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C1 - Technical report on public response to the Dynamap System

LIFE – DYNAMAP
Dynamic Acoustic Mapping – Development of low cost sensors networks for real time noise mapping

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TABLE OF CONTENTS

LIST OF TABLES 3

LIST OF FIGURES 3

LIST OF KEYWORDS AND ABBREVIATION 3

EXECUTIVE SUMMARY 4

1.INTRODUCTION 5

2.METHODOLOGY 5

3.TEST TO OFFICIALS 6
3.1 Sessions 6
3.2 Participants 7
3.3 Results and observations 8

4.TEST TO THE GENERAL PUBLIC 11
4.1. Sessions 11
4.2. Participants 11
4.3. Results and observations 15

5.RECOMMENDATIONS AND CORRECTIVE ACTIONS 17

6.CONCLUSION 16

ANNEXES 16

ANNEX 1 - Test administered to officials 17
ANNEX 2 - Test administered to the general public 18
ANNEX 3 – Training course pictures 19
ANNEX 4 – Answers given by officials 22
ANNEX 5 – Answers given by the general public 26
ANNEX 6 - Undertaken corrective actions 27

LIST OF TABLES

Table 1 - Suggested corrective actions..... 16
Table 2 – How to implement corrective actions 18

LIST OF FIGURES

Figure 1 – Officials age 7
Figure 2 – Officials gender 7
Figure 3 – Officials qualification 8
Figure 4 – Officials profession..... 8
Figure 5 – Dynamap platform knowledge 9
Figure 6 – General public age..... 12
Figure 7 – General public gender..... 12
Figure 8 – General public qualification..... 13
Figure 9 – General public profession 13
Figure 10 – General public acoustics knowledge 14
Figure 11 – General public attitude to use internet 14
Figure 12 – Dynamap platform kn 15
Figure 12 – Weekly hours spent on the web by testers..... 14
Figure 13 – Dynamap platform knowledge..... 15

LIST OF KEYWORDS AND ABBREVIATION

DYNAMAP: DYNamic Acoustic MAPping
ANED: Anomalous Noise Event Detection algorithm
PhD: Philosophiae Doctor

EXECUTIVE SUMMARY

The DYNAMAP project (Dynamic Acoustic Mapping - Development of low cost sensors networks for real time noise mapping) is a LIFE project aimed to develop a dynamic noise mapping system able to detect and represent in real time the acoustic impact of road infrastructures. To that end, a user friendly interface and tools have been developed, so as to deploy the information gathered by the system on a large scale. In order to optimize the communication features of the software application, Action C1 foresees a series of tests to assess users ability in accessing information and managing the system. To do so, a group of selected users has been monitored to check their aptitude in managing the system and help developing a user-friendly interface for public information. Tests have been also administered to the general public to evaluate the system versatility and its contents comprehensibility.

Public response has been checked as a function of two main objectives that can be linked to the functional structure of the DYNAMAP software interface. In particular, the system provides for two interface levels with different access privileges:

- Level 1 (high access privilege): this level is reserved to system managers and provides for the remote control of the devices installed along the road networks, the access to the system configuration parameters and applications for viewing/edit data and noise maps;
- Level 2 (low access privilege): this level is dedicated to the general public information. The access to this level allows to view noise maps in real time and to query the system to depict, in graphical mode, the environmental data stored in the system.

As a consequence of this structure, the aim of the survey is focused on checking the functionality and usability of the first level users interface addressed to system managers and the users friendliness and accessibility of the second level interface addressed to stakeholders and the general public. As consequence two kind of tests have been prepared.

The first type of test aims at assessing users ability in managing the system and it has been addressed to ANAS and Milan Municipality/AMAT officials. The test included direct observation of users ability in managing the system and the compilation of a technical evaluation form.

The second type of test has been addressed to stakeholders and the general public. In this case, the test required a remote access to the system through the project website and the compilation of a short questionnaire to acquire information about users reactions. The questionnaire included questions on project tools capability of raising people awareness on noise through freely accessible information and communication from the website, such as educational applications to explain citizens roles as subjects exposed to noise, but also as generators of noise, the influence of driving habits on noise levels, the exposure to noise levels and the solutions that could be applied to abate noise.

Test results show that participants liked most the application operational features, the response times, the easy to use and usefulness of the contents. Also the aesthetic aspect received very good feedbacks. On the other hand, the platform communication skills was considered poor and some practical suggestion to improve them was given.

The collected recommendations have been used to improve the overall user friendliness and address the areas where participants experienced problems or found the interface and information architecture unclear. Corrective actions have been then implemented according to the assigned priority index. The effectiveness of changes will be tested informally: a questionnaire will be published on the project website and on social networks to collect new feedbacks.

1. INTRODUCTION

The DYNAMAP project (Dynamic Acoustic Mapping - Development of low cost sensors networks for real time noise mapping) is a LIFE project aimed to develop a dynamic noise mapping system able to detect and represent in real time the acoustic impact of road infrastructures.

Scope of the project is the European Directive 2002/49/EC relating to the assessment and management of environmental noise (END), enforcing Member States to provide and update noise maps every five years in order to report about changes in environmental conditions (mainly traffic, mobility and urban development) that may have occurred over the reference period.

The Directive 90/313/EEC3 enforces also public authorities to give free access to environmental information, setting out the basic terms and conditions on which such information should be made available. According to this directive, Member States shall ensure that public authorities make environmental information available to any natural or legal person at his request and without his having to prove an interest. They shall also define the practical arrangements under which such information is effectively made available and shall take the necessary steps to provide general information to the public on the state of environment by such means as the periodic publication of descriptive reports.

To that end, in the Dynamap project a user friendly interface and tools have been developed, so as to deploy the information gathered by the system on a large scale. In order to optimize the communication features of the software application, the project includes also a series of tests to assess users ability in accessing information and managing the system. To do so, a group of selected users has been monitored to check their aptitude in managing the system and help developing a user-friendly interface for public information. Tests have been also administered to the general public to evaluate the system versatility and its contents comprehensibility.

2. METHODOLOGY

Public response has been checked as a function of two main objectives that can be linked to the functional structure of the DYNAMAP software interface. In particular, the system provides for two interface levels with different access privileges:

- Level 1 (high access privilege): this level is reserved to system managers and provides for the remote control of the devices installed along the road networks, the access to the system configuration parameters and applications for viewing/edit data and noise maps;
- Level 2 (low access privilege): this level is dedicated to the general public information. The access to this level allows to view noise maps in real time and to query the system to depict, in graphical mode, the environmental data stored in the system.

As a consequence of this structure, the aim of the survey is focused on the following two objectives:

- to check the functionality and usability of the first level users interface addressed to system managers;
- to check users friendliness and accessibility of the second level interface addressed to stakeholders and the general public.

Two kind of tests have been prepared.

The first type of test aims at assessing users ability in managing the system and it has been addressed to ANAS and Milan Municipality / AMAT officials. The test included direct observation of users ability

in managing the system and the compilation of a technical evaluation form (Annex 1). The test has been assisted by software experts and developers.

The second type of test has been addressed to stakeholders and the general public. In this case, the test required a remote access to the system through the project website and the compilation of a short questionnaire to acquire information about users reactions. The questionnaire included questions on project tools capability of raising people awareness on noise through freely accessible information and communication from the website, such as educational applications to explain citizens roles as subjects exposed to noise, but also as generators of noise, the influence of driving habits on noise levels, the exposure to noise levels and the solutions that could be applied to abate noise (Annex 2).

3. TEST TO OFFICIALS

3.1 Sessions

The participants were selected among Anas, Amat and Milan Municipality officials, who are working in the environmental acoustics field or are generally interested in the Dynamap system. Among the selected people, also future potential users of the system have been invited.

Before the test session, a training course was held to deliver the Dynamap system users the necessary skills to manage and maintain the system. The Dynamap technical manual and user guide was also presented and distributed at the training course.

The course was held in Rome on 18 December 2018, according to the following agenda:

TRAINING COURSE AGENDA - 18 DICEMBER 2018

Item	Time	Topic	Lecturer
1	11:30	General structure and aim of the project	*P.Bellucci (ANAS)*
2	12:00	Practical demonstration of sensors assembly and calibration	*L.Nencini/D.Mastri (BLUE WAVE)*
3	13:00	Basic concept of dynamic maps	*G.Zambon (BICOCCA)*
4	13:30	Lunch	*All*
5	15:00	The Dynamap system management software	*L.Nencini/S.Sorresina (BLUE WAVE)*
6	16:00	Suggestions, comments, questions and clarifications	*All*
7	16:30	Test session	*All*
8	17:00	End course	

Training course pictures are available in Annex 3.

After the course, participants were asked to explore and test the Dynamap platform, assisted by software experts and developers, and to fill in a questionnaire. Received answers are reported in Annex 4. In particular, participants were asked to provide information and scores on the following general issues:

a) Frequency of use;
b) Site organization and ease of use;
c) Platform browsing;
d) Usefulness of site content.

3.2 Participants

The test was attended by:

- 7 Anas officials in the classroom;
- 3 Anas and 4 Amat officials in videoconference.

From the data gathered, we discerned that our pool of testers was comprised most of young adults in the range from 25 to 45 years old (Figure 1).

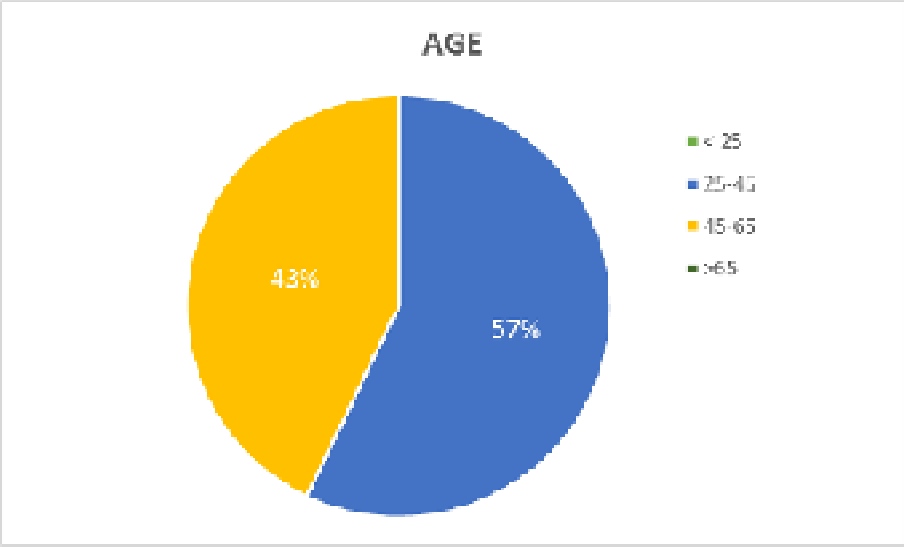

Figure 1 – Officials age

The majority of our testers, 79%, were male (Figure 2), and 89% of testers possess a higher educational level (Figure 3).

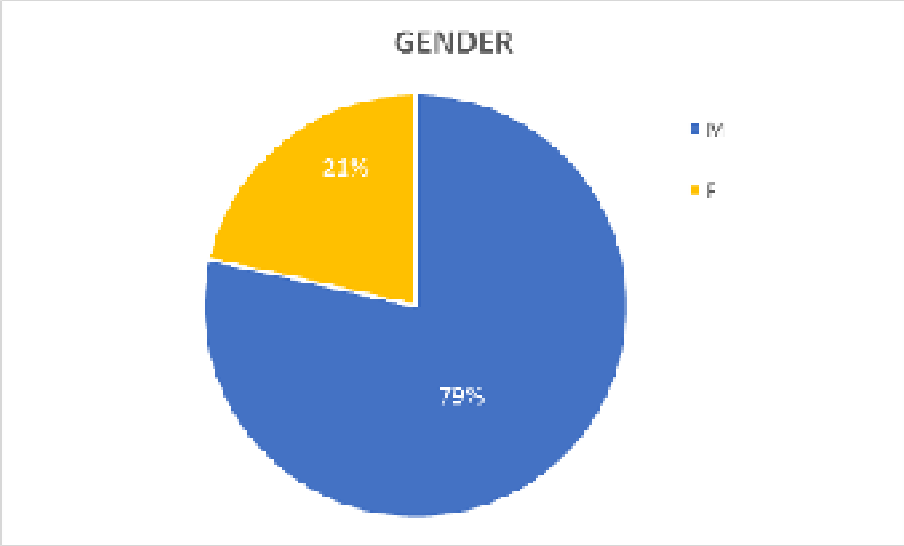

Figure 2 – Officials gender

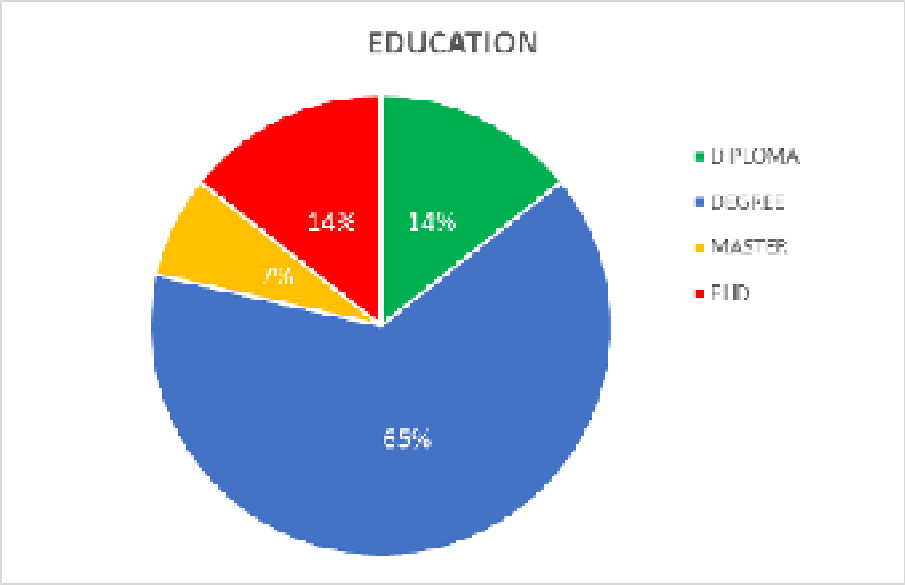

Figure 3 – Officials education

Professionally, our testers identified as follows (Figure 4):

- 8 engineers (57% of testers);
- 2 quantity surveyors (15% of testers);
- 2 environmental consultants (14%)
- 1 office worker (7%);
- Other (7%).

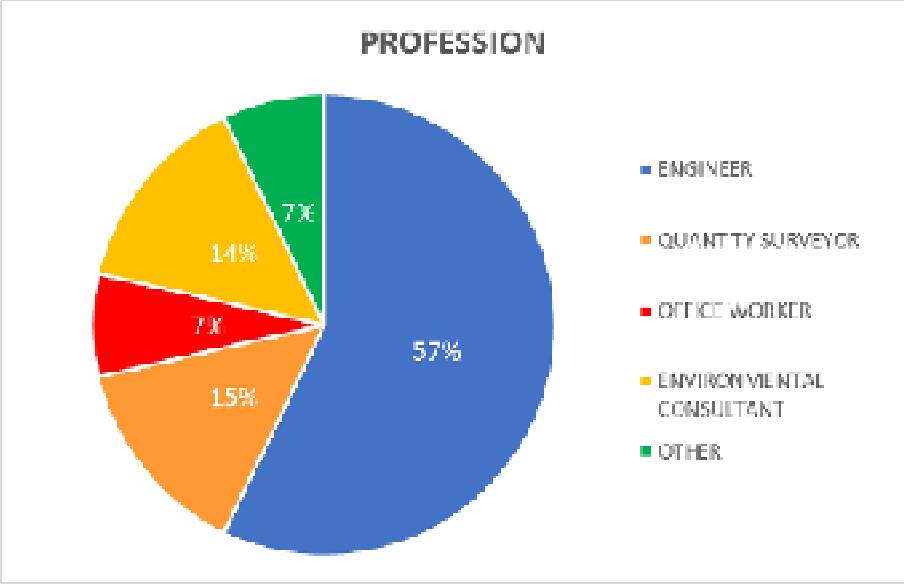

Figure 4 – Officials profession

3.3 Results and observations

In the following section, a detailed description of the major findings and observations for improving the Dynamap Web-GIS application usability is given, according to the major measures reported in paragraph 4.1.

a) Frequency of use

As shown in Figure 5, the Dynamap platform was seen for the first time by most of the participants (57%) during the training course.

