FORCOAST

Earth Observation Services For Wild Fisheries, Oystergrounds Restoration And Bivalve Mariculture Along European Coasts

PROJECT DELIVERABLE REPORT

Deliverable Number: D5.2
Deliverable Title: Evaluation report of the pre-operational platform by end users
Author(s): Jun She
Work Package Number: WP5
Work Package Title: Service Operationalization, Demonstration & Validation

FORCOAST Project Information	
Project full title	Earth Observation Services For Wild Fisheries, Oystergrounds Restoration And Bivalve Mariculture Along European Coasts
Project acronym	FORCOAST
Grant agreement number	870465
Project coordinator	Ghada El Serafy, Deltares
Project start date and duration	1st November 2019, 36 months
Project website	https://forcoast.eu/

Deliverable Information	
Work package number	5
Work package title	Service Operationalisation, Demonstration & Validation
Deliverable number	D5.5
Deliverable title	Evaluation report of the pre-operational platform by end users
Description	This deliverable provides an evaluation report of the pre-operational platform by end-users, which have to extensively test the platform and evaluate it based on items such as user-friendliness, intuitiveness, response time, etc.
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Revision number	4
Revision Date	30/08/2022
Status (Final (F), Draft (D), Revised Draft (RV))	F
Dissemination level (Public (PU), Restricted to other program	PU

participants (PP), Restricted to a group specified by the consortium (RE), Confidential for consortium members only (CO))	

Document History			
Revision	**Date**	**Modification**	**Author**
0	05/04/2022	Report structure and drafting	Jun She
1	10/08/2022	Contributions complete	Ainhoa Caballero, Luis Rodriguez
2	23/08/2022	Revision	Jun She, Diego Pereiro
3	26/08/2022	Revision	Luis Rodriguez
4	30/08/2022	Revision	Ghada El Serafy

Approvals				
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Executive Summary

In this work, user feedbacks on the pre-operational FORCOAST service platform were collected with focusing on two areas: i) features, web presentation and fitness-for-purpose, and ii) practical operational performance of the front-end. The outcomes of this evaluation have contributed to the co-design and co-development of the service platform features, as well as improving technical performance and user friendliness of the platform implemented in WP4.

For the features, web presentation and fitness-for-purpose, a user demonstration workshop and an embedded online survey were organized. In total, 39 participants from 24 organizations responded to the survey. This includes FORCOAST internal users and external users. The participants were from 10 EU member states, including Belgium (6), Denmark (3), Ireland (6), Italy (3), Bulgaria (6), Romania (6), Norway (1), Portugal (3), Spain (2) and France (2). They were from both field and management functions in the sectors in fishery (3), bivalve mariculture (12), oyster ground restoration (6) and others (2).

The web presentation scored 8.8 out of 10 while the usefulness about 6.5 out of 10. It is noted that scores are similar across different services, ranging from 8.4-9.3 for web presentation and 6.3-6.7 for the usefulness.

The features of the subset of Service Modules (SM) that were further in an operational state at the time of the Workshop (December 2021) were also evaluated, while the rest were evaluated in a pre-operational under development state. For the Marine condition service and Front detection service, users are satisfied with the features presented. For Land pollution and Contamination source retrieval services, there are similar request on some features: more support information (e.g., background of the model, data quality information, more explanation of the bulletin results), indicating locations of sources and types of contaminants, and adding new products e.g., bacteria.

More comments were given for further improvements of the platform. Half of the users were fully satisfied with current setup, while the other half proposed the following suggestions:

- The ability to select satellite or terrain view
- Broad presentation on farms
- Services should be provided to single farm
- Specialization on different EU seas conditions

The above comments have been implemented in the platform.

The platform front-end performance was evaluated by the internal users. Practical technical issues and potential improvements were proposed. The practical issues will be further checked and fixed by the platform developer, and the potential improvement proposed will be evaluated by the platform developer to determine if they are within the scope of FORCOAST to be further implemented.

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1. Introduction

The activities of this task encompass the engagement with end-users regarding the practical aspects of working with the developed platform and its testing in the pre-operational environment. This task liaises with end users and co-develops the end-users evaluation template that has been used to evaluate the platform under various criteria. These criteria will range from practical aspects of the platform (e.g. user-friendliness, intuitiveness, response time, etc.) to merit-based criteria, (e.g. is the platform capable of addressing a specific question). In this pre-operational phase, users had access to functionalities of the platform and were able to construct scenarios and structure complex decision questions. Users were able to assign a score to each of the practical criteria and to provide a score as to what degree the platform met their requirements as regards supporting a particular question. This feedback is part of an iterative co-design and co-development process of the platform, which was transferred to WPs 3 and 4.

The user evaluation of pre-operational platform and service includes an evaluation during an initial pre-operational testing (i.e. service testing). There is a second part of the evaluation, which is the one after the improvements are implemented (i.e. service validation). This second part evaluation will be summarized in deliverables D5.7 and D2.3 to be submitted in subsequent months.

The methodology and outcomes of the pre-operational testing are described in section 2 and section 3, respectively and discussed in section 4.

2. Methods

2.1 Service modules to be assessed by users

The service-testing and user evaluation was conducted during a service demonstration workshop with the end users on 10th December 2021. By that time a pre-operational demo, conducted by our internal end-users in an user story format, was available for four of the 7 SMs (please be noted that SM-A1 and former SM-A5 are merged into one service - Marine Conditions). An online Mentimeter survey was carried out during the event for the following services as they were the ones more advanced in the operational development cycle at the time of the event (December 2021), i.e.:

- SM-A2: Land pollution,
- SM-A1: Marine conditions,
- SM-F2 Front detection,
- SM-R1 Contaminant source retrieval,

as illustrated in Fig. 1.

