

# VIEW MANAGEMENT IN CITY-PORT LANDSCAPES. LIVORNO APPLICATIVE EXPERIENCE

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**Abstract** – The paper is an extreme synthesis of a multi-year research path (2013-2017) carried out by Didalab in Regional Design on behalf of the Livorno Port Authority. This research, although born and developed within a specific context, the port one, is part of a more general debate concerning the planning, design and evaluation of urban transformations at a visual and scenic level in complex and stratified territories with historical permanence. The protection and enhancement of the latter is important both on a cultural/identitarian level and on a recognition of the local urban landscape and image of the city.

The ultimate aim of this contribution is represented by the results of the experiments on the tools for measuring the visual and scenic impact, known at disciplinary level as View Management. With this method, widely used in northern Europe, we want to overcome the current rigid "zoning of the heights" which proved inadequate to manage most of the transformations in the Italian port-cities.

The View Management method and tools have been "hybridized" with those consolidated by Italian landscape planning, reaching a quali-quantitative approach. In fact, the research ranges from the use of quantitative ICT tools, such as GIS-3D and Geodesign modeling, at the base of the Northern European View Management plans, to the qualitative tools of Italian regional and provincial landscape planning / design.

Of the visual impact measuring instruments used in the research, only those more markedly quantitative related to Viewsheed Analysis and Line of Sight Analysis are presented for synthesis. Their reproducibility is to be considered almost absolute, in fact also in other places and other contexts the analyses can also be carried out with the same method and the same technical specifications.

## **The landscape integration reduced to a problem of heights: The paradigmatic case of Livorno**

The case of Livorno is paradigmatic and very useful for understanding how important it is to introduce the View Management tool also in Italy.

The works envisaged by the Livorno Port Master Plan approved in 2015 are very substantial both as regards the construction and as regards the docks and spaces for large ships. The new layout of the port is fundamental for socio-economic development and is necessary to allow a global competitiveness of the logistic and production node. At the same time the Port of Livorno, like many other Italian and Mediterranean ports, is "embedded" in the city. There is no clear separation between the port and the city, just as there is no possibility that one will renounce the other. The contact area of the port with the City is mostly in very fragile places and important from an environmental, historical, social and economic point of

view. The transformation of the Port must therefore in no way justify a break in the link between the port and the city and must take into account the landscape and the "genius loci". The main problem is therefore represented by the "close coexistence", and often conflictual, between the operating port and the historic city, between the need to transform and that of protecting.

How can Port and Urban Planning manage to control transformations, both visually and in terms of landscape, while safeguarding the operation of the Port and the historical and cultural heritage?

The most common answer, at least in Italy, to this question is given by limiting the heights of the artefacts by area, the so-called "Zoning of the heights". The case of the Port of Livorno is paradigmatic. In 2013 the Port authority, in a table with the Municipality and the province of Livorno, the Tuscany Region and the Superintendence for Cultural Heritage, limited the heights of the buildings (except for technical systems and structures strictly functional to port activities) inside of the port area according to four degrees: 0 meters, absolute prohibition to build within a buffer of 300 meters around the tower of the Marzocco of 1500; 20 meters, in the area of greatest port-city interaction where the new ferry / cruise terminal will be built and on the more external works; 35 meters, in the construction site area adjacent to the oldest port, the Medici port; 40 meters, in the most operational north area.

