



Final end-user-partner consultation report

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Executive summary / Abstract

FAST has made major advances in the development of downstream services, which have been packaged under the name 'MI-SAFE'. The MI-SAFE package includes; the MI-SAFE viewer (an online software tool), open format data services (see section 3.3), Open Source (OS) modelling services (see section 3.4), and finally access to a team with high expertise in coastal ecosystems and Nature Based Solutions. Depending on the spatial scale and the availability of products or building capacity, these services are structured as Educational (global scale products), Expert (local scale products) and Advance level services (capacity-building, consultation, and tailor-made services).

In this final round of end-user consultations, before the release of MI-SAFE in June 2017, FAST has focused on the opinions of end-users in terms of; how useful are the Educational and Expert services, and which Advanced services may be in demand. To perform this consultation, the project team generated a set of resources to interact with end-users; a beta version of the [MI-SAFE viewer](#), a fact sheet, and presentations that summarize the MI-SAFE products and services. These were distributed to a core-group of end-users who partners identified as having high potential for future involvement in the MI-SAFE package. Partners then had meetings with the end-users and filled in a semi-structured questionnaire that was analysed so as to highlight the general trends in responses. End-user archetypes were split into two groups; Public administrations or Universities (PU-AD), and Private organizations (PRI). Analysis of the responses was structured into 5 sections:

- General value of the MI-SAFE package
- Value of MI-SAFE viewer
- Value of MI-SAFE data service
- Value of MI-SAFE OS modelling service
- Preferred way of receiving MI-SAFE services

In general, public organizations, especially those involved in the management of natural systems, had a preference for Open Source modelling services, particularly services related with the validation and calibration of new geographical areas and the development of new functionalities. On the other hand, private organizations, which often had a role as service providers to public administrations, were especially interested in the MI-SAFE data services, in particular the Advanced MI-SAFE services for generating new information, as well as validating and calibrating data on water and wave statistics.

Both public and private organizations agreed on a preference for requesting advanced MI-SAFE services in a consultancy format (i.e., subcontracting the MI-SAFE expert consortium to fully develop the requested services, rather than via training and support mechanisms).

In the period toward the closing of the project the emphasis will be on furthering interaction and collaboration with the open source and open data user communities and selected third parties to establish Service Level Agreements and implementation of (Advanced) services. Furthermore, we are identifying suitable events to disseminate FAST project outcomes and the associated MI-SAFE package. Within the Deltares hardware and software infrastructure, the MI-SAFE package will be further consolidated.



Scope

The FP7 FAST project is developing a new generation of downstream services based on satellite information for assessing foreshore flood impacts on levee requirements and flood risk mitigation. To increase the success rate of these services, giving answers to real end-user needs and linking to existing procedures is paramount.

This document describes the third and last round of end-user consultations conducted by the FAST partners in four EU countries (ES, NL, RO, UK). This last consultation focused on the interaction with the customer archetypes: PU-AD (Public administrations and Universities) and PRI (Private organizations). During this consultation, the FAST consortium demonstrated to end-users the services available within the MI-SAFE package and how to use the MI-SAFE viewer to access to these services. This last round of consultation explored the perceived value for end-users of the MI-SAFE package and the potential demand for on request, Advanced services. Chapter 2 discuss the resources and methodology used in this round of consultations. Chapter 3 elaborates on the information that was gathered and provides an analysis of the main results. Finally, the way forward is discussed in Chapter 4.



Glossary

CSW	Catalog Service for the Web, or Catalog Service - Web
DoW	Description of Work
DX.X	Deliverable X.X
EO	Earth Observation
ES	Spain
FAST	Foreshore Assessment using Space Technology
MI-SAFE	Service package developed by FAST consortium
NBS	Nature Based Solutions
NL	the Netherlands
PRI	Private Companies
PU-AD	Public Administrations and Universities
RO	Romania
UK	the United Kingdom
WP	Work package
OS	Open Software
OGC	Open Geospatial Consortium



1 Introduction

Throughout the project, the FAST consortium has conducted several rounds of consultations with potential end-users. During the first consultation (D5.6, August 2014), we focused on “challenge interviews”, trying to learn what real problems our target users face (i.e., to understand what are their real issues and working practices). The main conclusion was that we had to focus on producing a minimum viable product (MVP) that, using a user-friendly interface, provides ecosystem status information derived from the EO Sentinel data, that is validated, transparent, based on open data standards, and available in the long term. After the first consultation, the FAST consortium decided to design a package of services (the MI-SAFE package) with three levels of services: MI-SAFE Educational (Global scale, limited spatial resolution), Expert (high resolution at study sites) and Advanced (tailor-made services on request).

