholder groups were defined. Within the sociogram, each stakeholder group expressed a judgement of compatibility with the scenarios proposed by the other groups, expressing in the matrix a judgement ranging from very negative (xx) to very positive (++). Hence, on the base of the likelihood to collaborate, the groups were united into two coalitions, composed as follows:

- Tourism, Culture, Metropolitan teams (TCM);
- Green, Developers, Farmers team (GDH).

Figure 7. The Sociogram for Negotiation Agreement (original photographs by the authors).

A first negotiation phase was then launched. The two coalitions through dialogue and negotiation, constructed their two shared design syntheses (Fig. 8) which they then presented to the others.

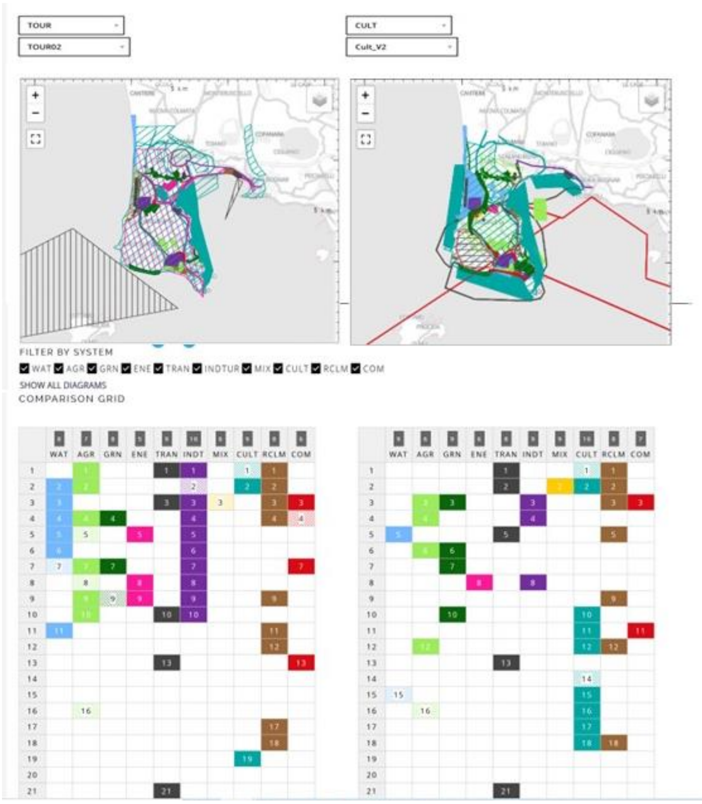

Figure 8. The comparison of the two initially negotiated designs: TCM and GDH (Source: the authors

After presenting the two designs that emerged from the respective coalitions, there was a final phase in which, through dialogue and negotiation between the two coalitions, compatible policies and projects flowed into one final shared scenario.

4 Outcomes

The proposed scenario for the city of Bacoli to 2030 fully reflects the three targets established in the preparatory phases. The diagram frequency (Fig. 9) has facilitated the comparison of the scenarios proposed by the two merged teams of stakeholders (TCM and GDF). It allowed the similarities in design and policy to emerge with a straightforward negotiation process.

In particular, the scenario proposed by the TCM team identified many more solutions aiming to solve the problem of connectivity - both by land and by the sea - and the recovery of abandoned areas, giving less importance to the design and policy interventions planned for the WAT, AGR, GRN, ENE, INDTUR, MIX and COM systems. Instead, the scenario approved by the GDF team, having selected a more significant number of project interventions for the WAT, AGR, GRN, INDTOUR, COM, and CULT systems, gave less importance to change actions in the MIX, ENE and TRAN systems. The two scenarios, therefore, turned out to be almost entirely different. However, the negotiation facilitated the construction of a scenario shared by all the stakeholders. Projects and policies linked to the final scenario (Fig. 9) were oriented to developing the network of connections. Moreover, several interventions were selected with the ambition to develop the port areas, with the related interventions for the recovery, reclamation and redevelopment of the coastal zones.

