Report on pilot actions replicability

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1 Introduction

The transfer of project results and main outputs requires appropriate guidelines delivering the methodologies used and a description of the context where projects have been implemented. This report represents the output through which project partners and stakeholders may be able to better understand the methodological frame used for the pilot actions implementation and to replicate and scale-up them in other territorial contexts. As final deliverable of pilot actions, the contents of this document may provide valuable insights, through the FRAMESPORT Toolbox (D.5.4.2), for the strategy consultation and for the structure of the FRAMESPORT strategy paper.

The present report aims to describe the method used for the project proposals in the complex case of the regeneration of harbour areas. Also, the smaller ports, in the planning of the territory, demand and unitary vision, that not only takes the port into account but considers it inserted inside a multipurpose city. The study consists of a preliminary analysis, the participation of stakeholders, and deepening with indicators, thus giving an all-round picture of the reality of the Port. An important achievement of the present study is that the set of indicators adopted can be used in similar contexts, encouraging local Administrations to adopt them. To such purpose, the fixed parameters are of easy finding and calculation.

This methodology, integrated with the ANP-BOCR analysis, evaluates the different possible scenarios considering the real needs of the territory as well as those of the stakeholders. The next design phase must necessarily take into account what emerged from the previous analysis and identify best strategies and technical solutions. The method applied to the Canal Port of Rimini case gave satisfactory results suggesting the priority interventions to be carried out. The method applied to the case of the Canal out. The flexible solution studied for the specific case and its criticalities Port of Rimini has given effective and satisfactory results suggesting the priority interventions to be carried was the best one to realize sustainability goals and the development of the area.

Starting from a qualitative and quantitative analysis, the purpose of the present report is to show the different steps to get to the most suitable project for the regeneration of degraded urban areas with a priority scale for the interventions proposed. Figure 1 shows the different steps followed to get to the definition of the final design suggested. After on-site inspections data collection to better know the current scenario, the first phase includes a qualitative analysis of the historical and urban context to identify the potential and the criticalities of the area. In the second phase the qualitative data collected will be processed and interpreted through a SWOT analysis. However, this analysis does not establish the degree of priority of the actions to be taken. A matrix of indicators is set up

allowing a qualitative and quantitative assessment of the various aspects that contribute to pursue the goal of sustainability within the urban area of study.
In order to ensure optimal use of resources and a successful outcome of the pro-ject, in the third phase, the critical issues requiring priority action are identified. For this purpose, a model is used that considers benefits, opportunities, costs, and risks (BOCR). The results of this analysis represent the basis on which to focus the project proposal.

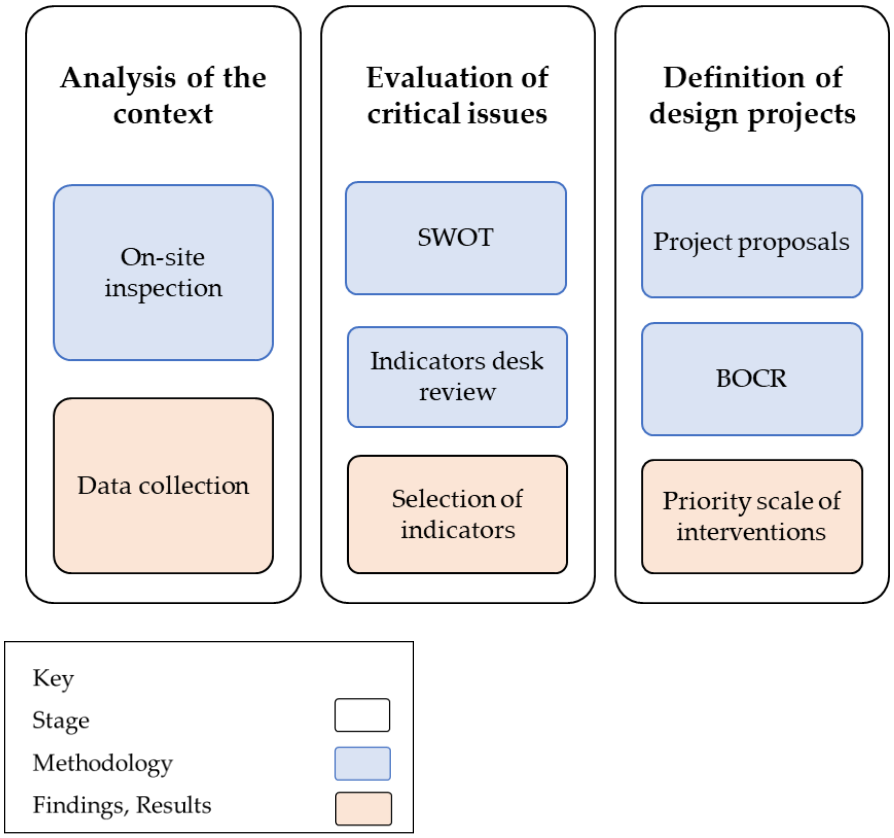


Figure 1: The method used to establish the priority scale of interventions

In the following paragraphs, the steps followed to identify the proposed methodology will be described. Starting from the analysis of the state of the art and the literature review, the Rimini Canal Port context will be analysed comparing the procedure followed with different cases studies and different methods. Moreover, the proposed method will be set out by analysing step by step the procedure followed, the meetings with stakeholders, the obstacles encountered and the final output.

2 Pilot action in a nutshell

2.1 Contextualization

The activities of this European INTERREG Italy-Croatia project are aimed at supporting the overall and sustainable growth of the smaller Adriatic Sea ports through a long-term strategy, enhancing their socio-economic role for the development of coastal areas. The project is financed by the Italy - Croatia Cross Border Cooperation Programme of the European Union.

Figure 2 – FRAMESPORT logo. Source: http://www.corila.it/it/node/329.

The project is based on an articulated approach that envisages the identification of priority themes to be promoted in the overall strategy and the implementation of pilot actions for the experimentation of new solutions for the development of small ports. The pilot actions, in particular, will focus on the following themes:

- Development of ICT services and applications;
- Infrastructure management and spatial planning;
- Energy and environment;
- Business-oriented actions;
- Training and knowledge enhancement.

The project initiatives envisage the involvement of local and national stakeholders, which will allow to establish a strong link between the project initiatives and the territorial realities involved, and the development of a common ICT platform among the partners for the collection and systematisation of the data of the ports involved and the results of the pilot actions. The results of the FRAMESPORT actions and initiatives will form the basis of the project's main product, i.e. the common strategy dedicated to the development of small ports. The ITL Foundation, in particular, will co-ordinate the activities envisaged in WP5 "Innovative services and tools to support the strategic development of small ports" and will also be responsible for the pilot actions to be developed in the Canal Port of Rimini. The Pilot Action concerning the Rimini Canal Port was selected as the Municipality of Rimini expressed its interest in participating in the project.

Figure 3 – FRAMESPORT Project area and partnership. Source: http://www.corila.it/it/node/329.

The Canal Port of Rimini consists of the original mouth of the Marecchia River, with piers on both sides and an extension on two docks. The canal has a length of 2.2 km and a width of 46 m at the entrance of the port and 40 m along its development up to "XXV Aprile" Park. It divides the historic centre of the City of Rimini from the district of San Giuliano a Mare in the north of Rimini.

Figure 4 – Canal Port of Rimini. Source: Google Earth.

The Rimini Canal Port was selected as a Pilot Action for the project section "Subcontracting 1 - Professional service for urban planning/architectural and urban design analyses", whose aims are:

- Assessment on of the existing institutional, regulatory and environmental framework of the functional pole of the port; analysis of the urban, territorial, and landscape system of the

various areas; analysis and valorisation of the existing context, functions and services of the port; economic and financial evaluation of the port valorisation implementation process.

- Redaction of a redevelopment study of the waterfront and of a project proposal that provides for the strengthening of the offer of structures and services in the port area with a strong landscape value, the requalification of environmental, infrastructural and settlement conditions, including a participatory process.

All the activities described in the project reports can be methodologically replicated in other minor ports to foster their sustainable development. The strongly historical character of the city of Rimini makes it an exemplary case of a minor port in a consolidated urban context with a strong tourist attraction.

2.2 Overall vision of the pilot

The activities carried out for the implementation of the project can be subdivided in four phases:

Phase 1: Analysis and data collection;
Phase 2: Data processing and evaluations;
Phase 3: Project development;
Phase 4: Dissemination.

In Phase 1, preliminary analyses were addressed in seven different thematic areas, covering different scales, that are basically related to the seven topics identified in the previous deliverable D.5.3.1 (1° pilot action advancement session), as listed below:

1. Analysis of the existing institutional, regulatory, and environmental framework of the functional pole;
2. Analysis of the urban, territorial, and landscape system;
3. Analysis of the relations between the port, the city, and the neighbouring territories;
4. Analysis of the existing heritage context;
5. Analysis of the existing functions and services with particular reference to ICT services;
6. Mapping of the socio-economic and cultural context;
7. Analysis of the historic and cultural values.

Each one was the subject of research activity, desk analysis, surveys, and stakeholders' consultation. Most of the data were collected through web sources, but the consultation with the stakeholders

was essential to identify the most critical issues to consider in shaping the Pilot action activities aimed at the renovation of the area.
At the end of phase 1, to complement the desk analyses and surveys, a questionnaire was distributed to all the stakeholders involved in order to obtain a more detailed overview of the opportunities and threats of the area.
The results of this first data collection were incorporated into a SWOT analysis and in two meta-project boards containing some suggestions about criticalities and potentialities of the area that marked the conclusion of phase 1. At the end of this preliminary phase, an internal report was prepared for the FRAMESPORT consortium, resuming the results of this first phase.