In the second round of interviews with end-users (D5.7, September 2015), FAST focused on “solution interviews”, checking the viability of the solutions offered by the MI-SAFE package and the potential for revenue flows, analysing the results according to a customer archetype classification identified after the first round of consultation (PU-AD: Public administration; PRI: Private company; NGO-RES: NGOs, research institutions and the General Public, deliverable D5.6). The second consultation revealed that the Educational services of MI-SAFE have a high dissemination utility with high potential for demonstrations, whereas the Expert services (with high resolution and specifically-calibrated for the study sites) offer an excellent example of the improved services for local applications. From the Expert services generated for MI-SAFE, end-users highlighted their interest in information on sediment stability (area eroded), in improved layers on the absence/presence of vegetation and intertidal elevation (most valued for PU-AD and PRI), as well as on the quantification of wave dissipation, including effects of vegetation (most valued by NGO-RES). For the Advanced MI-SAFE services, the most valued services were estimations in ‘vegetation type’ and ‘overtopping of dikes’, although flexible integration (e.g. compatible data standards, uploading of local datasets, support of the open-source community) and the availability of time series analysis were also positively valued. The main conclusions on potential revenue flows were that consultancy (subcontracting of environmental consultancy, establishment of new site with calibration) and training services were highly valued.

Based on these two previous end-users consultations, the FAST consortium further developed the MI-SAFE package; providing beta (demonstration) products and services for the Educational and Expert levels of the package. To demonstrate and give access to these services to selected end-users, FAST finished much improved version of the MI-SAFE viewer (the interactive tool). Additionally, to demonstrate the full potential of the MI-SAFE package, FAST produced an example of MI-SAFE Advanced services, which was demonstrated to potential end-users during the Delft Software Days 2016 (DSD2016) and incorporated into the MI-SAFE viewer.

After the previous end-user consultations and the major progresses made in the development of the MI-SAFE products and services (i.e. the MI-SAFE package) ([Figure 1](#)), the last round of end-user consultation focussed on a reduced core of end-users with high potential for future request of MI-SAFE Advanced services (i.e. tailor-made services). This last round of consultation evaluated how useful are the services provided by the MI-SAFE package, and by which streams the Advanced MI-SAFE services are likely to be demanded.



MI-SAFE software development process

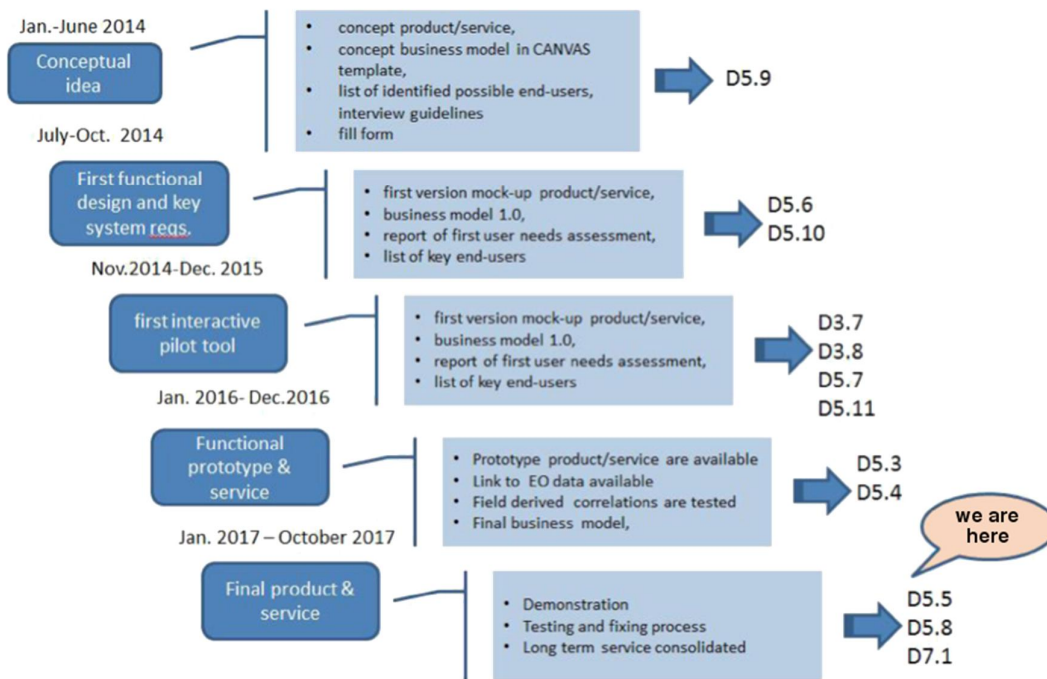


Figure 1. MI-SAFE software development process scheme. Source: modified from deliverable D5.9 (month 6).



2 Methodology

Following a similar pattern to previous end-user consultations, the final end-user consultation process was developed in several phases:

1. Finalization of the MI-SAFE package; including finalization of the beta version of the [MI-SAFE viewer](#) and the development of an example of the Advanced services at the Tillingham field site in the UK. Additionally, a set of support materials was developed to facilitate interaction with end-users (e.g. short and long pitch MI-SAFE presentations and the MI-SAFE package factsheet).
2. The final end-user consultation with a 'face-to-face' beta MI-SAFE viewer demonstration. A small group of end-users with high potential for future request of MI-SAFE Advanced services (i.e. tailor-made services) was selected by partners. Partners sent end-users support material and a link to the viewer, and then conducted demonstrations and interviews (in person, by phone or online) with the aim of evaluating how useful end-users find the services provided by the MI-SAFE package and exploring by which streams Advanced MI-SAFE services may be demanded. The methodology used for this final consultation round was similar to the previous rounds:
 - a. A semi-structured interview (see guide on [Regarding the](#) development of the MI-SAFE viewer, we are currently only foreseeing small updates related to results from the analysis of field and EO data that were not yet included in the MI-SAFE viewer at the time of the end user interviews. The focus for the rest of the project will be on the business case side and further developing the Advanced services related to the viewer.