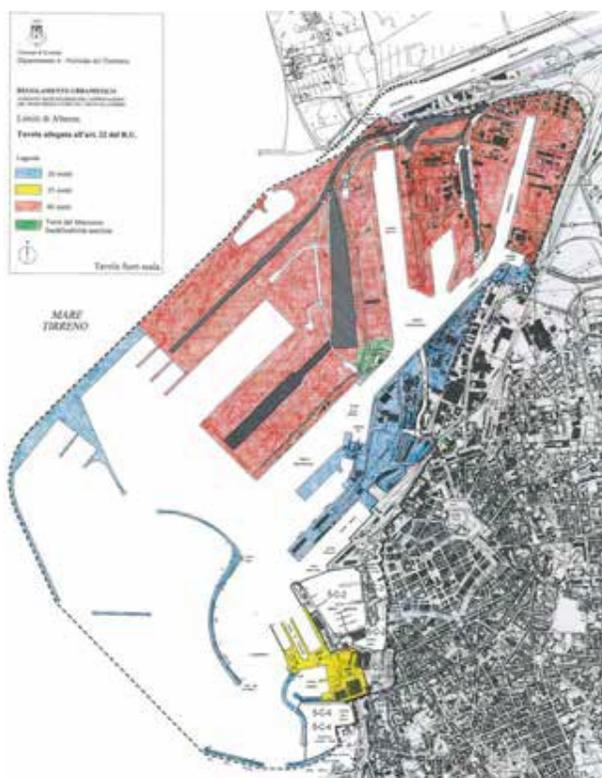


Figure 1 - Zoning map of the heights contained in the anticipatory variant of 2013 to the PRP.

These limitations, if viewed with the "eyes" of urban and territorial planning, may seem adequate if not superabundant. In fact, the Zoning of the heights, widely used in Italian urban plans, rarely exceeds 40 m and often remains below 20 m. But these limitations seen with the "eyes" of the Port prove to be much less adequate. As an example: 30 m is the average height of a ferry or oil tanker, 40 m of a ro-pax ship such as those of the "motorways of the sea" or container ships, over 50 m for cruise ships and container ships of last generation. Furthermore, the aforementioned ships are also slightly less wide and at least eight times longer respectively.

It is therefore easy to understand how the artefacts, facilities and spaces called to welcome them must have an adequate dimensional consistency. The structures and port spaces therefore, by their nature, will be of a higher scale than those of urban or territorial landscapes. The height of buildings and artefacts must have a direct relationship not only with the places frequented by boats but also with the latter which, although by their nature "non-fixed", represent the real architectural and compositional reference. Zoning does not allow you to modulate the heights, nor even to organically compose the full and empty spaces necessary to safeguard the overall landscape as well as the skyline.

In addition, buildings and port structures, by virtue of their considerable consistency, are powerful landmarks, in designing position and height they influence when even miles of distance, and again, the zoning of heights does not allow in any way to control visual and landscape impacts of large area.

The thesis supported by the research is therefore that of a paradigm shift passing from height control (zoning) to the management of the visual and scenic impact (View Management).

### **Disciplinary references: The landscape and its perceptive scenic components**

The European Landscape Convention (CEP) defines the landscape as "an area, as it is perceived by populations, which character is the result of the action and interaction between natural and / or human factors and their interrelationships." (Council of Europe, 2000). Thus, the CEP clearly emphasizes the sensory relationship between the observer and the landscape. The main problem that arises is: how do we know and understand the landscape through perception?

Although "perceived by populations" refers to a holistic experience with all the senses, visual aspects and the sense of sight are often the main vehicle of perception. This clearly has to do with the "range" of our senses. Already Granö (1929) made the distinction between "Nachsicht" and "Fernsicht". The Nachsicht, or proximity, is the environment in which we can experiment with all our senses, the Fernsicht, or landscape, is the part of our environment we perceive mainly through experience related to vision.

"The landscape concerns a certain part of the territory, as perceived by people, whose character derives from the natural and / or human activity and their interrelationships" (E.L.C. art. 1, c. A).

The European Landscape Convention refers to the perception that we can define "social", that is shared by a community, something quite different than that of their own individual subjectivity. In fact, there are values that people, or mere observers, associate with the landscape (among them the aesthetic value is the most relevant), these be investigated mainly through direct inquiries on the population. There are landscapes and elements of this

that play an identity ascertained value, documented by iconographic representations, literature and social recognition.

The identification character of rural and urban environments is built on visual perception, which is a key factor in the behavior and preference, and therefore important for the protection of the landscape, monitoring, planning and management and design. We could say that the visual component is the infrastructure, the network, which travels up the landscape in all its complexity, even holistic, recognized by the European Landscape Convention. In other words what is not visible is not even perceptible, appreciable and recognizable by the community and therefore has a landscape value less almost to zero. Obviously, the visual component is not isolatable from the cultural, or environmental, that the supports and substantiates it. Certainly, the only visibility is no guarantee of landscape, in fact although not sufficient is still a necessary and indispensable.