In Phase 2 the analysis for the identification of criticalities and potentials and the research of the indicators for the analysis and monitoring of urban quality took place. The most significant topics of this phase are the following:

1. SWOT Analysis (Strengths - Weaknesses - Opportunities - Threats) based on the results of the preliminary analysis delivered in the Phase 1;
2. Graphic tables summarizing the potential and criticality of the Porto Canale area;
3. In-depth analysis of the criticalities identified by the analyzes and surveys;
4. Data collection to identify a set of significant indicators for the assessment of the urban and infrastructural quality of the Porto Canale area;
5. Analysis of the data collected and identification of a proper set of indicators;
6. BOCR analysis (Benefits - Opportunities - Costs - Risks) based on the selected set of indicators;
7. Identification of the priority scale of the interventions to be carried out for the redevelopment of the Porto Canale area.
8. Elaboration of project concepts to be discussed with the Stakeholders involved.

In this phase, the contribution of the Municipality of Rimini was of fundamental importance, which actively supported the analysis phase by providing all the material necessary to conduct the analysis, in particular project files, shapefiles for the GIS and support for regulatory issues.

In the Phase 3 the outcomes of the previous phases were collected and synthesises into a design proposal that takes into account the urban context and co-design activities derived from the dialogue with stakeholders.

In particular, this phase involved the following activities:

1. Identification of the elevation level of the docks;
2. Study of the accesses to the quays;
3. Study of the public spaces to be integrated to increase the attractiveness of the area;
4. Study of the technological systems to be applied to the project;
5. Study of soft mobility paths in the project area;
6. Drafting master plans and project boards.

From the consultations with the Emilia-Romagna Region's technicians and the study of the material provided by the Municipality of Rimini, it is concluded that it is essential to raise the docks to a height of between 1.30 and 1.70 m above sea level. Such a height represents the optimal compromise for making the quays safe in the long term, since it also takes into account the subsidence phenomenon, while respecting the urban context in which the intervention will take place. Proper solutions will have to be evaluated in order to allow access to boats (e.g. by means of floating bridges or appropriately designed stairways), should it be decided to regularise the landings upstream of Ponte della Resistenza. The docks downstream Ponte della Resistenza are at an elevation of 1.24m asl and have been recently renovated; therefore, they have not been considered in this project proposal.

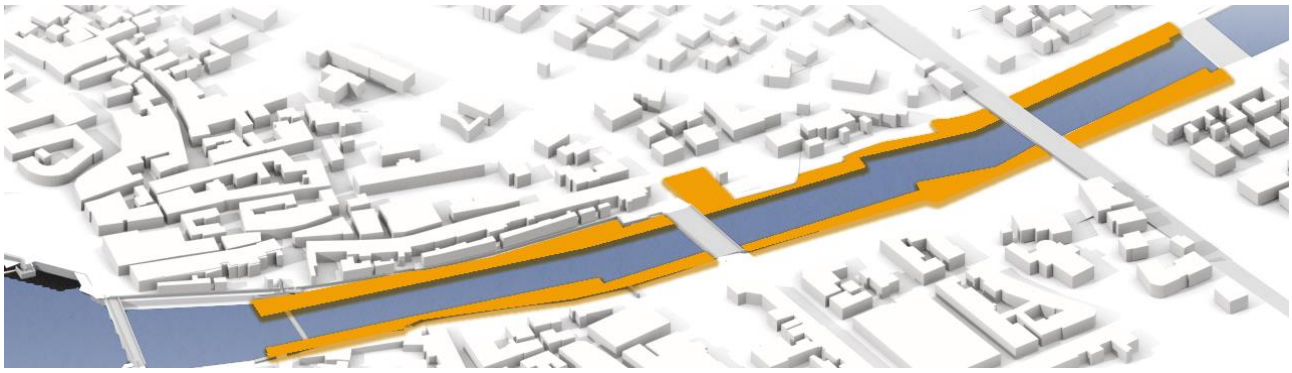


Figure 5 – Area involved in the elevation of the docks. Source: CIRI Building and Construction.

To conclude, it is reported that during a meeting with the region's technicians it was identified the need to conduct an updated hydraulic study to validate the correctness of the proposed elevation. In fact, raising the docks to 1.50 m above sea level would not definitively solve the problem of flooding, but would considerably lengthen the return time of the occurrence of such events.

While waiting for such a study to be carried out, the project proposal illustrated in this contribution is based on raising the embankments to 1.50 m above sea level in the sections from Ponte della Resistenza to Tiberius Bridge.

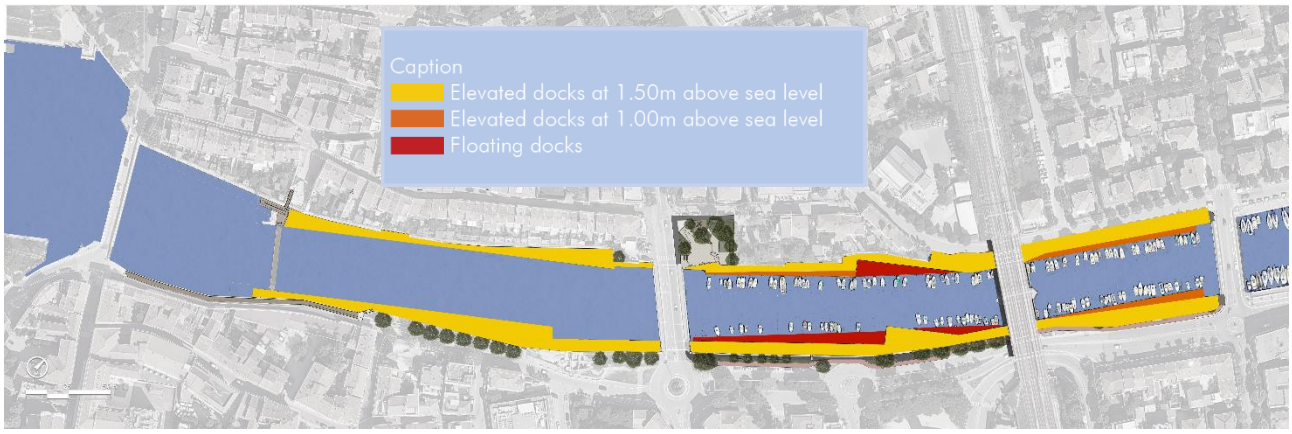


Figure 6 – Types of docks. Source: CIRI Building and Construction.

In the stretch between Ponte della Resistenza and Ponte dei Mille, boats belonging to the local association Amici del Mare (Friends of the Sea) are currently moored. In order to regularise these moorings, which are currently unauthorised, and to allow access to the boats following the work to raise the docks, the following design solutions are proposed:

- Raised dock at an elevation of 1.50 m above sea level: the dock is raised entirely and there is no access for boats.
- Raised quay at an elevation of 1.00m above sea level: the strip of quay closest to the edge of the canal remains at an intermediate level between the current level and that of the raising to allow access to boats. It is possible that this strip will be submerged at times during the year, but much less frequently than at present.
- Floating platform: in those sections where it is not possible to dedicate a strip of the quay to mooring access, it is proposed to install floating platforms made of medium density polyethylene anchored to the quay by means of steel brackets. These platforms move vertically along the steel guides following the free surface of the water.

Figure 7 – Floating platform for moorings. Source: 6ECO S.r.l..

To understand how to interconnect the height of the docks with the upper pavement above the historic walls, a study of the six most significant sections between Tiberius Bridge and Ponte della Resistenza was set up to compare the height of the current state and that of the elevation at 1.5m above sea level. As indicated by the section lines, all sections look downstream.

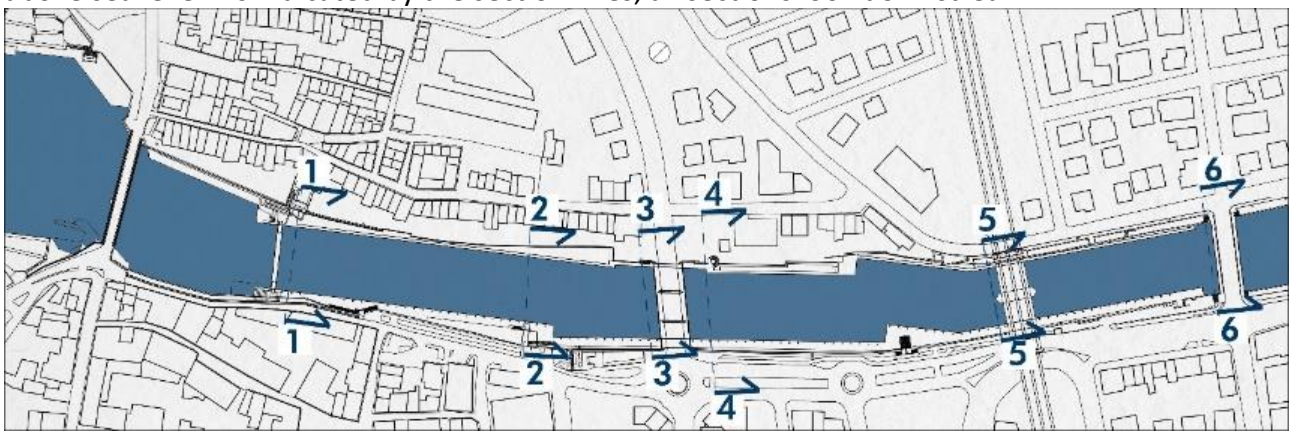


Figure 8 – Six most significant sections. Source: CIRI Building and Construction.