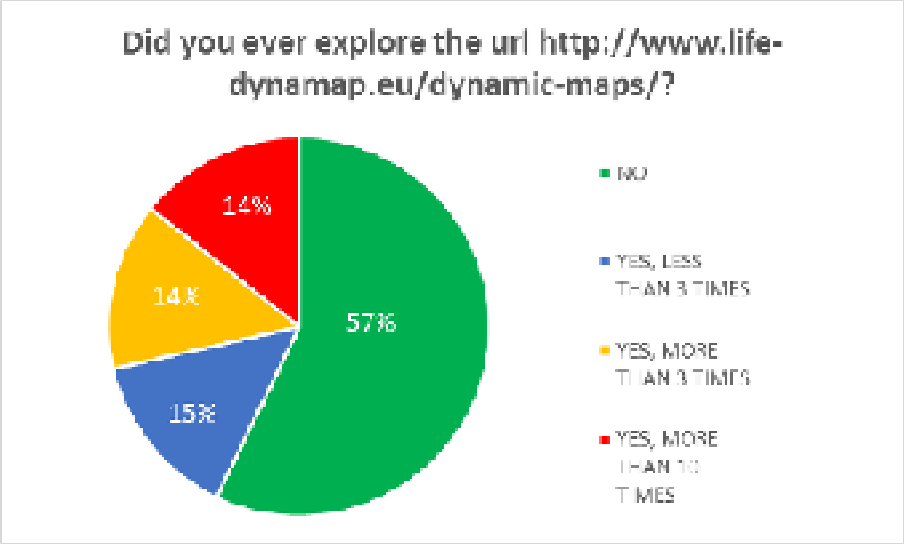

Figure 5 – Dynamap platform knowledge

On the other hand, all the participants underlines that they will use the site in the future.

b) Site organization and ease of use

The general organization of the site has obtained an excellent average score (4 on a scale ranging from 1 – very bad - to 5 – great-) and the participants considered the content sufficiently clear (average score 3.7). However some suggestions to improve the communication aspect of the site were given.

The site was also positively judged as user friendly (average score 3.9), although many testers have highlighted the lack of a complete legend.

Below some comments and suggestions given by participants to improve the Dynamap platform:

- *It seems very technical and it could scare the general public*
- *You need to read several lines to understand what it is. An immediate communication key is missing*
- *Lacks of visual communication related to the topic (symbolic images that refer to the "noise" theme)*
- *Operating procedure and additional legends are missing*
- *A complete legend of everything displayed on the map would be useful*
- *It would be better to have a legend with all the elements displayed on the map (residential and non-residential buildings, action plan interventions) and not only with the Harmonic Index colors.*

c) Content facilities exploration

The contents were generally assessed easy to be understood and well organized (average score 4). Some difficulties have been found in understanding the functionality to view buildings, in accessing mitigation actions details and conflict maps.

Below some comments and suggestions given by participants to improve the Dynamap platform:

- *It should be more evident*
- *It is not very simple, it should be specified that the selection must be made on the map*
- *I wasn't able to find conflict maps.*

d) Usefulness of site content.

The **DYNAMIC MAPS** section has been evaluated very useful by the officials (average score 4); a lower score was instead obtained by the **ACTION PLAN** section (3.4). In particular, the testers suggested to improve the Questionnaire on Action Plans, by geo-localizing citizens polls both by reverse geocoding and by direct entry to the buildings with the related mitigation measure.

Below some comments and suggestions given by participants to improve the Dynamap platform:

- *It would be good to understand how effective the mitigation measures are*
- *It would be nice to have a small description on purpose (to protect inhabitants, to reduce sound emissions, etc.), to operate and to work effectively of mitigation measures*
- *Not very useful (ndr. Questionnaire on Action Plans), there is no information on the noise pollution reduction obtained with the planned measures. As consequence it is difficult to express an opinion on their effectivness*
- *The user's judgment should be associated to the specific measure*
- *You should be able to be sure to address it to the concerned people*

The **SENSORS** section received excellent ratings from all the officials, who consider it complete with all the necessary information. A direct link to dynamic maps and the possibility to add data of previous monitoring campaigns in other measuring points (creation of a monitoring database) have been suggested. It was also highlighted the difficulty to identify the ANED events on the screen, as it was not clear at which zoom level the displayed information is correct.

Below some comments and suggestions given by participants to improve the Dynamap platform:

- *I would give the possibility to switch to full screen between sensor data and maps*

The **STATIC MAPS** section was considered useful and complete by all the testers. The possible suggested applications are:

- evaluation of the mitigation measures effects;
- design of noise mitigation measures;
- acoustic impact analysis of new works;
- evaluation of noise levels variability over time in order to identify the most critical periods in areas of interest.

Regarding the data to be downloaded, the officials considered them easy to be used and END compliant.

Finally, the **METEO** section received some observations on the clarity of the contents: officials highlighted that it is not clear if the data are in real time and they have also suggested the creation of weather maps.

Below some comments and suggestions given by participants to improve the Dynamap platform:

- *It is not clear if weather data is updated in real time*

Upon completion of the tasks, participants provided feedback for what they liked most and least about the website, and recommendations for improving the website.

- Liked Most
  - operational features
  - response times
  - easy to use
  - aesthetics
  - usefulness of the contents

  The following comments capture what participants liked the most:
  - *simple and very intuitive site*
  - *topic addressed in an interesting way*

- Liked Least
  - communication skills
  - cartographic basis slightly not updated

  The following comments capture what the participants liked the least:
  - *The dynamic map is useful at a dissemination level, but no public access to environmental data is foreseen (download of maps or monitoring data);*
  - *Some contents are not clearly visible and must be searched for;*
  - *Some parts are not very clear for the general public;*
  - *In general the appearance is very technical and a bit old style, the wavy map of the home page should be replaced and the dynamic maps would be more pleasant if the colors were blurred (eg windy.com);*
  - *Impact is missing and maybe a digital assistant could help;*
  - *The cartographic basis slightly not updated.*

4. TEST TO THE GENERAL PUBLIC

4.1. Sessions

For the users testing session, a pool of participants was identified within a demographic target specified by the project team with the aim of involving the greatest number of people of different ages, cultural level and profession. Participants were recruited by email: a link was sent to them to fill out the online form on Google Forms both for Rome and Milan pilot areas. Answers are available in Annex 5.

4.2. Participants

A total number of 46 people participated in the test. From the data gathered, we discerned that our pool of testers was composed mostly of young adults in the range from 25 to 45 years old (Figure 6).

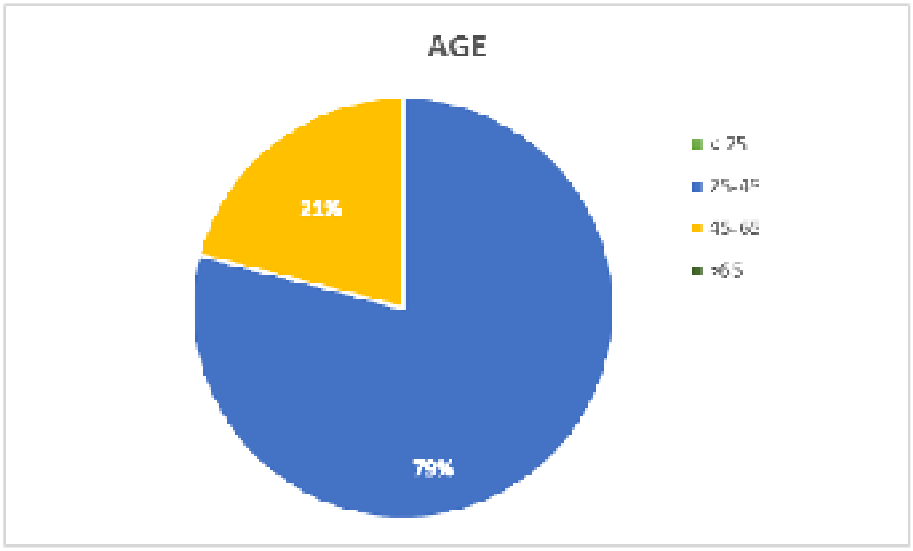

Figure 6 – General public age

The majority of our testers (63%) was male (Figure 7), and a percentage of 50% possess a university degree (Figure 8).

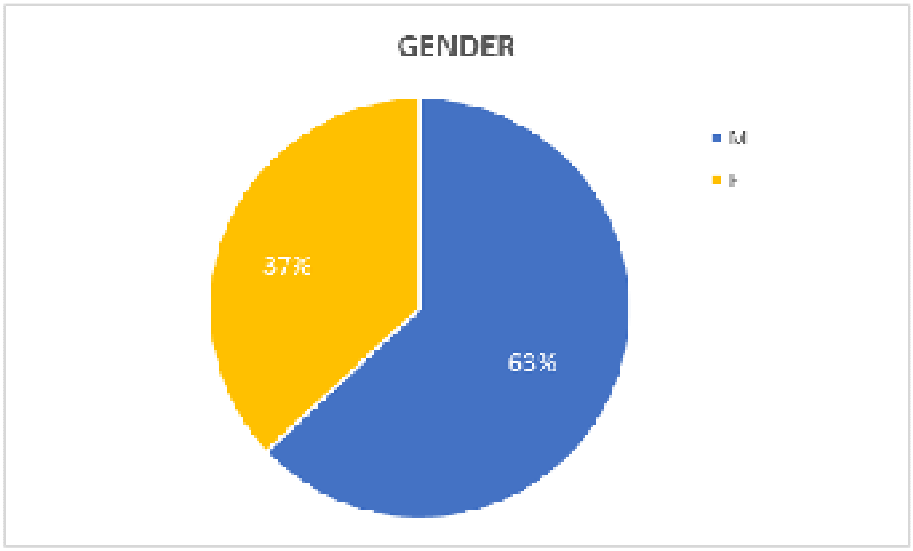

Figure 7 – General public gender

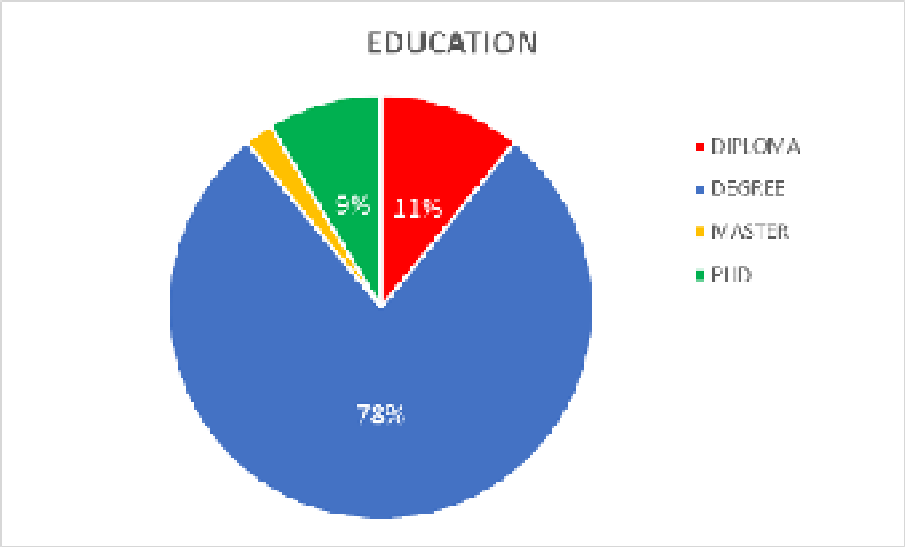

Figure 8 – General public education

Professionally, our testers are identified as follows (Figure 9):

- 11 engineers (24% of testers);
- 10 office workers (22% of testers);
- 6 environmental consultants (13% of testers);
- 7 technicians (15%);
- 3 researchers (7%);
- 2 professors (4%);
- 7 other professions (15%).

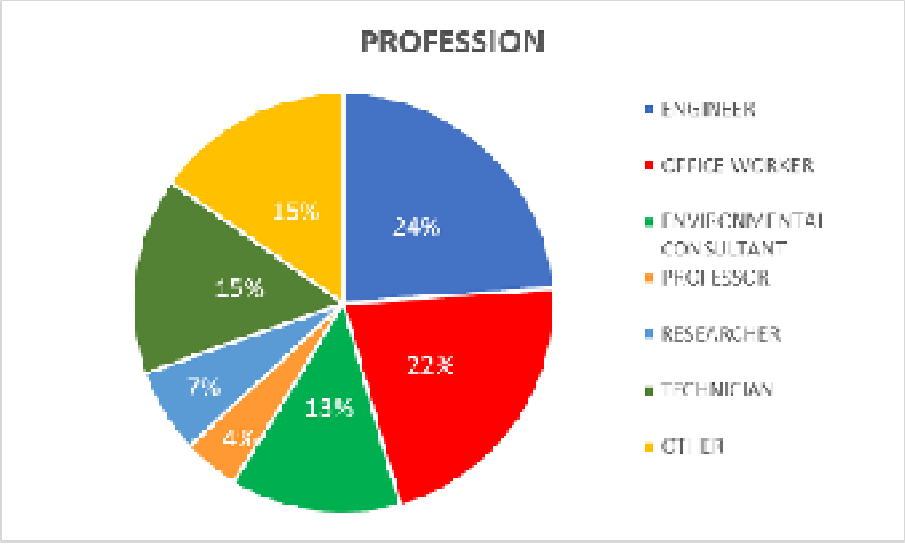

Figure 9 – General public profession

We first used the questionnaire to investigate whether our participants were able to use internet and/or were expert in the acoustic field, in order to understand their ability in browsing websites and testing new applications.

Most of the testers show a medium-good knowledge on acoustics (Figure 10) and a very comfortable attitude to the internet use (Figure 11 and 12).

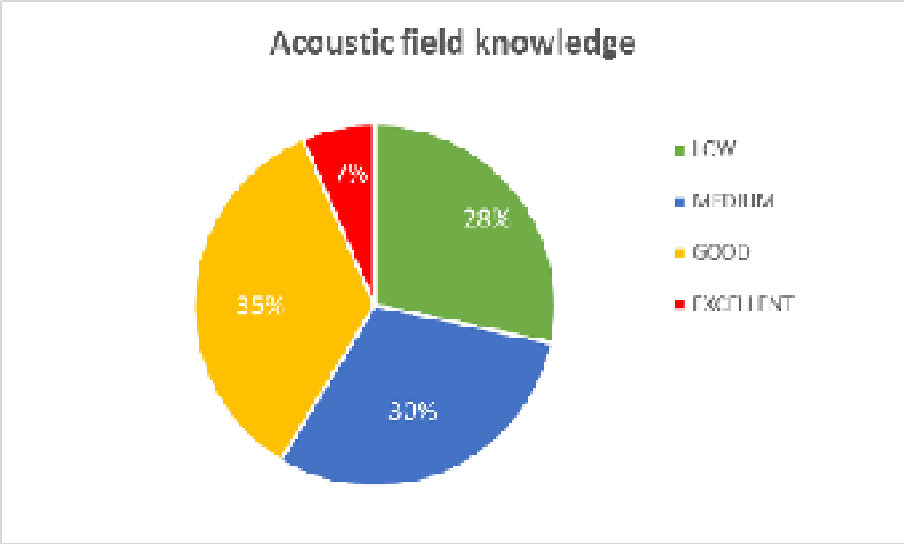

Figure 10 – General public acoustics knowledge

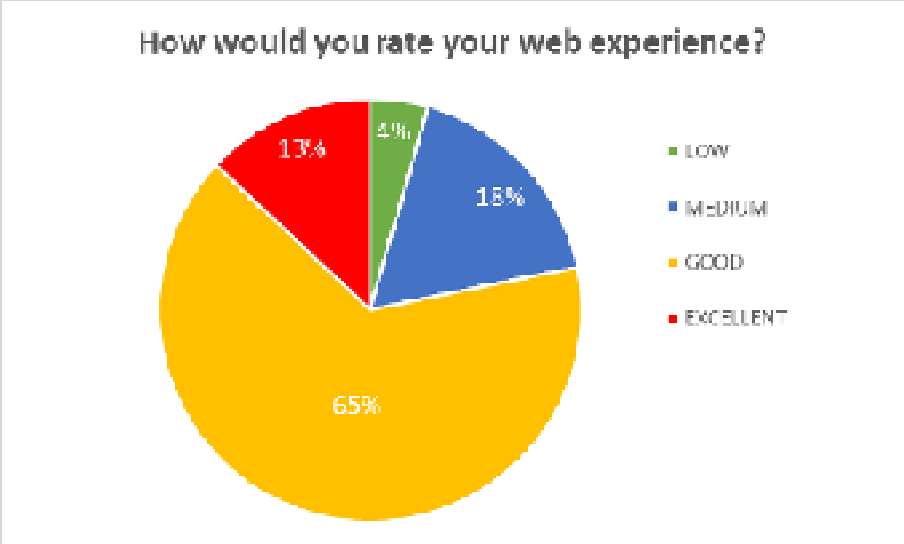

Figure 11 – General public attitude to use internet

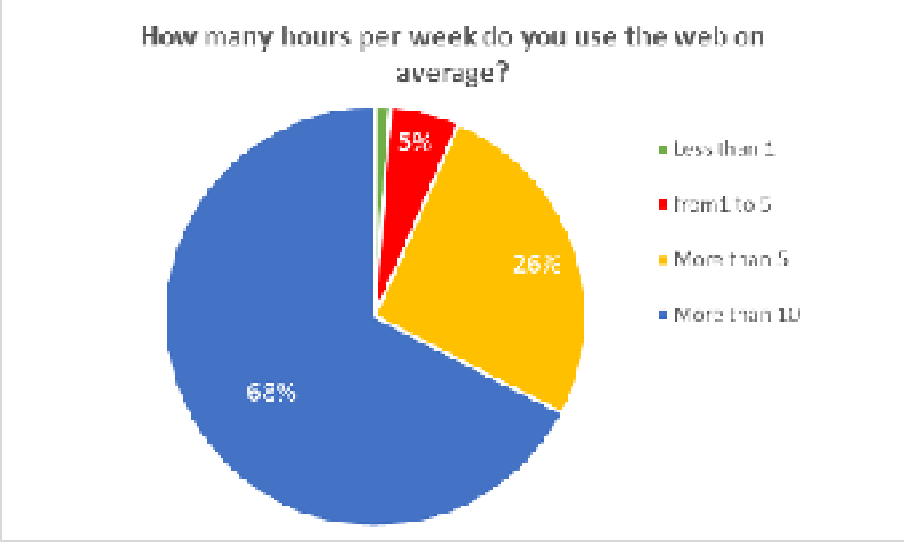

Figure 12 – Weekly hours spent on the web by testers

4.3. Results and observations

In the following section, we have detailed the major findings and observations received to improve the Dynamap Web-GIS application usability according to the major measures reported in paragraph 4.1.

a) Frequency of use

As shown in Figure 13, the Dynamap platform was seen less than 3 times before filling the test by most of the participants (56.5%).