In the period towards the closing of the project the emphasis will be on furthering interaction and collaboration with the open source and open data user communities and selected third parties to establish Service Level Agreements (SLA's) and implementation of (Advanced) services. Furthermore, we are identifying suitable events to disseminate FAST project outcomes and the associated MI-SAFE package. The MI-SAFE package will be further consolidated within the Deltares hardware and software infrastructure.

For interactions with the end user communities we are executing a FAST summer course at the University of Cadiz, we have planned interaction with the XBeach communities through the XBeach events that are scheduled and we are planning for a FAST specific session at the Delft Software Days in the fall of this year. In November the project will be presented at the EU Flagship meeting on Nature Based Solutions in Tallinn (Estonia). Likely other suitable venues will be identified in the coming period to further broaden our potential client base for SLA's.

From the end user interviews discussed in this report, it is clear that there is an interest for the Advanced services with end users, mainly for consultancy. Therefore, our aim is to continue conversations with key end users and the Advisory Board to help broadcast the MI-SAFE package and collect further information on the details of these consultancy services; what these should look like and what kind of pricing is appropriate. It seems that training services are less highly demanded, however, we think that for specific key end users, we need to explore this option further in the coming months. Interactions with specific third parties (governments, consultancy firms, etc.) for reaching SLA's and developing Advanced services are foreseen but are not specific at the moment of writing this report. We do have several ideas for testing out the tool in areas



outside of the FAST case study areas and generate some revenue from that, while simultaneously demonstrating the MI-SAFE viewers' capabilities. We aim to have such test events finalized before the summer.

- b. Annex I).
- c. The FAST end-user Google form. To facilitate the analysis of the consultation outcomes, FAST partners were asked to fill in a Google form to help unify the format of the transcribed end-user feedback interviews.

2.1 Finalization of the MI-SAFE package

Prior to the last round of consultation, the FAST team produced resources needed to facilitate efficient interaction with end-users, including:

- (1) The beta version of the MI-SAFE viewer
- (2) An example of MI-SAFE Advanced services
- (3) Support materials for interaction with end-users

2.1.1 The Beta version of the MI-SAFE viewer

According to the previous rounds of end-user consultation, the MI-SAFE viewer includes of 3 main sections ([Figure 2](#)):

- the canvas where maps are shown,
- the data page where a selection of layers can be toggled on or of,
- the results page, where the viewer summarizes the effects of vegetation on wave attenuation for any coast in the world.



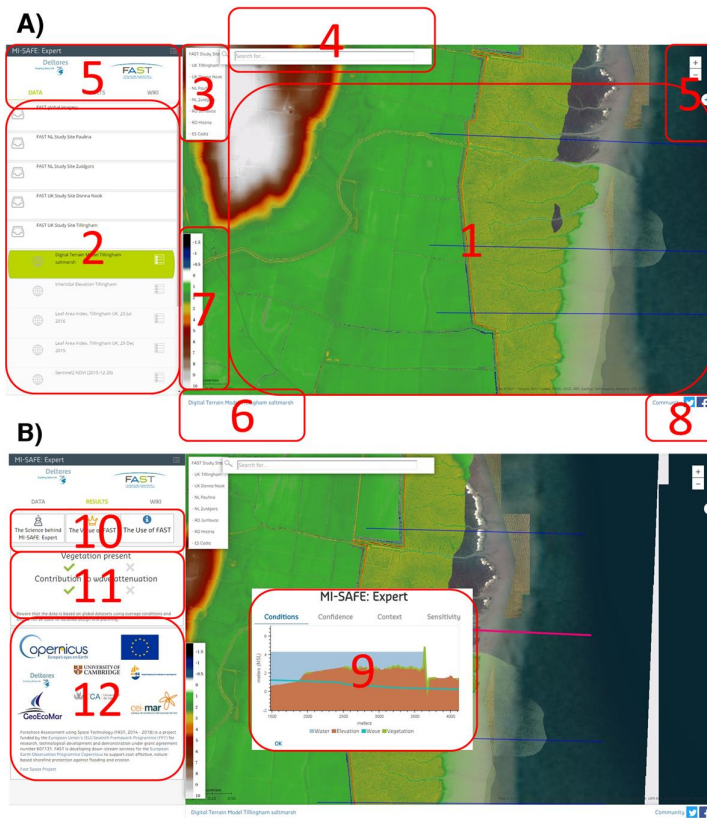


Figure 2. Screen shot of the MI-SAFE viewer interface. A) 'Data' page. (1) map canvas, (2) layer selection, (3) shortcuts to data from the FAST study sites, (4) search bar to navigate for a place of interest, (5) zoom buttons, the + sign enables toggling between several background layers, (6) quick access to metadata of the layer selected. Selected layers become green. Hovering over the link displays the abstract of the layer, (7) legend of the last layer toggled on, switch between legends on toggled layers can be done by clicking on the legend icon on the right of the layer name, (8) short cuts to FAST project Facebook and Twitter pages. **B) 'Results' page.** (9) MI-SAFE viewer result showing several tabs: conditions --> physical condition on the study site or any particular place on the world (in the latter case resolution of the conditions visualised is less then for the study sites), confidence --> displays the quality of the information in terms of confidence, context --> gives context to the information displayed, sensitivity --> model result, (10) Shortcuts to several sub pages where detailed information can be found, (11) presentation screen indicating the effect of vegetation to wave attenuation (short version of the outcomes of the tool results), (12) project information. *MI-SAFE viewer is openly available at <http://fast.openearth.eu>.*