From the study of these significant sections, it was possible to verify the performance of the network of cycle and pedestrian paths connecting the upper pavement at the roadside with the quaysides. The aim was to eliminate all existing architectural barriers and to obtain more open spaces that visually and physically invite users to walk on the quaysides. An improvement in the accessibility of the quays is the first step to encourage greater fruition and discourage phenomena of social and urban degradation. In addition, greater accessibility of these spaces and a greater flow of people also contribute to increasing the attractiveness of the Canal Port area. This supports the sustainable development of the small port. Not only citizens and tourists benefit from this improvement in urban quality, but also local commercial activities can increase their incomes due to an increased flow of visitors.

3 State-of-the-art and literature review

The most suitable urban transformation project always depends on a large number of elements influencing each other. Therefore, different alternatives should be provided already during the ex-ante evaluation. Traditional methods of economic and financial feasibility such as cost-benefit and cost-benefit analysis (CBA), are not suitable enough to understand complex cases [1]. In fact, in this type of analysis, the evaluation is limited to some quantitative variables and to the judgment of a few experts. Most cost information, particularly in the early stages of a project, is often limited and many costs and benefits are difficult to count and quantify [2]. Some aspects relevant to the environment, sociality, and inclusiveness are difficult to quantify with CBA [3]. A wide range of aspects, including both technical elements based on empirical observations and non-technical elements based on social values, should therefore be taken into account, based on the basis of an overall view of the problem.

The evaluation of urban transformation projects is a complex decision-making problem often analysed using Multi-Criteria Analysis (MCA). The MCA considers at the same time many different aspects of the problem to be faced, both qualitative and quantitative, highlighting the different points of view of the stakeholders involved [4]. This technique consists in the definition of a rational basis for the choice, identifying criteria according to which to evaluate the different possible alternatives. Several studies have shown that MCA analysis is appropriate and suitable for the evaluation of complex projects [5],[7]. There are different types of MCA to be used depending on the context under consideration [8]. Within the class of MCA, the methodology of the Analytical Network Process (ANP) plays a leading role. Developed by the American scholar Thomas L. Saaty [9], it represents the generalization of the simpler linear analysis hierarchical methodology Analytic Hierarchy Process (AHP) [10] to more complex problems involving varying degrees of interaction between the elements analysed.

The Analytic Network Process (ANP) network system is a useful decision support tool for public and private managers and operators. It allows to reach a final numerical ranking of alternative choices, based on the comparison in pairs between the different aspects that make up the problem. In ANP, the decision problem is schematized as a network of elements organized in groups and related by various relationships of influence. The structure of the network allows the assessment of interdependence relationships both within each group of elements and between the various groups of elements. Unlike other analysis techniques, the ANP network model is more suitable and

beneficial when it comes to complex decision-making problems, usually difficult to represent through a hierarchical scheme. In these cases, not only does the importance attached to the criteria help to determine the priority scale of the alternatives, but also the importance of the latter affects that of the criteria. On the contrary, the AHP method, ANP method comes from, simplifies reality by distributing criteria as a hierarchy and it simplifies reality by not considering the relationships among elements [11]. The AHP method is based on a linear hierarchical structure where relationships between the elements of the different decision levels are unidirectional along the hierarchy. Moreover, there are no dependencies either between elements of the same group or between elements belonging to different groups [12]. Although complex case studies can be solved through the ANP method, due to the complexity of this analysis method, many studies have used the AHP method as more comprehensible by decision-makers [13]. However, it has been shown that, when comparing the two methods of analysis, results obtained with AHP are underestimated or overestimated compared to the results obtained with ANP. In fact, aspects evaluated in AHP are not directly compared with the other elements. [14], [15].

In order to assess urban quality, to support the design choices, and the monitoring phase of the proposed interventions, it was decided to identify a set of indicators: this solution allows for a qualitative-quantitative assessment of the various aspects that contribute to pursuing the objective of a sustainable city.

A suitable definition regarding the purpose of indicators is “to enhance communication, transparency, effectiveness and accountability of management of a highly complex natural system. They should provide a readily understood tool for describing the state of the system and for assessing trends regarding sustainable development objectives. In the process of measuring progress, they should also stimulate action to better achieve those objectives. They can be thought of as a dashboard of a car, which provides information on the speed, engine performance, fuel and possible potential problems. The responsibility of judging risks and changing the driving behaviour is that of the driver. Just as a car's dashboard does, indicators summarise large quantities of information into a few relevant signals for the driver. Importantly, they cover all important aspects of the vehicle, not just one component in great detail.” [16],[17].

Indicators can in fact be used as:

- Preliminary survey tools;

- In itinere monitoring tools;
- Evaluation of final performance.

They can therefore be used for ex-ante, in itinere or ex-post evaluation. The importance of indicators as tools for knowing and analysing, designing and monitoring has already been emphasised in various fields: there are numerous examples of sets of indicators both at national and European level [18]–[24].

A large literature agrees that indicators should fulfil the following requirements:

- Accessibility: it must be measurable and easily sampled;
- Operability: must be directly and easily usable;
- Reliability: it must have minimum systematic error values;
- Representativeness: it must be clearly correlated with the phenomenon or characteristic to be detected or monitored.

In order to construct synthetic, clear and interpretable indicators, it is essential to strategically choose the information that forms the matrix: it must pursue the set objectives without unnecessarily increasing the information load. Consequently, it is necessary to avoid all those confusing phenomena such as redundancy, excessive generality or lack of specific relevance of the information collected, which would be detrimental to effectiveness and efficiency [25]–[26].

Therefore, in the case of the Rimini Canal Port, the inclusion and exclusion criteria adopted in the selection of indicators were as follows:

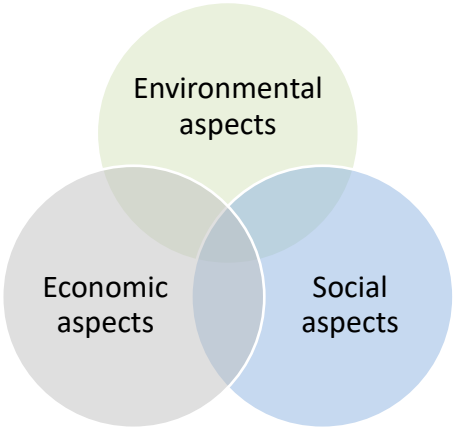
1. Detectability and availability of information;
2. Reliability and accuracy of data and sources;
3. Comprehensibility and ease of reading and interpretation;
4. Validity and completeness of output information;
5. Relevance in relation to the objectives set.

The outputs provided by these indicators acquire importance because, interpreted in a systemic manner, they provide the picture of the state of the art, from which pilot actions can be deduced by means of the BOCR (Benefits, Opportunities, Costs, Risks) analysis, described below.

The literature agrees that sustainability depends on social, economic and environmental factors, which are not independent of each other. There are several versions of the Venn diagram depicting these factors:

- the most widespread of these (in the figure) illustrates them by means of intersecting circles, signifying the necessary integrations;
- others depict the three aspects as concentric circles (economic within the social and the latter within the environmental);
- others emphasise that the environmental elements need to expand to reach the same size as the other two.

All the various graphic versions, however, show that the practical realisation of sustainability can only be achieved through the combination of the three basic elements mentioned above [27,28].

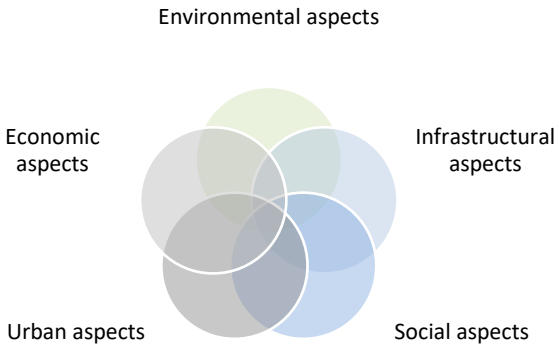


In other words, to pursue the goal of sustainable urban development, it is crucial to measure and evaluate policies, infrastructure, socio-economic factors, resource use, emissions, and any other processes that contribute to and benefit from the city's metabolism and prosperity, as well as quality of life.

This will enable city decision-makers and government in general to better identify areas of potential opportunity and respond by developing realistic and sustainable goals with a long-term perspective.

The indicators identified for the study area were classified according to five categories in order to analyse not only the aspects included in the Venn diagram, but also the infrastructural aspects

related to transport and those of urban morphology related to the context. The decision to integrate these other two categories with those already present in the Venn diagram was made precisely because the urban and transport system has a decisive influence on urban well-being and, consequently, on the sustainability of the project intervention.



The Analytic Network Process (ANP) is used to get a quantitative analysis of the factors evaluated by the SWOT analysis [29]. The ANP represents the decision problem as a network in which the elements of the problem are linked through interdependency relationships and at different levels [30], [31]. In this study, an analysis of the BOCR, with indicators able to identify the priority of actions to be taken for the redevelopment of an urban area, allowed an in-depth analysis in the meta-design phase.