2.2 Survey design

The survey included four parts:

i)   Participants' profiles;
ii)   User rating fitness for the purposes and user friendliness on information provision per service module;
iii)   User feedback on the completeness of the service per service module;
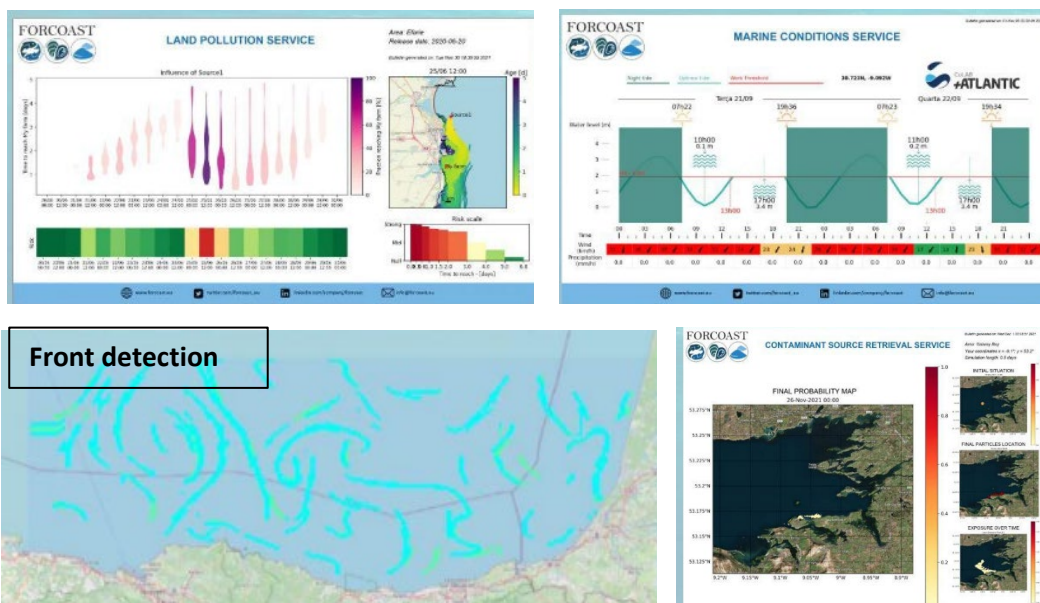iv)   final feedback on all service modules.

Figure 1. Four SMs assessed in user Demonstration event on 10 December 2021: Land pollution (upper left), Marine conditions (upper right), Front detection (lower left) and Contaminant source retrieving (lower right)

Participants' profiles - the participants' profiles include information of participants' name, sector and countries.

Fit-for-purpose feedback – one question is asked for a given SM: How useful/needed is it for your operations? The participants will need to give a rate (out of 10) for the given SM.

User friendliness feedback – one question is asked for each of the four SMs: Is it clearly presented? The participants will need to give a rate (out of 10) for the given SM.

Completeness - one question is asked for each of the four SMs: are you missing any key features from this service information based on your foreseen use?

Final feedback – The purpose of the final feedback is to get users' feedback on general issues, i.e., the interactive feature of the platform (Q1), potential improvements on general presentation (Q2), users' intention to use this service (Q3, Q4), financial impact (Q5), share observations (Q6), and future user contribution to FORCOAST (Q7). The seven questions are listed below:

Q1. Is the foreseen interaction with the platform suited to your needs?
Q2. Are there any improvements you would like to suggest?
Q3. Would you make use of the FORCOAST platform and service products presented?
Q4. Which of the presented services would you subscribe to?
Q5. By using the information service such as the one presented, how much revenue could you gain (per year)?
Q6. Would you be keen on sharing some additional data on your operations to improve the offered services? If so, how frequently?
Q7. Would you like to follow and contribute to the FORCOAST services and to be contacted for closer future interaction? For which specific services?

2.3 Platform front-end evaluation

During the implementation of the service platform, FORCOAST internal users have been invited to test the platform and give their evaluation on the performance and suggestions for future improvements. The results of this evaluation are given in section 3.5.

3. Results analysis

In the FORCOAST User demonstration workshop, the four Service Modules (SM-A2: Land pollution, SM-A1: Marine condition, SM-F2 Front detection and SM-R1 Contaminant source retrieval) were first introduced and presented. Then, an online survey was carried out in an interactive way between the workshop organizer Deltares and the participants.

3.1 User profiles

In total 39 participants from 24 organizations responded to the survey. This includes FORCOAST internal users USOF, Marine Instruments, Brevisco, FOCUS-Uliege, Exporsado – Pt, DMI, Cuan Beo Environmental CLG, ICBM, NTNU, Jailoo, Oyster Boat and RBINS and external users NIMRD Grigore Antipa, governmental agency, EATIP, A.M.A, ILVO, MATYFISH LTD, public research institute, EPA, NUI-Galway, HIDROMOD, AZTI, BlackSea – Danube Association for Research and Development www.bdcabg.org etc. A more wide FORCOAST user list has been identified and given in Appendix Table A1.

The participants were from 10 EU member states, including Belgium (6), Denmark (3), Ireland (6), Italy (3), Bulgaria (6), Romania (6), Norway (1), Portugal (3), Spain (2) and France (2).

Among the participants, 29 of them specified their working sectors: 3 from fishery, 12 from bivalve mariculture, 6 from oyster ground restoration, 2 from management, 19 from research and 3 from others (Fig. 2). One responder might choose more than one working sector. It shows that bivalve mariculture and oyster restoration have relatively more representation but fisheries users are relatively limited.

Figure 2. Sectoral distribution of the survey participants.

3.2 Fit-for-purpose and user friendliness survey per SM

For each service module, users were asked to give a rate (out of 10) on how they think the SM will fit for their operation purpose, and how clear is the SM presented. The results are given in Table 1. The first feature is that the number of interested users is different for different SMs. The contaminant source retrieval SM got 28 votes while Front detection SM only received 9 votes. This is consistent with responders' sectoral

distribution in Fig. 2: bivalve mariculture and oyster restoration have more participants than the Fishery sector.

For the first question, the score ranges from 6 in Marine condition service to 6.7 in Front detection service. This means the presented SM addressed more than 60% of the user operational needs (positively) but still, some of the user needs might not be addressed in the current service.