2.1.2 Example of MI-SAFE Advanced services

To demonstrate the potential of the MI-SAFE Advanced services, as an example of the Advanced consultation service, FAST has combined products and services generated by the EU project RISC-KIT project (<http://www.risckit.eu/np4/home.html>), to estimate the risk of overtopping using model simulations (XBeach, FAST) and the corresponding flooding (LISFLOOD, RISC-KIT) with and without vegetation for our Tillingham study site (UK) ([Figure 3](#)).

The outputs of these services are also available via the 'data' page on the MI-SAFE viewer (under the folder of 'FAST UK Study Site Tillingham').



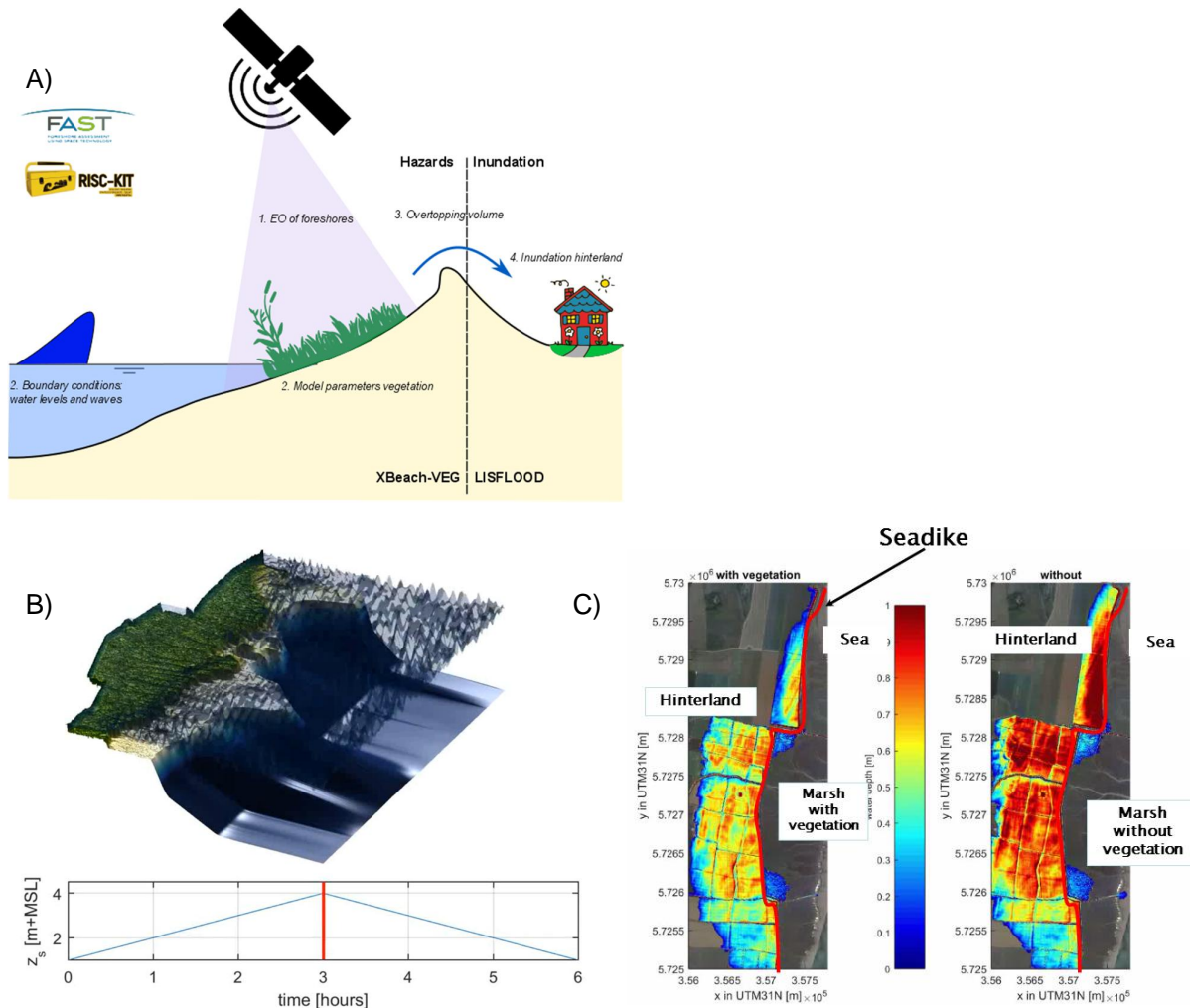


Figure 3. A) Combination of FAST (XBeach-VEG) and RISCKIT (LISFLOOD) elements used to generate an advanced service on overtopping and inundation due to the impact of a large storm on a vegetated foreshore. B) XBeach 3D non-hydrostatic model of impact of a large storm at Tillingham saltmarsh (UK). C) LISFLOOD simulation inundation of impact of a large storm at Tillingham saltmarsh (UK).