In literature, the application of the ANP method for the evaluation of urban and spatial transformation scenarios is widely treated [32]–[34]. The basic steps for the development and application of an ANP model are:

1. Problem structuring and construction of the decision-making model;
2. Compilation of the pairwise comparison matrices;
3. Formation of the Supermatrices;
4. Aggregation of results;

Once the model has been built, it is necessary to identify the relationships among the network elements. The decision-making model can be structured in two ways - simple network model: relations among clusters of criteria, alternatives and nodes or complex network model: existence of

a control hierarchy giving rise to sub-networks, each organised according to the simple network structure. Figure 2 shows the complex network structure followed in this study.

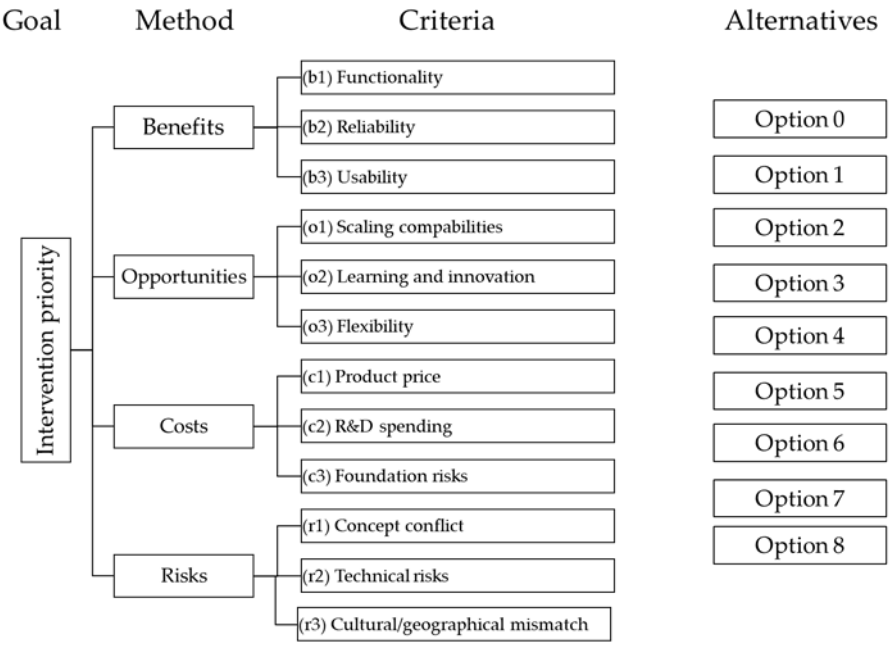


Figure 9: Complex network structure followed for the BOCR analysis.

After the schematisation of the model, the evaluation is carried out using the method of pairwise comparisons. The procedure is carried out by rotating each net-work element as “parent” and making a preference judgement between all “child” elements connected to it. At this stage, a binary preference relationship is established between the elements of comparison. Judgements are made according to Saaty's “fundamental scale” [35], i.e. a 9-point numerical scale that allows the preference between the two choice options to be identified. Pairwise comparisons take place at both cluster and node level. The numerical values assigned in the evaluation phase form matrices of pairwise comparisons of the elements. Once these matrices have been completed, the priority of the respective components can be determined through the main eigen-vector of the matrix, which represents the synthesis of the preference judgements ex-pressed. There are three supermatrices within the ANP. Initial supermatrix: composed of the priority vectors obtained from the pairwise comparison, it represents the influ-ence flows identified by the network; Weighted supermatrix: obtained by multiplying the values of the initial supermatrix by the matrix obtained from the

comparison be-tween clusters, it also serves to take into account the different weights attributed to the clusters; Limit supermatrix: obtained by multiplying the weighted supermatrix by itself a number of times tending to infinity, its columns contain the vector of priorities of the analysis elements. In the case of simple network, the priority ranking of the alternatives is obtained directly from the boundary supermatrix, whereas in the case of com-plex network, further aggregation of the results with the corresponding formulae is required. Finally, a sensitivity analysis is carried out to check the final preference ranking as the weights assigned to the control criteria change.

The most common case of a complex network model with control hierarchies giving rise to sub-networks is the BOCR (Benefits, Opportunities, Costs, Risks) model, which similarly to the SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis refers to two-time dimensions:

- Benefits and Costs are measured in the present;
- Opportunities and Risks are estimated on the basis of expectations of impacts of the intervention and in the long term.

In detail it identifies:

- Benefits: favourable aspects identified in the analysis of the area;
- Opportunities: potentially favourable aspects deriving from the planned project actions;
- Costs: negative aspects identified in the analysis of the area;
- Risks: potentially negative aspects that may be caused by the project actions.

In this model, the complexity of the problem is broken down into four sub-networks: Benefits, Opportunities, Costs, Risks. Each of these four sub-networks contains five clusters of environmental, economic, infrastructural, urban and social aspects. Each sub-network produces a ranking of alternatives that will then be corre-lated with those of the other sub-networks to obtain an overall result that provides a ranking of choice options.

4 Pilot action development and main obstacles

4.1 Step-by-step procedure

Although there is no standard and univocal methodology to elaborate an Urban Regeneration Project, the procedure developed for the Rimini Canal Port Pilot Action proved successful and can be replicated in similar cases. Although a number of case studies similar to Rimini's Canal Port in

certain aspects were considered, it was necessary to construct a tailor-made matrix of indicators. The selected indicators were subdivided on the basis of the five previously mentioned categories and were further divided into nodes to simplify the subsequent BOCR analysis. Each indicator was evaluated according to its own rating and unit of measure.

The set of indicators and their subsequent score assessment was carried out contextually to the thesis work of student Chiara Casamassima [Master Thesis: Casamassima C. "Strumenti e metodi di analisi e progettazione per la rigenerazione urbana delle aree portuali: il caso del Porto Canale di Rimini", Supervisor: Ferrante A., Co-supervisors: Mazzoli C., Corticelli R., Lantieri C., University of Bologna, 2022], who compared the data collected for the project area - consisting of the group of eight macro-areas described above - with a wider area that included the urban areas surrounding the Port Canal. From this study it was possible to derive some considerations to understand which functions and services were already available in the project area and which, instead, were lacking. The two comparison areas are shown in yellow and red in Fig. 10.

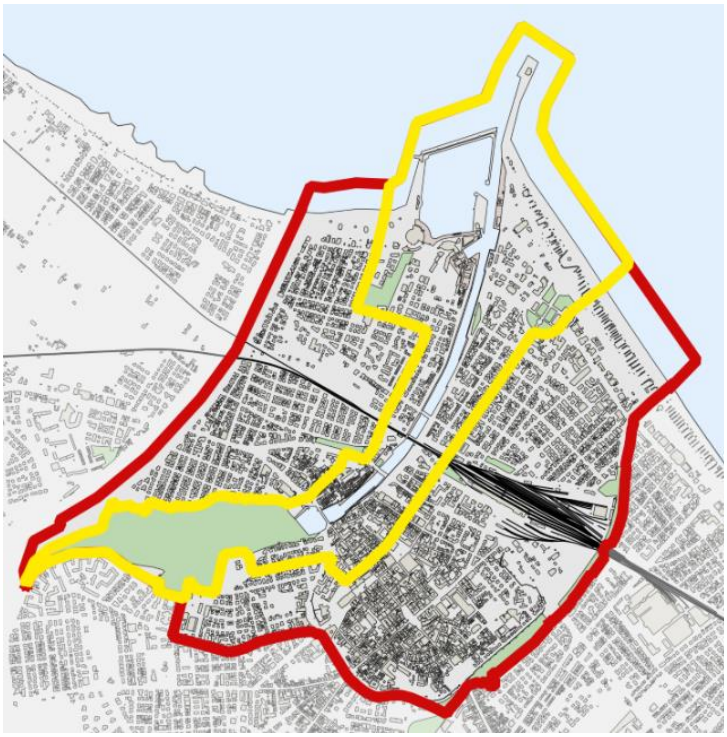


Figure 10 – Yellow: project area; Red: target area.
Source: Student Thesis Chiara Casamassima, CIRI Building and Construction.

As the evaluation of alternative urban transformation scenarios represents a complex decision-making problem that is frequently analysed by means of Multi-Criteria Analysis (MCA), for phase 2 the Analytic Network Process (ANP) methodology - a sub-class of MCA – was selected.
The most common case of a ANP with control hierarchies giving rise to sub-networks used for urban regeneration projects is the BOCR (Benefits, Opportunities, Costs, Risks) model, which similarly to the SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis refers to two time dimensions:

1. Benefits and Costs are measured in the present;
2. Opportunities and Risks are estimated on the basis of expectations of the impacts of the intervention and in the long term.

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In this model, the complexity of the problem is decomposed into four sub-networks: Benefits, Opportunities, Costs, Risks. Each of these four sub-networks contains five clusters of environmental, economic, infrastructural, urban and social aspects. Each sub-network produces a ranking of alternatives that will then be correlated with those of the other sub-networks to obtain an overall result that provides a ranking of choice options.

In the case of Rimini Canal Port, the intention is to evaluate the priority of intervention among the redevelopment actions identified by the previous analyses. The alternatives considered refer to the current situation (option 0), i.e. the no-intervention option, and to the possible intervention solutions identified by the previous analysis phases (Table 1).

Alternative	Description
Option 0	**Maintaining the current configuration of the Canal Port area.** This solution entails considerable criticalities of an urbanistic nature (inadequacy of the docks), infrastructural (interruptions to the cycle-pedestrian network) and social (lack of community spaces).
Option 1	**Creation of better quality urban spaces** and improvement of existing community spaces (P.le Boscovich).