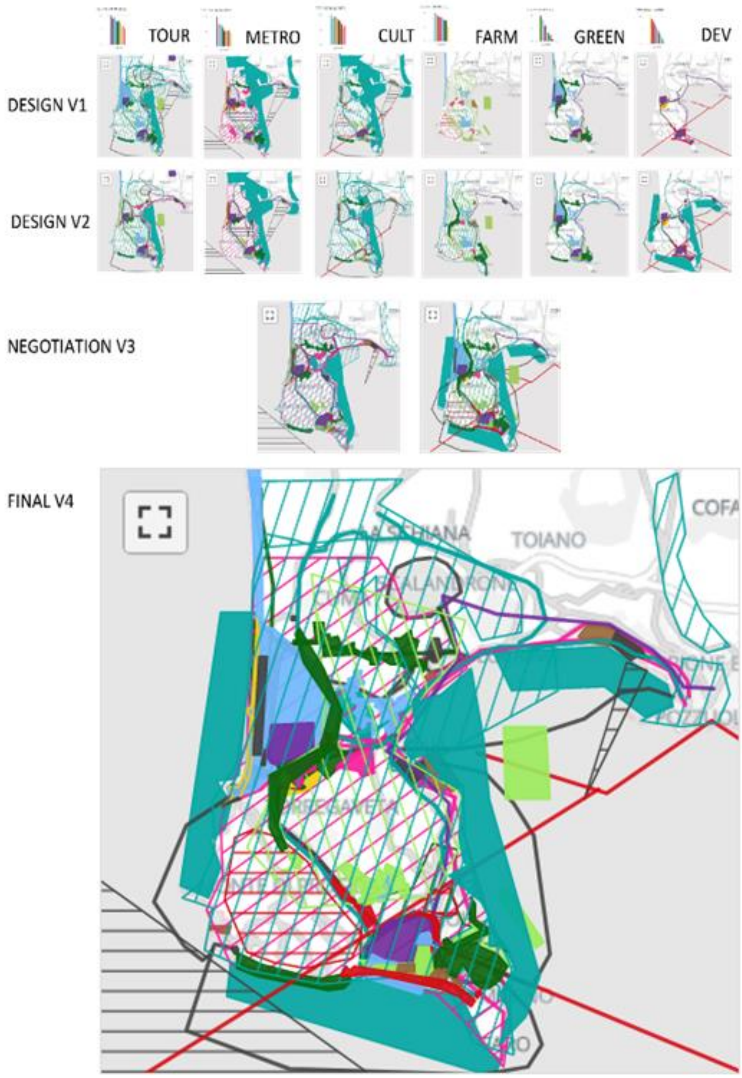

Figure 9. Evolution of the final design syntheses by negotiation (Source: the authors).

The workshop was a great success, both for the participants and the organisers. The geodesign framework provided excellent support for the workshop, simplifying participants' activities and fostering a collaborative working environment. In less than two days, it was possible to build several alternative scenarios for the development of Bacoli and the surrounding areas and to reach consensus through negotiation, reducing the number of potential alternative future projects to those acceptable for all.

5 Conclusions

The main focus of the Bacoli geodesign workshop was to trace scenarios of transformations in a territory that is highly protected but, at the same time, compromised and fragmented both in terms of landscape and the land-sea connections.

The application of geodesign methods and tools to solve the complex problems that characterise the territory of Bacoli made it possible to structure an interactive and collaborative planning process between the various stakeholders involved.

Using the GDH collaboration platform facilitated the management of the selection and identification process of sustainable solutions focused on the recovery of abandoned areas and the planning of connecting infrastructures to solve crucial accessibility problems detected by the assessment phase. It helped evaluating alternatives simultaneously and quickly select those that best met territorial and social needs, trying to overcome trade-offs.

More sustainable future planning was encouraged by the participation in the workshop of government representatives from all levels and of representatives from the private sector.

In addition, from the institutional point of view, there is still no apparent inclination toward territorial development that aims to regenerate rather than consume additional land. In this sense, the workshop was an experimental playground for introducing the assessment of the degraded systems that make up the current territories in planning processes.