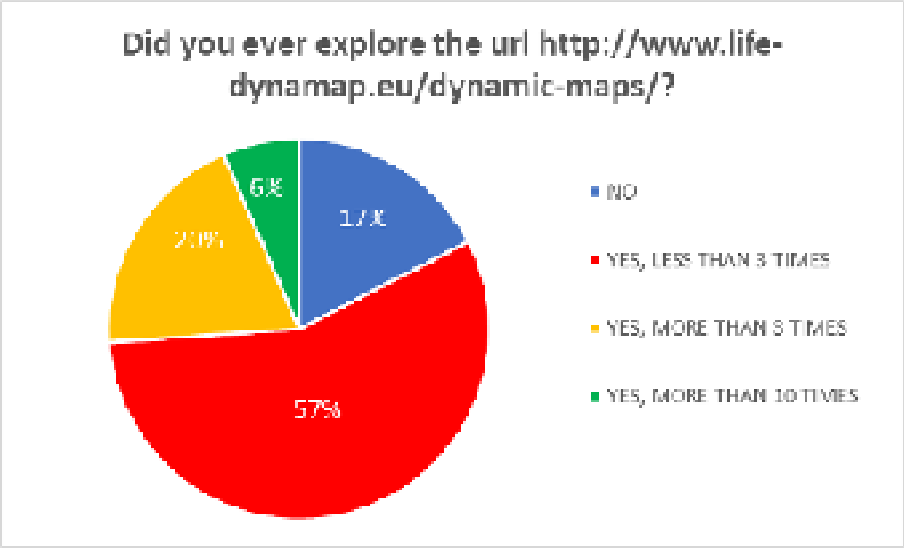

Figure 13 – Dynamap platform knowledge

The testers who had already seen the application basically visited the website to read the Dynamap project contents and documents and to consult the dynamic maps.

b) Site organization and ease of use

The general organization of the site has obtained a good average score (3.6 on a scale of 1 – very bad - to 5 – great-) and the participants considered the content sufficiently clear (average score 3.8). Nevertheless, the participants less experienced in acoustics have highlighted the website overly technical nature and the difficulty to understand what is displayed without reading explanations.

The site was judged to be user frinedly (average score 3.7), although also in this case many testers have highlighted the lack of a complete legend.

Below some comments and suggestions given by participants to improve the Dynamap platform:

- *It is necessary to read the specific sections*
- *The texts could be more synthetic*
- *I have to read the popups*
- *Yes, but the tabs for choosing navigation are not very clear: Maps live and Action Plan.*
- *In the legend I would try to be more exhaustive*
- *For those who have knowledge of acoustics it's clear, for the others it could be a difficult subject*
- *If you read the text first, it's clear.*
- *Legends are missing*

c) Browsing the contents

The contents were generally assessed easy to be understood and well organized (average score 3.8). Some difficulties have been found in understanding the functionality to view buildings and mitigation actions details. It doesn't seem always clear how to switch from Rome to Milan application and vice versa. In addiction the need to have an Italian version of the Harmonica Index was underlined.

Below some comments and suggestions given by participants to improve the Dynamap platform:

- *The function to change language is not visible*
- *It is not easy to move from the map of Rome to Milan*
- *Everything is very schematic, orderly and up-to-date. Maybe more suited to a technical user, than to other types of users (institutions, citizens). It is not clear that by clicking on the "live" icon, the map is updated in real time.*
- *For those who do not know English the video on the Harmonica index is not very easy to be understood*
- *Effective video, but English could be a difficulty to the user*
- *Building details view is not easy, you should specify that the selection must be made on the map*
- *At first glance, the Action plan page looks like the Maps-Live page. Mitigation measures should be better highlighted*

d) Usefulness of site content.

The **MAPS LIVE** section has been evaluated very useful and funny by the general public (average score 3.8). In particular, according to articipants, dynamic maps can be very useful for understanding and reflecting on the noise pollution of the city. An interesting dynamic maps use proposed by the general public is the search of less noisy areas where to live.

A lower score was instead obtained by the **ACTION PLAN** section (3.5): some doubts have been expressed on the general public judgments account in the mitigation measures design phase.

Below some comments and suggestions given by participants to improve the Dynamap platform:

- *Action plan section is useful for information only*
- *I believe the Questionnaire on Action Plans is not much considered*

Upon completion of the tasks, participants provided feedback for what they liked most and least about the website, and recommendations for improving the website.

- <u>Liked Most</u>
  - operational features
  - response times
  - easy to use
  - aesthetics
  - usefulness of the contents

The following comments capture what the participants liked the most:

- *Project explanation is exhaustive*
- *The purpose of the project is clear enough*
- *The objective of the project is easy to be understood*
- *The information is comprehensive and clear*
- *The concept is quite clear even for non-professionals*
- *Sufficiently clear*
- *Graphically intuitive*

- *Well-arranged essential information*
- *The color scale is clear even for a person who is not involved in the acoustic field.*
- *Well developed!*
- *Very interesting and useful information*

- Liked Least
  - too technical
  - some parts are a little bit confusing

The following comments capture what the participants liked the least:
- *To be better reorganized in some parts*
- *Some parts are not very clear for non-professionals*
- *It would be useful to have more supporting information*

5. RECOMMENDATIONS AND CORRECTIVE ACTIONS

This section provides recommended changes and justifications driven by the participant observations, behaviours, and comments. The following recommendations will improve the overall ease of use of the platform and address the areas where participants experienced problems or found the interface and information architecture unclear. In Table 1 suggested corrective actions for each application section are shown, reporting major comments received on the specific issue. Each recommendation includes a priority indication based on the number of received observations and on the judgment of the Dynamap team on the relevance of remarks to the project objectives.

Table 1 - Suggested corrective actions

PUBLIC AREA			
SECTION	**CORRECTIVE ACTION**	**MAJOR COMMENTS**	**PRIORITY**
GENERAL	**IMPROVE COMMUNICATION ASPECT**	• *Application seems very technical and it could scare general public* • *The texts could be more synthetic* • *An immediate communication key is missing* • *Lack of visual communication with respect to the topic (symbolic images that refer to the noise theme)* • *Impact is missing* • *I have to read explanations to understand what I'm viewing* • *Give more emphasis to the dynamic map section* • *Navigation tabs are not very clear: Live Maps and Action Plan*	**LOW**
	ADD AN HELP	• *An help desk would be useful* • *Impact is missing and maybe a digital assistant could help*	**HIGH**
MAPS LIVE	**ADD A COMPLETE LEGEND**	• *It would be useful to have a legend containing all the elements that can be displayed on the map (residential and non-residential buildings, action plan measures) and not only Harmonica Index colors* • *Legend is not exhaustive* • *Legends are missing* • *Some additional legend might be useful to remember the meaning of what you are viewing* • *An operating procedure and additional legends are missing* • *A complete legend would be useful*	**HIGH**
	CLARIFY THAT YOU CAN CLICK ON THE BUILDINGS TO VIEW DETAILS	• *It's all simple, but at first I did not understand what to do with dynamic maps. On the side the message 'you did not select any building' appeared. Only by trying to zoom and click random I found out that they are the blue areas. I recommend specifying it in the message, for example, "Zoom the map and click on the blue areas"* • *It is not clear that building selection must be made on the map* • *It should be more evident* • *It is not very simple, it should be specified that the selection must be made on the map*	**HIGH**
	HIGHLIGHT SENSITIVE RECEIVERS WITH A DIFFERENT COLOR	• *Sensitive buildings could be highlighted*	**HIGH**
	EMPHASIZE THIS SECTION ON THE WEB SITE	• *A clearer and faster link on the homepage would be useful* • *Since the dynamic maps is the heart of the project, I would not place them between the "gallery" buttons "news and events" and "contacts". The link to the maps should be more evident* • *In the general organization of the site it is not very evident* • *A link would be useful directly on the home page*	**NA**
	INSERT SUBTITLES IN ITALIAN LANGUAGE IN THE HARMONICA INDEX VIDEO	• *An Italian language version might be useful* • *For those who do not know English it is not very easy to understand* • *Effective video, but English could be a difficulty to the user*	**LOW**
	MAKE THE LANGUAGE SELECTION KEY MOST EVIDENT	• *The function to change language is not visible*	**LOW**

PUBLIC AREA			
SECTION	**CORRECTIVE ACTION**	**MAJOR COMMENTS**	**PRIORITY**
	INSERT A SWITCH TO SELECT THE MAPS OF ROME AND MILAN	• *It is not easy to switch from the maps of Rome to Milan*	**MEDIUM**
ACTION PLAN	**ADD A COMPLETE LEGEND**	• *A legend is missing* • *A legend with the different types of measures shown on the map would be useful* • *The building symbols in the legend are missing. Why some of them are blue and others purple? What does it depend on?*	**HIGH**
	CLARIFY THAT YOU CAN CLICK ON THE MITIGATION MEASURES TO VIEW DETAILS	• *Even in this case, I do not know what I should select. I tried again with blue buildings and nothing. Finally I selected those with the celestial lunette just by chance. I do not know if there are other objects to select. Ah here! I also found the acoustic barriers. It's annoying to go trying.* • *There is always the problem of selection on the map. It is not clear that the measures must be selected on the map.* • *It is not clear that the Action Plan contains interactive content* • *Who tells me that I have to click on it and above all how can I distinguish them (shape, color)?*	**HIGH**
	MAKE THE MITIGATION MEASURES MORE VISIBLE ON THE SCREEN	• *At first glance, the page looks like the Maps-Live page. Measures should be better highlighted.* • *The lines of the mitigation measures are difficult to be found and clicked, but once you find them and understand how it works, it is well done*	**HIGH**
	HIGHLIGHT SENSITIVE RECEIVERS WITH A DIFFERENT COLOR	• *Sensitive buildings could be highlighted*	**HIGH**
	CLARIFY THAT MITIGATION MEASURES ARE ONLY PLANNED AND NOT BUILT	• *It is not clear whether it displays the expected levels following the mitigation measures or continues to represent the measured levels. Perhaps the legend could be made more explicit.* • *It is not clear whether the SOURCE MITIGATION MEASURES (I imagine these are the light blue areas) have already been implemented or are only planned … This makes the action plan questionnaire unclear.* • *It is not clear whether the measures are only planned or implemented*	**HIGH**
	SHORTEN THE POPUP TEXT	• *I would have preferred a concise and incisive preliminary information* • *Too much text*	**LOW**
	ADD DETAILED INFORMATION ABOUT ANAS STRATEGY	• *It might be useful to detail the Anas strategy in terms of timing, spending and planning status*	**NA**
	ADD INFORMATION ON THE EFFECTIVENESS OF MITIGATION MEASURES	• *It would be useful to understand how effective the measures are* • *It would be nice to have a small description on the purpose (to protect homes, to reduce sound emissions, etc.), function and effectiveness of noise mitigation measures* • *There is no information on the reduction of the noise pollution obtained with the planned measures. As consequence it is difficult to express an opinion on their adequacy*	**LOW**
	REVIEW THE QUESTIONNAIRE ON ACTION PLANS	• *Many questions are poorly asked and unclear.* • *The question about expressing an opinion on the measures is not very clear. Maybe because I'm not an expert, maybe finding myself in a problematic situation I might have suggestions … I do not know … but it seems a question for professionals: to put the first check, noise mitigation measures should have already been done and then I could express my opinion. The second check on other possible measures it's a question to ask to professionals.*	**LOW**

PUBLIC AREA			
SECTION	**CORRECTIVE ACTION**	**MAJOR COMMENTS**	**PRIORITY**
	LINK THE QUESTIONNAIRE ON THE ACTION PLANS TO THE RELATED MEASURE / BUILDING	• *The user's judgment should be associated with the specific proposed mitigation measure* • *Geolocation of citizens polls both by reverse geocoding and by direct entry to the buildings*	**LOW**
RESERVED AREA			
SECTION	**CORRECTIVE ACTION**	**MAJOR COMMENTS**	**PRIORITY**
SENSORS	**LINK MAPS/SENSORS**	• *I will give the possibility to switch to full screen between sensors data and maps*	**LOW**
	IMPROVE ANED DETECTION ON SCREEN	• *Difficulties in identifying ANED events: graphically it is not clear at which level of zoom the displayed info is corrected.*	**HIGH**
METEO	**CLARIFY THAT WEATHER DATA ARE IN REAL TIME**	• *It is not clear if the weather data is updated in real time*	**HIGH**
CONFLICT MAPS	**IMPROVE ACCESSIBILITY**	• *"What operations have you found most difficult to do?" Identification of conflict maps*	**HIGH**
	CHANGE THE Leq NIGHT LIMIT FOR SCHOOLS FROM 100 dB TO NA		**HIGH**
ADDITIONAL FUNCTIONS			
SECTION	**CORRECTIVE ACTION**	**MAJOR COMMENTS**	**PRIORITY**
SENSORS	**POSSIBILITY TO ADD PREVIOUS MONITORING DATA**	• *Possibility to add data of previous monitoring campaigns in other measuring points (creation of a monitoring database)*	**MEDIUM**
MAPS	**ADD A SCALE FACTOR AND RULER**	• *Add a scale factor, possibility of making measurements*	**MEDIUM**
NEW	**WEATHER DATA MAPS**	• *Implementation of georeferenced weather data*	**LOW**

Table 2 shows the suggestions accepted by the Dynamap team, after an analysis of their feasibility and usefulness to the project. The methods for implementing changes are also reported. The suggestions highlighted in light gray have been not accepted by the Dynamap team.

Table 2 – How to implement corrective actions

PUBLIC AREA		
SECTION	**CORRECTIVE ACTION**	**HOW TO IMPLEMENT RECOMMENDED CHANGES**
GENERAL	**IMPROVE COMMUNICATION ASPECT**	The communicative aspect will be re-evaluated once all the changes requested to the platform have been made.
	ADD AN HELP	RESERVED AREA: the possibility to view / download the user manual will be added. PUBLIC AREA: to be re-evaluated once all the changes requested to the platform have been made. An info button will be added to clarify only the unclear aspects.
MAPS LIVE	**ADD A COMPLETE LEGEND**	Ok
	CLARIFY THAT YOU CAN CLICK ON THE BUILDINGS TO VIEW DETAILS	The text on the left panel will be modified, specifying how to display the buildings details (for example: "zoom and then select the building").
	HIGHLIGHT SENSITIVE RECEIVERS WITH A DIFFERENT COLOR	To be implemented after an evaluation on the visibility of the different colors (only for Rome pilot area).