Option 2	**Implementation of the ferry service** in cooperation with START (local public transport).
Option 3	**Interchange car park** strategically located to promote intermodality.
Option 4	**Reconnection of cycle and pedestrian paths** and interconnection of socio-cultural poles of attraction.
Option 5	**Redevelopment and raising of docks**, regularization of moorings, and consequent improvement of the quality and safety of public spaces.
Option 6	**Construction of the new Fish Market.**
Option 7	**Construction of new tourist connections** (Croatia).
Option 8	**Redevelopment of the slipway.**

Table 1 – Alternatives. Source: CIRI Building and Construction.

For the construction of the sub-networks Benefits, Opportunities, Costs and Risks concerning the Rimini Canal Port, reference is made to the analyses carried out previously and proceed as follows:

1. The sub-networks of Benefits and Costs are derived from the analysis of indicators derived from desk analyses and surveys.
2. The sub-networks Opportunities and Risks derive from the SWOT analysis and are mainly based on stakeholders' contributions.

Table 2 shows the decision network schematised according to the BOCR model. As can be seen, the network is composed of four sub-networks characterised by the presence of different clusters of elements. Once all nodes in the network have been classified within their respective clusters and the four sub-networks, it is possible to proceed with the BOCR analysis. The Superdecisions software was used as a tool to support the analysis. It is a proven tool that guides the development of the model and automatically generates the comparison matrices.

BOCR	Cluster	Nodes	Code
BENEFITS	1: Environmental aspects	Level of exposure to flood risk	B1.1
	2: Economic aspects	Commercial and productive activities	B2.1
		Real estate value	B2.2
		Hotel and non-hotel capacity	B2.3
	3: Infrastructural aspects	Quality of road infrastructure	B3.1
		Collective transport services	B3.2
		Quality of cycle-pedestrian mobility	B3.3
		Implementation of the cycle-pedestrian network during the design phase	B3.4

	4: Urban planning aspects	Quality of public space	B4.1
		Coverage ratio	B4.2
		Public green	B4.3
	5: Social aspects	Territorial coverage and level of accessibility of education services	B5.1
		Coverage of social and health services	B5.2
		Coverage of recreational and sports activities	B5.3
		Coverage of cultural activities	B5.4
		Coverage of places of worship	B5.5
OPPORTUNITIES	2: Economic aspects	Realization of the new Fish Market	O2.1
		Construction of new tourist links (Croatia)	O2.2
	3: Infrastructural aspects	Exchanger parking located in a strategic position to promote intermodality	O3.1
		Re-stitching of cycle-pedestrian paths and interconnection of socio-cultural poles	O3.2
		Cycle connection near the Tiberius Bridge	O3.3
		Increase of Zone 30 and cycle-pedestrian paths	O3.4
		Implementation of the SUMP to improve the connectivity of the urban fabric	O3.5
	4: Urban planning aspects	Creating better quality urban spaces	O4.1
		Functional spaces for loading and unloading goods and at the same time attractive for tourists	O4.2
		Raising docks and regularizing moorings	O4.3
		Redevelopment of the docks and consequent improvement of quality and safety of public spaces	O4.4
		Redevelopment of the slipway	O4.5
COSTS	1: Environmental aspects	Naturalness index	C1.1
		Soil permeability	C1.2
	3: Infrastructural aspects	Parking quality	C3.1
		Traversability of the Canal Port	C3.2
	4: Urban planning aspects	Population density	C4.1
		Built functional variety	C4.2
		Phenomena of urban degradation	C4.3
	5: Social aspects	Phenomena of social degradation	C5.1
RISKS	1: Environmental aspects	Incorrect management of the hydraulics of the canal (diverter of the Marecchia river)	R1.1
	2: Economic aspects	Insufficient funds for the creation of new areas	R2.1
		Involvement of many different actors with different needs that do not find a meeting point	R2.2

	3: Infrastructural aspects	Increased demand for parking in the Canal Port area	R3.1
	4: Urban planning aspects	Shape of urban areas that represents an obstacle to the continuity of the network	R4.1
	5: Social aspects	Unused of spaces after the redevelopment of the Canal Port	R5.1

Table 2 – BOCR model. Source: CIRI Building and Construction.

Once the decision-making network consisting of the subnets Benefits, Opportunities, Costs, Risks has been defined, the relationships of interdependence between clusters and nodes are attributed. The Alternatives cluster is related to all other clusters, while the other clusters can be related to each other or not. By appropriately conducting the BOCR analysis, it conducts at the determination of the final priority ranking that takes into account all the previously identified relationships.

Option	Description	Priority
O0	**Maintaining the current configuration of the Canal Port area**	5,74%
O1	**Creation of urban spaces of better quality** (Largo Boscovich)	15,51%
O2	**Implementation of the "Ferry Victory" service**	7,05%
O3	**Construction of a new exchanger car park**	9,63%
O4	**Improvement of cycle-pedestrian paths** (greater continuity)	17,28%
O5	**Redevelopment and raising of docks and regularization of moorings**	16,83%
O6	**Realization of the new Fish Market**	12,72%
O7	**Construction of new tourist links** (Croatia)	8,35%
O8	**Redevelopment of the slipway**	6,89%

Table 3 – Overall priority ranking. Source: CIRI Building and Construction.

From Phase 2, the priority ranking of the actions to be developed was obtained and the two priority alternatives were selected as the fundamental basis on which to set up the Phase 3 project: the **improvement of cycle-pedestrian paths** and **redevelopment and raising of docks and regularization of moorings**.

Phase 3 collects the outcomes of the previous phases and synthesises them into a design proposal that takes into account the urban context and co-design activities derived from the dialogue with stakeholders. This phase ends with the delivery of this report. The result of the project phase is concluded in graphic boards showing:

1. Project Masterplan of the intervention area with reference to the current state;

2. Sections before and after the intervention;
3. Study boards of the accesses to the quays;
4. Study boards of the activities to be included in the public spaces;
5. Study boards of the soft mobility in the project area.

To summarise, the essential steps for the replicability of the procedure are:

1. Context analysis through archival sources, on-site surveys, stakeholder questionnaires, open data, etc;
2. Data processing through a SWOT analysis to identify potentials and criticalities of the project area;
3. Identification of a set of indicators from the collected data and assessment of their score for a pre-project phase (and possible future monitoring);
4. Elaboration of a BOCR model to identify a priority scale of urban regeneration actions;
5. Elaboration of an urban regeneration project based on the outcomes of the previous phases.

4.2 Target groups and stakeholders

The involvement of the stakeholders was fundamental to identify which project actions were indispensable and understand their effectiveness in the specific case of the Rimini Canal Port. In fact, the participation of actors who were fully familiar with the needs of the area proved to be essential to make proper design choices that respected local needs and were actually aimed at the wellbeing of the community.

A list of the main stakeholders involved in the pilot action project is provided. the following table shows the stakeholders' name, their role and their contribution to the project, reporting their interest and influence within the development of the activities.

Stakeholder	Potential Role	Contribution to the projects	Consulted
Municipality of Rimini	Empower	The Municipality of Rimini cooperates to make informed decisions and takes responsibility for final decisions.	yes

Port Authority	Collaborate	The Port Authority works as a partner on the development of alternatives and the identification of the preferred solution.	no
Italian Naval League	Collaborate	The Italian Naval League works as a partner on e aspect of the project for the re-qualification of the port area.	no
Nautical Club of Rimini	Collaborate	The Nautical Club of Rimini works as a partner on every aspect of the project for the re-qualification of the port area.	no
Sea Workers' Cooperative	Collaborate	The Sea Workers' Cooperative works as a partner on every aspect of the decision, including the identification of the critical points of the Canal Port.	yes
Rimini Sailing Club	Collaborate	The Rimini Sailing Club works as a partner on every aspect of the project for the re-qualification of the port area.	yes
Council of Port Operators "Consulta degli operatori del Porto"	Collaborate	The Council of Sea Operators works as a partner on the development of alternatives and the identification of the preferred solution.	yes
"Gori Marineria" Shipyard	Consult	Gori Marineria Shipyard provides feedbacks on analysis, alternatives and/or decisions.	No
"Carlini Stefano" Shipyard	Consult	Carlini Stefano Shipyard provides feedbacks on analysis, alternatives and/or decisions.	No
"Imarr" - Agricultural Cooperative Society	Consult	Imarr - Agricultural Cooperative Society provides feedbacks on analysis, alternatives and/or decisions.	No
"Acqua di mare" - Agricultural Cooperative Society	Consult	Acqua di mare - Agricultural Cooperative Society provides feedbacks on analysis, alternatives and/or decisions.	No
"Adriamar" - - Agricultural Cooperative Society	Consult	Adriamar - Agricultural Cooperative Society provides feedbacks on analysis, alternatives and/or decisions.	No

“Cento Fiori” Association	Consult	Cento Fiori Association provides feedbacks on analysis, alternatives and/or decisions.	No
Hera SpA	Inform	Hera SpA provides balanced and objective information to allow people to understand the problem and the solutions found for the re-qualification of the Port Canal.	No
“Carontino” Ferry Boat (transport between the banks)	Inform	The “Carontino” Ferry Boat provides balanced and objective information for people going to the canal port and move between the two banks of the pier understanding the solutions found in the project.	No
START Romagna	Inform	START Romagna provides balanced and objective information to enable people using public transport to understand the problem, alternatives and / or solution.	No
Hotel Associations	Inform	The Hotel Associations provides balanced and objective information helping people to understand the problem, alternatives and/or solution.	No
ARPAE	Inform	ARPAE provides balanced and objective information to allow understanding the management of the docks of the Canal Port.	yes
National Civil Defense Service	Inform	The National Civil Defense Service provides balanced and objective information to help people to understand the problem, possible alternatives and solutions.	yes

Table 4 – Mapping of stakeholders

After the phase of identification of stakeholders, their relationships are taken into account. The analysis is based on a list of different criteria or attributes for each specific case, e.g., interest, power, influence on each other, coalitions, etc. In this way it is possible to find out what the

objectives of each stakeholder are, what their hidden agendas are, and whether they regard themselves as "winners" or "losers" if a given issue is implemented.