The benefit of using the Steinitz's framework in an intensive workshop with GDH is that it enable to solves complex problems in a concise amount of time, improving the understanding and knowledge of the participants and making it easy to reach a consensus among them [28].

A possible limitation is the lack of design accuracy, which has to be fast. Nevertheless, this approach best fits with strategic planning, and it lays a solid consensus base on the base of which to make implementation plans afterwards.

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References

1. Rittel, H.W.J.; Webber, M.M. Dilemmas in a general theory of planning. *Policy Sci. 1973 42* **1973**, *4*, 155–169, doi:10.1007/BF01405730.
2. Dall'Omo, C.F.; Limongi, G.; Privitera, E.; Somma, M.; Vingelli, F. Diary extract of five research experiences in the XXXIV Italian doctoral cycle. Sharing common research questions on environment-oriented planning. *Plurimondi* 123–160.
3. Nyerges, T.; Ballal, H.; Steinitz, C.; Canfield, T.; Roderick, M.; Ritzman, J.; Thanatemaneerat, W. Geodesign dynamics for sustainable urban watershed development. *Sustain. Cities Soc.* **2016**, *25*, 13–24, doi:10.1016/J.SCS.2016.04.016.
4. Cerreta, M.; Mazzarella, C.; Somma, M. *Opportunities and Challenges of a Geodesign Based Platform for Waste Management in the Circular Economy Perspective*; 2020; Vol. 12252 LNCS; ISBN 9783030588106.
5. Cerreta, M.; Panaro, S.; Cannatella, D. Multidimensional Spatial Decision-Making Process: Local Shared Values in Action. *Lect. Notes Comput. Sci. (including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics)* **2012**, *7334 LNCS*, 54–70, doi:10.1007/978-3-642-31075-1_5.
6. Cerreta, M.; Panaro, S. From Perceived Values to Shared Values: A Multi-Stakeholder Spatial Decision Analysis (M-SSDA) for Resilient Landscapes. *Sustainability* **2017**, *9*, 1113, doi:10.3390/su9071113.
7. Cerreta, M.; Panaro, S.; Poli, G. A knowledge-based approach for the implementation of a SDSS in the Partenio Regional Park (Italy). *Lect. Notes Comput. Sci. (including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics)* **2016**, *9789*, 111–124, doi:10.1007/978-3-319-42089-9_8/TABLES/3.
8. Scorza, F. Training Decision-Makers: GEODESIGN Workshop Paving the Way for New Urban Agenda. *Lect. Notes Comput. Sci. (including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics)* **2020**, *12252 LNCS*, 310–316, doi:10.1007/978-3-030-58811-3_22.
9. Cerreta, M.; De, P. Integrated Spatial Assessment (ISA): A Multi-Methodological Approach for Planning Choices. *Adv. Spat. Plan.* **2012**, doi:10.5772/35417.
10. Attardi, R.; Bonifazi, A.; Torre, C.M. Evaluating Sustainability and Democracy in the Development of Industrial Port Cities: Some Italian Cases. *Sustain. 2012, Vol. 4, Pages 3042-3065* **2012**, *4*, 3042–3065, doi:10.3390/SU4113042.
11. Di Cesare EA; Cocco C; Campagna M Il Geodesign come metodologia per la progettazione collaborativa di scenari di sviluppo per l'Area Metropolitana di Cagliari. *ASITA 2016 Proc.* **2016**, 333–340.
12. Keenan, P.B.; Jankowski, P. Spatial Decision Support Systems: Three decades on. *Decis. Support Syst.* **2019**, *116*, 64–76, doi:10.1016/j.dss.2018.10.010.
13. Cerreta, M.; La Rocca, L. Urban Regeneration Processes and Social Impact: A Literature Review to Explore the Role of Evaluation. *Lect. Notes Comput. Sci. (including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics)* **2021**, *12954 LNCS*, 167–182, doi:10.1007/978-3-030-86979-3_13.
14. Loures, L.; Panagopoulos, T.; Burley, J.B. Assessing user preferences on post-