PUBLIC AREA		
SECTION	**CORRECTIVE ACTION**	**HOW TO IMPLEMENT RECOMMENDED CHANGES**
	EMPHASIZE THIS SECTION ON THE WEB SITE	After a check on the feasibility on Wordpress, the map in the Homepage will be made clickable and a popup / claim will be added to clarify that the image is interactive. The "Dynamic maps" button will be highlight.
	INSERT SUBTITLES IN ITALIAN LANGUAGE IN THE HARMONICA INDEX VIDEO	*This corrective action has been judged not strictly necessary for the aim of the project.*
	MAKE THE LANGUAGE SELECTION KEY MOST EVIDENT	*The platform is geo-localized: it opens automatically in the language corresponding to the user's IP. Unnecessary corrective action.*
	INSERT A BUTTON TO SWITCH FROM THE MAPS OF ROME AND MILAN	A button will be added on the top right of the bar to switch from a window to another.
ACTION PLAN	**ADD A COMPLETE LEGEND**	Ok
	CLARIFY THAT YOU CAN CLICK ON THE MITIGATION MEASURES TO VIEW DETAILS	The text on the left panel will be modified, specifying how to display the buildings details (for example: "zoom and then select the building").
	MAKE THE MITIGATION MEASURES MORE VISIBLE ON THE SCREEN	On the top bar an additional button "ACTION PLAN" will be added. Noise maps will be deleted to avoid confusion. The critical acoustic areas will be highlighted with colored geometrical shapes: by clicking on them the list of planned mitigation measures in the selected area will be opened. Information on single measurements will be kept, making the lines and the lunettes more visible.
	HIGHLIGHT SENSITIVE RECEIVERS WITH A DIFFERENT COLOR	To be implemented after an evaluation on the visibility of the different colors (only for Rome pilot area).
	CLARIFY THAT MITIGATION MEASURES ARE ONLY PLANNED AND NOT BUILT	The title in the left bar will be modified from NOISE MITIGATION MEASURES to PLANNED NOISE MITIGATION MEASURES.
	SHORTEN THE POPUP TEXT	*The text is important to inform the public about Action Plan aims and contents. Unnecessary corrective action.*
	ADD DETAILED INFORMATION ABOUT ANAS STRATEGY	*Not applicable in the frame of the Dynamap project.*
	ADD INFORMATION ON THE MITIGATION MEASURES EFFECTIVENESS	RESERVED AREA: information about the level difference between Ante and Post operam situations will be included PUBLIC AREA: graphical information about the disturbance reduction will be implemented
	REVIEW THE QUESTIONNAIRE ON ACTION PLANS	Some questions will be reformulated.
	LINK THE QUESTIONNAIRE ON THE ACTION PLANS TO THE RELATED MEASURE / BUILDING	In the questionnaire a question will be added to ask the user to specify the critical area he refers to. Consequently, the name of the critical areas on the Action plan map will be highlighted. Each colored area will correspond to a critical area.
RESERVED AREA		
SECTION	**CORRECTIVE ACTION**	**HOW TO IMPLEMENT RECOMMENDED CHANGES**
SENSORS	***LINK MAPS/SENSORS***	*This corrective action could lead confusion. Unnecessary corrective action.*
	IMPROVE ANED DETECTION ON SCREEN	Anomalous noise events will be made visible on the screen only when the temporal resolution is adequate.
METEO	**CLARIFY THAT WEATHER DATA ARE IN REAL TIME**	A text will be added reporting the update frequency.
CONFLICT MAPS	**IMPROVE ACCESSIBILITY**	An additional "CONFLICT MAPS" menu will be added: the noise map and the END table on the left will be deleted. The possibility to select only the proper indicators will be left. A legend will be added.
	CHANGE THE Leq NIGHT LIMIT FOR	Ok

PUBLIC AREA		
SECTION	**CORRECTIVE ACTION**	**HOW TO IMPLEMENT RECOMMENDED CHANGES**
	SCHOOLS FROM 100 dB TO NA	
ADDITIONAL FUNCTIONS		
SECTION	**CORRECTIVE ACTION**	**HOW TO IMPLEMENT RECOMMENDED CHANGES**
SENSORS	***POSSIBILITY TO ADD PREVIOUS MONITORING DATA***	*Not applicable in the frame of the Dynamap project.*
MAPS	**ADD A SCALE FACTOR AND RULER**	*A scale factor will be added, the ruler if feasible.*
NEW	***WEATHER DATA MAPS***	*Not applicable in the frame of the Dynamap project.*

Annex 6 shows the platform images before and after each undertaken major corrective action.

6. CONCLUSION

The DYNAMAP project is a LIFE project aiming at developing a dynamic noise mapping system able to detect and represent in real time the acoustic impact due to road infrastructures (dynamic noise maps). Dynamic noise maps are achieved by updating pre-calculated basic noise maps as a function of sound pressure levels and weather conditions, provided by an automatic monitoring system, made of customized low-cost sensors and of a software tool implemented in a general purpose GIS platform. The web-GIS platform is able to read data coming from the system and depict noise values as coloured geo-referred noise maps in a user-friendly format.

In Action C1, detailed tests have been prepared to check recipients ability in managing and consulting the system. Tests have been administered to both the general public and selected stakeholders to evaluate the system versatility and its contents comprehensibility. The general public was able to view noise maps in real time and query the system to depict, in graphical mode, the environmental data stored in the system, while road owner's officials were able to see additional information, such as real time, historical and statistical data, as well as accessing the system configuration parameters.

Test results show that participants liked most the application operational features, the response times, the easy to use and usefulness of the contents. Also the aesthetic aspect received very good feedbacks. On the other hand, the platform communication skills was considered poor and some practical suggestion to improve them was given.

The collected recommendations have been used to improve the overall user friendliness and address the areas where participants experienced problems or found the interface and information architecture unclear. Corrective actions have been then implemented according to the assigned priority index. The effectiveness of changes will be tested informally: a questionnaire will be published on the project website and on social networks to collect new feedbacks.

ANNEXES

ANNEX 1 – Test administered to officials

ANNEX 2 – Test administered to the general public

ANNEX 3 – Training course pictures

ANNEX 4 – Answers given by officials

ANNEX 5 – Answers given by the general public

ANNEX 6 - Undertaken corrective actions

ANNEX 1 - Test administered to officials

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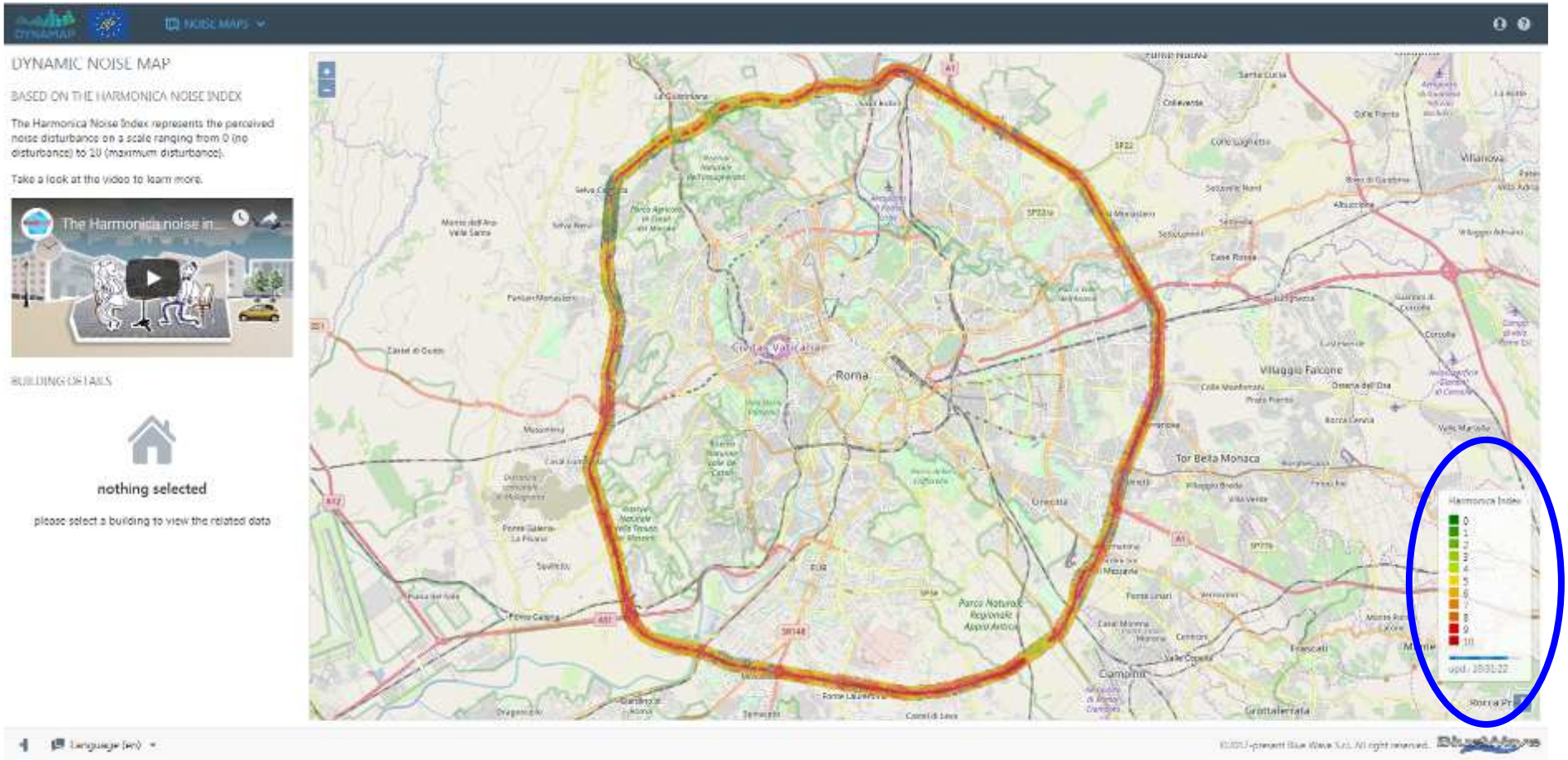
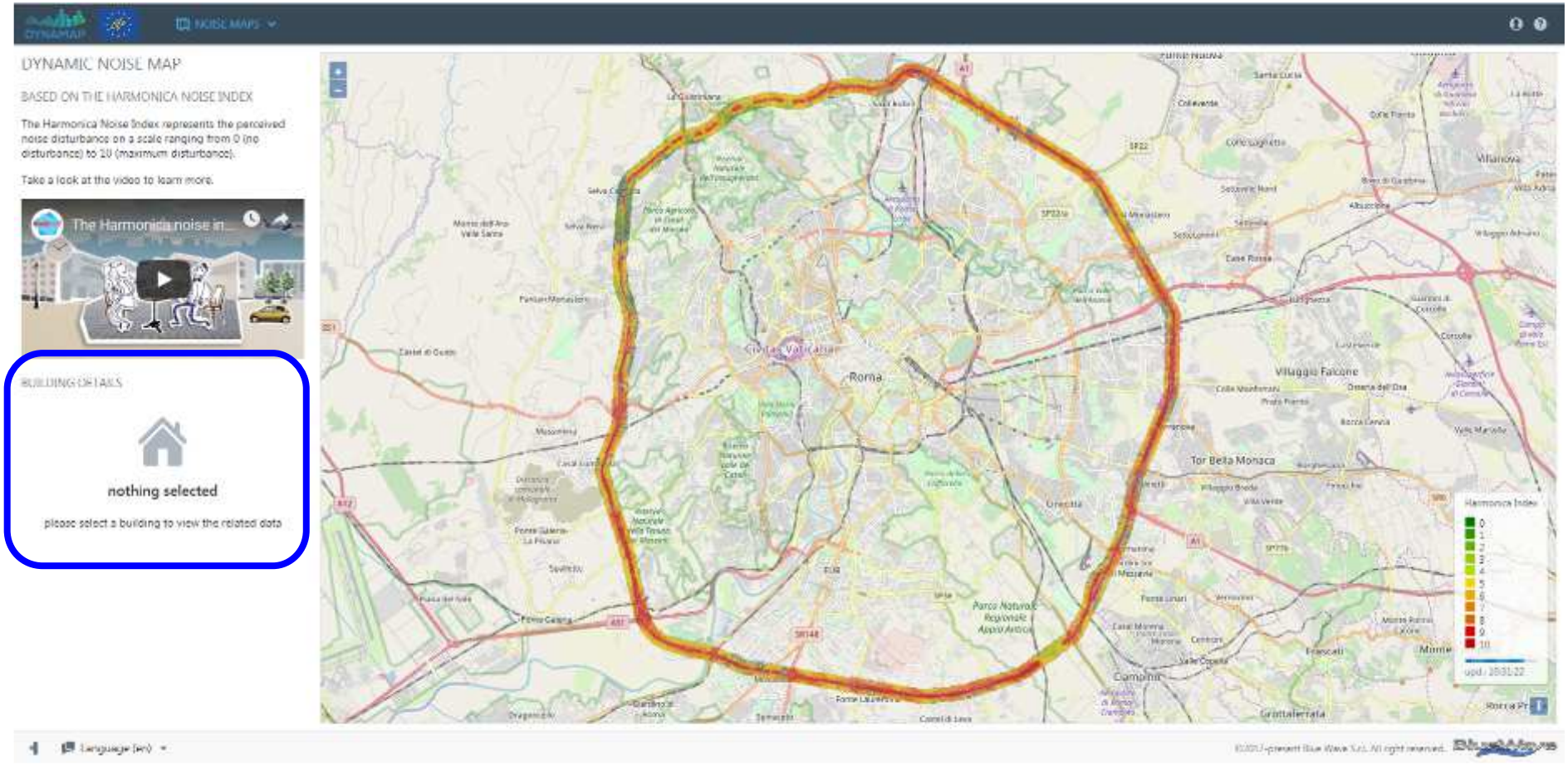
ANNEX 6 - Undertaken corrective actions