The objective of a systematic analysis of actor relationships is to get a clear picture of conflicts of interest or potential coalitions. These helps to define clusters of stakeholders having different levels of involvement, capacities, and interest in the issue in question. For example, this can be done by developing an "Influence-Interest Matrix", which groups stakeholders by their level of influence/ importance as summarized in the table below.

		Influence	
		Low	High
Interest	Low	Cento Fiori Association Hotel Associations	HERA Start Romagna Arpae Civil defence
	High	Gori Marineria Shipyard Carlini Stefano Shipyard Imarr Acqua di mare Adriamar "Carontino" Ferry Boat	Municipality of Rimini Council of Sea Operators Italian Naval League Sailing Club Sea Workers' Cooperative Rimini Sailing Club Port Authority

Table 5 – Mapping of stakeholders

Below are the dates of the meetings that took place with this purpose from the beginning of the project:

Meeting date	Online/In presence	Participants
4 May 2021	Online	• Municipality of Rimini (Ing. Messina, Councillor Anna Montini) • Sailing Club • Consult Port Operators • ITL • CIRI

18 May 2021	In presence	• Municipality of Rimini (Ing. Della Valle, Ing. Messina) • ITL • CIRI
9 June 2021	In presence	• Sea Worker's Cooperative • CIRI
10 June 2021	In presence	• ARPAE • CIRI
29 July 2021	In presence	• Municipality of Rimini • CIRI
5 October 2021	In presence	• Municipality of Rimini • Civil Protection STPC (Sarti, Cevoli, Sanzio) • CIRI
31 January 2022	In presence	• Municipality of Rimini (Councillor Mattia Morolli, Ing. Della Valle, Ing. Messina) • ITL • CIRI
28 April 2022	In presence	1. Municipality of Rimini (ing. Della Valle, ing. Messina, ing. Paganelli) 2. Region – Civil Protection (Cevoli, Taballini, Sarti) 3. CIRI
30 June 2022	Online	• Municipality of Rimini (Ing. Dellavalle, Ing. Messina) • ITL 4. CIRI
07 July 2022	In presence	• Municipality of Rimini (Councillor Mattia Morolli, Ing. Della Valle, Ing. Messina) • ITL 5. CIRI

Table 6 – Meetings with the stakeholders (source: CIRI Edilizia e Costruzioni - UNIBO)

At the end of phase 1, to complement the desk analyses and surveys, a questionnaire was distributed to all the stakeholders involved in order to obtain a more detailed overview of the opportunities and threats of the area:

Questionnaire

Section 1 - Transport infrastructure and systems

1. Express an opinion on the following aspects concerning the infrastructures dedicated to the mobility to the Canal Port area by private motorized vehicles:	
Safety	(very bad – insufficient – sufficient – good – excellent)
Roads adequacy	(very bad – insufficient – sufficient – good – excellent)
Traffic	(very bad – insufficient – sufficient – good – excellent)

2. Express an opinion on the following factors regarding the mobility by public transport to the Canal Port area:	
Intermodality	(very bad – insufficient – sufficient – good – excellent)
Safety	(very bad – insufficient – sufficient – good – excellent)

3. Express a judgment on the following aspects regarding the mobility to the Canal Port area by bike/on foot:	
Visibility and illumination	(very bad – insufficient – sufficient – good – excellent)
Road signs	(very bad – insufficient – sufficient – good – excellent)
Roadway protections	(very bad – insufficient – sufficient – good – excellent)
Safety	(very bad – insufficient – sufficient – good – excellent)
Shading	(very bad – insufficient – sufficient – good – excellent)
Adequacy of the sidewalk/cycle-pedestrian path	(very bad – insufficient – sufficient – good – excellent)

4. Express an opinion on the following aspects regarding parking in the Canal Port area:	
Availability of car parks	(very bad – insufficient – sufficient – good – excellent)
Time taken to find a place	(very bad – insufficient – sufficient – good – excellent)
Price	(very bad – insufficient – sufficient – good – excellent)
Shading	(very bad – insufficient – sufficient – good – excellent)
Proximity to the place of arrival	(very bad – insufficient – sufficient – good – excellent)

Section 2 - Public space

5. Express a judgment on the following aspects concerning public spaces in the area adjacent to the docks of the Canal Port:	
Lighting	(very bad – insufficient – sufficient – good – excellent)
Safety	(very bad – insufficient – sufficient – good – excellent)
Street furniture	(very bad – insufficient – sufficient – good – excellent)
Removal of architectural barriers	(very bad – insufficient – sufficient – good – excellent)
Presence of urban green	(very bad – insufficient – sufficient – good – excellent)
Cleaning and maintenance	(very bad – insufficient – sufficient – good – excellent)
Integration with the urban landscape	(very bad – insufficient – sufficient – good – excellent)

6. Express an opinion on the following environmental aspects concerning the Canal Port:	
Water quality	(very bad – insufficient – sufficient – good – excellent)
Water recirculation	(very bad – insufficient – sufficient – good – excellent)

7. Use this space for observations and reports on the phenomena of urban and social degradation in the area of the Canal Port and surroundings:
To be filled in…

8. Use this space to report any suggestion and/or critical issues that you need to make up for in the Canal Port area:
To be filled in…

The following conclusions were drawn from the results of the questionnaire:

- Movements with private motorized vehicles are safe and the infrastructures are on average perceived as satisfactory, but there are considerable inconveniences due to traffic.
- Traveling by public transport is considered safe, but shortcomings in intramodality have emerged;
- The cycle-pedestrian paths are generally well lit and signposted and are perceived as being on average safe, but the scarce shading has been reported and in general they are considered not completely adequate to the needs;

- The parking lots were evaluated very negatively in almost every aspect investigated, in particular it emerged the scarcity of available spaces and the amount of time needed to find a parking place;
- The public spaces meet on average the expectations of the stakeholders in the aspects concerning lighting and safety, but some unsatisfactory elements remain such as the scarce presence of green and urban furniture, the ineffective integration of the Canal Port area with the urban landscape of Rimini, poor cleaning and maintenance, as well as the presence of architectural barriers;
- The water quality of the Canal is considered very low due to dirt and the lack of water recirculation.

Figure 11 – Meetings with the Municipality of Rimini on 07 July 2022. Source: CIRI Building and Construction – UNIBO.

4.3 Main obstacles

During the **research phases** emerged some obstacles, collected in the following scheme:

Obstacle	Description	Solution
Availability of data for the identification of the set of indicators	Despite the readiness of the Municipality of Rimini to provide us with all the data and information requested, sometimes the data necessary for the identification of some indicators potentially useful for the analysis was not available. Furthermore, sometimes despite having the data to calculate an indicator, there was no availability of targets with which to compare the data collected to verify its applicability.	Those indicators that provided a certain possibility of control and ease of availability were selected preferably. Please refer to chapter "3. Monitoring Activities" for a more complete explanation.
Identification of the project regulatory limitations on the quays	Since the docks of the Porto Canale are both the responsibility of the River Authority Marecchia-Conca and the Port Authority, there have been some difficulties in understanding which rules to base the project interventions.	It was chosen the most stringent regulation to prevent conflicts on responsibilities arising in the subsequent project phases.
Need to raise the quays hindered by the impossibility of reducing the hydraulic section of the canal	Among the problems identified by the analysis, the raising of the docks was a priority, however this is problematic because from a comparison with the Civil Protection and the River Authority it emerged that it is forbidden to	There have been developed proposals for raising the quays that do not envisage the reduction of the hydraulic section of the canal.

