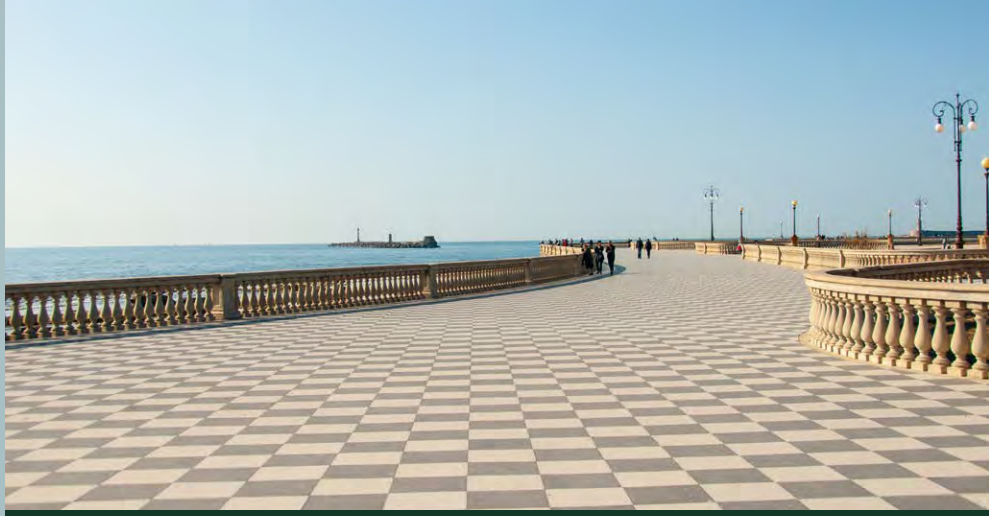

Monitoring of Mediterranean Coastal Areas

PROBLEMS AND MEASUREMENT TECHNIQUES

EIGHTH INTERNATIONAL SYMPOSIUM
Livorno (Italy) June 2020

edited by
Laura Bonora, Donatella Carboni,
Matteo De Vincenzi

FIRENZE UNIVERSITY PRESS

ISSN 2704-601X (PRINT) | ISSN 2704-5846 (ONLINE)

CNR - IBE
Fondazione Clima e Sostenibilità

Museo di Storia Naturale
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Eighth International Symposium

MONITORING OF MEDITERRANEAN COASTAL AREAS: PROBLEMS AND MEASUREMENT TECHNIQUES

LIVORNO (ITALY) JUNE 2020

Patronized by

Università degli Studi di Firenze

Regione Toscana

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Provincia di Livorno

Eighth International Symposium "Monitoring of Mediterranean Coastal Areas. Problems and Measurement Techniques"

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2020

Eighth International Symposium "Monitoring of Mediterranean Coastal Areas. Problems and Measurement Techniques" : Livorno (Italy) June 2020 / a cura di Laura Bonora, Donatella Carboni, Matteo De Vincenzi. – Firenze University Press, 2020.
(Proceedings e report; 126)

https://www.fupress.com/isbn/9788855181471

ISSN 2704-601X (print)
ISSN 2704-5846 (online)
ISBN 978-88-5518-147-1 (PDF)
ISBN 978-88-5518-148-8 (XML)
DOI 10.36253/978-88-5518-147-1

Cover graphic design: Alberto Pizarro Fernández, Lettera Meccanica SRLs
Front cover: *Terrazza Mascagni Livorno* (Italy), photo by Gianni Fasano

Edited by: Laura Bonora, Donatella Carboni, Matteo De Vincenzi
Desktop publishing: Matteo De Vincenzi
Graphic Design: Gianni Fasano

FUP Best Practice in Scholarly Publishing (DOI https://doi.org/10.36253/fup_best_practice)
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The online digital edition is published in Open Access on www.fupress.com.

Published by Firenze University Press
Firenze University Press
Università degli Studi di Firenze
via Cittadella, 7, 50144 Firenze, Italy
www.fupress.com

This book is printed on acid-free paper
Printed in Italy

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Laura Bonora, Donatella Carboni, Matteo De Vincenzi (edited by), *Eighth International Symposium "Monitoring of Mediterranean Coastal Areas. Problems and Measurement Techniques". Livorno (Italy) June 2020*, © 2020 Author(s), content CC BY 4.0 International, metadata CC0 1.0 Universal, published by Firenze University Press (www.fupress.com), ISSN 2704-5846 (online), ISBN 978-88-5518-147-1 (PDF), DOI 10.36253/978-88-5518-147-1

NEW SCENARIOS FOR A DEVELOPMENT BETWEEN INFRASTRUCTURES AND INNOVATION

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Abstract – Both infrastructure and research, development and innovation, make communications and exchanges between distant places possible. As a consequence, geographic positions and administrative borders of countries are less and less significant compared to the polarity of the individual cities [23].