MAPS LIVE - ADD A COMPLETE LEGEND
BEFORE



MAPS LIVE - ADD A COMPLETE LEGEND
AFTER

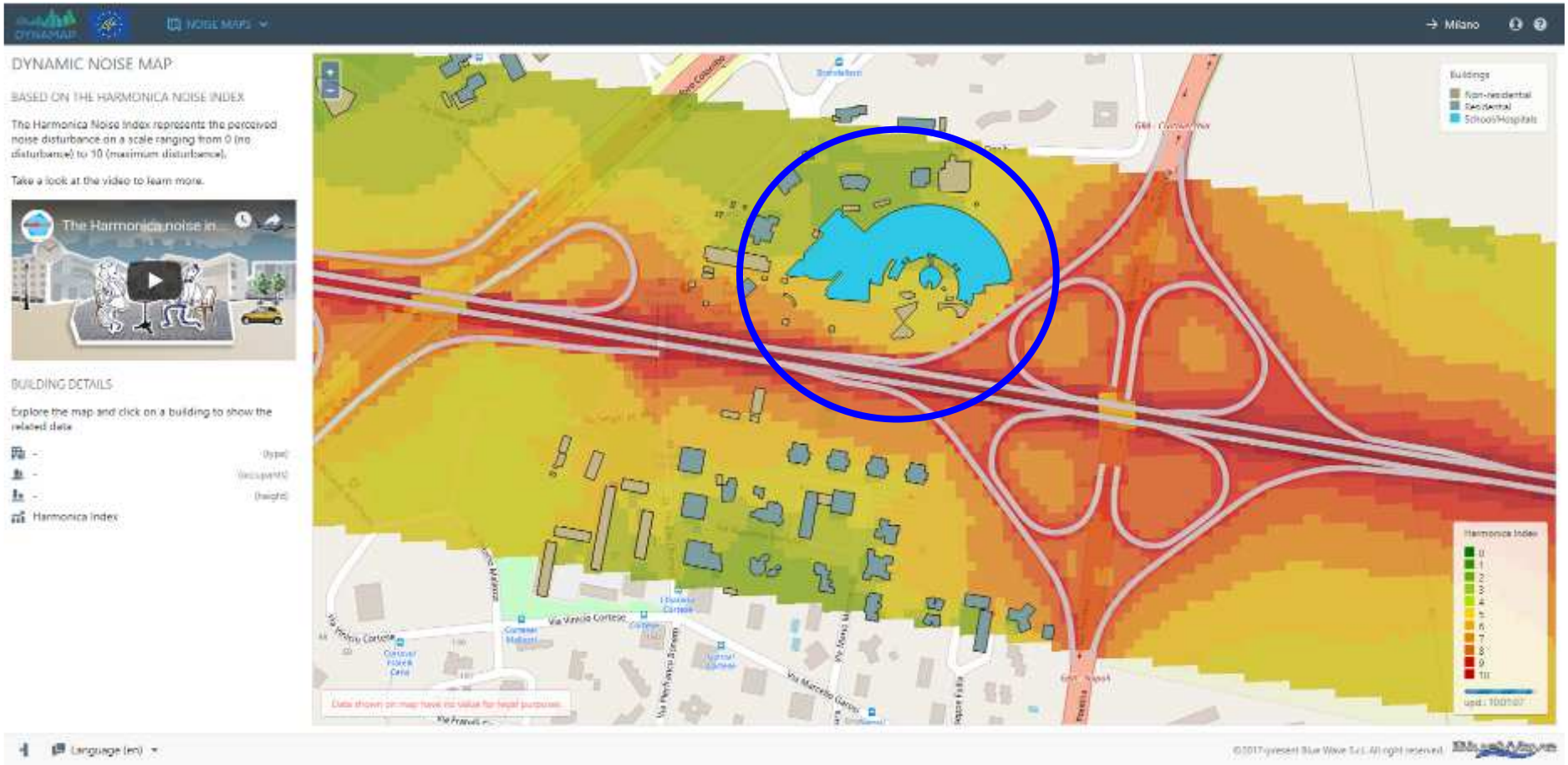
MAPS LIVE - CLARIFY THAT YOU CAN CLICK ON THE BUILDINGS TO VIEW DETAILS
BEFORE



MAPS LIVE - CLARIFY THAT YOU CAN CLICK ON THE BUILDINGS TO VIEW DETAILS
AFTER

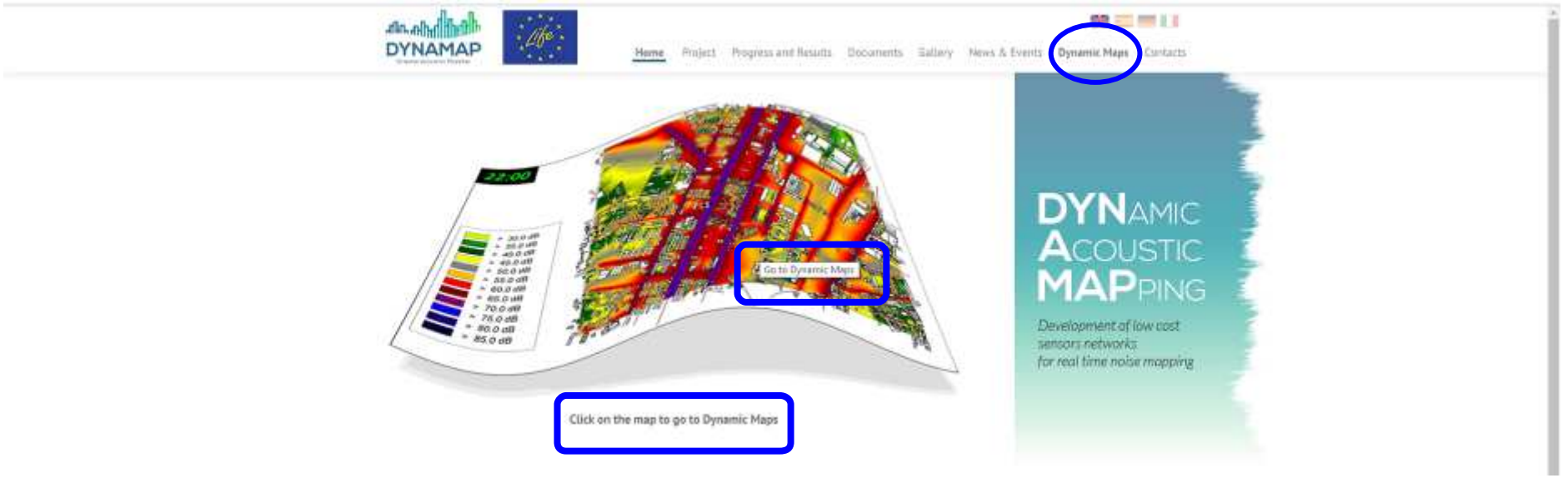
MAPS LIVE - HIGHLIGHT SENSITIVE RECEIVERS WITH A DIFFERENT COLOR
BEFORE

MAPS LIVE - HIGHLIGHT SENSITIVE RECEIVERS WITH A DIFFERENT COLOR
AFTER

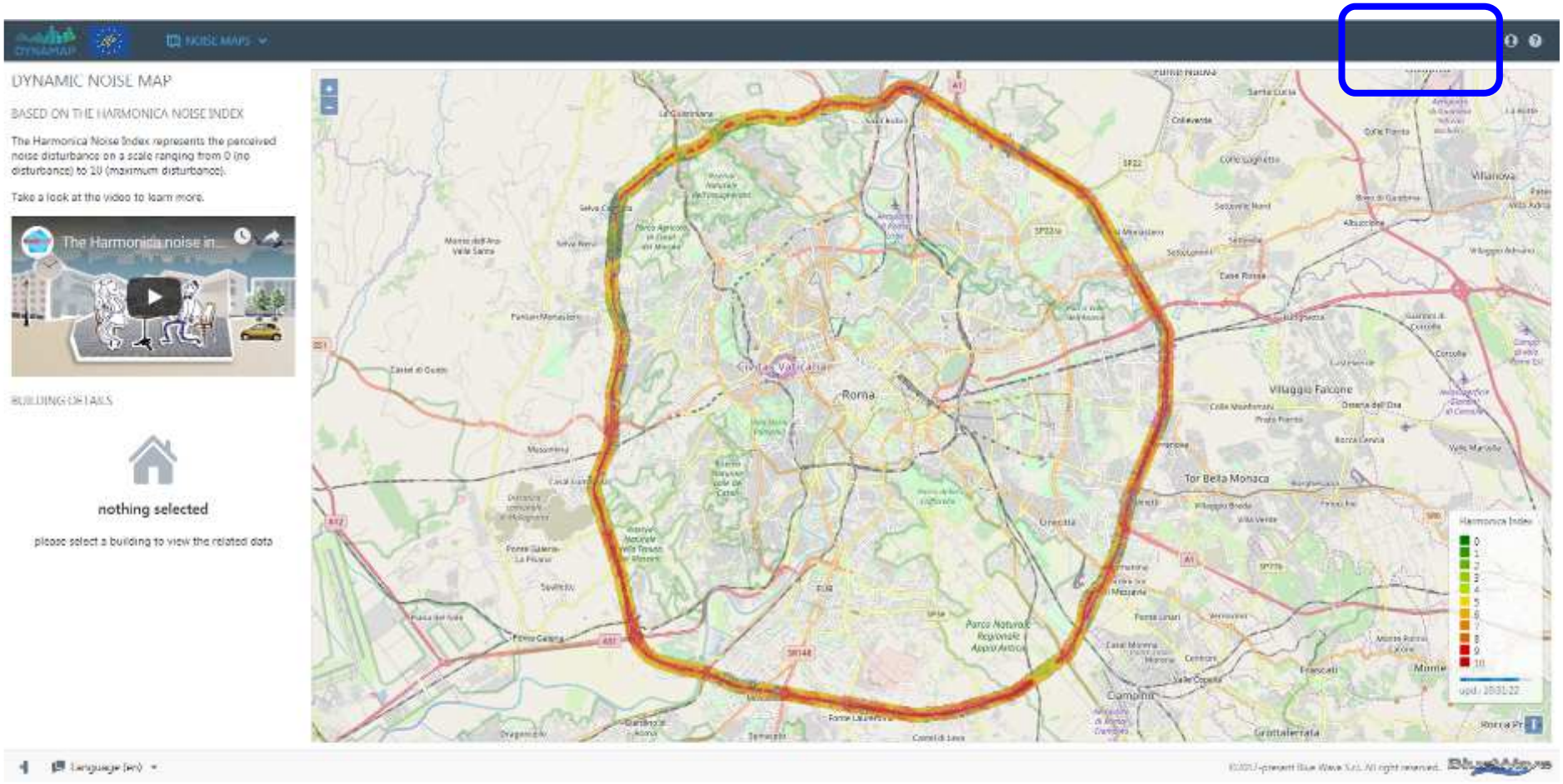


DYNAMIC MAPS - EMPHASIZE THIS SECTION ON THE WEB SITE
BEFORE

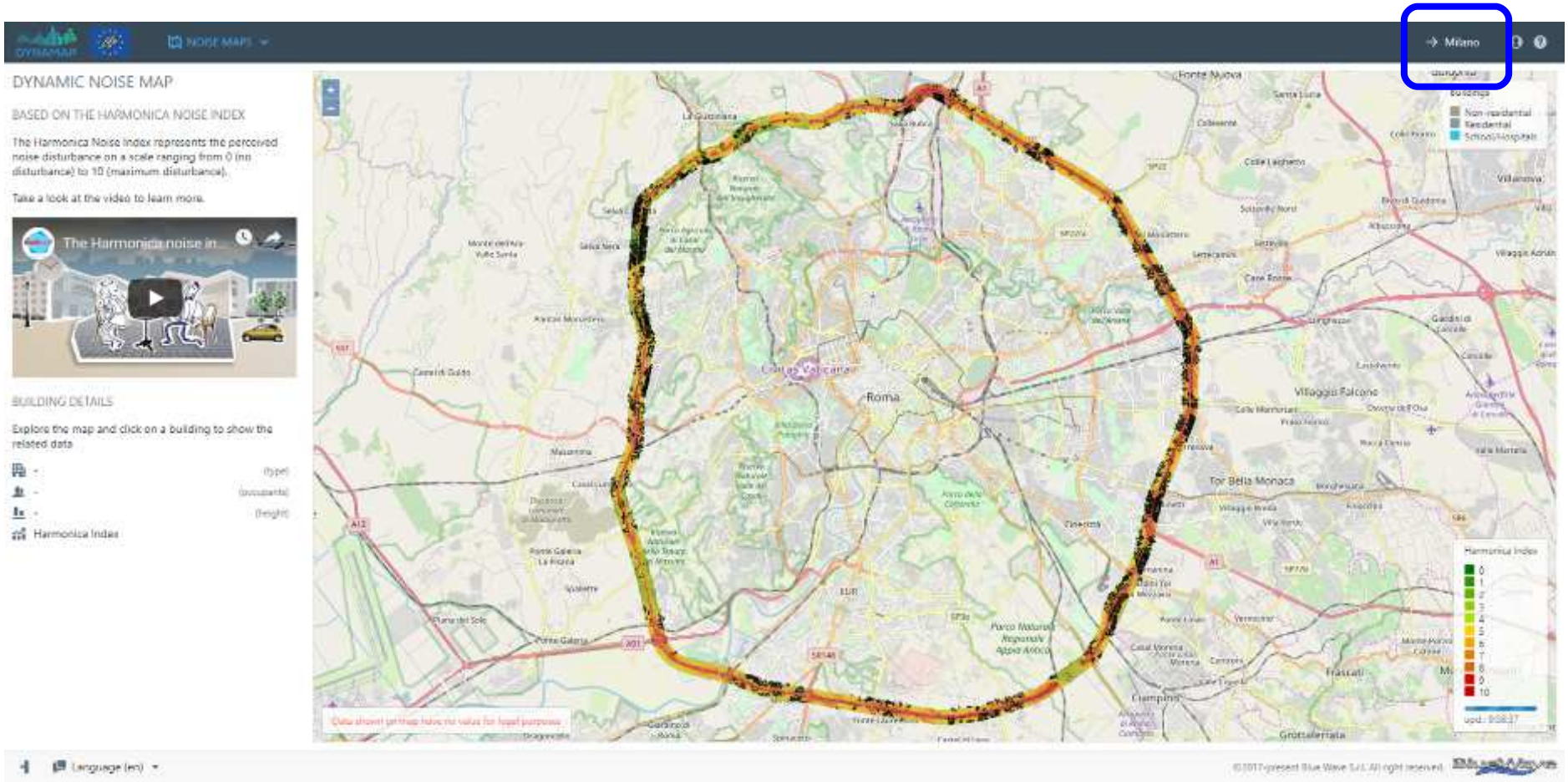
AFTER



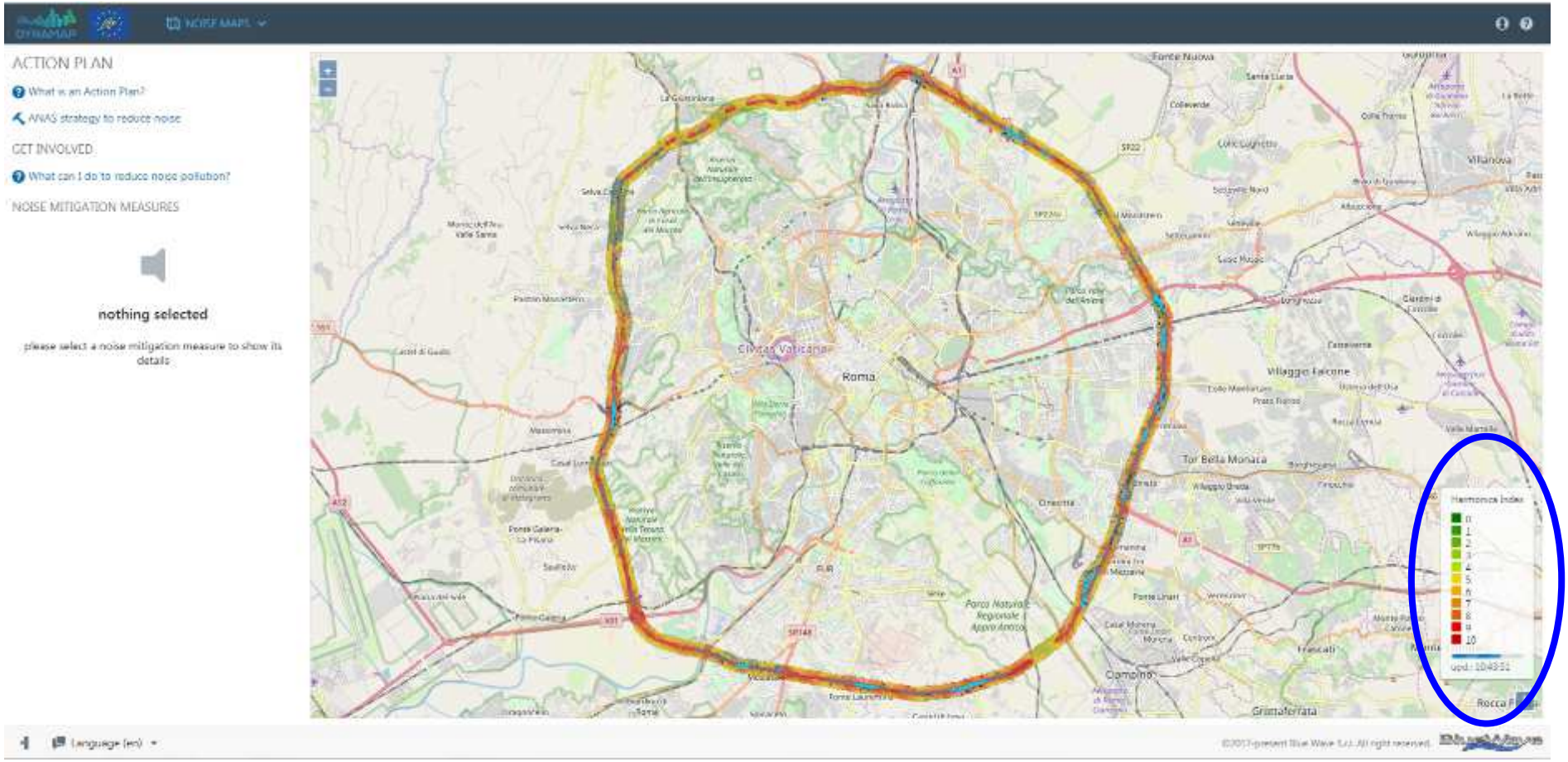
MAPS LIVE - INSERT A BUTTON TO SWITCH FROM THE MAPS OF ROME AND TO THE MAP OF MILAN AND VICE VERSA BEFORE