1.1.1 Support materials for interaction with end-users

FAST produced two types of divulgation materials for the last end-user consultation:

- Materials to engage end-users in advance of the last round of consultation; this included a fact-sheet ([Annex II](#)) and a short pitch presentation ([Annex III](#)), both summarizing the products and services of the MI-SAFE package.
- Materials to structure the interaction with the end-users during the consultations; this includes a longer presentation on the MI-SAFE package ([Annex IV](#)), with technical details, and the demonstration of an example of MI-SAFE Advanced services.

2.2 The final end-user consultation round

For this final end-user consultation, as the selected end-users did not included a significant number within the category 'NGOs, research institutions and General Public' (NGO-RES), but



included the consultation of two Universities ([Table 1](#)), these two specific end-users were included in the archetype category of public administrations and Universities (PU-AD).

2.2.1 Interviewed end-users

During March 2017, FAST partners performed interviews with end users in four EU countries. In general, the selected end-users had responsibilities related to flood risks, designing policies, legislation, or were involved in environmental management and/or conservation (see [Table 1](#) for further details). Overall, in this last round of consultation, FAST consulted 14 end-users in total, including 4 private (PRI) and 10 public (PU-AD) organizations.

Table 1. List of companies or agencies interviewed during the third end-user-partner consultation of the FAST project. Code is the acronym used for every end-user, the first two letters indicate the EU country: ES: Spain, RO: Romania, UK: United Kingdom, NL: The Netherlands. GR: is the customer archetype group where the end-user fits: PU-AD: Public administration or Universities; PRI: Private company.

Company name	Code	GR	Role /Company profile
JA Consejería de Medio Ambiente y ordenación del territorio (Departamento de dominio Publico - Costas)	ES-JA-MA	PU-AD	Regulator of uses on coastal public domain
JA Consejería de Medio Ambiente y ordenación del territorio (REDIAM)	ES-JA-REDIAM	PU-AD	Environmental Remote sensing and GIS information provider to the Regional Government
JA Consejería de Medio Ambiente y ordenación del territorio (Espacios protegidos)	ES-JA-T	PU-AD	Regulator of uses and quality of protected natural environments, regulator of sustainable development.
Tecnoambiente (Andalucía)	ES-TECNOA	PRI	Consultancy
Rijkswaterstaat, Building with Nature	NL-RWS-BN	PU-AD	Executive agency national department Public Works and Environment
Rijkswaterstaat (district North of Netherlands)	NL-RWS-DN	PU-AD	Executive agency national department Public Works and Environment
Rijkswaterstaat (Ecotope maps)	NL-RWS-EM	PU-AD	Executive agency national department Public Works and Environment
Rijkswaterstaat (Expert advisor ecology)	NL-RWS-EXP	PU-AD	Executive agency national department Public Works and Environment
TU Delft	NL-TUDELFT	PU-AD	Delft University of Technology. TU Delft cooperates with many other educational and research institutions, both in the Netherlands and abroad.
Van Oord	NL-VO	PRI	Leading contractor for dredging, marine engineering and offshore energy projects (oil, gas and wind), offering innovative solutions to marine challenges
Witteveen & Bos	NL-W&B	PRI	Consultancy and designs for water, infrastructure, environment and construction projects.
University of Bucharest	RO-UB	PU-AD	
Environment Agency	UK-EA	PU-AD	Executive agency national department DEFRA*
Mott MacDonald Ltd.	UK-MM	PRI	Global management, engineering and development consultancy

*DEFRA: Department for Environment, Food & Rural Affairs

2.2.2 Semi-structured interviews as the method to interact with end-users

For every FAST country (NL, UK, RO, ES), direct contact with the end-users was the responsibility of the local FAST partner. Using semi-structured interviews provided an open format, allowing the interviewee to bring up new ideas during the interview. To support the interviewers we provided a guide ([Regarding the](#) development of the MI-SAFE viewer, we are currently only foreseeing small



updates related to results from the analysis of field and EO data that were not yet included in the MI-SAFE viewer at the time of the end user interviews. The focus for the rest of the project will be on the business case side and further developing the Advanced services related to the viewer.

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Annex I) and communication materials. The guide together with the long presentation on the MI-SAFE package ([Annex IV](#)) were designed to help the interviewer focus on the aim of the interview without constraining the conversation to a particular format, allowing interviewers to tailor questions to the interview context/situation, and/or to the profile of interviewee.

To facilitate the analysis of the consultation outcomes, after every interview with an end-user, the FAST partners were asked to fill in a Google form, which help us to unify the transcript format of the end-user feedback (see details in [Annex V](#)).



3 The final end-user consultation analysis

The last round of consultation was structured to evaluate, according to the customer archetype, the value that end-users give to the MI-SAFE package in general, and more specifically, what end-user find more valuable from the more specific MI-SAFE products and services. According to this, the analysis of this end-user consultation was structured into 5 sections:

- General values of the MI-SAFE package
- Values of MI-SAFE viewer
- Values of MI-SAFE data service
- Values of MI-SAFE OS modelling service
- Preferred way of receiving MI-SAFE services

3.1 End-user valorization of the MI-SAFE package

The MI-SAFE package is the name that groups all products and services generated and offered by the FAST consortium, including; the MI-SAFE viewer (the online data viewer), OGC data services (see section 3.3), the OS modelling services (see section 3.4), and finally access to the team of experts for training, consultation, etc. (Advanced services).