	reduce the hydraulic section of the canal because it would constitute an increase in danger in case of flooding of the canal.	
Accuracy of the connections established within the BOCR decision-making model	In order to obtain reliable results from the BOCR model it is necessary that all the connections between the nodes of the network are established as precisely as possible. Incorrect modeling of relationships can cause an alteration in the ranking of intervention priorities.	It was tried to build a model as simple and representative as possible, carefully taking care of all connections to avoid distorting the results.
Difficulties in identifying an appropriate quay elevation	The coexistence of flooding phenomena of the Marecchia river and tidal phenomena make it particularly difficult to identify a safe level for raising the quays. To these phenomena must be added that of subsidence, which causes the level of the quays to drop annually. Moreover, in certain stretches it is not possible to raise the quays too high because this would prevent access to boats and passage under bridges.	Review of existing hydraulic studies (CESI and others) and of information held by the municipality. Meeting with the Municipality of Rimini and the Emilia-Romagna Region to discuss possible strategies to overcome the problem.
Identification of public functions to be located above the docks	Need to identify appropriate functions to be placed in the new quays to make them more attractive to visitors, without,	Consultation with stakeholders and the questionnaire revealed the needs of citizens. Preferences converged with the need to create light and removable facilities in case

	however, hindering the spillway functions of the Canal Port.	of flooding in order to maintain the safety of public spaces.
Architecturally valuable works limiting design (historical constraints)	The historical walls are constrained and were not altered in the project. The white stone staircase near the Ponte della Resistenza does not appear to be constrained, but since it is a valuable element, it was decided to disassemble it, clean it and relocate it in the same position. A check is currently underway to determine whether Architect Vittoriano Viganò's stairways are constrained, because if so, it would greatly restrict planning flexibility.	Based on municipal maps, the stairs designed by Viganò were not listed, so their demolition was proposed. The other listed artefacts were left untouched or relocated in their place.
Impossibility of passage under the Ponte dei Mille due to the raising of the quaysides	With the raising of the height of the quays it becomes impossible to pass under the Ponte dei Mille because the serviceable height would be insufficient.	A passage above the bridge was proposed to maintain the continuity of the quayside paths and encourage citizens to use them.
Continuity of the cycle path beyond Borgo San Giuliano along Via Sinistra del Porto	The current 'Green Ring' (‘Anello Verde’) cycle route does not have a dedicated path within Borgo San Giuliano and outside this area there is no cycle path along Via Sinistra del Porto.	A cycle-pedestrian passage from Borgo San Giuliano through the Don Luigi Sturzo Gardens descending along the quay and reconnecting to a new dedicated cycle path along Via Sinistra del Porto was proposed.

Table 7 – Obstacles (source: CIRI Edilizia e Costruzioni - UNIBO)

Despite all the solution measures considered, it still remains the risk that some of these issues may affect the planned results and/or original plans, but it has been made an attempt to minimize the

risk as much as possible and further systematic verifications will be carried out in the subsequent phases of project to check its adequacy.

4.4 Identified KPIs and related achievements

The following indicators have been chosen in Deliverable D5.2.1. to monitor the progress of the work within the project, for each one of them a target and a time horizon have been set.
All the key activities identified have been analysed, meeting the target of the first indicator. As foreseen for the second indicator, 2/2 internal report has been completed. Then, for the third indicator, 2/2 meta-project design documents has been completed. The final technical report and the definitive design documents have been completed and the delivery of this final technical report represents the meeting of the target value for the fourth indicator. All the identified stakeholders were involved within the questionnaire related to the Phase 2 of the project. Dissemination activities are still ongoing and will continue until the end of December '22.

Indicator	Unit of measure	Target value	Achieved value	Time horizon for monitoring (June '21/ Dec. '21/ June '22)
Key Activities analyzed/ key activities identified	*percentage*	*100%*	*100%*	*June '21*
Number of internal reports	*number*	*2*	*2*	*Dec. '21*
Number of meta-projects design documents	*number*	*2*	*2*	*Dec. '21*
Number of technical report	*number*	*1*	*1*	~~*June '22*~~ *December '22*
Number of definitive design documents	*number*	*2*	*2*	~~*June '22*~~ *December '22*
Number of stakeholders involved/number of stakeholders identified	*percentage*	*100%*	*100%*	*June '22*

Dissemination activities	*number*	*2*	*2*	~~*June'22*~~ *December '22*

Table 8 – Indicators: CIRI Edilizia e Costruzioni – UNIBO.

The project's deadlines were extended, therefore some activities have not yet been completed within the time horizon originally set in D5.2.1. The time horizon for monitoring is therefore extended until December '22 to allow the final versions of the design phase to be finalised and dissemination activities to continue.

There is no standard methodology for analysing urban sustainability through a predefined set of indicators. A matrix of indicators for the Canal Port of Rimini was specially built. The selected indicators were subdivided on basis of the five previously mentioned categories. Then, they were further divided into nodes to simplify the BOCR analysis. Each indicator was evaluated according to its own rating and unit of measure. In the case of Rimini Canal Port, the inclusion and exclusion criteria adopted in the selection of indicators were as follows:

- Detectability and availability of information;
- Reliability and accuracy of data and sources;
- Comprehensibility and easy reading and interpretation;
- Validity and completeness of output information;
- Relevance in relation to the objectives set.

Within the environmental category, for example, indicators related to surface emissions, noise protection and air quality were not taken into consideration as they are difficult to find and not relevant to the case study under consideration. Being a port area, indicators such as permeability of the soil and level of exposure to flood risk are of greater importance. Rimini is a tourist city of international fame, therefore all indicators related to tourism such as business activities, productive activities in the area, the presence of points of interest and the quality of public space were of fundamental importance. On the contrary, indicators such as the number of cars and motorcycles for residents, the detection of speeds within the town, road capacity and service level were not taken into account for the difficulty in finding relevant data. In a study of urban regeneration, in order to encourage sustainable mobility, several indicators were found in the literature related to the presence of sharing (car sharing, bike sharing, e-scooters sharing). In the case of Rimini, these indicators were not taken into account as no accurate and updated data on the number of cars, bicycles and e-scooters in the city and the coverage area were available.

The outputs provided by these indicators are very important because, when interpreted in a systemic way, they provide the picture of the state of the art, from which pilot actions can be deduced by means of the BOCR (Benefits, Opportunities, Costs, Risks) analysis. The evaluation of the score obtained from the set of indicators was carried out by comparing the data collected for the project area with a wider area including the urban areas surrounding the Canal Port. Some considerations emerged from this study to understand which functions and services were already available in the project area and which were missing.

1. Environmental aspects			
Node	Indicator	Description	UoM
Naturality index	Naturality index	Classification according to an increasing naturality gradient from 0 (absence of vegetation cover due to anthropogenic causes) to 10 (climax vegetation).	Rating 0-10
Level of exposure to flood risk	Level of exposure to flood risk	Incidence of the number of buildings and inhabitants living in the areas affected by flood events according to the hazard scenarios defined by the PAI of the Po River Basin Authority.	Rating 1-6
Soil permeability	Soil permeability	Determination of soil permeability classes, i.e. the capacity of the soil under saturated conditions to be traversed by a flow of water in a vertical direction.	Rating 1-3
2. Economic aspects			
Node	Indicator	Description	UoM
Commercial and productive activities	Commercial activities	Degree of business activity in the study area	%
	Production activities related to the canal port	Presence of productive activities linked to the canal port to navigation	no/hectare
Real estate value	Real estate value	Property value assessment within the study area	€/m^2
Hotel and residence capacity	Hotel and residence capacity	Estimation of hotel and non-hotel capacity	Beds/hectare
3. Infrastructural aspects			
Node	Indicator	Description	UoM

Quality of road infrastructure	Presence of 30 km/h zones	Presence of speed restricted areas	%
	Presence of restricted traffic zone	Identification of areas subject to limited traffic zones	%
	Presence of pedestrian zones	Identification of pedestrian areas	%
	Road accidents	Index to assess road safety based on the number of accidents over the last 10 years	no/10 years
	Perceived safety of infrastructure	Qualitative index obtained through a questionnaire concerning the perceived safety of infrastructure users	Rating 1-10
Parking quality	Presence of car parks	Number and location of parking spaces in the area	no/inhabitant no/summer resident
	Presence of electricity columns	Number and location of places for electric cars to encourage electric mobility	no
	Presence of digital parking management systems	Presence of digital systems (apps or sites) for parking management and payment	yes/no
Public transport services	Bus stop coverage	Index indicating the coverage of public transport services in the territory	%
	Population served by public transport	Index indicating the accessibility of the population to the public transport service	%
	Intermodalità dei trasporti	Parameter derived from the degree of satisfaction of public transport service users regarding intermodality of transport	Rating 1-10
	Perceived quality of public transport services	Parameter derived from the degree of satisfaction of public transport service users with the quality of the service	Rating 1-10
Quality of bicycle and pedestrian mobility	Cyclo-pedestrian index	Linear extension of bicycle and pedestrian paths and spaces available to residents in the consolidated city	m/inhabitant

			m/summer resident
	Accessibility of cycling and walking routes	The indicator aims to check the coverage of cycling and walking routes with regard to points of interest: i.e. whether the major points of attraction are accessible via dedicated soft mobility routes	%
	Perceived quality of cycling and walking routes	Parameter derived from the degree of satisfaction of cyclists and pedestrians with the quality of the routes dedicated to them	Rating 1-10
	Continuity of the cycle-pedestrian network	Degree of continuity of bicycle and pedestrian routes through the identification of discontinuity elements present on sections	m
	Degree of implementation of the cycle-pedestrian network	Degree of continuity of the bicycle and pedestrian network by comparing existing and planned networks	%
Crossability of the Canal Port	Degree of navigability of the Canal Port	The parameter is intended to measure the level of longitudinal permeability (navigability) of the canal port taking into account possible impediments: draught, height of bridges	%
	Ease of crossing the Canal Port	The parameter is intended to measure the level of transversal permeability (crossing) by measuring on average every how many metres there is a bridge	m
4. Urban aspects			
Node	Indicator	Description	UoM
Quality of public space	Incidence of outdoor public spaces used as squares or meeting places	Presence of public areas intended as meeting places and for events, demonstrations, etc.	m^2/inhabitant m^2/summer resident