industrial redevelopment: *https://doi.org/10.1177/0265813515599981* **2015**, *43*, 871–892, doi:10.1177/0265813515599981.
15. Albert, C.; von Haaren, C.; Vargas-Moreno, J.C.; Steinitz, C. Teaching Scenario-Based Planning for Sustainable Landscape Development: An Evaluation of Learning Effects in the Cagliari Studio Workshop. *Sustain. 2015, Vol. 7, Pages 6872-6892* **2015**, *7*, 6872–6892, doi:10.3390/SU7066872.
16. Fisher, T. An education in geodesign. *Landsc. Urban Plan.* **2016**, *156*, 20–22, doi:10.1016/j.landurbplan.2016.09.016.
17. Wheeler, C. Geodesign takes root. *Arc User* **2019**, *22*, 64–65.
18. Patata, S..; Paula P.L.;; Moura, A.C.M. The application of geodesign in a Brazilian illegal settlement. Participatory planning in Dandara occupation case study. In *Environmental and Territorial Modelling for Planning and Design*; A. Leone, C. Gargiulo, Eds.; FedOAPress: Naples, 2018; pp. 673–685.
19. Pettit, C.J.; Hawken, S.; Ticzon, C.; Leao, S.Z.; Afrooz, A.E.; Lieske, S.N.; Canfield, T.; Ballal, H.; Steinitz, C. Breaking down the silos through geodesign – Envisioning Sydney's urban future: *https://doi.org/10.1177/2399808318812887* **2019**, *46*, 1387–1404.
20. Campagna, M.; Steinitz, C.; Di Cesare, E.A.; Cocco, C.; Ballal, H.; Canfield, T. Collaboration in planning: The Geodesign approach. *Rozw. Reg. i Polityka Reg.* **2016**, *35*, 55–72.
21. Campagna M; Moura ACM; Borges J; Cocco C Future Scenarios for the Pampulha Region: A Geodesign Workshop. *J. Digit. Landsc. Archit.* **2016**, *1*, 292–301, doi:10.14627/537612033.
22. Fischer, J.-G.; Gneiting, P. Collaborative Planning Processes. In *Build To Order: The Road to the 5-Day Car*; Parry, G., Graves, A., Eds.; Springer London: London, 2008; pp. 181–207 ISBN 978-1-84800-225-8.
23. Steinitz, C. *A Framework for Geodesign: Changing Geography by Design*; ESRI Press, R.C., Ed.; 2012;
24. Cerreta, M.; Poli, G. Landscape Services Assessment: A Hybrid Multi-Criteria Spatial Decision Support System (MC-SDSS). *Sustain. 2017, Vol. 9, Page 1311* **2017**, *9*, 1311, doi:10.3390/SU9081311.
25. Botte, M.; Di Salvo, C.; Caropreso, C.; Montella, B.; D'Acierno, L. Defining economic and environmental feasibility thresholds in the case of rail signalling systems based on satellite technology. *EEEIC 2016 - Int. Conf. Environ. Electr. Eng.* **2016**, doi:10.1109/EEEIC.2016.7555878.
26. D'Acierno, L.; Botte, M.; Pignatiello, G. A simulation-based approach for estimating railway capacity. *Int. J. Transp. Dev. Integr.* **2019**, *3*, 232–244, doi:10.2495/TDI-V3-N3-232-244.
27. Cerreta, M.; di Girasole, E.G.; Poli, G.; Regalbuto, S. Operationalizing the Circular City Model for Naples' City-Port: A Hybrid Development Strategy. *Sustain. 2020, Vol. 12, Page 2927* **2020**, *12*, 2927, doi:10.3390/SU12072927.
28. Campagna, M.; Di Cesare, E.A.; Cocco, C. Integrating Green-Infrastructures Design in Strategic Spatial Planning with Geodesign. *Sustainability* **2020**, *12*, 1820, doi:10.3390/su12051820.