During the last round of consultation, we asked end-users to evaluate the main services they think the MI-SAFE package provides, highlighting their priorities (Figure 4), in summary these were:

- (1) Free access to improved, standardised, open format, data layers on coastal environmental information.
- (2) Educational services that MI-SAFE provides for Nature Based Solutions.
- (3) Easy access to a team with a high level of expertise on coastal ecosystems and Nature Based Solutions.
- (4) Access to a service that provides visual support for Nature Based Solutions, helping to shape discussions about coastal management decisions.

Public and private organizations both highly valued the free access to improved environmental information. In the case of public organizations, with capacity for management decisions, they also highly valued the access to an educational service on Nature Based Solutions, giving a lower, but also important, value to access to a team of experts, and access to a tool for supporting discussions about coastal management decisions. Private organizations, often providers of services to public administrations, also highlighted the value of access to a team of experts, but gave a lower priority to the value of a tool in terms of supporting discussions on coastal management decisions and as an educational service on Nature Based Solutions.



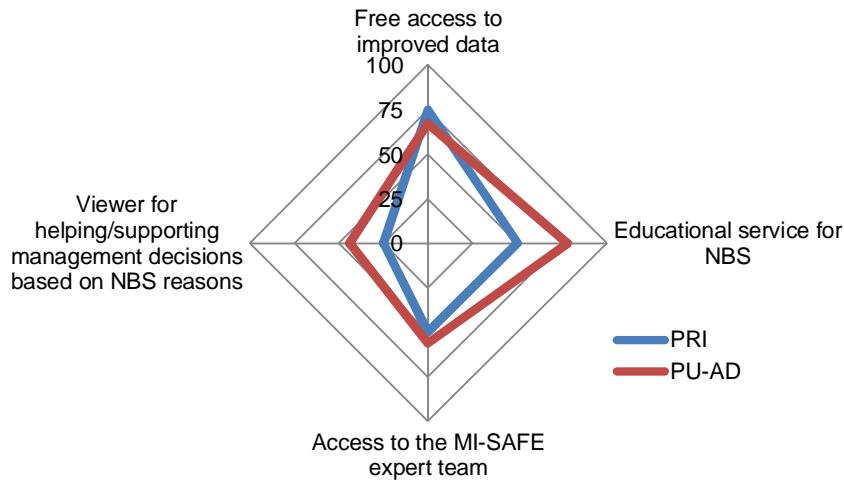


Figure 4. Summary of MI-SAFE package strengths according to consulted end-users. The responses of the end-users have been grouped by customer archetypes, including private companies (PRI, blue) and public administrations and Universities (PU-AD, red). NBS: Nature Based Solutions. The values on the graph correspond to the percentage of end-user consulted per customer archetype that valued the service.

3.2 End-user valorization of the MI-SAFE viewer

The [MI-SAFE viewer](#) is an on-line software tool designed to quickly and efficiently evaluate wave transformation over a foreshore. With this viewer, end-users can click on any foreshore, automatically generating a transect over the upper foreshore that is translated into a quick assessment of slope and vegetation presence and into an estimate of the expected wave attenuation and crest height reduction (with uncertainty bands around a central value), depending on elevation, hydraulic boundary conditions and type of vegetation present with a global scale resolution (part of the 'Educational services'). For the FAST case study sites, the MI-SAFE viewer offers results calibrated and validated with higher quality and resolution ('Expert services').

During this last round of consultation, the FAST consortium demonstrated to the end-users how to use the MI-SAFE viewer to have access to all the MI-SAFE products and services (see also the [demonstration video](#)). After this demonstration, we asked end-users to highlight the main values of this resource. These included:

- (1) Easy-to-use tool for demonstration of the utility of foreshore vegetation in coastal protection,
- (2) Easy-to-use tool for exploring coastal environmental information.
- (3) Easy-to-use platform to facilitate direct access to OGC data layers on coastal environmental information.
- (4) The easy access to MI-SAFE team expertise with high expertise on coastal ecosystems and Nature Based Solutions.
- (5) Other values.



In general, public organizations had more interest in services related with modelling Nature Base solutions (NBS) and Advance services that extend the existing products/services to new geographical areas (services 1, 5, 4 and 2), whereas private organizations showed a preference a primary preference for aspects related to MI-SAFE data services (2 and 3) and secondly for services related to modelling of NBS, and the capacity to extend MI-SAFE services to other geographical areas (services 1 and 4).

The discussion about other aspects was diverse and depended on the particular interest of the end-user interviewed, including within the same organisation (Table 1). These other values included; the utility of the MI-SAFE viewer as a supporting tool to illustrate why realignment is sometimes the best strategy for coastal defense; a practical tool to make a preliminary approximation on detecting areas with potential issues, where NBS solutions may be viable; or simply to do preliminary environmental evaluations in coastal areas, particularly where data is sparse. The access to the scientific knowledge behind MI-SAFE (a lengthy, transparent, “living” document describing the know-how that supports the MI-SAFE package) was also highly evaluated by some end-users.