Europe tries to keep up with this global vision, European cities with the biggest growth rates are already "designing the revolution". Stockholm, Copenhagen and Hamburg have developed strategic holistic plans where man and its needs are put at the forefront.

Figure 1 - Framing at the continental scale, pointing out the European macro systems Blue Banana and Arco Latino (Latin Arch) and the intermodal node of Trieste (in yellow), meeting point of the sea routes and the European corridors[1].

The growth trend also involves mid-sized cities. Some researches indicate that 77 % of the European cities with a population of more than 300 million have

[1] Source: Fraziano G., et al. (2015) – *Le regole del gioco. Scenari architettonici e infrastrutturali per l'aeroporto FVG*, EUT Edizioni Università d Trieste, Trieste, pp. 168-169.
Savron M. (2020) – *Trieste: nuovi scenari per uno sviluppo tra infrastruttura e innovazione*, dissertation Università degli Studi di Trieste, 2018-2019, rapporteur Bisiani T., co-rapporteur Meninno C., p. 65

FUP Best Practice in Scholarly Publishing (DOI 10.36253/fup_best_practice)
Thomas Bisiani, Matteo Savron, *New Scenarios for a Development between Infrastructures and Innovation*, pp. 164-173, © 2020 Author(s), CC BY 4.0 International, DOI 10.36253/978-88-5518-147-1.17

demographically grown between 2000 and 2014 and a further growth of 96 % is expected in the next 15 years.

From the port and infrastructural systems' point of view, Trieste, can closely resemble this model by strengthening the two drivers for development, quality of life and employment opportunity [7] [8]. Until now considered at the center of Europe, today it is contextually repositioned, through the Belt and Road Initiative, at the western extremity of a vast Eurasian system [23].

The specificity that needs to be investigated is the complex system that joins infrastructure and port logistics with research and scientific innovation promoted by the International Center for Theoretical Physics, the International School for Advanced Studies, the University of Trieste (*Università degli Studi di Trieste*), AREA Science Park among others. Through a recent Intesa San Paolo monitor, Trieste's ICT cluster stands out along the 24 high tech Italian areas for electronic components, semiconductors and computer hardware export performance for the TLC.

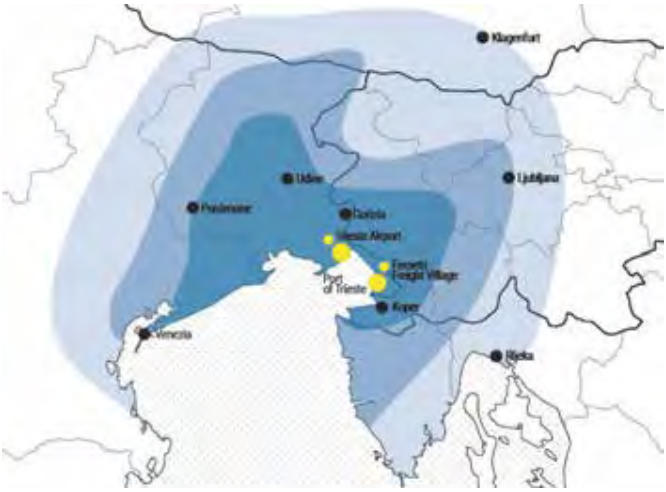

Figure 2 - Framing at the regional scale, highlighting the ports system of Trieste and Monfalcone, of the Fernetti Freight Village and the Trieste Airport (in yellow) and individualization of the isochronous with origin in the intermodal hub of Ronchi dei Legionari (60, 90, 120 minutes) [2].

Three cases to get started

Three case studies demonstrate how an ecosystem constructed of infrastructure and innovation can be generated by both development conditions and crisis situations, as a consequence it cannot exclusively exist as it needs to be managed:

[2] Source: Fraziano G., et al. (2015) – *Le regole del gioco. Scenari architettonici e infrastrutturali per l'aeroporto FVG*, EUT Edizioni Università d Trieste, Trieste, p. 74.

1. SAIPEM – leader in the energy and infrastructure sector, has based in Trieste its center for submarine robotics, where OIE's (Offset Installation Equipment) operative base had been established. It deals with the most recent and highest technology in the world to avoid environmental disasters from underwater oil spills.
2. Java Biocolloid – Indonesian company among the main manufacturers of red algae extracts for the food and pharmaceutical industries that has established in Trieste its European headquarter. This location favors distribution to Europe, the Middle East and the USA and offers development and innovation opportunities through the scientific organizations of the territory.
3. The Coltan – The so called "blue gold" is a superconductor with great ability to store electric charges. In March 2019 a 5 tons container has been confiscated in the port of Trieste for having violated the norms regarding radioactive materials. The Coltan needed to be processed and transformed in Trieste for the production and export of microchips [16].

This last example also confirms the existence of a model that rewards the infrastructural allocation and the commitment of innovation. It also brings out criticalities linked to dubious operations and the exploitation of rare lands and resources of the planet [3].

On these terms this research wants to underline regenerating scenarios of the port areas within Trieste seen as an incubator of innovations. The objective is to define a landscape of activities of great added value, able to affect the quality of life and employment opportunities, exploiting the new central port position [5] [6].

Figure 3 - Goods and passengers interchange nodes of the FVG, particularly the ports of Trieste and Monfalcone, the Fernetti Freight Village and the Trieste Airport (in yellow) [3].

[3] Source: Fraziano G., et al. (2015) – *Le regole del gioco. Scenari architettonici e infrastrutturali per l'aeroporto FVG*, EUT Edizioni Università d Trieste, Trieste, p. 213.

Designing with scenarios

From a methodological point of view this research presents itself as a natural continuation of the previous analysis [20] carried out within the supervision of the University of Trieste in order to define the guidelines for the realization of the intermodal hub of the Trieste Airport.

In both cases three development scenarios have been identified, one alternative to the other in order to evaluate advantages and disadvantages and define their suitability by comparing them to the contextual conditions. This approach enables to modulate for at least three degrees – one per scenario – some of the strategic aspects which, in the case of Trieste Airport, the level of infrastructure service and in the circumstance of this specific case study, the intended use of the identified development area.

This research, requires a further preliminary action, carried out through a series of interviews aimed at stakeholders and public figures that have allowed to identify a collection of four strategic development areas. The cross referencing of the data collected during the consultations has allowed the recognition of the area of the Industrial canal among others. Previously the lot was occupied by the former tobacco manufacturer, the former Giuliane Steelworks along with the currently disused logistic area located at the head of the canal and of the existing docs, where the main interests of the participants involved converged.

The consideration that such area possesses all the characteristics to reach high infrastructural development potentials within a fairly reduced time period, being already the interest of private industrial investments of innovative character, supports the choice made.

Figure 4 - Individuation of the four development areas (in yellow) and of the two macro systems of the infrastructural services (in cyan) and of innovation (in magenta), comprised of highly innovative activities[4].

[4] Source: Savron M. (2020) – *Trieste: nuovi scenari per uno sviluppo tra infrastruttura e innovazione*, dissertation Università degli Studi di Trieste, 2018-2019, rapporteur Bisiani T., co-rapporteur Meninno C., pp. 19, 23

The area occupies a strategic position since it is located at the center of the so called “logistics’ triangle”, defined by the centers of the new port, the new logistic platform of the dock eight (VIII), Trieste’s new Freight Village and of the former Aquila area, in the future a new multipurpose terminal recently acquired by a Hungarian developer.

In this regard, it is significant to underline that the position Trieste grants, on the one hand, reduced travel time of ships coming from the Suez Canal and a point of confluence for the eastern routes, and on the other, quick railway connections to the main European destinations.

The presence of a railway terminal within the currently discussed lot is of particular interest, it would offer added value to the development potentials, allowing a direct relation to the continental railway network.

Finally, a plan to insert the docks first and subsequentially the surrounding industrial area within the margins of the FTZ (Foreign-trade zone) is already in place.

In response to the individualization of the area, three alternative scenarios have consequentially been recognized and are able to meet the expectations of the actors interested in the development of the area: the cold chain logistics center, the industrial hub and the data center.

The cold chain logistics center

The conversion of the intended use of the lot as a logistic area [18] includes the construction of two large warehouses designed for the storage of goods [14]. The parallel and perimetral position of the two buildings is dictated by the necessity to have wide maneuver areas for the loading and unloading activities of the goods. Moreover, an important multi-modal exchange is established. At the head of the area are located the docks equipped with the ship owner’s spaces, at the center with the trucks connecting it to the main arteries of the city and at the other end with the railway terminal.

As a whole, they guarantee a perfect reliability and operativity of the system, as well as a minimal impact on the maintenance of the ideal environmental conditions along the cold chain for the optimal conservation of the goods [23].

The industrial Hub

With its objective being aiming at the valorization of the development activities linked to the projects Sistema Argo and Freeway Trieste along with the exploitation of the presence on the territory of the Area Science Park, the third park in Italy for the birth and development of startups, the scenario promotes an Innovation Factory intended for the development of innovative products [10] [11] [12]. In order to allow the designer with original ideas to shift from concept to production, the Hub would provide in one location the technology, the competence in the field and the infrastructure; a working space, a research center, that offers expertise in the field of technology transfers, knowledge and strategic management of the R&D (research and development).

Data center

In the current geopolitical context [4], ports have established increasing importance as strategic factors of a state that is projected from the sea to the rest of the world. This scenario proposes the realization of a data center [15] in service to the logistics of transportation in support to the continuously growing infrastructural and technological development. In order to increasingly digitalize the ports activities and to maintain the terminal at a high level of international competitiveness the data center would include areas that are both inside and outside the administrative area of *the Autorità del Sistema Portuale del Mare Adriatico Orientale*. The data center represents the core of this strategy since it guarantees the 24/7 operations of all processes, communications and services in support of the logistic activities [9].

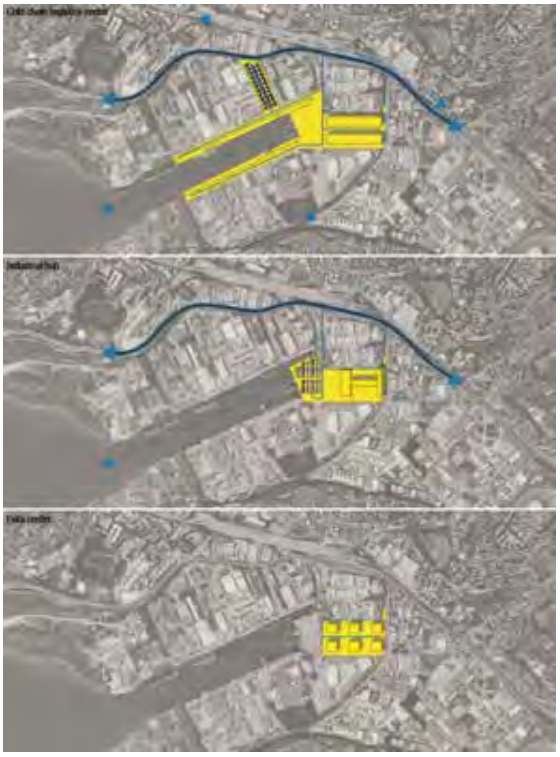

Figure 5 - The three alternative development scenarios individuated for the area of the industrial canal with the identification of the heavy infrastructures connected to the case study[5].

[5] Source: Savron M. (2020) – *Trieste: nuovi scenari per uno sviluppo tra infrastruttura e innovazione*, dissertation Università degli Studi di Trieste, 2018-2019, rapporteur Bisiani T., co-rapporteur Meninno C., pp. 67, 71, 75

The identification of an additional privileged scenario to this process has followed. It was obtained by developing an intermediate vision between two of the three scenarios previously mentioned, the industrial hub and the cold chain logistics center [1].

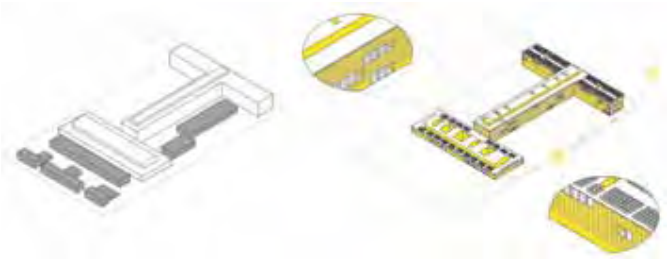

Figure 6 - Conceptual diagrams of the project development scenarios that verify the mixed scenario of the industrial hub and the cold chain logistics center. On the left, the planned demolitions (in grey) and on the right, the study of the facade enclosing and of the shading[6].

The BIM project as a verification tool

The definition of the ideal scenario was followed by a verifying action through the development of an architectural project using BIM methodology [17]. This practice strengthens the choice to operate through scenarios as it allows to have, at the end of the process, a dynamic simulation. It can be reused in order to verify alternative hypothesis maximizing the modeling effort, that can efficiently be reused, allowing for easy comparisons and analysis.