	Accessibility of public spaces	Parameter for measuring the accessibility of public spaces by residents and tourists on foot	%
	Perceived quality of public space	Parameter derived through the citizens' rank regarding the quality, adequacy, safety and usability of public spaces dedicated to them	Rating 1-5
	Integration of the Canal Port into the Urban Landscape	The parameter aims to measure the extent to which the perception of the natural and urban landscape is integrated and enhanced	Rating 1-5
Coverage ratio	Coverage ratio	Useful indicator for identifying the incidence of covered area and its arrangement in relation to the total area	%
Population density	Population density	Indicator for understanding the distribution of population density in the area	Inhabitant/ hectare
Functional variety of buildings	Functional variety of buildings	Identification of the presence and distribution of use functions in the area	%
Phenomena of urban decay	Phenomena of urban decay	Identification of spaces or buildings subject to degradation	Rating 1-5
Public greenery	Incidenza del verde	Identification of green and sports areas present per inhabitant	m^2/inhabitant m^2/summer resident
	Presence of trees	Identification of trees in the area	no/hectare
5. Social aspects			
Node	Indicator	Description	UoM
Territorial coverage and level of accessibility of education services	Coverage of childcare services	Value to indicate the actual availability of places that the service, consisting of nursery and kindergarten, provides in relation to the number of people using it	%
	Primary school coverage (5-14 years old)	Value to indicate the actual availability of places that the service, consisting of primary and secondary schools, provides in relation to the number of people using it	%

	Secondary school coverage (15-19 years old)	Value to indicate the actual availability of places that the service, consisting of secondary schools, provides in relation to the number of people using it	%
	Accessibility of childcare services	Value for indicating whether the service is accessible by soft transport mode (cycling or walking) by the population using it	%
	Primary school accessibility	Value for indicating whether the service is accessible by soft transport mode (cycling or walking) by the population using it	%
	Secondary school accessibility	Value for indicating whether the service is accessible by soft transport mode in relation to the population using it	%
Coverage of social and health services	Copertura servizi socio-sanitari	Value to indicate the actual presence of socio-medical facilities, consisting of public and private hospitals, RSAs, outpatient clinics and cp, compared to the number of people using them	no/1000 inhabitants
Coverage of recreational and sporting activities	Coverage of recreational and sporting activities	Value for indicating the actual presence of sports facilities in relation to the number of people using them	no/1000 inhabitants
Coverage of cultural activities	Coverage of theatres and cultural associations	Value to indicate the actual presence of structures and associations promoting socio-cultural events and activities	no
	Cultural and entertainment events	Presence and frequency of cultural and entertainment events	no/year
	Presence of points of touristic interest	Identification of points of interest and tourist attractions	no/hectare
Covering places of worship	Covering places of worship	Presence of places of worship and meeting places for religious minorities	no/hectare
Phenomena of social degradation	Phenomena of social degradation	Presence of phenomena of social degradation	Rating 1-5

5 Final consideration, tip&tricks

This report suggests a method to support and justify project proposals in the complex case of the regeneration of port areas. The aim is to show how important sustainable mobility is within a deep urban redevelopment of a historical context such as the Canal Port of Rimini (Italy). The reconnection of cycle-pedestrian paths, the redevelopment of the quays and the creation of urban spaces for tourists and citizens, are possible solutions to improve the quality of life in a degraded and underutilized urban area.

The proposed methodology reflects the sustainability criteria promoted by the Interreg Europe program. The multidisciplinary nature of sustainability follows the principles of the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002. Environmental protection, economic development and social welfare are considered and well-balanced since environmental quality cannot be separated from people well-being. In 2015, 17 objectives were defined within the framework of the 2030 Agenda for Sustainable Development, 11 of which aim to "make cities inclusive, safe, resilient and sustainable", criteria being the basis of this research project.

The combination of different analysis methodologies, such as stakeholder involvement, SWOT analysis and the ANP-BOCR method, allowed for an objective and reliable result. A set of indicators described in a simpler and more detailed way the current state of the study area obtaining a qualitative and quantitative evaluation of the analysed aspects. The selected indicators follow the parameters provided at national and European levels adapted to the context considered. Such indicators can be used in other similar contexts since they evaluate the environment under consideration not only to the current state but also after the future requalification of the area, monitoring the progress of the project and comparing the two different scenarios.

In the literature, several studies use similar methodologies to solve decision-making problems in urban contexts. The ANP analysis is often used in combination with other analytical methodologies such as SWOT or BOCR or questionnaires to stakeholders. As shown, being both qualitative and quantitative aspects involved, reliable results on which to base the final choice of Decision Makers (DM) are difficult to obtain. ANP analysis is often used in combination with other analytical methodologies such as SWOT or BOCR or questionnaires to stakeholders. As shown, being both qualitative and quantitative aspects involved, reliable results on which to base the final choice of Decision Makers (DM) are difficult to obtain.

Different solutions for the urban regeneration of the Canal Port were suggested by the SWOT analysis. Strengths, weaknesses, opportunities and risks were estimated defining various project proposals for the requalification of the area. The SWOT analysis is extremely useful for a first interpretation of the data collected from the state-of-the-art examination but does not provide information on the degree of priority of the interventions to be carried out. A BOCR model - a particular subcategory of the ANP method- was developed to identify a ranking of necessary interventions resulting from the analysis of criticalities and potential issues. In the case of the Canal Port of Rimini the requalification interventions to be carried out were considered among those emerging from the previous analysis. As for the redevelopment of harbour areas, the most relevant interventions are the improvement of cycle-pedestrian paths, the requalification of the docks and the regularization of the moorings. The reconnection of cycle paths and the construction of pedestrian access to the platforms represent low economic and environmental impact for the Municipality. However, within an urban transformation, they can greatly contribute to improve the quality of life both of inhabitants and tourists.

After this analysis, an urban regeneration project was developed according to the proposed priority scale. The design phase began with the identification of the height to lift the docks in order to solve the problem of frequent flooding due to tides and adverse weather conditions. Access to platforms and public spaces were designed to identify new functions for the benefit of the community. As a result of the raising of the docks, the cycle and pedestrian paths along the two banks of the Canal Port were revised accordingly. To verify the effectiveness of urban regeneration actions and the validity of the design choices made, the same indicators used in the planning phase will be reused in the monitoring phase to verify changes in relation to the starting situation. These changes should also aim to increase the economic productivity of the area.

Annex: Pilot action synthesis

Project partner	ITL FOUNDATION	**Pilot action number**		**Macro-theme***	
Pilot action name					
Group of stakeholders involved (bullet points)	• Municipality of Rimini • Sea Workers' Cooperative • Rimini Sailing Club • Council of Port Operators "Consulta degli operatori del Porto" • ARPAE • National Civil Defense Service • Emilia-Romagna Region				
Main steps (bullet points)	1. Context analysis through archival sources, on-site surveys, stakeholder questionnaires, open data, etc; 2. Data processing through a SWOT analysis to identify potentials and criticalities of the project area; 3. Identification of a set of indicators from the collected data and assessment of their score for a pre-design phase (and possible future monitoring); 4. Elaboration of a BOCR model to identify a priority scale of urban regeneration actions; 5. Elaboration of an urban regeneration project based on the outcomes of the previous phases.				
KPIs (bullet points)	**1. Environmental aspects** • Naturality index • Level of exposure to flood risk • Soil permeability **2. Economic aspects** • Commercial activities • Production activities related to the canal port • Real estate value • Hotel and residence capacity				

	3. Infrastructural aspects • Presence of 30 km/h zones • Presence of restricted traffic zone • Presence of pedestrian zones • Road accidents • Perceived safety of infrastructure • Presence of car parks • Presence of electricity columns • Presence of digital parking management systems • Bus stop coverage • Population served by public transport • Transport intermodalty • Perceived quality of public transport services • Cyclo-pedestrian index • Accessibility of cycling and walking routes • Perceived quality of cycling and walking routes • Continuity of the cycle-pedestrian network • Degree of implementation of the cycle-pedestrian network • Degree of navigability of the Canal Port • Ease of crossing the Canal Port **4. Urban aspects** • Incidence of outdoor public spaces used as squares or meeting places • Accessibility of public spaces • Perceived quality of public space • Integration of the Canal Port into the Urban Landscape • Coverage ratio • Population density • Functional variety of buildings • Phenomena of urban decay • Incidenza del verde • Presence of trees **5. Social aspects** • Coverage of childcare services • Primary school coverage (5-14 years old)

	• Secondary school coverage (15-19 years old) • Accessibility of childcare services • Primary school accessibility • Secondary school accessibility • Coverage of social-sanitary services • Coverage of recreational and sporting activities • Coverage of theatres and cultural associations • Cultural and entertainment events • Presence of points of touristic interest • Covering places of worship • Phenomena of social degradation
Main obstacles (bullet points)	• Availability of data for the identification of the set of indicators • Identification of the project regulatory limitations on the quays • Need to raise the quays hindered by the impossibility of reducing the hydraulic section of the canal • Accuracy of the connections established within the BOCR decision-making model • Difficulties in identifying an appropriate quay elevation • Identification of public functions to be located above the docks • Architecturally valuable works limiting design (historical constraints) • Impossibility of passage under the Ponte dei Mille due to the raising of the quaysides • Continuity of the cycle path beyond Borgo San Giuliano along Via Sinistra del Porto
Advice and suggestions	
Other comments	

* Use the following acronyms:

- **ICT**: ICT application and service development
- **P&M**: Spatial planning and management
- **BSN**: Business oriented aspects
- **T&K**: Training and knowledge
- **E&E**: Environment and energy aspects

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