MAPS LIVE - INSERT A BUTTON TO SWITCH FROM THE MAPS OF ROME AND TO THE MAP OF MILAN AND VICE VERSA
AFTER



ACTION PLAN - ADD A COMPLETE LEGEND
BEFORE



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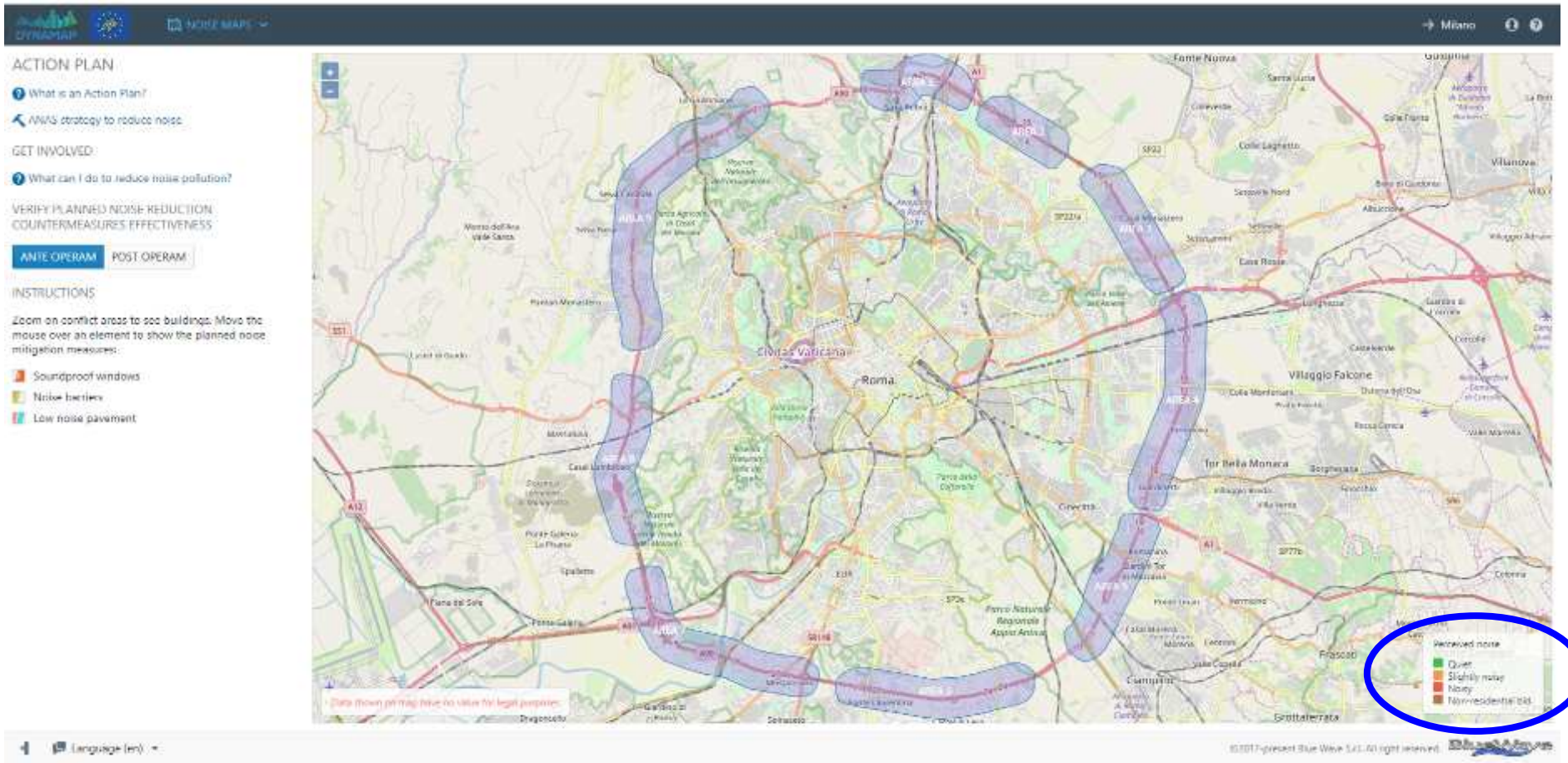
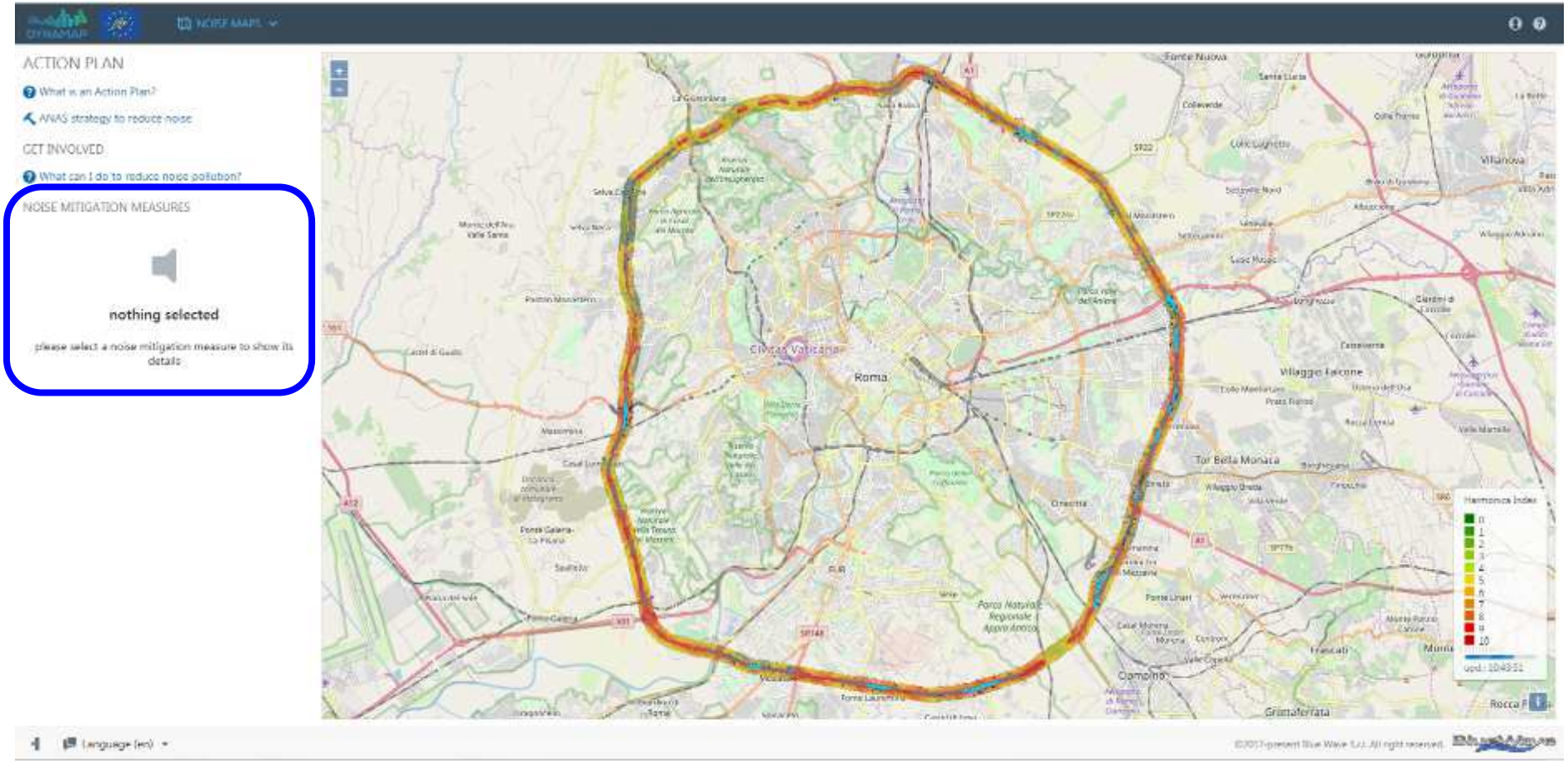
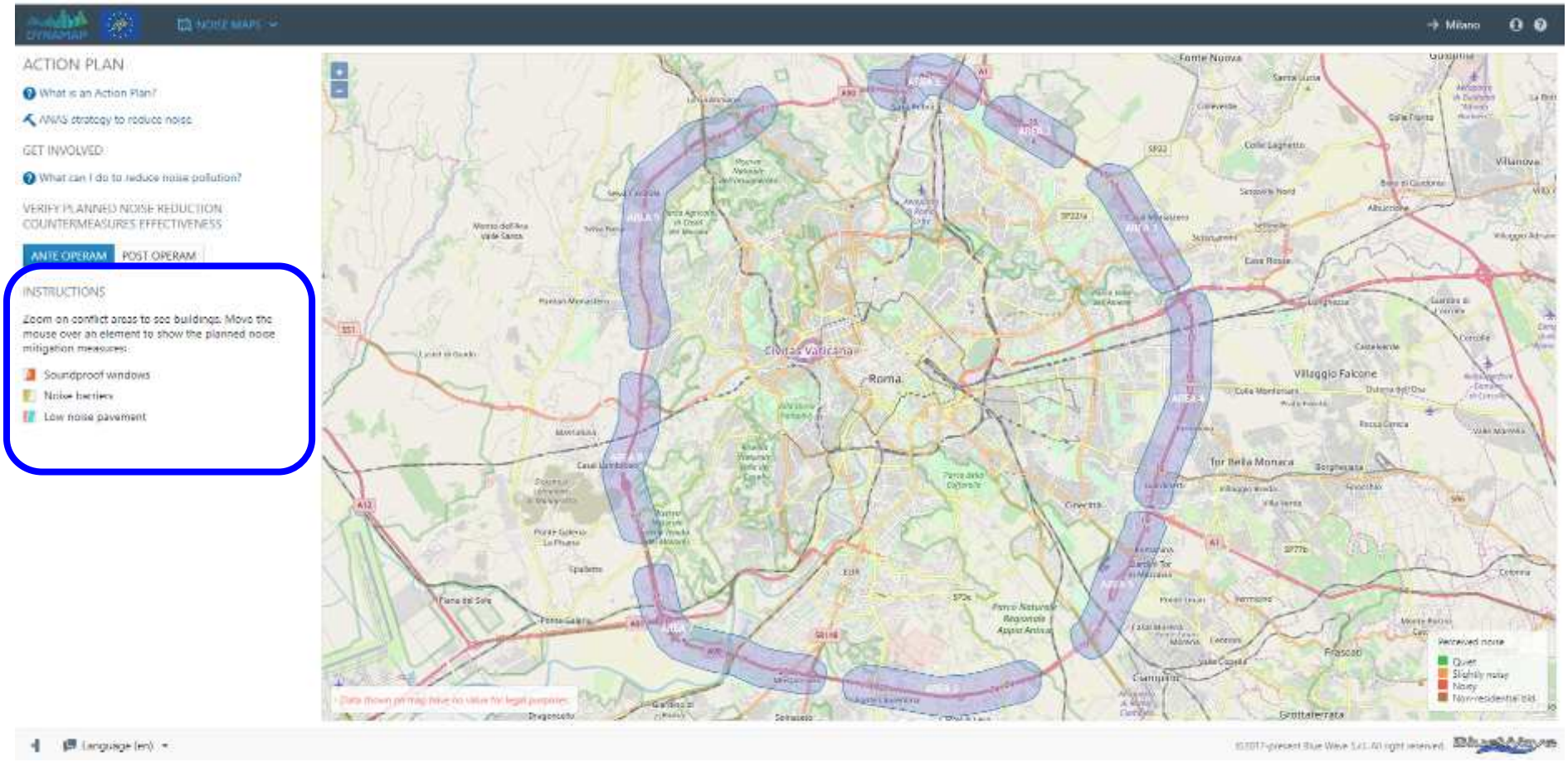
AFTER



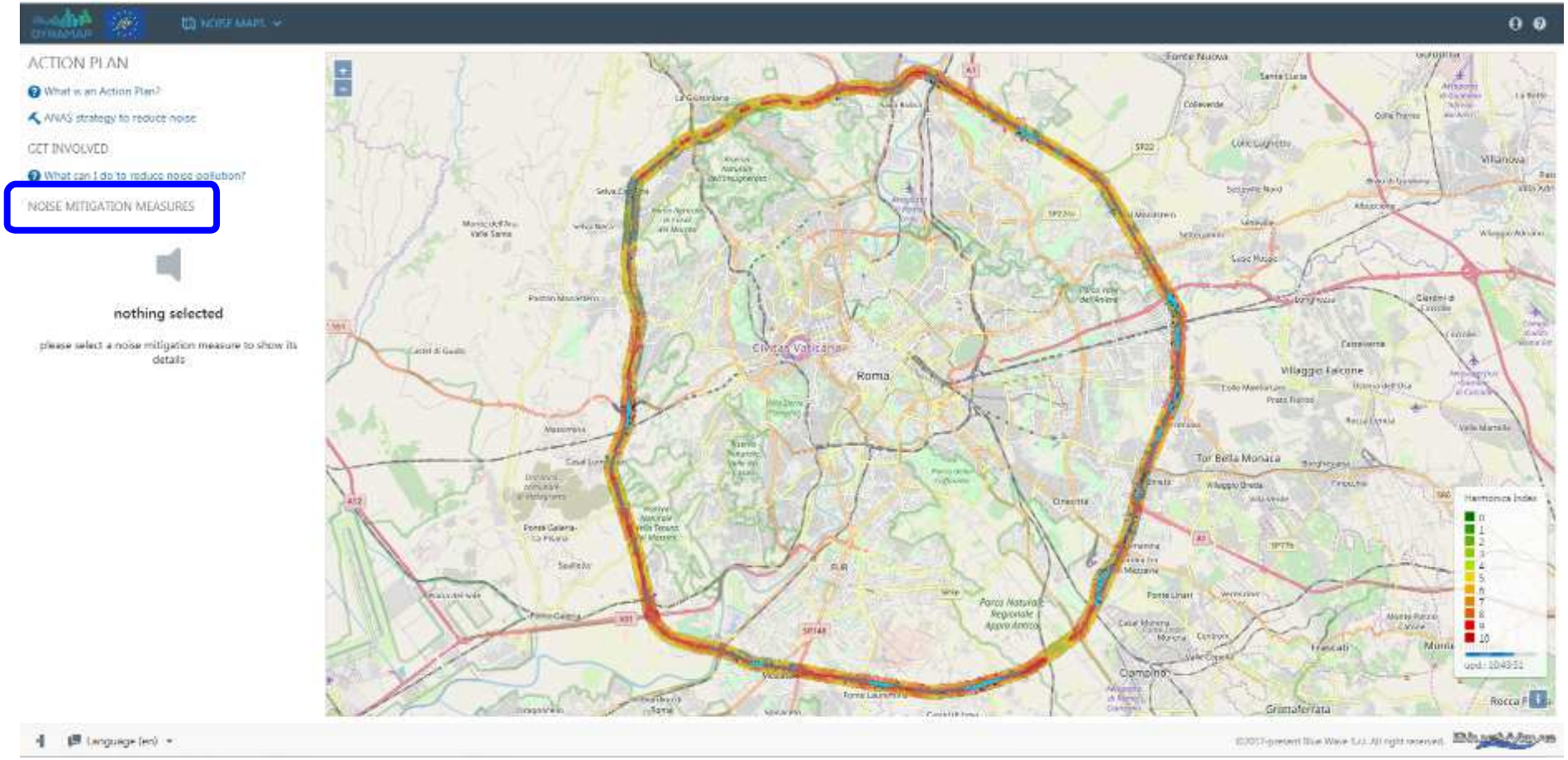
ACTION PLAN - CLARIFY THAT YOU CAN CLICK ON THE MITIGATION MEASURES TO VIEW DETAILS BEFORE