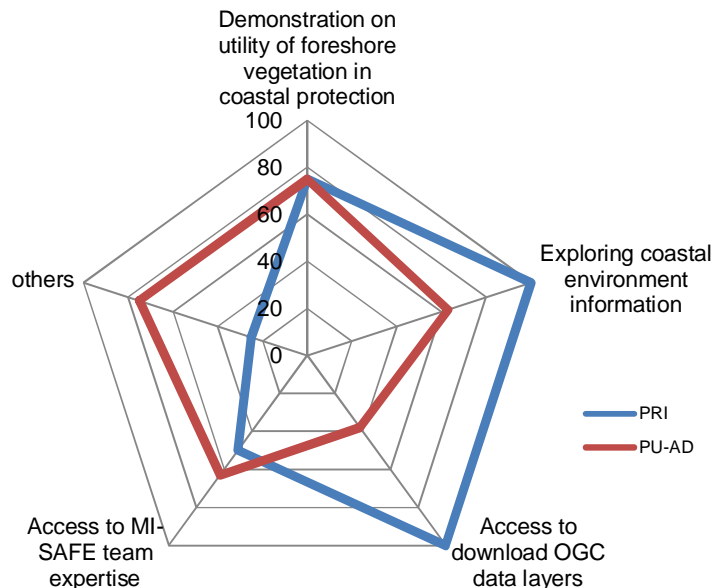


Figure 5. Summary of MI-SAFE viewer values according to consulted end-users. The responses of the end-users have been grouped by customer archetypes, including private companies (PRI, blue) and public administrations (PU-AD, red). OGC: Open Geospatial Consortium. The values on the graph correspond to the percentage of end-user consulted per customer archetype that valued the service.

3.3 End-user valorization of the MI-SAFE data service

One of the main services of the MI-SAFE package is the provisioning of data in standard OGC (Open Geospatial Consortium) format. With this service, MI-SAFE provides products at a global scale (Educational service), at regional/local scale with higher spatial resolution (produced for the FAST case study sites, Expert service), and can also provide as a service, on request, the generation of new information or calibrating/validating data layers for new geographical areas



(Advanced service). The MI-SAFE data service includes information on elevation (topography and bathymetry), vegetation, and waves and water level statistics, which can be displayed within the MI-SAFE viewer and accessed via the [MI-SAFE GeoNetwork CSW catalogue](#). Requests for advanced data services, are made by filling the community form available in the MI-SAFE viewer (see section 8 in [Figure 2](#)).

During the interviews, the MI-SAFE data services were described to end-users, showing how to display and download the OGC layers using the MI-SAFE viewer. After this demonstration, we asked the end-users to provide an evaluation of these aspects ([Figure 6](#)):

- The free access to improved OGC data layers; end-user can use these layers in their own data processing system (Educational and Expert services).
- The generation of new data layers for geographical areas different to the FAST study sites (on request, Advanced service).
- The validation and/or calibration of the existing data layers for specific geographical areas different to the FAST study sites (on request, Advanced services).

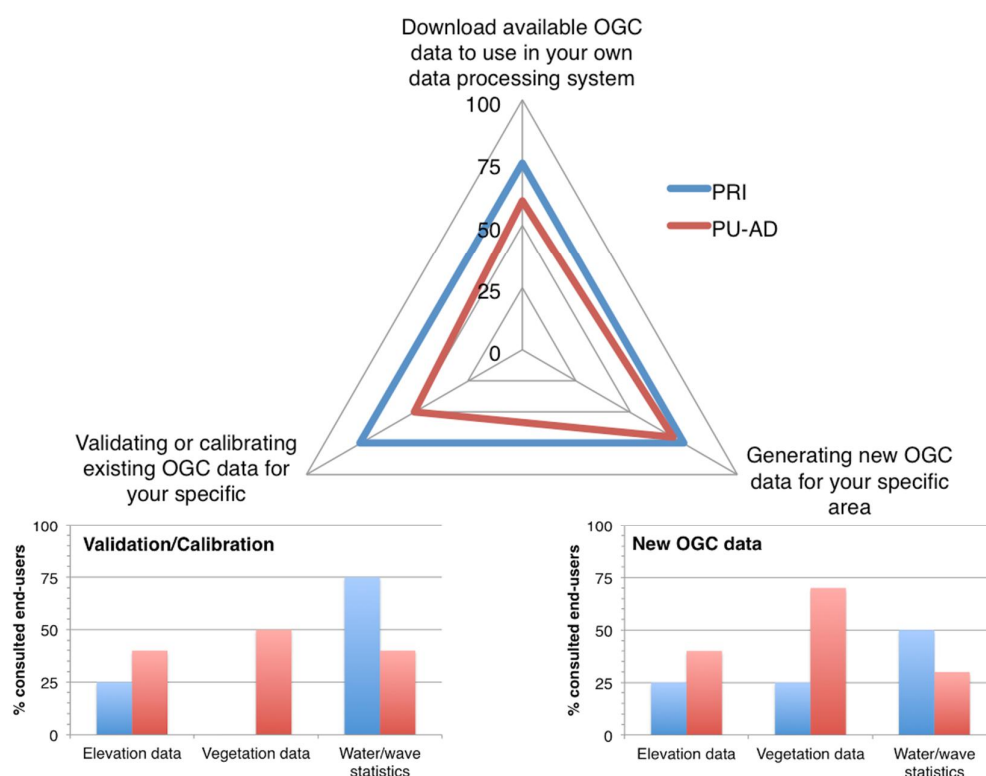


Figure 6. Summary of MI-SAFE data service potential demand according to consulted end-users. The responses of the end-users have been grouped by customer archetypes, including private companies (PRI, blue) and public administrations (PU-AD, red). OGC: Open Geospatial Consortium. For generation of new OGC data and validation/calibration of new geographical areas, it has been also included details in what type of information is most demanded by PU-AD and PRI end-users.