### **Legislative references: strategic port planning aligns with the regional landscape plan**

The introduction of these principles within the Italian port planners chain may seem to be a constraint, as Law 84/94 "Reorganization of port legislation" clearly defines the perimeter of competence of the Port Master Plan and the landscape, together with the visual management, is not mentioned. But in recent years, the management of port-city interaction and co-planning between territorial and port bodies is also gaining importance in the port area. This thanks first to the more innovative Port Regulatory Plans, including for example that of Livorno or Naples, and recently with two regulatory updates (Legislative Decree 169/2016; Legislative Decree 232/2017) which have officially introduced the theme of joint planning of port-city "interaction areas" in the framework of a new governance. The view management therefore becomes a theme fully in line with the Italian port planning chain.

But it is at a regional level where the need to manage in visual control assumes a key role. In detail, the PIT-PPR (Territorial Guidance Plan with the value of the Landscape Plan) of the Tuscany Region in the area files (Schede d'Ambito). In particular, two directives suggest the safeguarding of assets through visual management:

- 1.7 - requalify the large production and logistic platforms from a landscape point of view (Livorno interport; Navicelli canal; Pontedera industrial area), ensure the compatibility of the new interventions and promote projects for the recovery and reuse of industrial structures abandoned;
- 2.5 - safeguard the recognizability, the historical and visual integrity of Livorno, enhance the historically consolidated relationships between the city and the sea, through the redevelopment of the entrances, the urban waterfront and the interface areas between the city and the port area- industrial-commercial, as well as relations with the settlement system of the Livorno hills, including by redeveloping the fabrics of the recent settlement dispersion.

These directives are superordinated not only to the Port Master Plan, but above all to the DPSS (Port System Strategic Planning Document) under development. The latter has the function of providing addresses to future PRPs. The DPSS must contain the View Management Framework so as to ensure its introduction within future port and urban plans.

## Disciplinary references: The London method and Piedmont instruments

London. Inside the London Plan is the plan for the economic, social and spatial development of the city in the time frame between 2011 and 2031. The London View Management Framework is one of the tools of this plan. It was conceived by mayor Boris Johnson in 2011 and it was approved in 2012. Its goal is to protect the most historically valuable parts of the city, but also to regulate future developments in the nearest area in a rational and rigorous way. Among these valuable buildings, two are central for this plan: Buckingham Palace and Saint Paul Cathedral. The document defines 27 assessment viewpoints that look to valuable buildings. From these points four type of representation are determined: London Panoramas, Linear Views, River Prospects and Townscape Views. One of the pros of this document is to regulate the procedure to present a project inside one of these protected views. The project planner who wants to present a proposal for one of these areas would have to present an adequate number of Accurate Visual Representations. These are photomanipulations of the proposal inside the protected area, created in the most rigorous progress that can be always replicated. The required detail level will be adequate to the level of development of the project, and each elaboration will be judged by a commission of specialists. From this experience both the structure of the boards and the Linear Views for experimentation were borrowed.

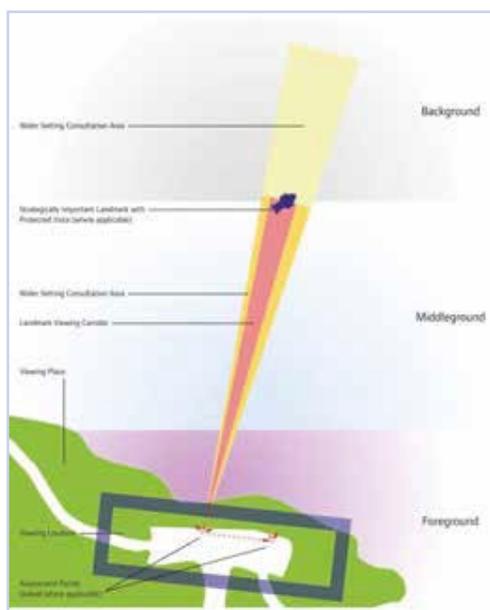


Figure 2 - Illustrative diagram of the linear views of the London View Management.

Piedmont. From the research activity of the DIST (*Dipartimento Interateneo di Scienze del Territorio*) of Turin University and Polytechnic for the regional direction for heritage of Piedmont, the *Linee guida per l'analisi, la tutela e la valorizzazione degli aspetti*

*scenico-percettivi del paesaggio* were born. Starting from the regional landscaping plan, these directives focus to the local scale and introduce a method to take account to scenic and perspectival aspects to landscape analysis, finding the best view channels, the definition of viewshed for the investigation upon spatial and visual relations. This analysis takes both in consideration areas that are universally acknowledged for their importance and “common” places with situations of particular landscape value (or issues), in the light of the European Landscape Convention of 2000. Moreover, these guidelines try to refine the ideas, tools and methods of scenic analysis, in order to make decisions being built on objective parameters and verifiable procedures. Scenic analysis has to be thought at human scale, because this is our only way to perceive landscape, and this may be difficult to relate with regional-scaled planning. For this reason, these guidelines aim to improve the take in charge of these themes at a local scale. In particular, the methodology of recognition and representation of visual fulcrums has been borrowed through overall panoramas. Another aspect taken up in the experimentation is that related to the GIS analysis IT tools: the Viewshed Analysis.



Figure 3 - Representative analysis of the panoramas on a photographic basis, contained in the Landscape Plan of the Piedmont Region.

### **Measure the visual influence of a landmark or landscape detractor**

This type of analysis defines the portion of territory from which a given element or structure is visible. The analysis can concern:

- “positive” elements, landscape-relevant or of historical-identity importance: for example, historical towers, fortifications, monumental trees, etc.... In this case we will talk about positive visual influence that future transformations will have to consider and conserve;

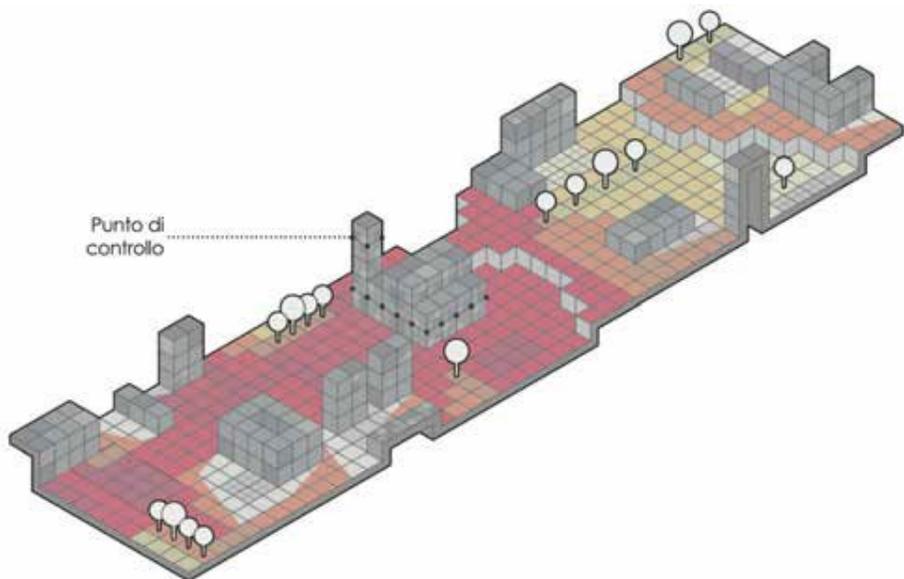


Figure 4 - Exemplary scheme of the basin of influence (Text: “Check point”).

- "negative" elements, impacting landscape and of no importance or identity relevance for the community: for example production structures, industrial buildings, infrastructures, etc ... In this case we will talk about negative visual influence or visual impact, which in the design must be reduced by modifying shape and / or positioning or, in particular for new forecasts, limited with the positioning of shields or structures that prevent intervisibility.

The analysis of visual influence and visual basins have already been used in the PIT-PPR within the regional level report on "visibility and perceptual characteristics" (*Visibilità e caratteri percettivi*). The research then started from this method and elaboration, taking it as a basis and reworking the analysis on an urban scale starting from the valuable historical-identity buildings in the port area.

Viewshed Analysis is used to obtain quantitative information on the actual visibility of an artefact from the surrounding area. The basis of the 3D GIS model is raster and consists of a DSM (Digital Surfaces Model) with cell size appropriately chosen according to the extent of the area under consideration and the quality of the available base data. Several points are identified, a grid, which follow the outline of the artefact from which the simulation is to start. In this the analysis differs from that of the visual basins in which the simulation starts from a single starting point, that of observation. A grid of points joined to the different facades and the roof is created. The program detects from each point the portion of territory from which it is visible. On the basic digital model, visibility at a zero altitude (i.e. coinciding with the surface of the model itself) is not considered but the 1.6 m elevation i.e. the conventional height of the eye of the hypothetical observer. In this way, a clear information is obtained on what is the actual visibility of the artefact directly on the cartography through a classification of the points visible from each single portion of the territory according to an appropriate chromatic scale.



Figure 5 - Example of visual influence of the old fortress of Livorno performed in the GIS environment with the View Sheed Analysis.

### Identify the privileged observation places for the Analysis

Privileged Observation Places are public perimeter areas from which it is possible to enjoy the vision of the landscape and the landmarks or identity elements of the landscape.

These places are identified by superimposing the visual influence analysis of the elements of landscape importance (landmark, heritage buildings, etc.) with public areas or in any case for public use (squares, streets, open spaces, terraces, prestigious public buildings etc.). Through this interpolation, it is possible to identify Privileged Observation Places, that is areas with a substantial coincidence between the potential visibility of the landscape and public accessibility to its vision, being, according to the European Landscape Convention, the landscape "a certain part of territory, as perceived by the populations".

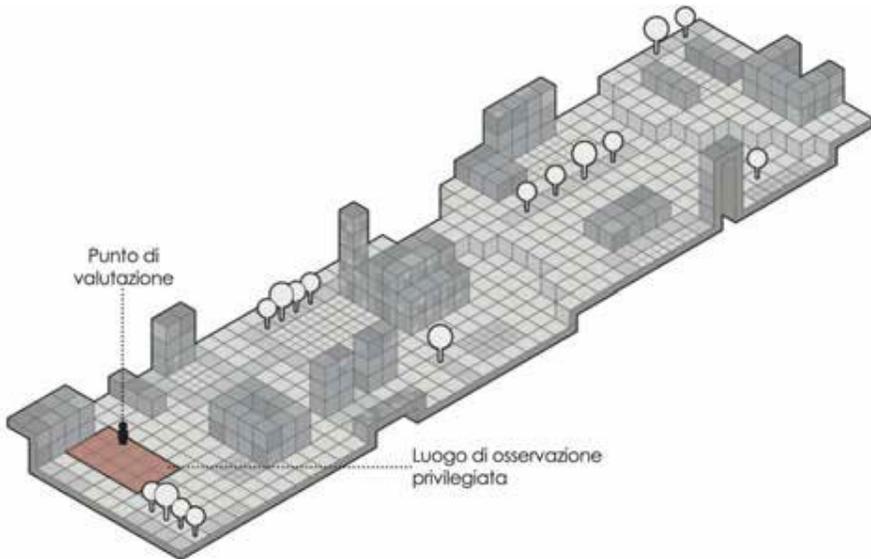


Figure 6 - Exemplary scheme of privileged observation places (Text: "Evaluation point"; "privileged observation places").

Within each of these places, one or more Assessment Points are defined. In each of these the observers are positioned for the analysis of the sets and the analysis of the visual line.

The positioning of these points is designated according to the type of analysis to be carried out following different and ad hoc ratios. In the case of analysis of the sets, the evaluation points will be positioned spaced apart from each other so that they can cover, with the visual cones, the entire landscape around the observation site, trying to position the key landmarks as close as possible to the bisectors of the cone. In the case of the analysis of the visual line, the evaluation points will be positioned in places, taken from the analysis of visual influence, where the landmarks are more visible or in such a way that along the lines the transformation areas are intercepted if known or inferred from urban plans.