Table 1. Rate (out of 10) on service information to fit for users' purposes and user friendliness

Rate (out of 10) on Service information	Services			
	Land pollution (19 votes)	Contaminant source retrieval (28 votes)	Front detection (9 votes)	Marine conditions (13 votes)
How useful/needed is it for your operations?	6.3	6.4	6.7	6
Is it clearly presented?	8.6	8.7	8.4	9.3

For the second question, the score ranges from 8.4 in Front detection to 9.3 in Marine conditions, which means that all SMs are clearly presented. However, Marine conditions service is the most clearly presented SM. The mock-up of the Marine condition service is illustrated in Fig. 3. An integrated meteogram is used to present this service.
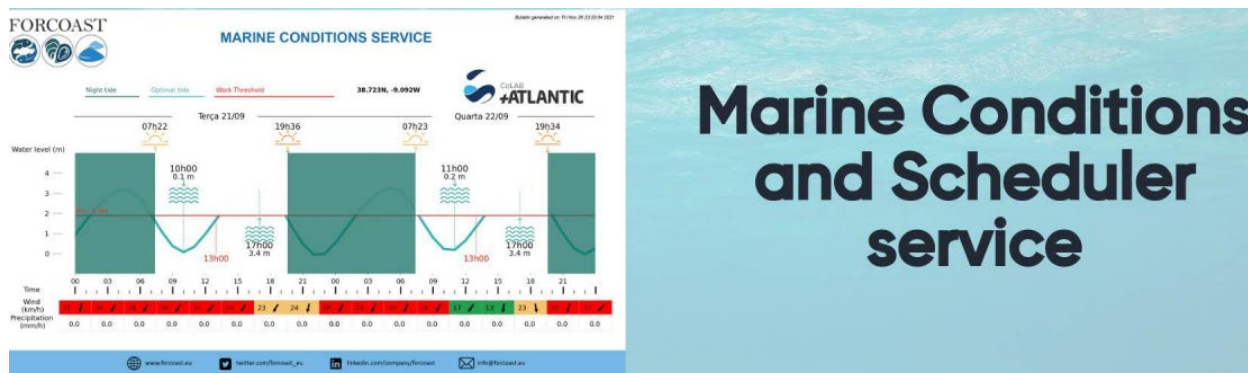

Figure 3. Marine Conditions service module illustration

On the other hand, Front Detection was voted as the least clear presentation (rate as 8.4 out of 10), as illustrated in Fig. 4. The strong and weak fronts are clearly distinguished by the plot. However, a conclusion from the consortium is that, a user may have less sense of the position and intensity of the front and what a strong or weak front really means to them as opposed to a SST forecast, for which a user knows exactly what, for example, 5 ^{0}C is.
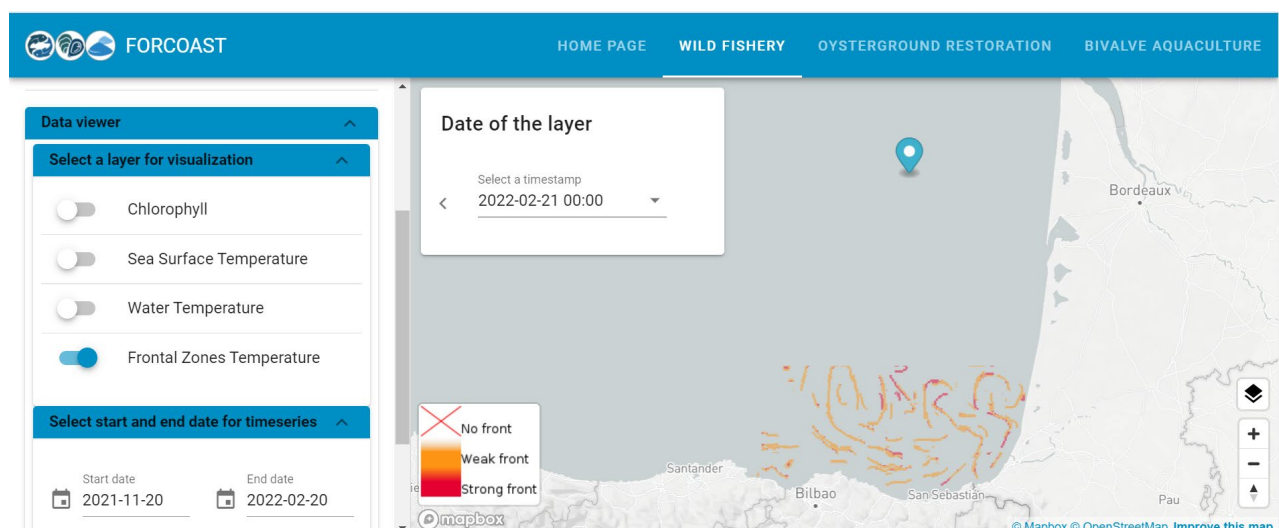
Figure 4. Front Detection service module illustration.

3.3 Missing feature per SM

For each SM, users were asked to propose features they wanted but were missed in the current SM specifications. The results are described below.

Land pollution SM (SM-A2)– In total 9 responses were received, among which 5 voted for no features missing. Other users have suggested their wishes for an extended service or missing features:

I.   Wish for the SM to be extended to other applications, e.g. bacteria.
II.   Wish to make it more user friendly.
III.   To have a Source menu list to choose from.
IV.   To have an explanatory page, which would be helpful for users from industrial entities.

Replies from SM-A2 service provider:

I.   The major technical barrier to SM-A2 lies in the difficulty to constrain actual harmful discharge rates (let alone forecast those). To overcome the restriction of a priori ignorance of harmful release rates, SM-A2 was built around the notion of "potential harm in the case of release", i.e. as a tool to support the planification of sanitary control. While there is a clear interest in further characterizing the nature of released harmful substances (eg. bacteria, chemical pollutants, oil, floating debris, ..) in order to enhance the estimates on potential nuisance on user's premises, such additional level of details requires in-depth quantitative characterization, This being said, these issues could be tackled in parallel, i.e. enforcing biophysical representation of a substance's behavior in seawater on one hand, and be ready to uptake any further enhancement on source characterization. The adopted Lagrangian module allows to record any environmental data available along the drifting trajectories. This means that, depending on their availability, variables such as in-situ temperature, salinity, solar radiation, oxygen may be used to constrain the fate of released substances in a more quantitative way. Accessing those variables is thus considered to require moderate efforts. However, building a substance-specific fate model under the influence of these environmental variables constitutes a substantial development effort, which was not foreseen within FORCOAST lifetime but could be evaluated more explicitly as a part of a beyond-project development plan for a specific user-funded trajectory.

II.   Interface issues are in the hand of the larger-scope platform development. Specific requirements on the front end for SM-A2 have been identified, proposed, and have been implemented by Platform developers.

III.   The requirement is unclear. The pollution source input requirements (i.e. currently: location) are to be provided by the users. Rather than a predefined list of potential sources from every location, which is technically not feasible at European scale, we implemented the option of a graphical map interface to let the users define the source points.

IV.   The general framework of User Manual is considered at project level, and coordinated under the frame of deliverable D5.2.

Contaminants source retrieval SM – In total 13 responses were received, among which 5 voted for no features missing. Other users have suggested their requests for missing features:

I.   Hypothesis behind the model
II.   Source of contaminants location menu. Option to choose from several (if possible)
III.   Type of contaminants
IV.   Enable user input for entering different survival values for different particles, e.g. E. coli, sediment, virus.
V.   Info on the data quality

This is a service provided by backtracking. Some users did not understand the theory behind it. For example, a user suggested "The location of input discharges from agriculture or industry is difficult to identify the sources", or a question like "Are the spring tides programmed into the model?". Thus to give a short presentation on the modelling method would be useful, as suggested in missing feature i). The relevant information can be found in D5.2 and D5.4.

Front detection SM – only 3 participants responded. Two of them voted for no major features missing, while the third one would like to have "the information being sent to my email in a bulletin or short report, for instance." Due to only a fraction of the partners being involved in the fishery sector, we already expected more attendance from the aquaculture sector. This will be addressed in subsequent user engagement events that will be held individually from a Service/Pilot perspective.

Marine condition SM - In total 7 responses were received, among which 2 voted for no major features missing. Other users have suggested their wishes for missing features, which is mainly to have a full set of water parameters, including not only tides but also wave height, ice, currents and winds.

The suggestions are considered as valid. Since currents and winds are also provided by the model forecasts in this SM, the forecast time series for currents and winds can be presented. According to the users, waves and ice (in Limfjorden) information are even more important than currents and winds. Due to the lack of wave and ice observations in Limfjord for the validation of the forecast models, no activities are planned within FORCOAST to provide these forecast services in Limfjord. This activity could be evaluated more explicitly if data becomes available as a part of a beyond-project development plan for a specific user-funded trajectory

3.4 Overall platform prototype feedback

Q1. Is the foreseen interaction with the platform suited to your needs? and
Q2. Are there any improvements you would like to suggest?

These two questions are asked for improving the cover page of the web service, as shown in Fig. 5.
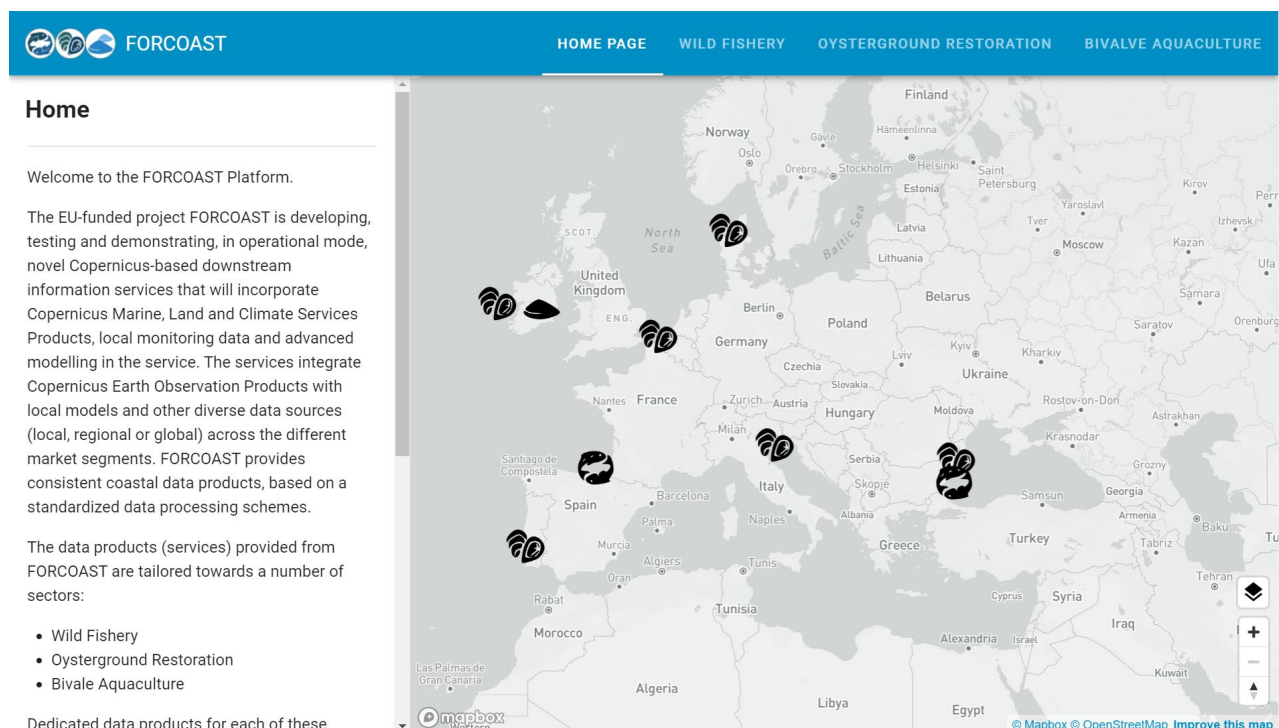
Figure 5. The cover page of the service website for comments.

In total, 9 responses were received, among which 5 voted for the page being satisfactory. Other users have made suggestions for further improvements:

- The ability to select satellite or terrain view
- Broad presentation on farms
- Services should be provided to single farm
- Specialization on different EU seas conditions

Q3. Would you make use of the FORCOAST platform and service products presented?

In total, 15 replied. All of them said they would like to use the service. However, only two of them said they would subscribe to one or more SMs with a fee without a condition. The other 13 are "conditional" users. Seven of them said they will use it if the service is free. The other six users stated that they agree with a subscription fee, only if the service is more adapted to their particular needs.
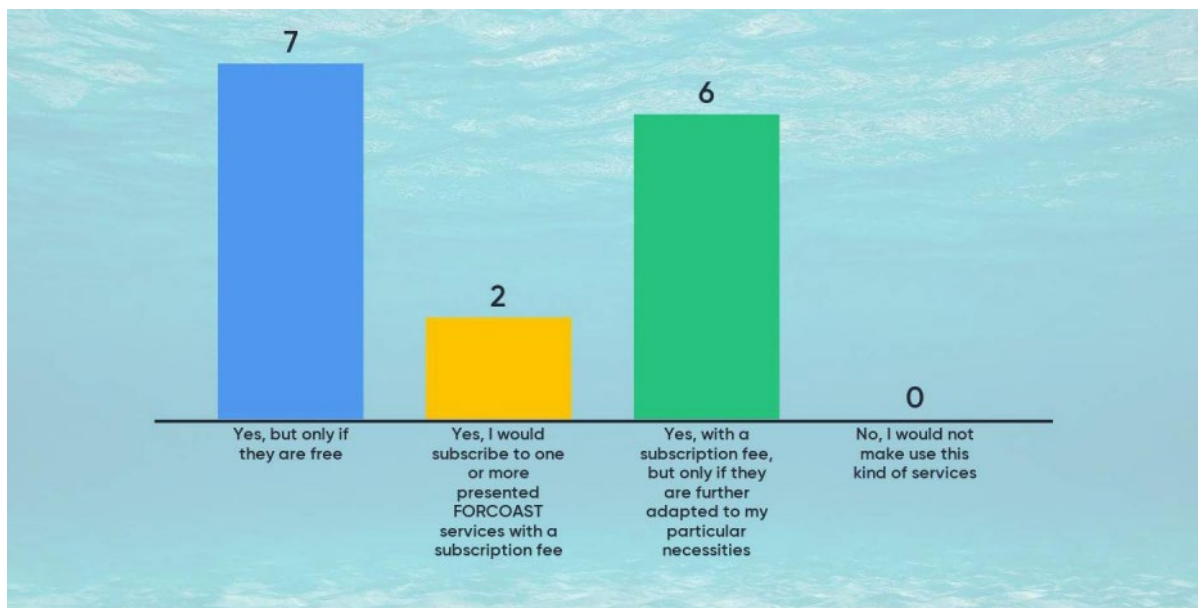
Figure 6. Outcomes on question: Would you make use of the FORCOAST platform and service products presented?

Q4. Which of the presented services would you subscribe to?
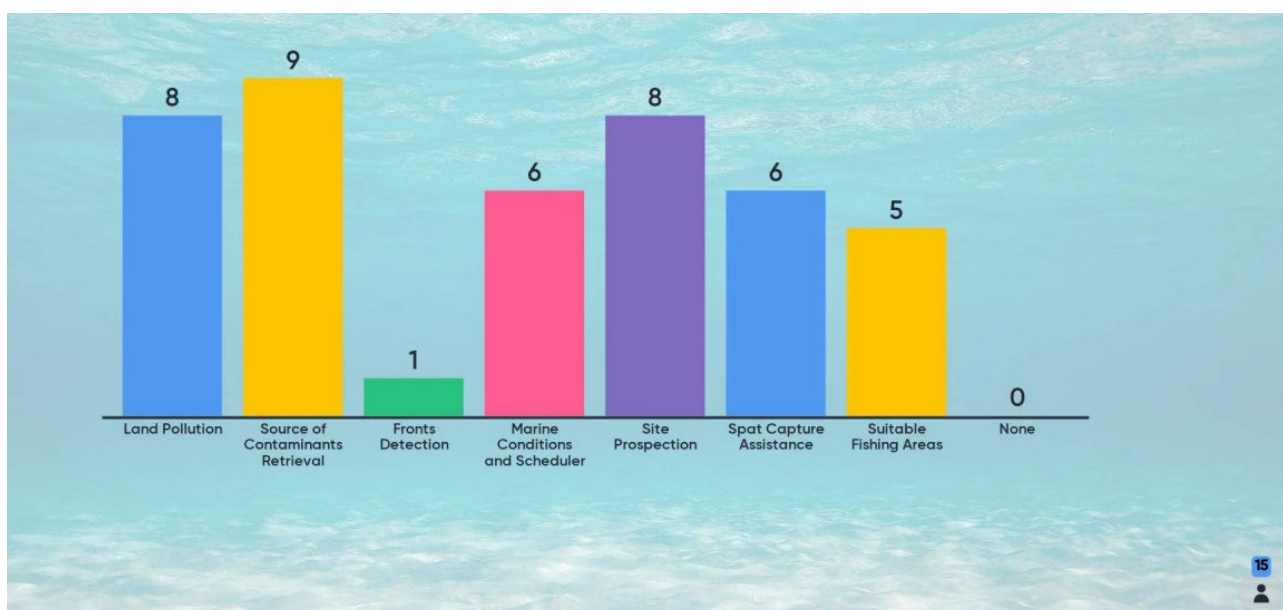

Figure 7. Outcomes on question: Which of the presented services would you subscribe to?

This question is about users' interests on specific SMs. In total 15 replied. All of them said they would like to use at least one of the services. There is a relatively large percentage of use for all SMs (ranging from 33% - 60% for each SM), except for the Front Detection SM which only has one user stating that they will use this SM (Fig. 7). This is again related to the missing users from the fisheries sector.

Q5. By using the information service such as the one presented, how much revenue could you gain (per year)?

This question is about users' potential financial benefit by using the FORCOAST service. In total 8 replied, which are the ones who could make financial benefit from using the service (Fig. 8). Considering replies for

Q3 and Q4, in which there are 15 users interested in the service, but 7 stated that they will only use the service if it's free, it is very much possible that these 7 users are not willing to pay for the services or they state their preference for free services. Then, there are 8 users left. The annual potential revenue by using the FORCOAST service ranges from 0-25K€, with 62.5% voted for an annual income of 1-10K€ by using the service. The estimated mean annual revenue is 5156€.
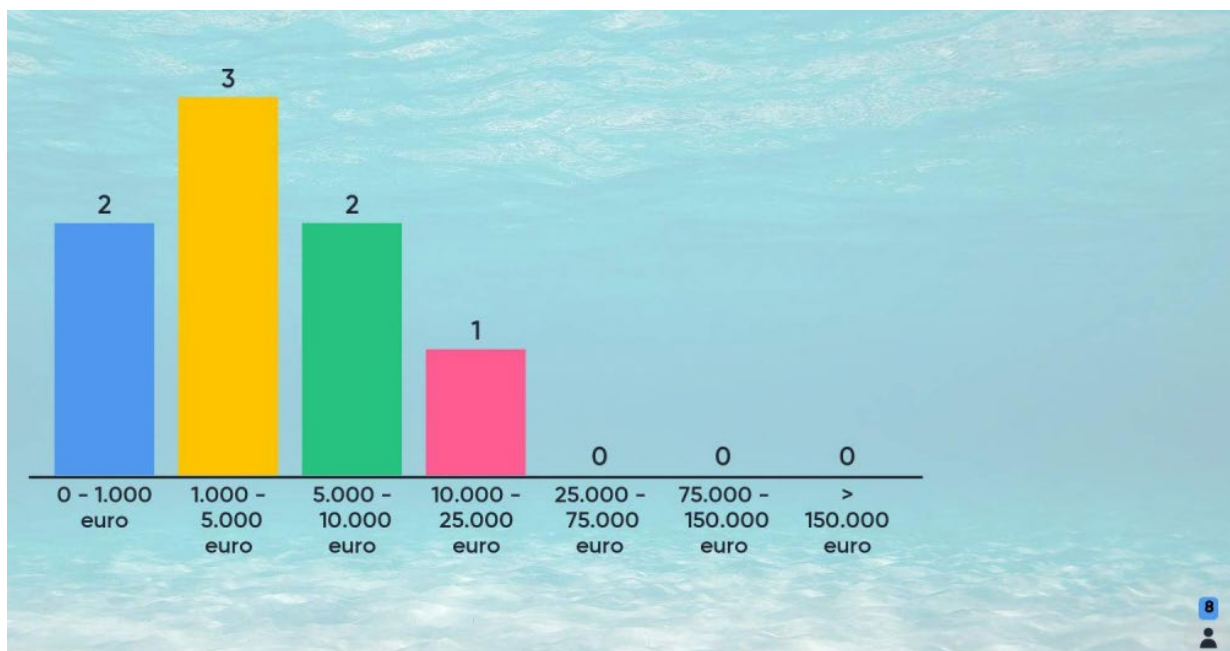

Figure 8. Outcomes on question: By using the information service such as the one presented, how much revenue could you gain (per year)?

Q6. Would you be keen on sharing some additional data on your operations to improve the offered services? If so, how frequently?

This question concerns users' willingness to share their data with FORCOAST. In total, 11 users replied, which are the ones who may have their own observations made and are willing to share. The frequency of data contributions ranges from daily (1 user) to yearly (1 user). Most of them have data available in a delay mode of 1 week to a few months. This also shows that the farmers lack a real time data delivery capacity.
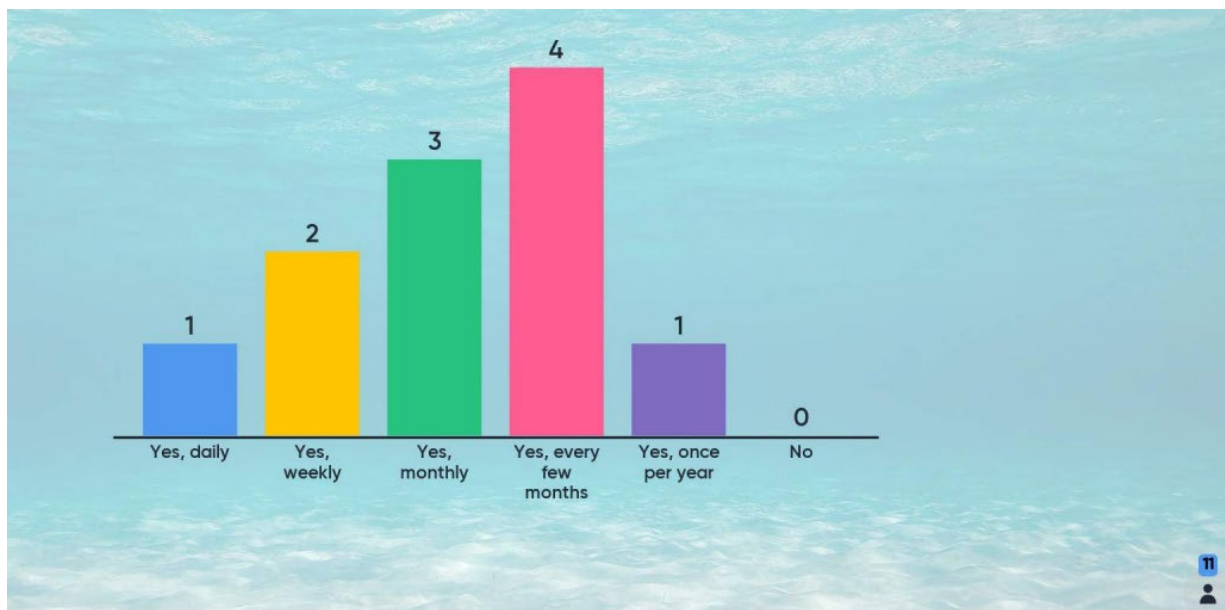
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Figure 9. Outcomes on question: Would you be keen on sharing some additional data on your operations to improve the offered services? If so, how frequently?

Q7. Would you like to follow and contribute to the FORCOAST services and to be contacted for closer future interaction? For which specific services?

For this question, there are only three replies. Marine conditions, Site prospection and Spat capture SMs were mentioned as the interesting services to follow. One user suggested having another similar meeting.

3.5 Status for SM-F1, SM-A3 and SM-A4 co-development

Implementation of SM-F1 (Suitable fishery areas), SM-A3 (Site prospection) and SM-A4 (Support for spat capture) in the platform was not as advanced as the four SMs mentioned above in the User Demonstration Event of December 2021 which results are being presented in this report. Since only graphical prototypes were available at the moment of the user demo workshop, they were explained to users by SM leaders without an online demo. For them, two questions are asked to identify usefulness of the SMs to the users and essential features that the users would like to have.

The outcome of the usefulness survey is shown in Fig. 10. In total, 14 users replied. Nine of them chose Site prospection SM-A3, 6 for Spat capture SM-A4 and 5 for suitable fishery area SM-F1. Only one of them has no interests.
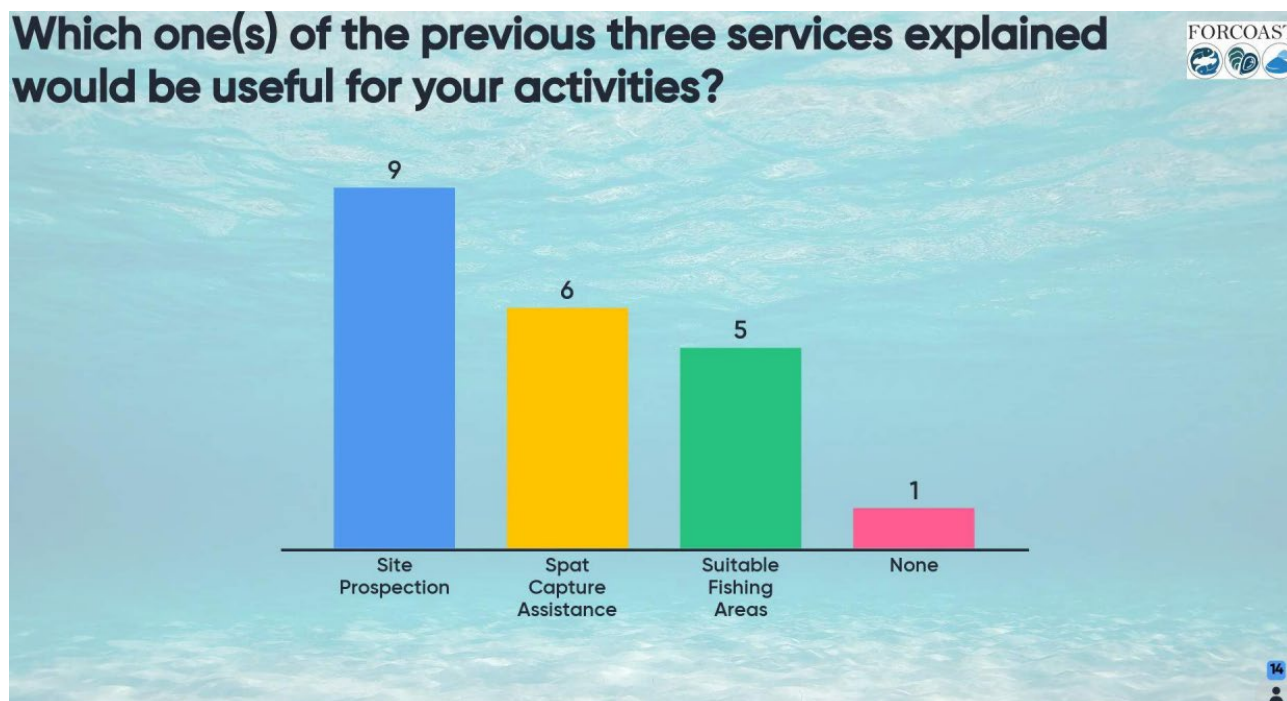
Figure 10. Outcomes to the user relevance survey

For the essential feature, the following question was asked:

- Based on your foreseen use of the 3 SMs, what would be their essential features in terms of information and how it is presented.

Seven answers were received. Three of them just stated that the three SMs were interesting without further suggestions of more essential features. One suggested identifying "which user inputs are needed for each SM". This has been in fact addressed in previous General Assembly survey and user requirement documents (D2.1). The remaining three users suggested information needs on "Wind-wave-precipitation forecast", sedimentation, and fish information. Among them Wind forecast has mostly been addressed in SM-A1, sedimentation can be addressed in Land pollution SM and fish information is out of the scope of FORCOAST.

3.6 Feedbacks from internal users on the practical aspects of the platform

Internal users have been asked to evaluate the front-end of the platform to ensure its proper functions. Below is a collection of internal user feedback. Note that since December 2021 when the feedback was collected, every feedback listed below has been considered and an appropriate improvement has been implemented to address any potential issue or suggestion.

SM-A2: Land pollution service

Performance: Issues in the front-end: for Pilot Romania, the bulletin runs too long to give results

Ways to improve:

- Underlie a real-picture layer (e.g. style google earth), to make it easy for the users to select their own farming site as a polygon.

- Since the running time is quite long, automated runs with user defined time and frequency to receive the information will be implemented.
- Reconsider the download tools and request only the variables of interest.

SM-A1: Marine conditions

Issues in the front-end:

- 2D maps in "Data Viewer" only work for some of the time stamps
- The service bulletin does not work when choosing current and recent a couple of days.

Ways to improve:

- Data viewer:show forecast and hourly data.
- Service runner: for the water level bulletin, using m/s for wind is more popular than km/h.

SM-R1: Contaminant source retrieval

Issues in the front-end:

- After waiting for 10-15 mins I closed the application, because the message was saying that the job is still running, and I am not sure if it got stuck or if it actually takes so much time (see my comment 3 below). It would be good to have a CANCEL button, e.g. for the case when the user makes a mistake in the set up and wants to restart the simulation.
- I clicked the Back button in my browser and I was not able to set it up again. I had to click the Back button again and then I was able to set up a new simulation. This time I set it for 1 hour and 2 hours later it was still running
- The SET button for the coordinates is inactive, so I could not "lock" the coordinates

Ways to improve:

- Indicate estimated waiting time in the manual and interface.
- The user is able to select a day from the calendar, and also the hour of the day will be available to choose as simulation start.

4. Discussions

Main purpose of this user evaluation is to help co-designing the service (in WP3) and co-developing the pre-operational platform (in WP4) so that the platform can meet user needs. All the user feedback has been examined and implemented if appropriate. There are two issues we would like to discuss: one is if the feedback from this report is representative, i.e., if there are any major issues missing; the other is how can these feedbacks be further used in co-designing and co-developing the pre-operational platform.

User opinion on the service and FORCOAST response

 The users are satisfied with the presentation of the service, i.e., the service is clearly presented. However, the score of the usefulness of the service is about 6.5 out of 10 (Table 1). This means that the services are interesting and useful but they fully meet 60-70% of the users' needs. There are still missing features. For example, for Marine condition service in Limfjord, the ice and wave conditions are important variables but they are not in the service list yet. For Land pollution service, users would like to have information on the type of bacteria. This is also currently not possible. These suggested missing features can be considered for future developments under a user-funding trajectory including the data availability conditions for validation.

Other wishes from the users include availability of background information, e.g., introduction to the models and products, and the data quality. This information is available in other FORCOAST deliverables. The model information can be found in D5.4, product information in D5.6 and quality information in D5.4 (for model products) and D5.5 (for Key Performance Indicators). Their relevant information and links to these documents are included in the service platform and project website to make this information available and accessible.

Internal users performed a detailed evaluation of the front end and the feedback is given in section 3.6. The identified bugs or problems have been implemented in the platform (WP4). Some suggestions cannot be implemented in the project period and are only for future improvements.

Comprehensiveness of the user evaluation: in this report, the user feedbacks were collected from both internal and external users. The external user feedbacks are mainly based on the User Demonstration Workshop in December 2021. The internal user feedbacks are from both the demonstration work and project internal communication. In the user demonstration workshop, both general and SM-specific evaluations were conducted. However, due to the development and operational implementation status of SMs at the time of the workshop, four out of seven SMs were evaluated with SM-specific questions. This means that more specific external user feedbacks for the remaining 3 SMs (SM-F1, A3 and A4) was missing at that stage. Considering that the 3 missing SMs were actually evaluated by internal users, with focus on the platform front-end performance, and the four evaluated SMs cover all three service sectors: Wild Fishery, Oyster Ground Restoration and Bivalve Aquaculture, and considering also that the suggestions from users have led to good improvements of the platform, the outcomes of the user evaluation in this report can be regarded as sufficient and to this end comprehensive. Specific evaluations of the 3 missing SMs will be carried out in a series of user meetings, and the results will be reported in D2.3 and D5.7.

Appendix. Identify a wider user community

Existing users are identified and documented in D2.1, later on updated by the user demo workshop on 10 December 2021. This is further updated in Table A1 in the Annex.

In addition to the existing user list, 20 new potential users have been identified and included (Table A1).

Table A1. A list of identified users for FORCOAST platform and services

User-ID	Company	Activity	Type	Country/region
1	TERRASIGNA	SM-F1 developer	Internal user	Black Sea
2	TERRASIGNA	SM-F1 developer	Internal user	Black Sea
3	UOSF	SM-F1 developer	Internal user	Black Sea
4	ICBP	SM-F1 developer	Internal user	Black Sea
5	Black Sea Fisheries - Bourgas PLC	Fishery management	New contact	Bulgaria
6	FNCP	Fishery management	New contact	Spain
7	Bureau Veritas	Seafood specialist	New contact	Bay of Biscay, Spain
8	BDC	Fishery Data manager	New contact	Limfjord, DK

9	Marine Instruments	Fishery	Internal user	BoB, Spain
10	Marine Instruments	SM-F2 developer	Internal user	BoB, Spain
11	AZTI	SM-F2 developer	Internal user	BoB, Spain
12	AZTI	Fishery	Internal user	BoB, Spain
13	AZTI	Fishery & Aqua	Internal user	BoB, Spain
14	AZTI	Fishery	Internal user	BoB, Spain
15	AZTI	Fishery	Internal user	BoB, Spain
16	Ulisboa	SM-A1 developer	Internal user	PT
17	DMI	SM-A1 developer	Internal user	Limfjord, DK
18	AU	SM-A3 developer	Internal user	Limfjord, DK
19	Oyster Boat	Oyster farmer	Internal user	Limfjord, DK
20	Exposado	Oyster farmer	Internal user	PT

21	Venøsund Fisk og Skaldyr ApS	Larviculture Limfjorden	New contact	Limfjord, DK
22	NEPTUNPEARL	Oyster farmer	Existing contact	Setuba, Pt
23	AQUANOSTRA	Oyster farmer	Existing contact	Setuba, Pt
24	Vilsund Blue	Oyster	Existing contact	Limfjord, DK
25	Uliege	SM-A2 developer	Internal user	Black Sea
26	Seamod	SM-A2 developer	Internal user	Black Sea
27	DGRM	Aquaculture	Existing contact	Lisbon, Pt
28	EST/IPS	Fishery&Aqua	Existing contact	Setuba, Pt
29	EST/IPS	Undergraduate	Existing contact	Setuba, Pt
30	AQUACULTUUR OOSTENDE	Oyster farmer	New contact	Belgium, North Sea
31	Brevisco	Belgium mussel farmer	Internal user	Belgium, North Sea
32	APSS	Port	Existing contact	Setubal Pt

33	AQUAPRI Denmark A/S	Sea farm	New contact	Limfjord, DK
34	DTU-MSC	Siting	Existing contact	Limfjord, DK
35	ICNF	MPA	Existing contact	Setuba, Pt
36	CMS	City council	Existing contact	Pt
37	Black Sea Shells Ltd		New contact	Kavarna, Bulgaria
38	AquaFarm Srl	Aqua consultant	New contact	Brasov, Roamnia
39	Mariculture Ltd	Romania Aqua	New contact	Romania
40	RBINS	SM-A4 developer	Internal user	Belgium, North Sea
41	ILVO	SM-A4 developer	Internal user	Belgium, North Sea
42	MI	SM	Internal user	IE, Galway Bay
43	Cuan Beo		Internal user	IE
44	Majestic Oysters	Oyster farming Ireland	New contact	IE

45	Harty Oysters	Oyster farming Ireland	New contact	IE
46	Kelly Oyster	Oyster farming Ireland	New contact	IE Galway
47	Wild Altantoc Shellfish Ltd	Oyster farming Ireland	New contact	IE
48	SFPA	fishery	New contact	IE
49	Aquaculture Ukraine LLC	Black Sea Aqua	New contact	Ukraine
50	Viqon Watre solution	NL fish farming consultant	New contact	NL
51	AquaProcess	Consultation	New contact	Limfjord, DK
52	COOPMARE	Italy Fishery & Aqua	Existing contact	Adriatic, Italy
53	AMA		Existing contact	IT
54	Blackshell		New contact	IE
55	www.cofradialaredo.org	Purse Seine fleet	New contact	Bay of Biscay, Spain
56	Foreningen Muslingeerhvervet	Mussel FIshermen association	New contact	Limfjord, DK

57	Muslingeriet	Mussel aquaculture company	New contact	Limfjord, DK
58	Danish Fishery agency	Fishery agency	New contact	Limfjord, DK
59	Limfjord council https://www.limfjordsraadet.dk/	The Limfjord council	new contact	Limfjord, DK