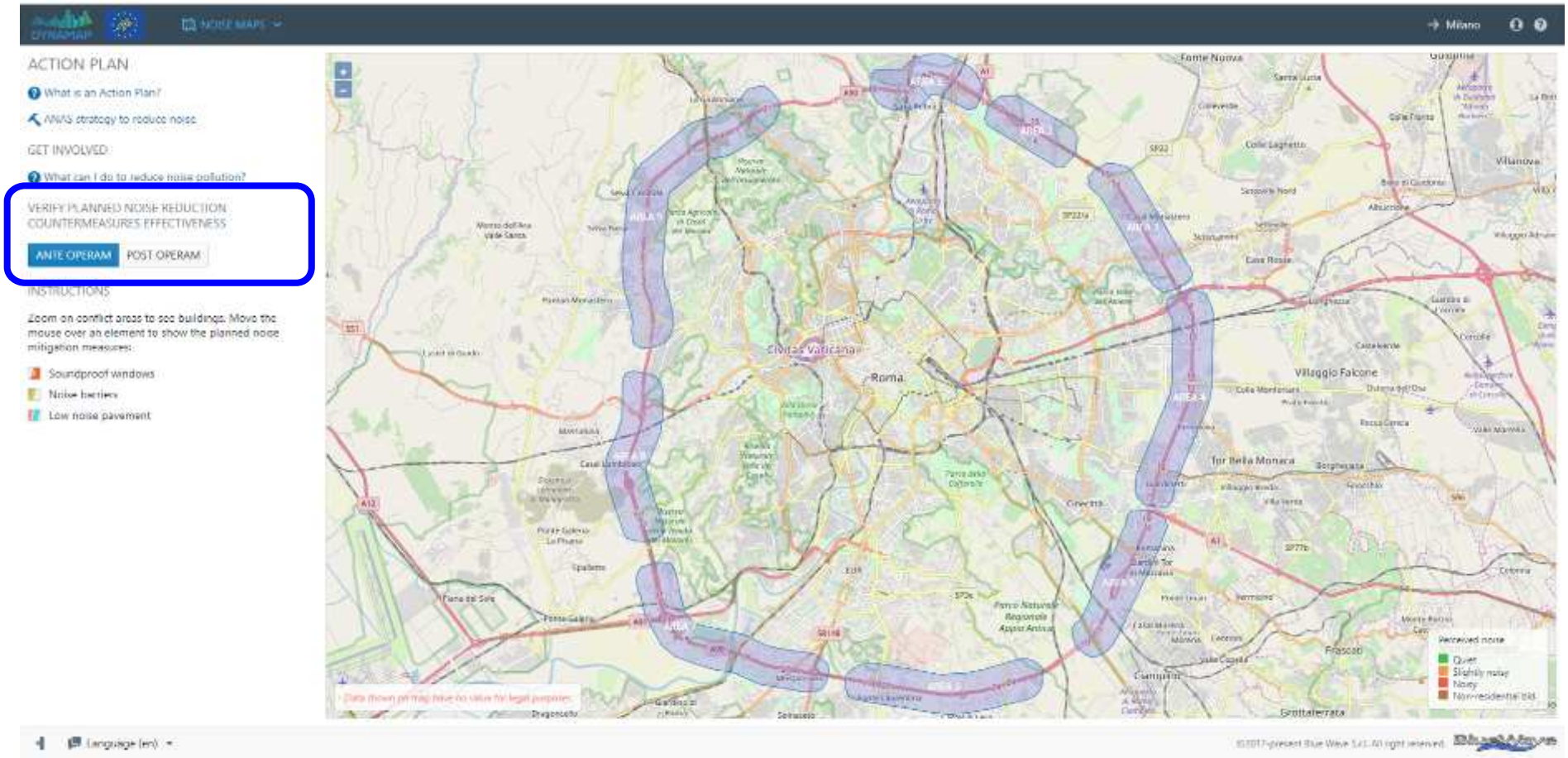
ACTION PLAN - CLARIFY THAT YOU CAN CLICK ON THE MITIGATION MEASURES TO VIEW DETAILS
AFTER



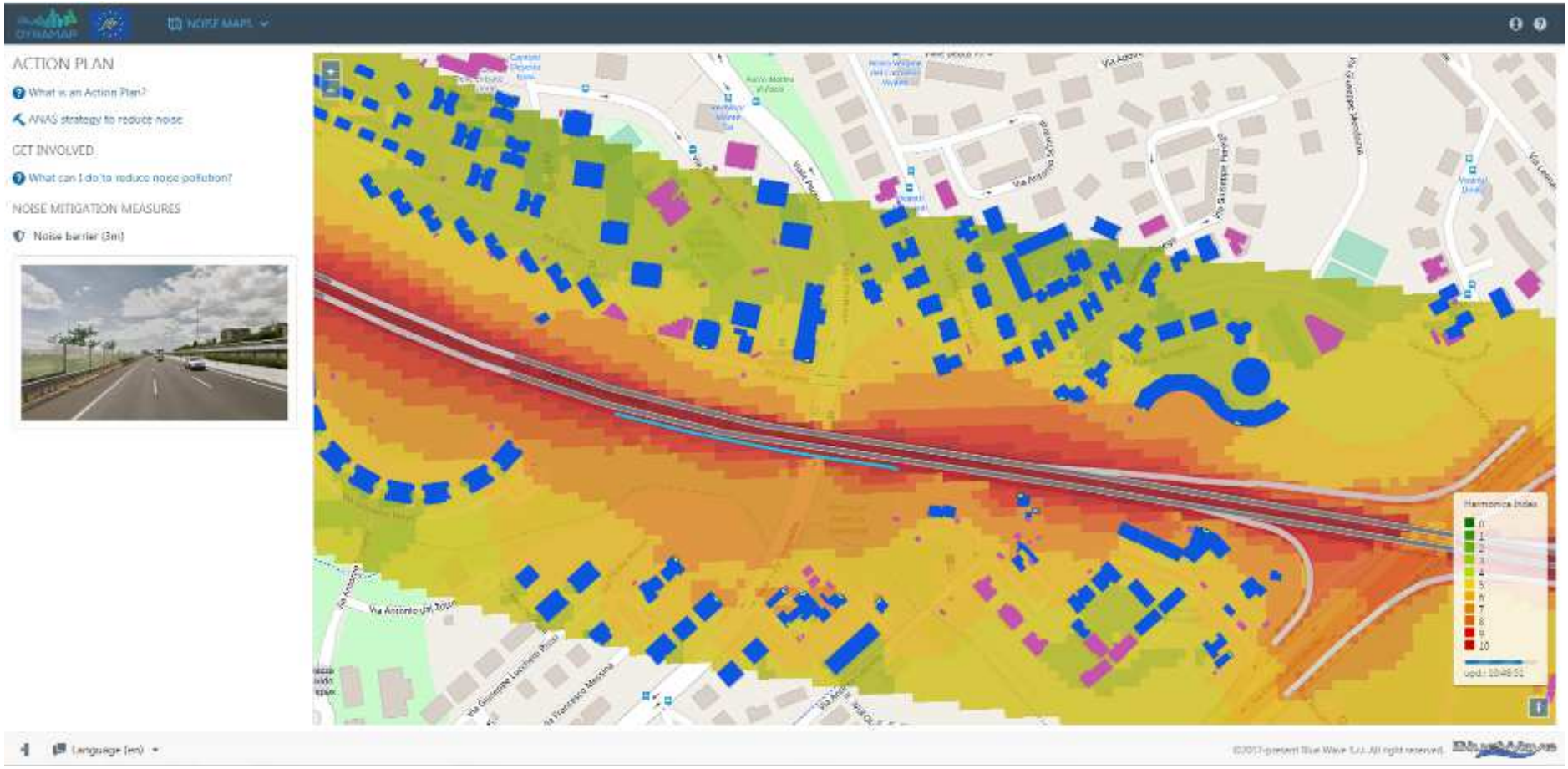
ACTION PLAN - CLARIFY THAT MITIGATION MEASURES ARE ONLY PLANNED AND NOT BUILT BEFORE



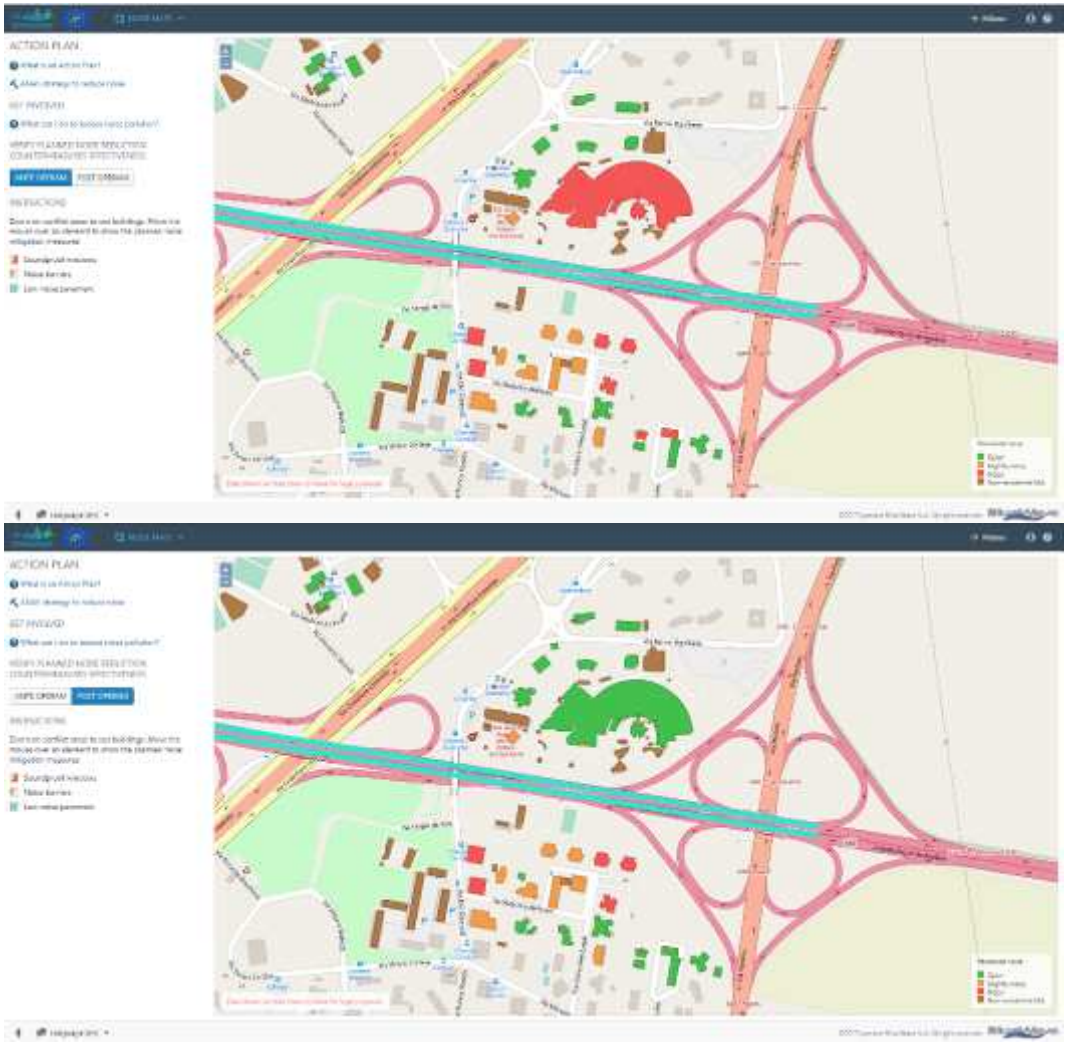
ACTION PLAN - CLARIFY THAT MITIGATION MEASURES ARE ONLY PLANNED AND NOT BUILT
AFTER



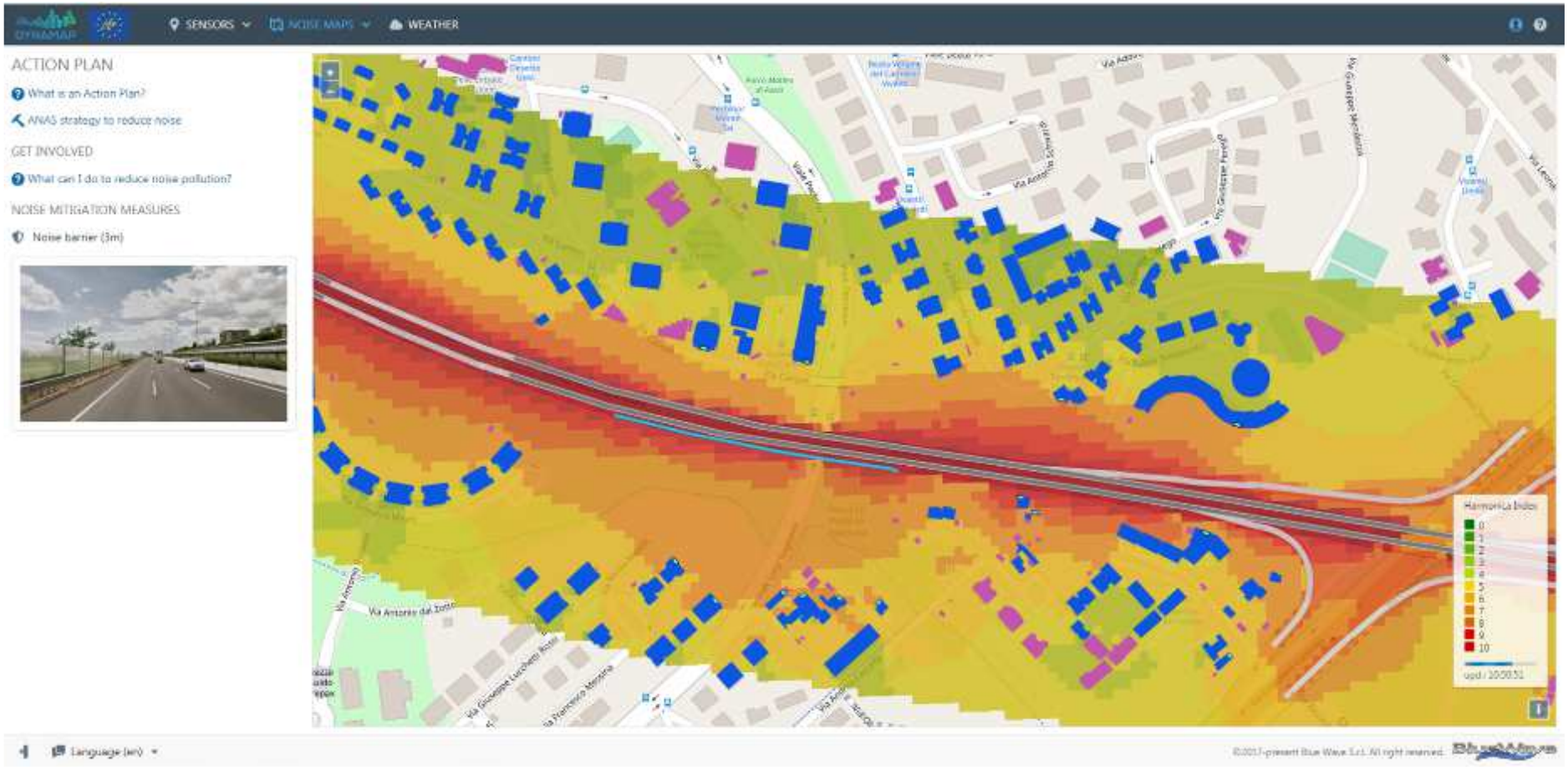
ACTION PLAN - ADD INFORMATION ON THE MITIGATION MEASURES EFFECTIVENESS
PUBLIC AREA BEFORE



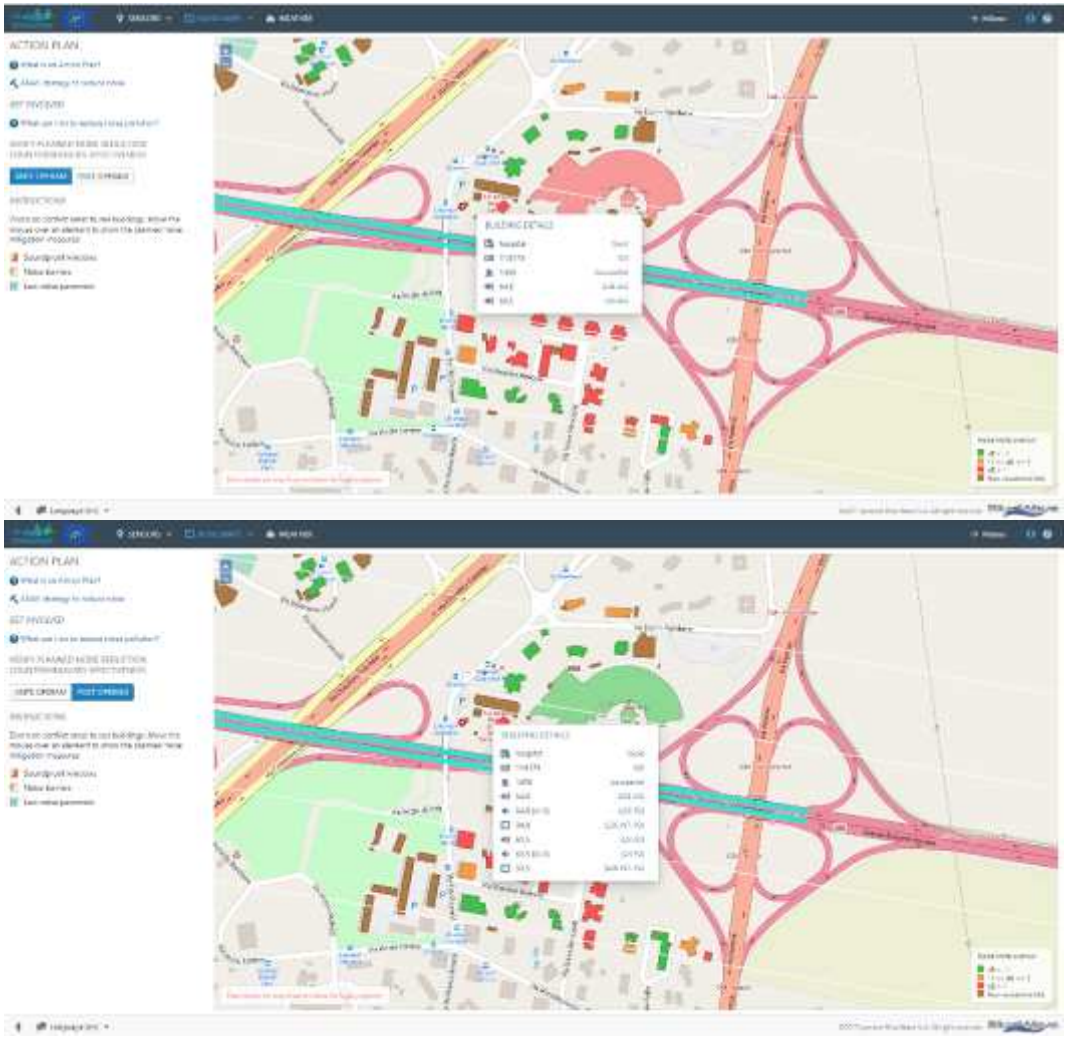
ACTION PLAN - ADD INFORMATION ON THE MITIGATION MEASURES EFFECTIVENESS
PUBLIC AREA AFTER



ACTION PLAN - ADD INFORMATION ON THE MITIGATION MEASURES EFFECTIVENESS
RESERVED AREA BEFORE

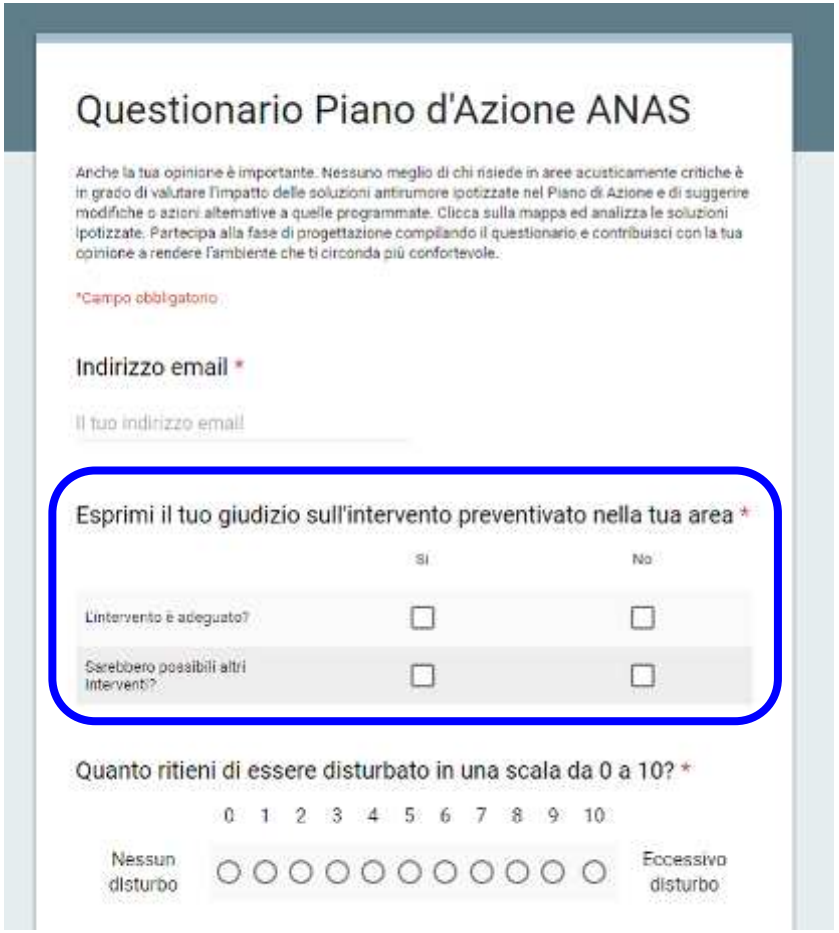


ACTION PLAN - ADD INFORMATION ON THE MITIGATION MEASURES EFFECTIVENESS
RESERVED AREA AFTER



ACTION PLAN - REVIEW THE QUESTIONNAIRE ON ACTION PLANS and LINK THE QUESTIONNAIRE ON THE ACTION PLANS TO THE RELATED MEASURE / BUILDING

BEFORE



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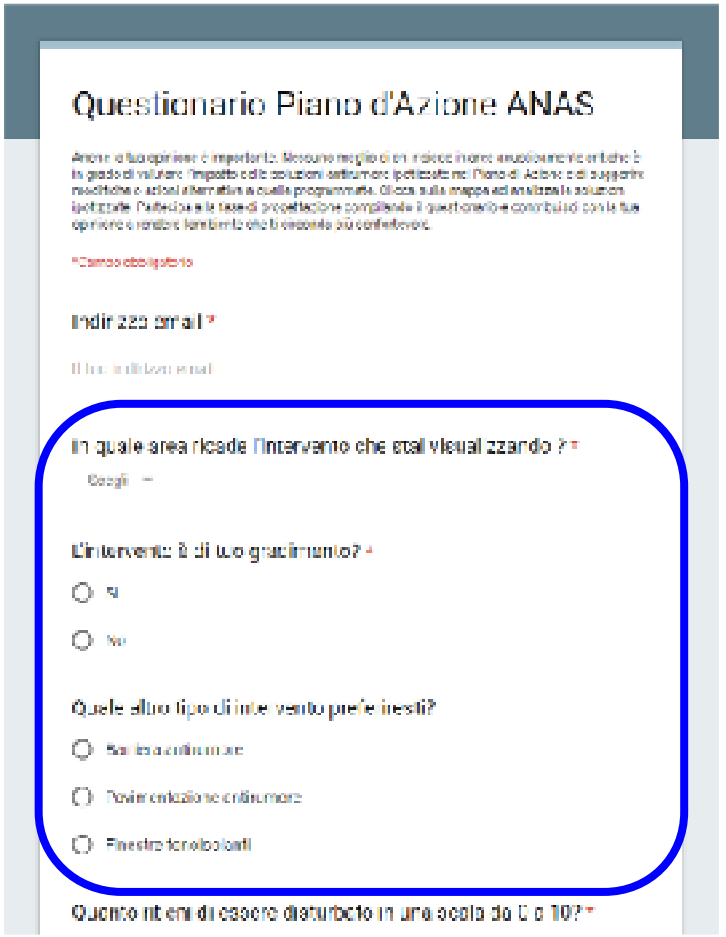
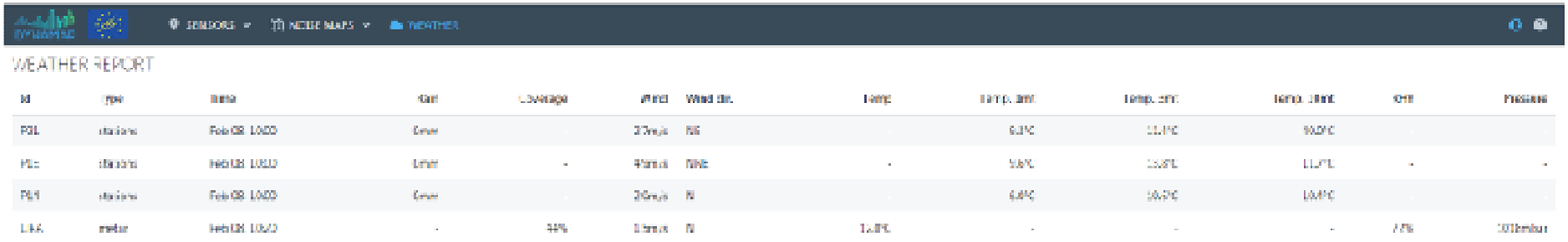


SENSORS - IMPROVE ANED DETECTION ON SCREEN
BEFORE

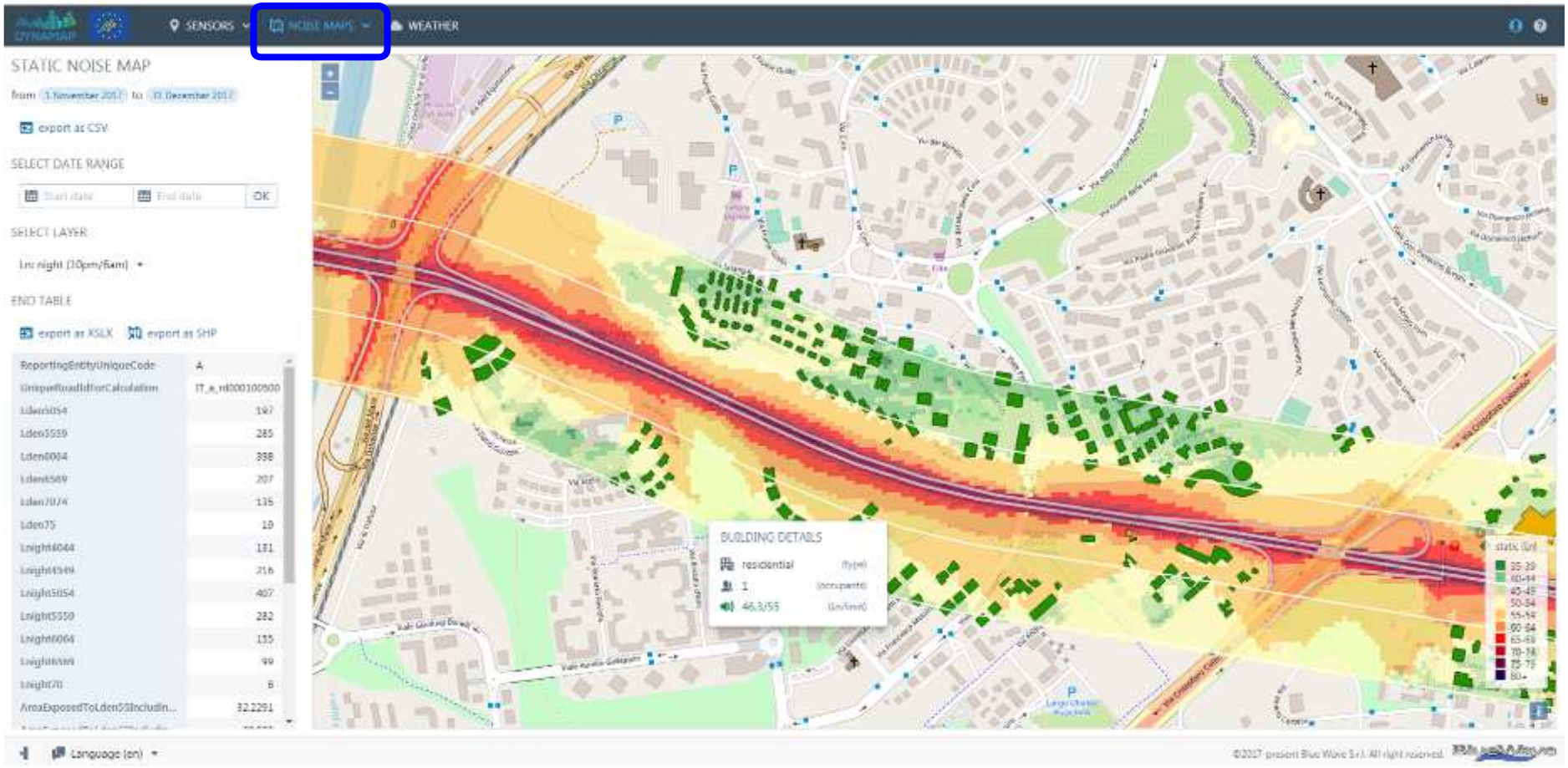
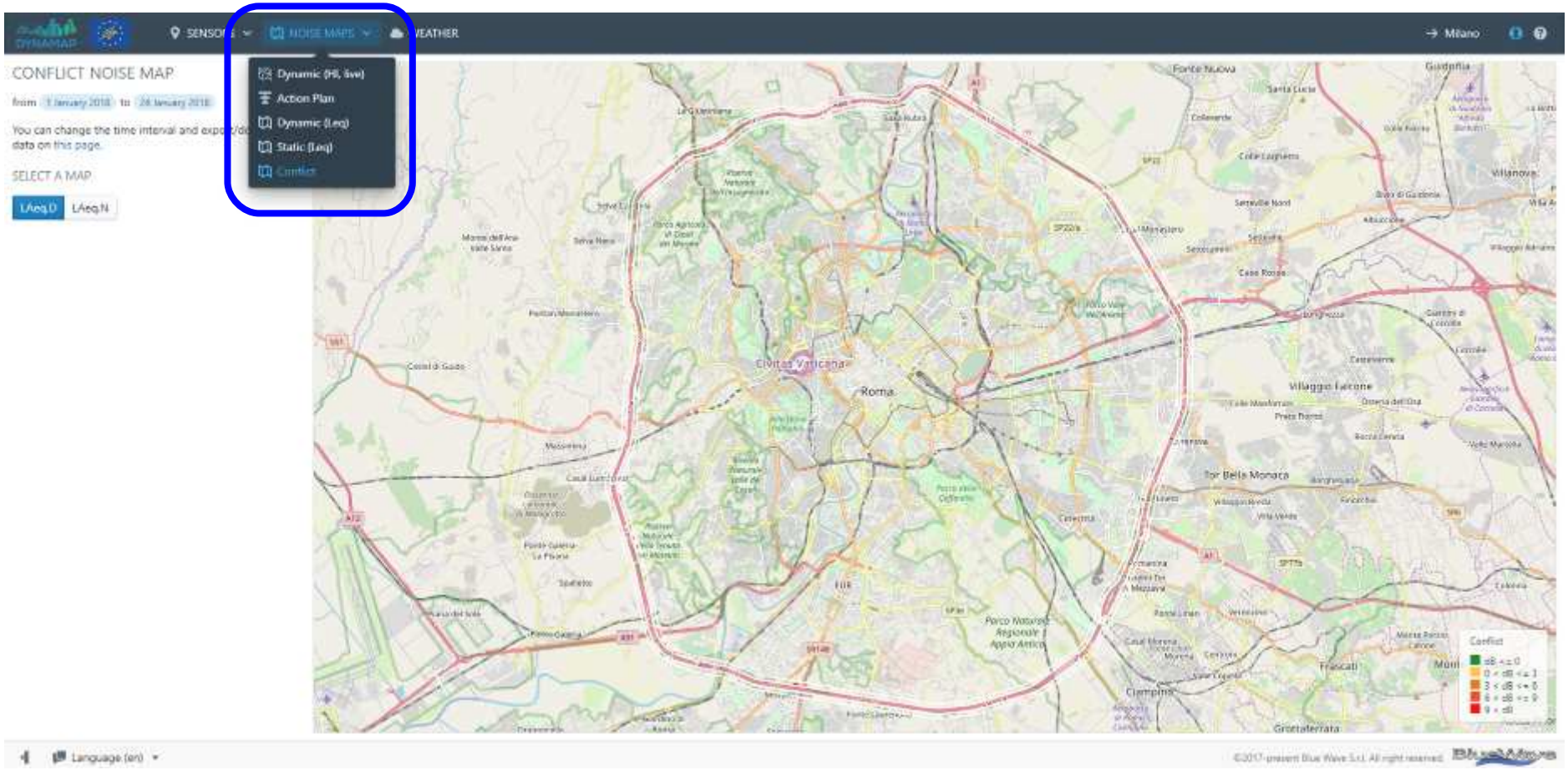
SENSORS - IMPROVE ANED DETECTION ON SCREEN
AFTER

METEO - CLARIFY THAT WEATHER DATA ARE IN REAL TIME
BEFORE



AFTER

CONFLICT MAPS - IMPROVE ACCESSIBILITY
BEFORE



CONFLICT MAPS - IMPROVE ACCESSIBILITY
AFTER