The points of origin of the simulations and those of photographic shooting must be taken at the conventional height of the human eye, that is 1.60 m.

### **Measuring what is visible currently and in the project: viewshed and line of sight analysis**

This type of analysis defines the portion of territory or the elements visible from an observation point. This can be achieved through two different analysis tools depending on the specific targets:

- viewshed analysis used to analyze the whole of the territorial or urban surface;
- line of sight analysis to analyze in particular elements and/or structures that develop mainly in one dimension.

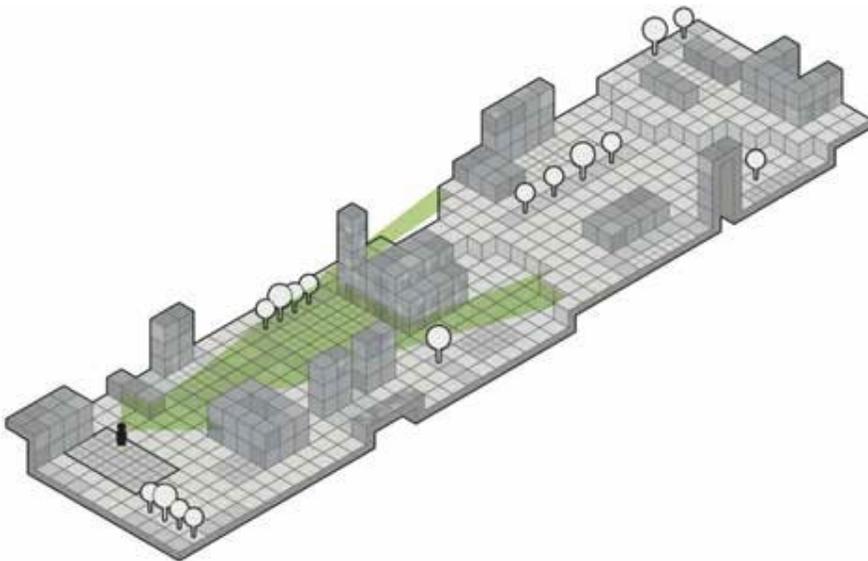


Figure 7 - Exemplary scheme of viewshed analysis tool.

In the first case the viewsheed analysis tool (which can be explained in other words as "visual basin") performs a raster analysis referring to a DSM (Digital Surface Model) where the height of the surfaces is absolute, topical, and does not allow to consider transparency or permeability intermediate lines (holes or openings). In the face of this limitation, however, the analysis allows to consider large portions of territory up to scales greater than 1: 25000 (based on the PIT-PPR intervisibility maps).

It is therefore very useful for data at a territorial level and in contexts of open territory. The accuracy of the analysis is linked to the discretization of the cartographic basis of the digital model in which the cells considered depend on the base source and calculation power of the machine used for processing.

Generally, the DTM (Digital Terrain Model) and DSM supplied by the Tuscany Region (LiDar) have cells ranging from 50 cm x 50 cm up to 2 m x 2 m so as to allow both urban and large area analysis. Among the parameters that can be controlled by the user are the observer's height and his field of view, allowing both targeted analyses, with an amplitude similar to the human visual field, and more general, with an amplitude of 180° or 360°.

In the second case, the line of sight analysis tool performs a terrain-based vector analysis (DTM) and 3D vector elements and structures. For this reason, it manages to be rigorous in the position and morphology of the soil and at the same time to evaluate the elements in their real shape (including openings, holes, cuts etc.). The limitation of this analysis is related to the fact that from the observation point it detects the visual pelvis according to defined points or lines (target). In this case, once the observation point has been chosen, a series of lines are projected starting from it, also in this case with an amplitude and density established by the user.

Having an absolute precision using vector files, it is very useful for detailed analyzes on urban and architectural scale. We therefore speak of elements visible from the observation point rather than portions of territory such as the previous one. This analysis is particularly suitable for identifying obstacles to the view and its impact, geolocating the points of interference along the lines, and distinguishing the visible areas in green and the hidden ones in red. In this way it is possible to locate obstructions in space as well as to know the amplitude in degrees of the obstructed visual field.



Figure 8 - View sheed analysis based on 3D GIS.

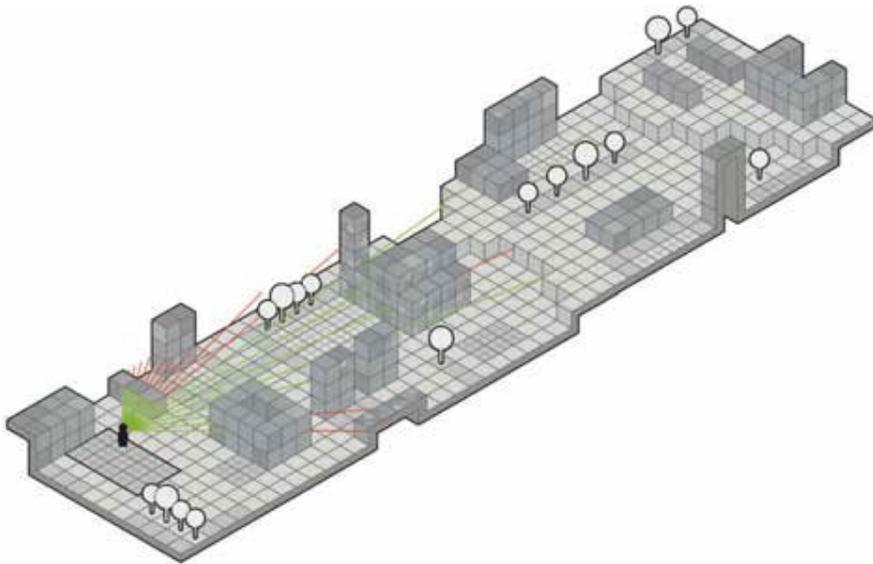


Figure 9 - Exemplary scheme of line of sight analysis tool.

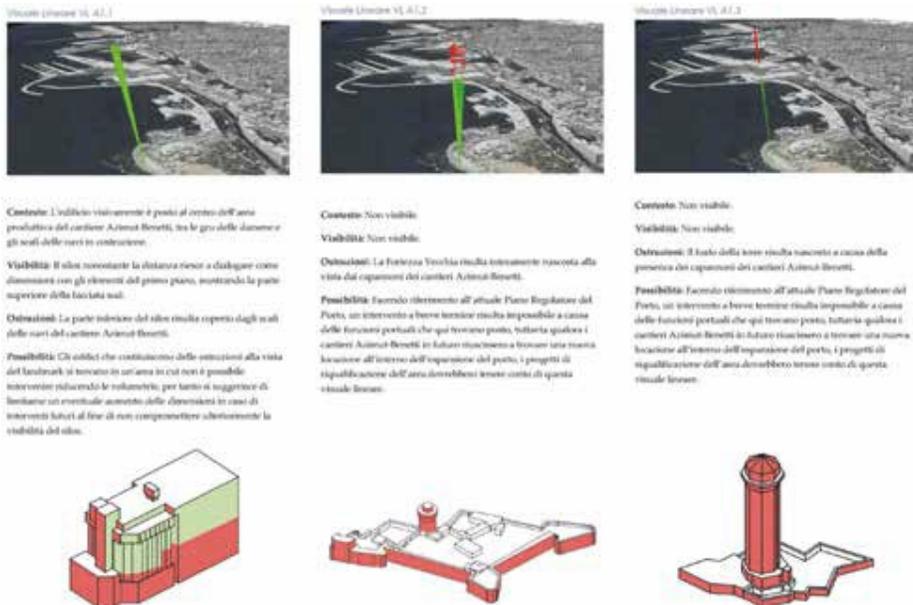


Figure 10 - Extract of the analysis sheets relating to the strategic views of Livorno's Port. At the top, the GIS elaboration related to linear views; a textual analysis of visual characters and visual interference; the real visibility of the protected historical buildings.

The two types of analysis are therefore not alternative but rather complementary based on the type and quantity of basic data, the territorial context in which we find ourselves and the area we intend to analyze.

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