Therefore, all the opportunities of simulations that offer BIM methodology need to be underlined. This technology offers different functions from those relating to physical performance (comfort levels, structural behavior, energy consumption, etc…), to those relating to expenses and execution costs, allowing in this respect for increasingly more objective and in depth analysis [13].

Figure 7 - Extracts of the section and floor plan of the project development with BIM simulation technology[7].

[6] Source: Savron M. (2020) – *Trieste: nuovi scenari per uno sviluppo tra infrastruttura e innovazione*, dissertation Università degli Studi di Trieste, 2018-2019, rapporteur Bisiani T., co-rapporteur Meninno C., p. 85

[7] Source: Savron M. (2020) – *Trieste: nuovi scenari per uno sviluppo tra infrastruttura e innovazione*, dissertation Università degli Studi di Trieste, 2018-2019, rapporteur Bisiani T., co-rapporteur Meninno C., p. 114

A flexible methodology

The composite use of design by scenarios and BIM modeling [2] allows the management of the project, extended to the different scales. As a consequence, it is able to answer to different initial hypothesis and eventual contextual maintenance instead of having to deal with revisions that are normally necessary in order to modify and optimize the project as a subsequent validation of the preliminary proposals.

Figure 8 - General vision of the architectural intervention and of the arrangement of the external spaces and connections with the surrounding infrastructural systems[8].

Conclusions

Simulation methods for both scenarios and project design, combined, demonstrate the ability to develop living solutions on various scales. This approach seems enriched by the possibility to apply interpolations of different solutions in both the scale of the scenario and of the design verification by exploiting the dynamism of the parametric modeling.

In this case however, it is not limited to these generic methodological conclusions.

It starts to outline specific emerging typological and architectural issues linked to the evolution of new landscapes of infrastructure and innovation. The analysis of the scenarios and of the activities compatible with the interests of the promoters of the development interventions, as a result, recognizes a series of activities and locations where mankind seems to progressively be emarginated or absent.

A new landscape made up of our machines, where infrastructure and storage spaces both physical and digital, minimize the presence of the human user, becoming occasional and an accessory.

[8] Source: Savron M. (2020) – *Trieste: nuovi scenari per uno sviluppo tra infrastruttura e innovazione*, dissertation Università degli Studi di Trieste, 2018-2019, rapporteur Bisiani T., co-rapporteur Meninno C., p. 124

In any case it is about spaces that, even if uninhabited, are strategic, essential, in order to guarantee the functioning of the cities we live in.

These are spaces that define the very identity of the contemporary western culture, but we'll never be able to access them.

A system, in many cases that hasn't been thought out for us, but whose shape, maternity and function has been configured in order to answer to the logics of a new artificial living, where we are nothing but intrusions in an architecture that is completely indifferent to our presence and as of this moment seems to have left us behind.

Conclusions

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Laura Bonora, Donatella Carboni, Matteo De Vincenzi (edited by), *Eighth International Symposium "Monitoring of Mediterranean Coastal Areas. Problems and Measurement Techniques". Livorno (Italy) June 2020*, © 2020 Author(s), content CC BY 4.0 International, metadata CC0 1.0 Universal, published by Firenze University Press (www.fupress.com), ISSN 2704-5846 (online), ISBN 978-88-5518-147-1 (PDF), DOI 10.36253/978-88-5518-147-1

The 8th International Symposium *Monitoring of Mediterranean Coastal Areas. Problems and Measurements Techniques* was organized by CNR-IBE in collaboration with FCS Foundation, and Natural History Museum of the Mediterranean and under the patronage of *University of Florence*, *Accademia dei Geogofili*, *Tuscany Region* and *Livorno Province*. It is the occasion in which scholars can illustrate and exchange their activities and innovative proposals, with common aims to promote actions to preserve coastal marine environment. Considering Symposium interdisciplinary nature, the Scientific Committee, underlining this holistic view of Nature, decided to celebrate Alexander von Humboldt; a nature scholar that proposed the organic and inorganic nature's aspects as a single system. It represents a sign of continuity considering that in-presence Symposium could not be carried out due to the COVID-19 pandemic restrictions. Subjects are related to coastal topics: morphology; flora and fauna; energy production; management and integrated protection; geography and landscape, cultural heritage and environmental assets, legal and economic aspects

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ISSN 2704-601X (print)
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ISBN 978-88-5518-147-1 (PDF)
ISBN 978-88-5518-148-8 (XML)
DOI 10.36253/978-88-5518-147-1