The consultation with end-users revealed that, agreeing with the evaluation of the MI-SAFE viewer, private organizations valued the data services slightly higher than public administrations; there was also differences in the type of information each customer archetype preferred. In general, public administrations (PU-AD) had an interest in all the environmental variables provided by MI-



SAFE, with a mild preference for coastal vegetation data ([Figure 6](#)), whereas private organizations (PRI) preferred validation/calibration and new information on water and wave statistics in new geographical areas.

3.4 End-user valorization of the MI-SAFE Open Software modeling service

The MI-SAFE Open Source Modelling service includes the simulation of wave propagation on the foreshore under the conditions with and without vegetation (although modeling of new processes is also offered under MI-SAFE Advanced services). The most important contribution of FAST project to this service has been the effort in modelling, calibrating and validating the effects of the vegetation. This service has been modelled with the OS numerical model XBeach maintained by the OpenEarth community and is accessible via the [MI-SAFE viewer](#) at global (Educational service) and local scale (for the FAST study sites, Expert service). Additionally, this service also includes the offer, on request, of calibration/validation for new sites and the modelling of new processes (Advanced services).

To facilitate the access to Advanced MI-SAFE OS modelling services, data derived in the FAST project have been implemented in the Delft Dashboard ([Figure 7](#)). Delft Dashboard is a tool, based on the proprietary Matlab software, to quickly create, edit and visualize model inputs (grids, bathymetry, boundary conditions etc.) for a number of hydrodynamic models (Delft3D, XBeach, WAVEWATCH III), using publicly-available datasets.

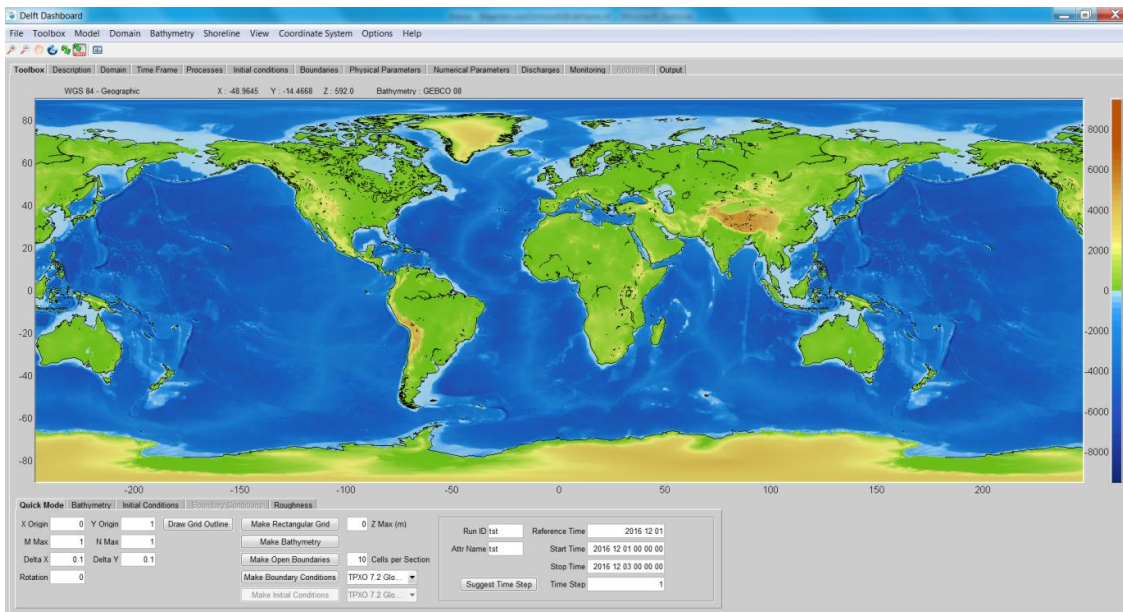


Figure 7. Delft Dashboard user interface. The Delft Dashboard is part of the OpenEarth Initiative.

The link with Delft Dashboard enables any user to setup an XBeach model schematization for any location in the world, while utilizing MI-SAFE map products and analyse influence of vegetated foreshores on flood risk reduction. Outputs are generated in open data formats and can be embedded in the MI-SAFE viewer (see Tillingham example online) as well as in standard GIS packages.



During the interviews, we described the MI-SAFE OS modelling service and how to access it using the MI-SAFE viewer. After this demonstration, we asked to the end-users to evaluate the aspects of the OS modelling service (Figure 8):

- (1) Access to the actual MI-SAFE modelling outputs (Educational and Expert services).
- (2) Validating and calibrating the MI-SAFE outputs for other geographical areas (on request, Advanced service).
- (3) Generating new functionalities (on request, