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QUIETMED2 – Joint programme for GES assessment on D11- noise in the Mediterranean Marine Region.

quietMED2

DELIVERABLE

D9.2. Report on the evaluation of the use of the tool to support the update of impulsive noise monitoring programmes and risk-based assessment

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11	International Council for the Exploration of the Sea	ICES	Denmark



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Abstract

This document is the Deliverable “D9.2. Report on the evaluation of the use of the tool to support the update monitoring programmes” of the QUIETMED2 project funded by the DG Environment of the European Commission within the call “DG ENV/MSFD 2018 call”. This call funds projects to support the implementation of the second cycle of the Marine Strategy Framework Directive (2008/56/EC) (hereinafter referred to as MSFD), in particular to implement the new GES Decision (Commission Decision (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU) and Programmes of Measures according Article 13 of the MSFD. The QUIETMED2 project aims to support Member States Competent Authorities in the Assessment of the extent to which GES on Descriptor 11-Underwater noise has been achieved in the Mediterranean Region by providing practical outcomes to implement the new GES Decision through: i) a joint proposal of a candidate for an impulsive noise indicator in the Mediterranean Region ii) a common methodology for Competent Authorities to establish thresholds values, together with associated lists of elements and integration rules, iii) a data and information tool to support the implementation of the monitoring programmes of impact of impulsive noise based on the current ACCOBAMS joint register which will be demonstrated on iv) an operational pilot of the tool and v) several activities to boost current regional cooperation efforts of Barcelona Convention developing new Mediterranean Region cooperation measures.

This document reports the process followed in the QUIETMED2 project to assess the user behavior through usability, usefulness, and desirability provided in the interaction with the tool to support the update monitoring programmes of impulsive noise developed within this project. It provides information about the design and results of the specific training session developed as a practical exercise for Competent Authorities to test this tool for policy implementation.

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List of Abbreviations

CTN	Centro Tecnológico Naval y del Mar
ACCOBAMS	Permanent Secretariat of the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
DFMR	Department of Fisheries and Marine Research
IZVRS	Inštitut za vode Republike Slovenije/Institute for water of the Republic of Slovenia
HCMR	Hellenic Centre for Marine Research
IOF	Institute of Oceanography and Fisheries
UM	University of Malta -The Conservation Biology Research Group
POLIMI-DICA	Politecnico di Milano-Department of Civil and Environmental Engineering
SSW	Special Secretariat for Water-Hellenic Ministry of Environment and Energy
SPA/RAC	Specially Protected Areas Regional Activity Centre
ICES	International Council for the Exploration of the Sea
MSFD	Marine Strategy Framework Directive
GES	Good Environmental Status
MS	Member States
MED	Mediterranean Sea Region
TVs	Threshold values
D11	Descriptor 11 – underwater noise
D11C1	Descriptor 11 Criterion 1 – impulsive noise
ECAP	Ecosystem Approach of the Barcelona Convention

1. Introduction

The QUIETMED2 Project is funded by DG Environment of the European Commission within the call “DG ENV/MSFD Second Cycle/2018”. This call funds the next phase of MSFD implementation, in particular, to implement the new GES Decision (Commission Decision (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU) and Programmes of Measures according Article 13 of the MSFD.

The QUIETMED2 project aims to enhance cooperation among Member States (MS) in the Mediterranean Sea Region (MED) to implement the Second Cycle of the MSFD and in particular to assist them in the preparation of their MSFD reports through the following specific objectives:

- Develop and implement a candidate impact indicator in the Mediterranean Region for D11C1 Criterion.
- Make a joint proposal of a methodology to establish Threshold Values (TVs), list of elements and integration rules to implement the GES decision in reference to D11 in the Mediterranean Region.
- Build an efficient data and information tool to support the implementation of the D11C1 Criterion and the update of the monitoring programmes for Impulsive Noise according to the new GES Decision.
- Perform an operational pilot of an impulsive noise impact monitoring programme implemented with the updated Joint register to demonstrate its feasibility.
- Promote Mediterranean Region Coordination by i) boosting current regional cooperation efforts of Barcelona Convention and others, and ii) developing new cooperation measures.
- Enhance collaboration among a wide network of stakeholders through the dissemination of the project results, knowledge share and networking.

To achieve its objectives, the project is divided in 3 work packages around 3 priorities and 10 activities whose relationships are shown in Figure 1.

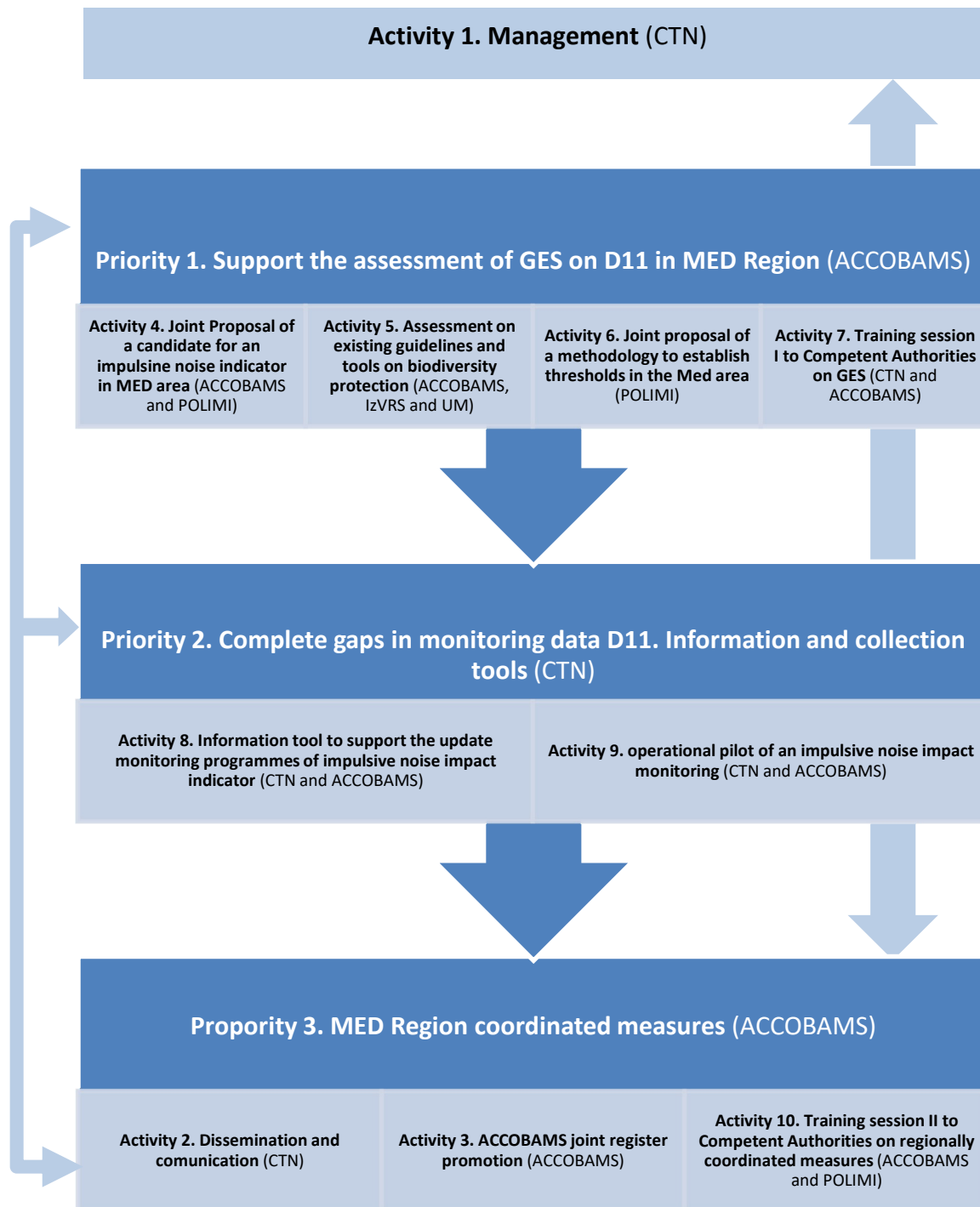


Figure 1. Work Plan Structure

The project is developed by a consortium made up of 11 entities coordinated by CTN and it has a duration of 24 months starting on February 2019.

This document reports the process to design and develop the user test applied within the QUIETMED2 project to assess the feasibility of the tool to support the update of monitoring programmes of impulsive noise (D11C1).

2. User Experience Design

User experience design (UXD, UED, or XD) is the process of supporting user behavior through usability, usefulness, and desirability provided in the interaction with a product, in this case a web tool developed to report, visualize and analyze impulsive noise data across the Mediterranean Sea.

The process of making a good user experience design requires a cross-discipline perspective that considers multiple aspects of the project and attitude of employees. In this case, we researched across multiple sources and consultancies to improve the current web tool, developed under the QUIETMED project (available in this link: [INR-MED](#)). Further information in: "[Deliverable 4.1. Joint register for impulsive noise in the Mediterranean Sea Region](#)".

After that, a retouched design came, also new information and data visualizations were implemented to evolve the use of this tool. With a better visual design and a better comprehension of the new data, the improvement in the design is focused on usability and access.

With this new design/UX the users can see all the necessary and understandable information to make better decisions based on real data with a big underlying methodology (see Deliverable 6.2 "*Joint proposal of a methodology to establish threshold values, together with associated lists of elements and integration rules in the Mediterranean Region*", <https://quietmed2.eu/outputs/>).

2.1. Research

Research is critical to UX. User experience design draws from design approaches like human-computer interaction and user-centred design, and includes elements from similar disciplines like interaction design, visual design, information architecture, user research, and others. Researching is important to understand the end-user needs and the purpose of the application.

Several consultations with end-users have been done to know the necessities and the point-of-view of real users about the functionalities implemented or missing resulting in a functional requirements and improvements list. This list includes points like:

- **Improve the map visualization with:** layers, better legends, D11C1 calculations, noise impact indicators, more filters, etc.
- **Better data upload system:** data validation before upload, simplest and more understandable system to upload xml or raw data, etc.
- **Development of the calculation of criterion D11C1:** maybe implement marine regions and subregions on the map.
- **Improve the developer team environment to speed up the upgradeability of the project:** Implement Docker, evaluate Bootstrap usage.
- **Improve the additional information:** to explain the aim of the register and the main concepts around this tool (MSFD, D11, calculations,...).

As a result, some mockups were produced to visually understand and test the research conclusions.

On the Frontpage the project is presented on a more clear and comprehensive way with simple and detailed texts and images. Also, new sub-sections have been created to show all the potential within the QUIETMED2 tool for different users profiles: from more accurate information to more understandable one, focused on non-expert people.



Image 1. Front-page mockup his first stages of conceptualization and re-design.

Also, the Data Manage Tool is introduced with two primary functions: Upload Data and Report No-Data. The Data Manage Page is a two tabbed page with the necessary options to upload data or to report no data with a simple step guided process. It is an evolution of the Upload process on previous version.

UPLOAD DATA
REPORT NO DATA

UPLOAD DATA TOOL

- 1

Download the "Underwater noise register template for the Mediterranean Region" (excel format).

DOWNLOAD .XLSX

DOWNLOAD .XLSX
- 2

Fulfil the required fields of the template following the instructions inside.
- 3

Transform the excel file in a XML file following the instructions of the template.
- 4

Save the XML file generated.
- 5

Upload the generated XML file using the upload box below.

UPLOAD FILE
- 6

If the upload process is successful, the application will show the message "Data uploaded successfully" *.

Log-in is a requirement to access both sections.

REPORT NO DATA

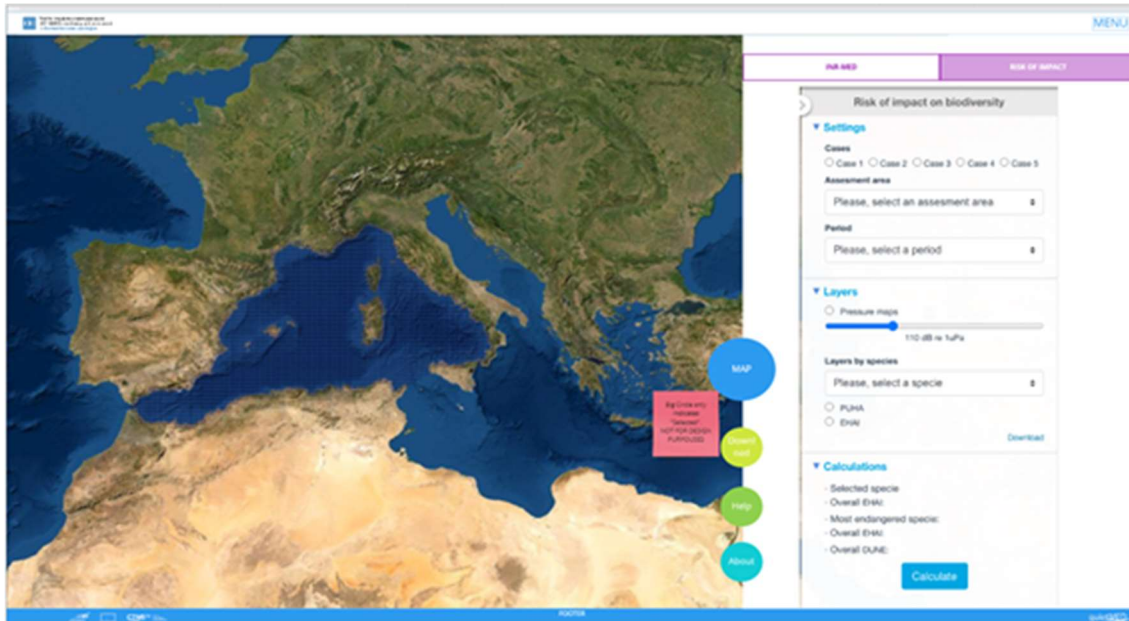
Interdum et malesuada fames ac ante ipsum primis in faucibus. Donec quis ante sit amet ligula ullamcorper aliquet. Integer dapibus massa in ipsum euismod euismod. Donec ultrices, nisi sodales malesuada egestas, lectus arcu molestie mi, rutrum dignissim justo magna vel massa. Nunc tempus dictum erat, nec mollis metus luctus vehicula. Donec quis ultrices libero. Integer fringilla urna eget cursus iaculis.

Lorem ipsum sit amet

DEFINIR COMO SE REPORTAN LOS NO DATOS.

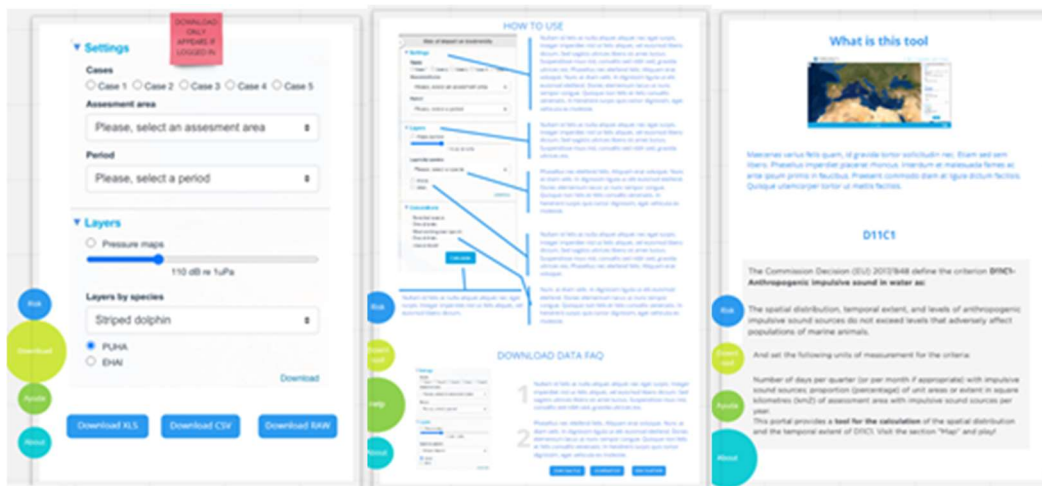
Send

The updated map removes unnecessary or poor-used elements and makes smaller the non-data-related elements like the menu bar or the footer. QUIETMED2 now focuses on the map and the sidebar. The two primary UX elements.



As the Map is the most used page and the sidebar is used to interact with, 4 sections are included on it:

- **Map:** Two tabbed section with INR-MED / Risk of Impact toggles and selectors who update the map and calculate automatically. See above.
- **Download:** The download section is basically the same tool where users can select the data and the output format to download it. Only shows if logged in (or shows a Login Form).
- **How-to:** A simple guide to use the map for non-experts visitors explaining data types and how to use it.
- **About:** Little summary of QUIETMED2 and the purposes of the tool for visitors who enters the web directly to the map.



2.2. Visual Design

Visual design represents the aesthetics or look-and-feel of any user interface. The purpose of visual design is to use visual elements like colours, images, and symbols to convey a message to its audience and with a precise organization, sizing and elements visual height drive the user on to the use of the tool and understand the visualized data.

New developments will be designed following the current visual aesthetics.

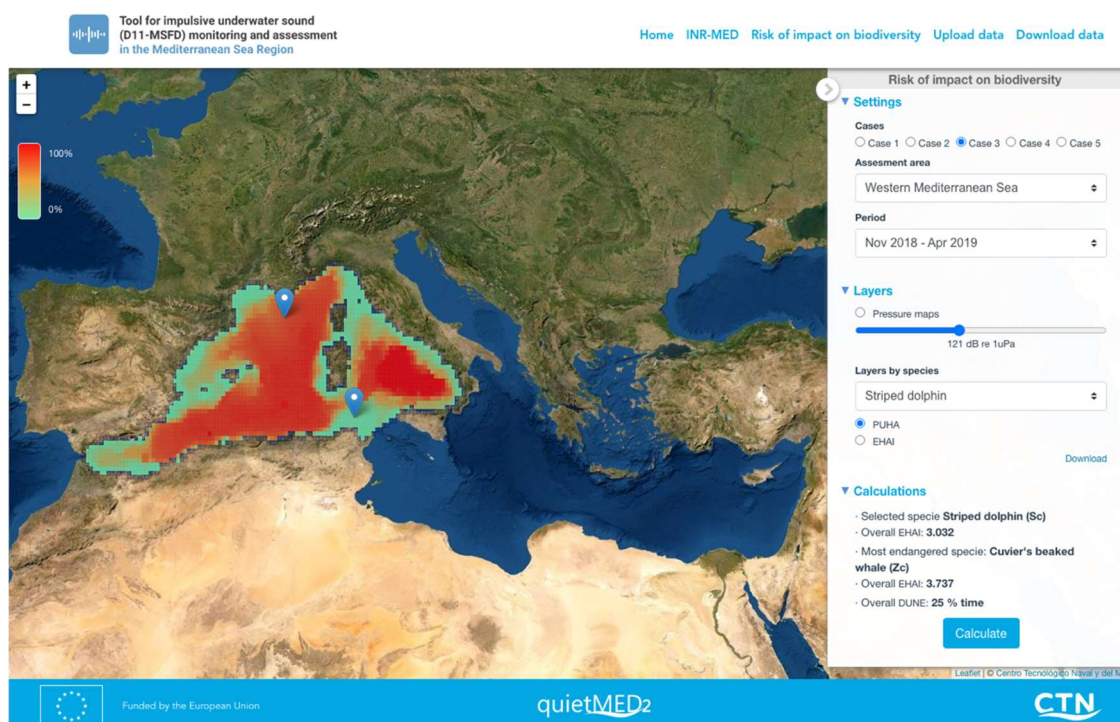


Image 2. Prototype. Data visualization of Potentially Usable Habitat Area - PUHA (in red, as marked on the legend) of Striped dolphin (selected species) within the Western Mediterranean Sea (selected assessment area) on Nov-2018 – Apr-2019 period (selected time period).

On QUIETMED2 new sections and pages have been created but the design style will remain the same, maximizing the sections and functions that the users might need.

2.3. Information architecture

Information architecture is the art and science of structuring and organizing the information in products and services to support usability and findability. Under QUIETMED2 the calculation system and methodologies need to be known but transparent to the user. As a tool to improve the decision making, the user doesn't need

to understand all the processes from the data upload to the visualization on a map, the user needs an understandable way to see the relevant information.

The proposed architecture, indicated below, simplifies the current content's structure:

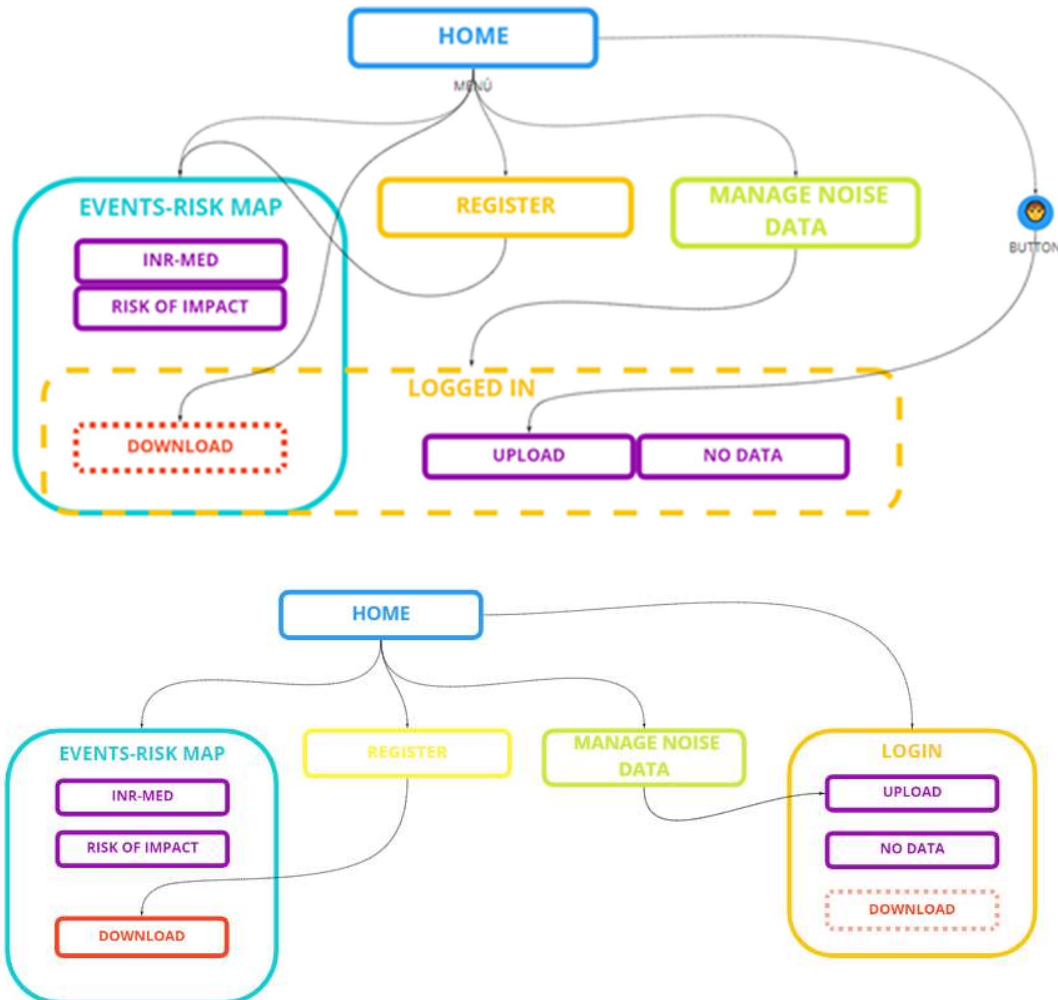


Figure 2. Proposed information architecture

There are two primary changes:

- **Register / Login Users:** Some actions only can be done by registered users (download, upload and report “no data”). This includes the creation of a Register Page and add a Login Button (or menu) on the top bar. Unregistered uses can use most of the functions for consulting or educational purposes.
- **Map and Data Visualization:** Making an effort on UX/UI we decided to simplify the toggles and actions with the map. First of all hiding unused settings and reducing the necessary clicks to reach the user needed functionality but showing a more understandable design (INR-MED / ROI data visualization or the Download Section).

QUIETMED2 tool provides a complex but transparent system using all the uploaded and processed data on an understandable map.

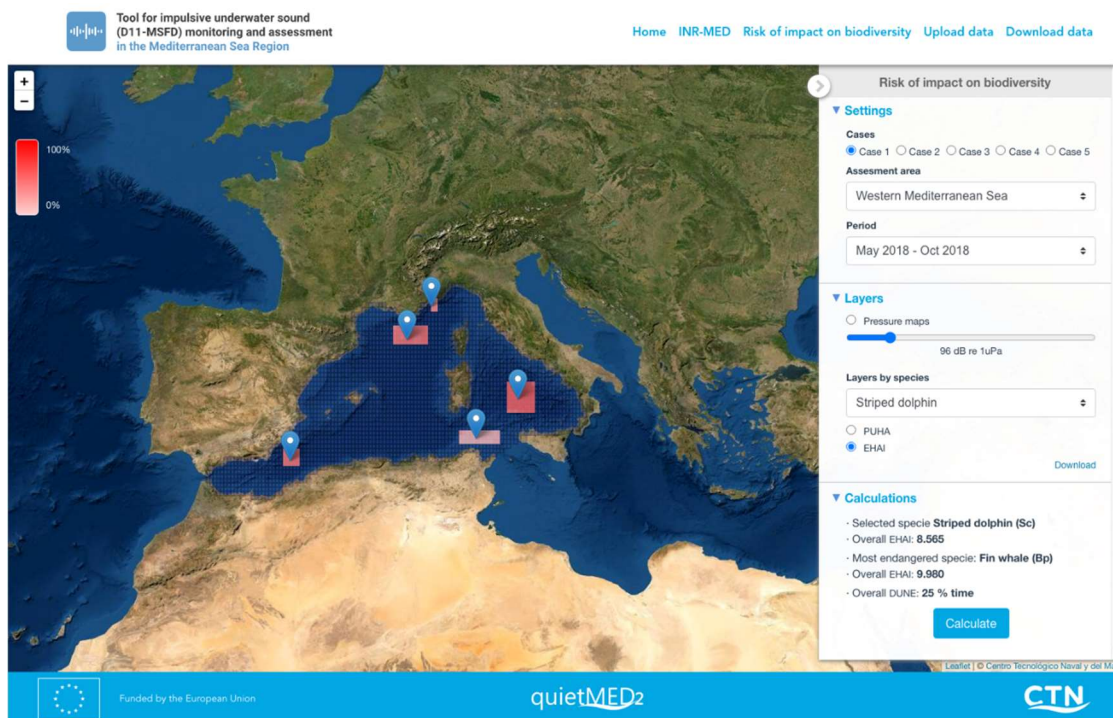


Image 3. Prototype. Data visualization of Exposed Habitat Areas Index - EHA (expressed in a red scale, as marked on the legend) for Striped dolphins through internal estimations based on calculation and user selected settings (e.g. assessment area, period, etc.).

2.4. Interaction design

It is well recognized that the component of interaction design is an essential part of user experience (UX) design, with focus on the interaction between users and products. The goal of interaction design is to create a product that provides an efficient and delightful end-user experience by enabling users to achieve their objectives in the best possible way.

QUIETMED2 has a comprehensible map on his principal page (<http://quietmed2.ctninnova.com>) and the primary interaction uses are based on three points:

- **Map and Sidebar:** A sidebar on the map visualization where the user can select and configure the sidebar and receive a live-updated map and the calculations.
- **Download Page:** the data and the results are public to download.
- **Upload page:** QUIETMED2 is capable of transform the uploaded data to some popular formats to download it for research.

Thus, the project development and design focus on improve the map visualization and a correct data validation and download.

2.5. Usability

Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. In the case of the QUIETMED2 tool, a better optimization of the tool has been achieved.

The map is more comprehensible thanks to a better design. Also, it is a bit faster to load since it uses now better data management systems and front-end technologies.

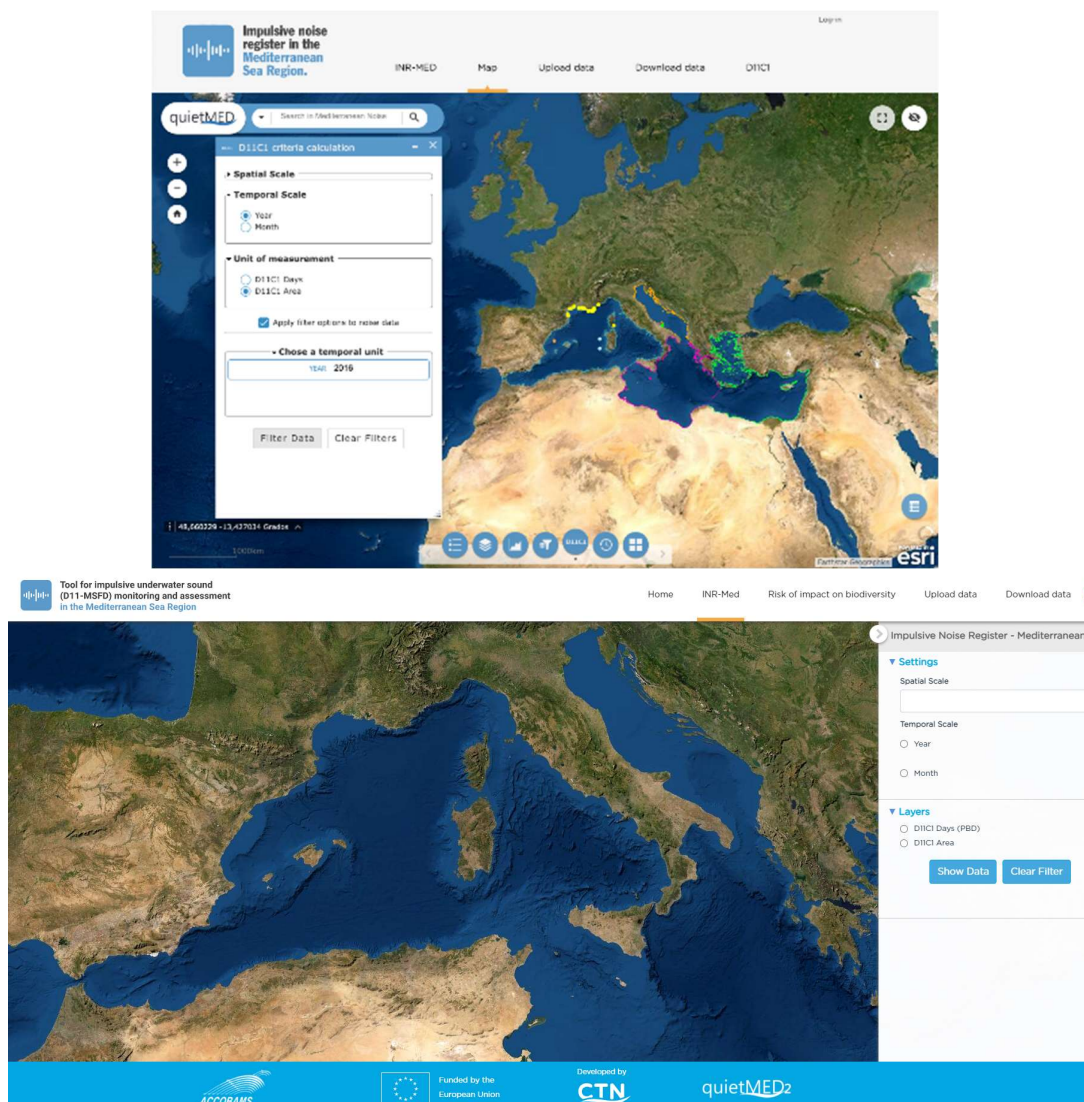


Image 4. QUIETMED / QUIETMED2 – The new map (below) has less elements but seems more comprehensible than the first one (above). Its usability is improved with less controls and a redesigned sidebar focused on the user necessities.

Furthermore, the use of underlying technologies as Docker or Bootstrap makes the developing process more efficient.

2.6. Accessibility

Accessibility of a system describes facility to reach, use, and understanding. In terms of user experience design, it can also be related to the overall comprehensibility of the information and features. It helps shorten the learning curve associated with the system. Accessibility in many contexts can be also related to the ease of use for people with disabilities and comes under usability.

In this case, QUIETMED2 tool presents huge improvement due to the evolution of the tools. It has been achieved deleting and re-shaping some elements to strengthen the visualization of important data, buttons-switch and results.

3. Training session as a practical exercise of user testing for policy implementation

User testing is the process of collecting qualitative and quantitative data from the test user. Qualitative or quantitative data are collected through users test sessions to improve all aspects of the end-user's interaction with the product to be tested.

In the case of the QUIETMED2 project, this product means a GIS-web tool to support policy making in the context of the implementation of the Marine Strategy Framework Directive with regards to Descriptor 11-underwater noise¹.

All these aspects may be summarized in seven topics:

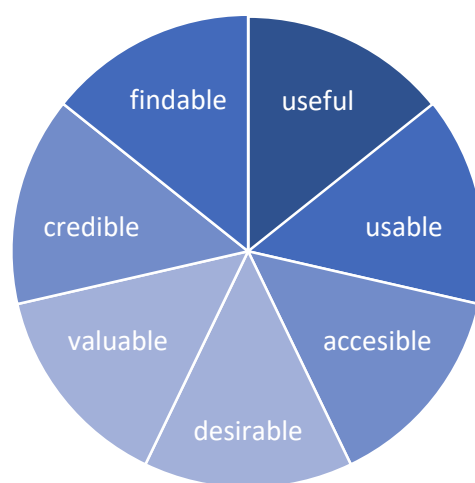


Figure 3. Aspects involved in the user test process

In more detail:

- **Useful:** Does the tool have a practical purpose? The greater the use, the greater the experience.
- **Usable:** Is the tool able to be used for its purpose? Is it complicated and confusing or easy to understand?
- **Desirable:** Adding emotion within the design, through the use of imagery, identity, and other elements of emotional design.
- **Findable:** Can users locate what they are after? Information and objects need to be locatable.
- **Accessible:** Proper use of alt text for images, organized headings for structured content, correctly labeled forms etc. (Top tips for making sites accessible)
- **Credible:** Will the user trust the tool?

¹ Detailed information about the tool may be found in the Deliverable 8.2. Data and information tool to support the update monitoring programmes of impulsive noise: <https://quietmed2.eu/outputs/>

- **Valuable:** Can the user derive value from the tool? Does the tool improve a user's satisfaction?

To perform a test of the tool, developed under the QUIETMED2 project, a specific test user exercise was including during the training session² for Competent Authorities organized by this project. The design, tools and results of this exercise are presented below.

3.1. User profile, test design and testing tools

Participants in the test have as common feature to be involved in the implementation of marine environmental policies in the Mediterranean Sea Basin such as the MSFD (2008/56/EC) and the EcAp process. However, the test users present different roles in this context:

- Competent Authorities responsible for the implementation of the MSFD.
- Researchers supporting the Competent Authorities.
- Technical expert group members.

This test was designed to assess participants a series of scenarios, tasks and questions being completed in a remote setting. This method presents as advantages:

- Large geographic diversity, with the ability to involve a panel from the whole Mediterranean Sea basin.
- Easy to run with large sample sizes.
- Timing is quick.

However, this method also has a few disadvantages:

- It can't probe test participants during the test session.
- If a user gets stuck in the test, it is more difficult direct in the right direction.

For that purpose, the user test was organized in three different sections. In the first part of the test, the tool was presented to the participants. This presentation, guided by the software developers, showed the different functionalities of the tool through a use case. Following this presentation, in the second part of the exercise, the users tested the tool by themselves using different use cases. The last part of the test was focused on assessing the use of the tool by filling an on-line questionnaire just after the test of the tool and sharing experiences by a common discussion about the live questionnaire results.

To perform this test two main tools were used: a demonstrator and an on-line questionnaire.

² The training session is described in the Deliverable D10.2. Summary report/ Conclusions of the Training session for competent Authorities from MS to authorities to stablish new regionally-coordinated measures (tools, methods and results). <https://quietmed2.eu/outputs/>

a) Demonstrator of the tool

A demonstrator of the tool was created to perform the user test. The aim of the use of this interactive prototype is to know the functionality and usability of the solution and identifying weak points before the real system is implemented.

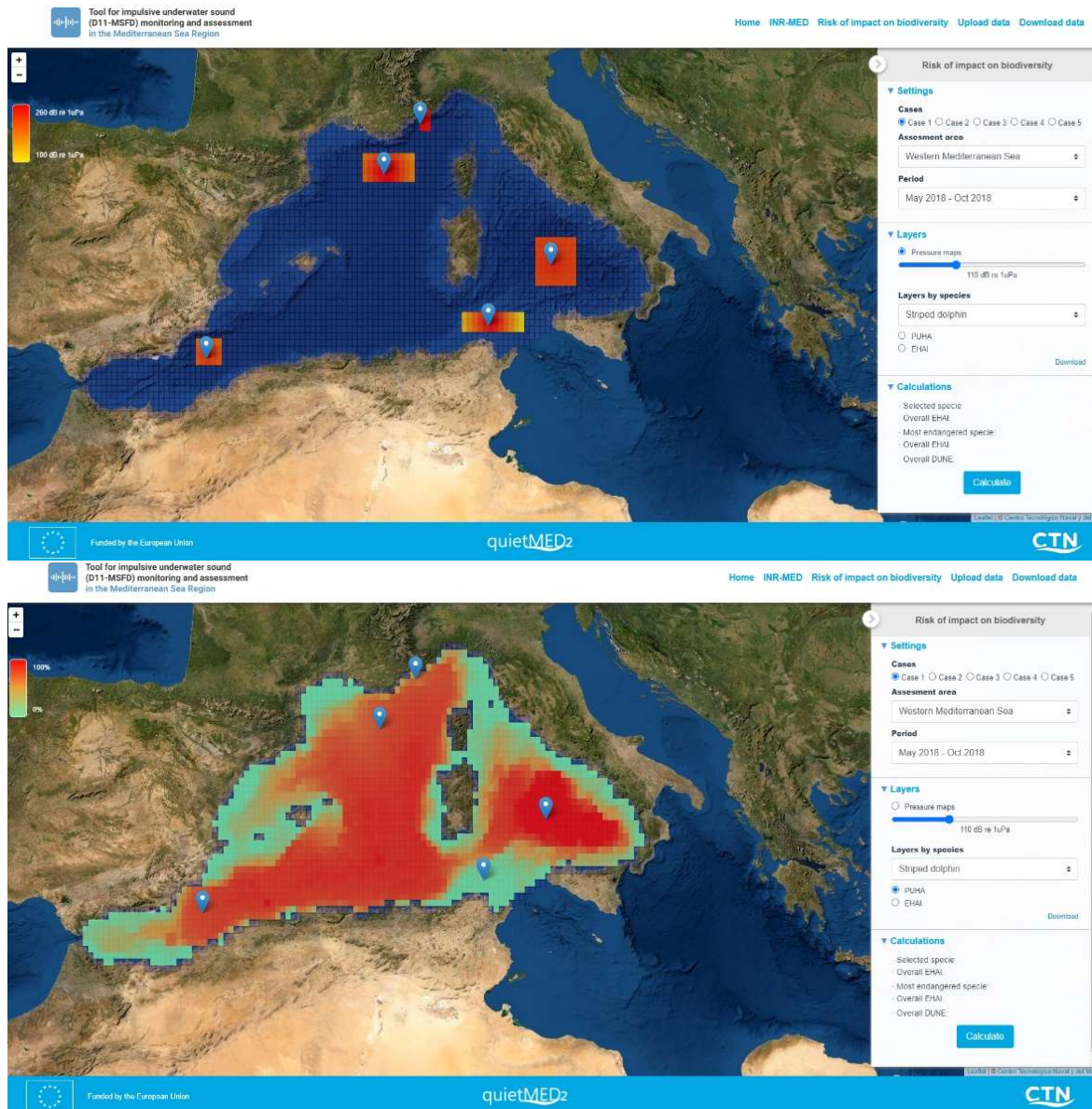
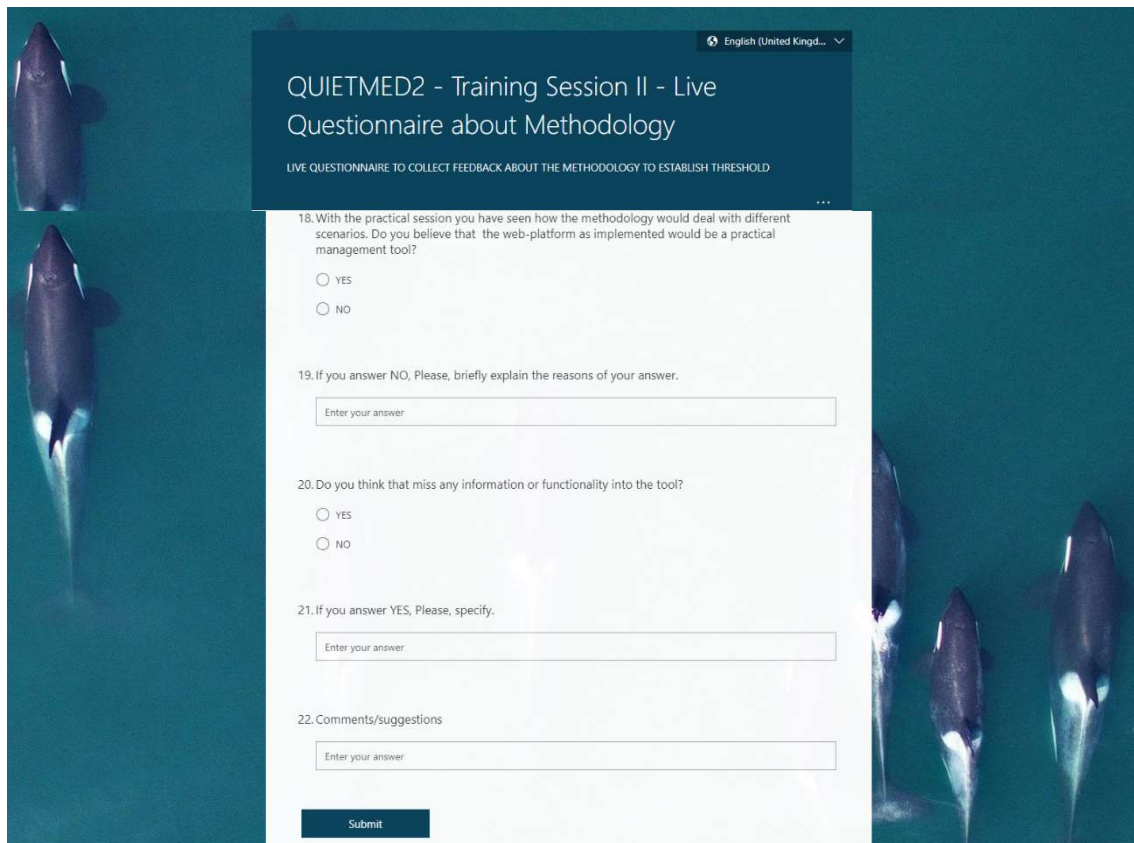


Image 5. Different functionalities of the tool tested in the demonstrator.

b) On-line questionnaire

An on-line questionnaire was designed to assess the main topics discussed during the training session in September 2020. Besides general questions on the development of other issues, specific questions on the use of the tool were included in this questionnaire as showed in the image below:



English (United Kingd... ▾)

QUIETMED2 - Training Session II - Live Questionnaire about Methodology

LIVE QUESTIONNAIRE TO COLLECT FEEDBACK ABOUT THE METHODOLOGY TO ESTABLISH THRESHOLD

18. With the practical session you have seen how the methodology would deal with different scenarios. Do you believe that the web-platform as implemented would be a practical management tool?

YES

NO

19. If you answer NO, Please, briefly explain the reasons of your answer.

Enter your answer

20. Do you think that miss any information or functionality into the tool?

YES

NO

21. If you answer YES, Please, specify.

Enter your answer

22. Comments/suggestions

Enter your answer

Submit

Image 6. Questionnaire used in the user test.

The results of the evaluation of the tool are described in the next section.

4. Evaluation of the use of the tool to support the update monitoring programmes

With the aim of assessing the use of the tool and of identifying potential weakness, specific questions were raised to the participants during the training session. Feedback from the participants, based on the live questionnaire, is presented below.

Most of the participants (96%) agreed on the idea that the presented web-platform would be a practical management tool; and 90% of the participants considered that the tool includes the main information needed to implement the methodology presented.

18. With the practical session you have seen how the methodology would deal with different scenarios. Do you believe that the web-platform as implemented would be a practical management tool?

[Altri dettagli](#)

● YES	20
● NO	1



20. Do you think that miss any information or functionality into the tool?

[Altri dettagli](#)

[Insights](#)

● YES	2
● NO	18



Image 7. Questionnaire results about the evaluation of the use of the tool.

As for the potential weaknesses, some participants pointed out the need to include some information in the tool related to technical terms (e.g. threshold values, cumulative pressures) currently on development in the context of the Descriptor 11-MSFD.

21. If you answer YES, Please, specify.

3 Respuestas

Id. ↑	Nombre	Idioma	Respuestas
1	anonymous	français (France)	I said NO but the answer can change with more practice
2	anonymous	English (United Kingdom)	I know D11 criteria are separating impulsive and continuous noise but I still have a questions for experts regarding how the two types of noise acting at the same time in an assessment area would affect GES definition (and TV to be set)
3	anonymous	English (United Kingdom)	Threshold value in conjunction with the duration of impulsive noise incorporated in the model.

Image 8. Feedback on the use of the tool.

8. Was the training clear enough to explain the proposed stepwise framework of the methodology?

[Altri dettagli](#)

[Insights](#)



Image 9. Feedback on the training

These results have been considered for the final development of the tool. In any case, this user test confirmed the potentiality of the tool presented as a management support, enabling to report, visualize and analyze noise data and their potential impact on selected species in the context of the MSFD.

5. Tool for impulsive noise monitoring and assessment. Final web design

This section summarizes the final web design, which compiles the result of the conceptual thinking and test user process for the development of the Tool for impulsive noise monitoring and assessment created within the QUIETMED2 project. This tool is available in this link: <http://80.73.144.56:8001/upload-data>

5.1. Section I. Home

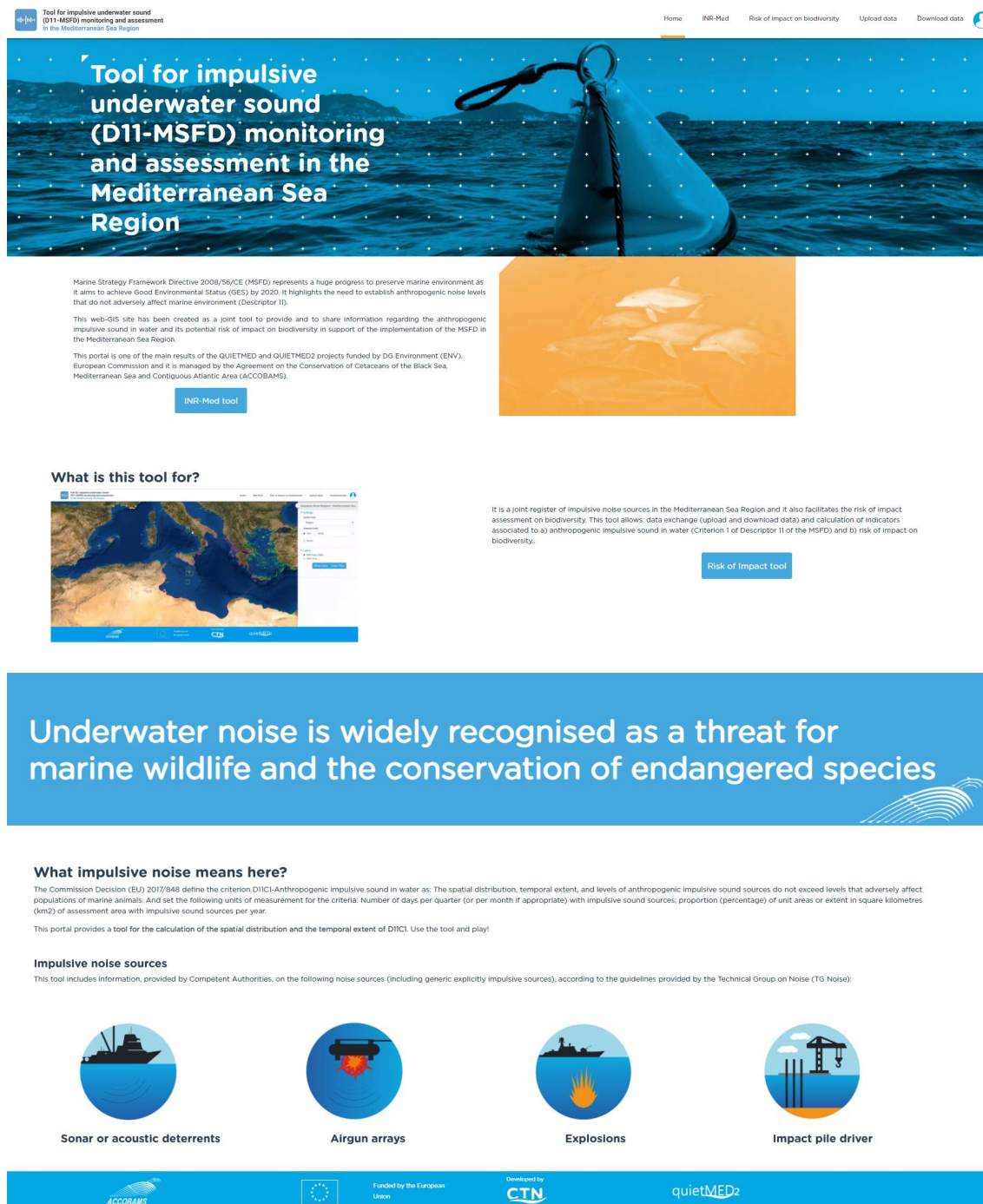


Image 10. Tool for impulsive noise monitoring and assessment. Section I: Home

5.2. Section II. INR-MED



Image 11. Tool for impulsive noise monitoring and assessment Section II: INR-MED

5.3. Section III. Risk of impact on biodiversity

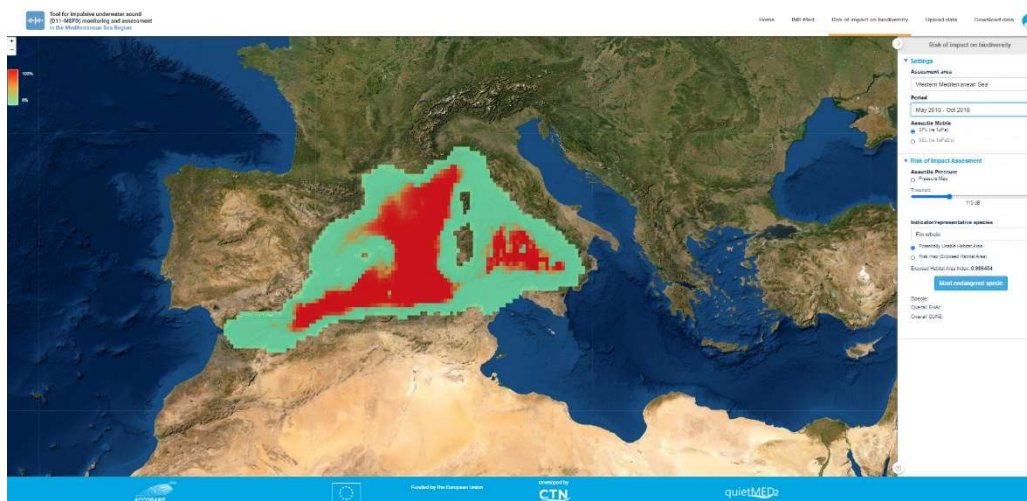


Image 12. Tool for impulsive noise monitoring and assessment. Section III: Risk of impact on biodiversity.

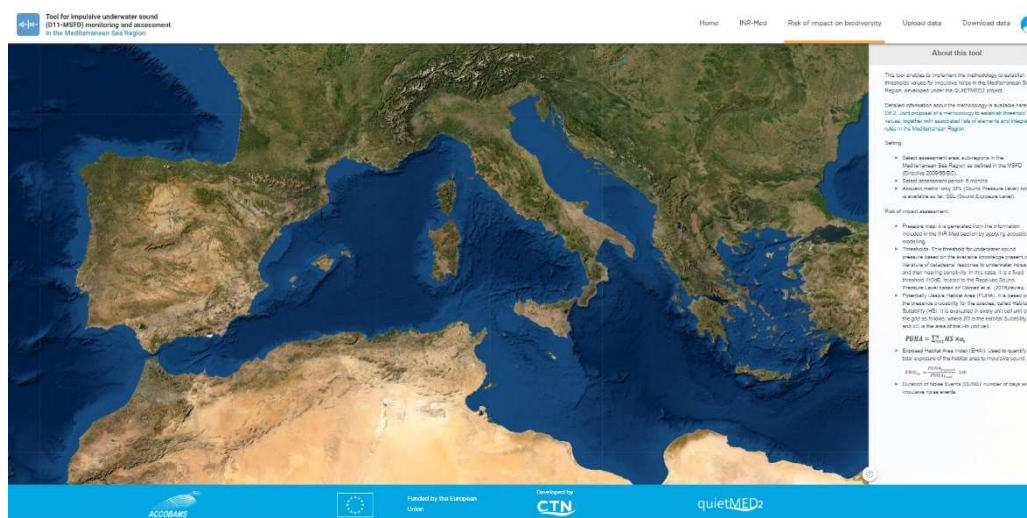
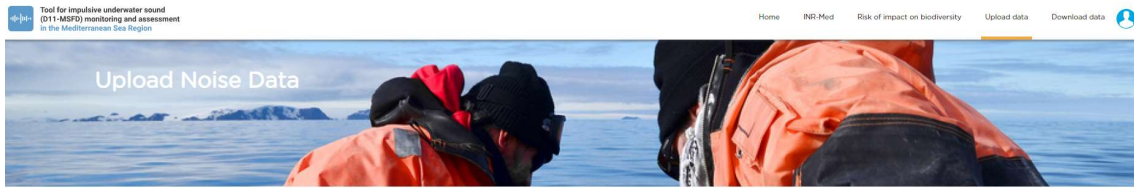


Image 13. Section III: Tool for impulsive noise monitoring and assessment. Risk of impact on biodiversity. About

5.4. Section IV: Upload data



Follow this step-by-step guide to upload data.

- 1**

Download the "Underwater noise register template for the Mediterranean Region" (excel format).

[Download Excel](#)
- 2**

Fulfill the required fields of the template following the instructions inside.
- 3**

Transform the excel file in a XML file following the instructions of the template.
- 4**

Save the XML file generated.
- 5**

Upload the generated XML file using the upload box below.

[Select XML](#) No file chosen

[Submit XML](#)
- 6**

If the upload process is successful, the application will show the message "Data uploaded successfully".



If your country has no data please report here.

Please select your country and year.

Please select the absence of noise event type

Airgun Arrays
 Explosions
 Generic Explicitly Impulse Source
 Impact Pile Driver
 Sonar or Acoustic Deterrents

I confirm that the country has no data to report for the selected noise events

[Send Report](#)



Image 14. Tool for impulsive noise monitoring and assessment. Section IV upload data

5.5. Section V. Download data

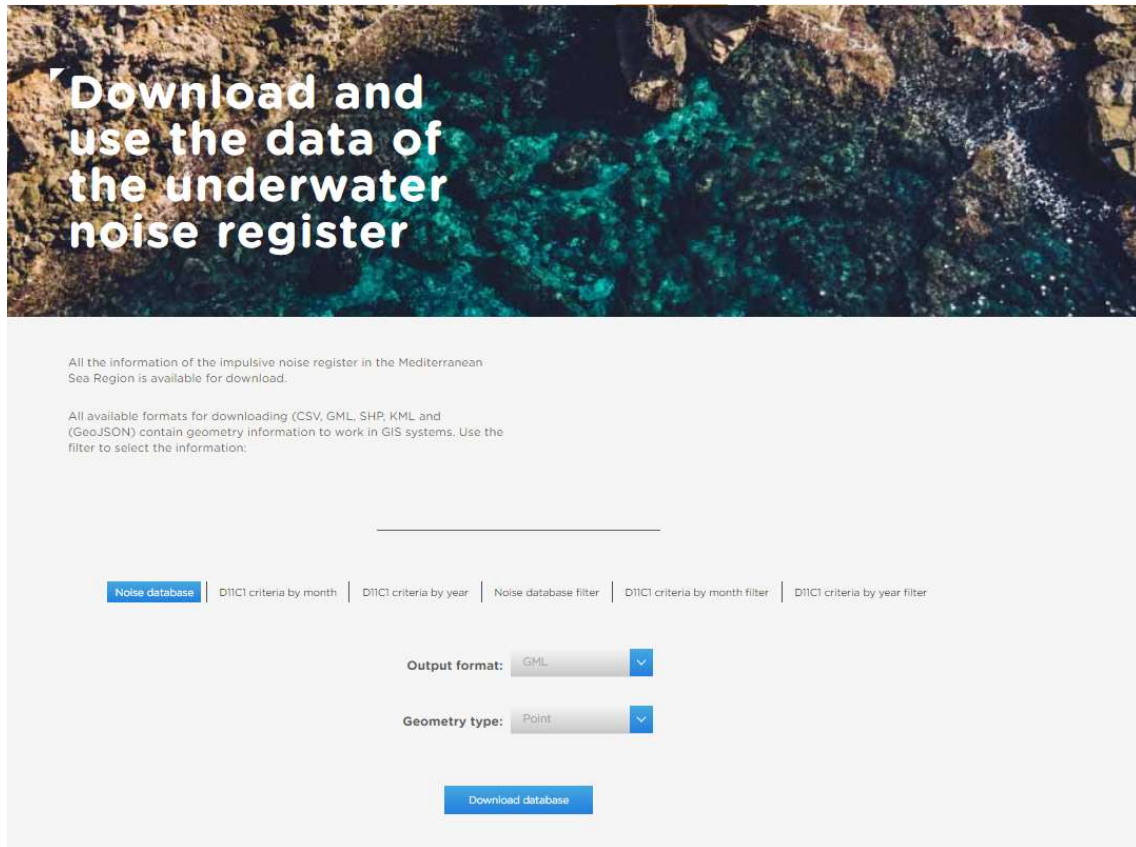


Image 15. Tool for impulsive noise monitoring and assessment. Section V: Download data.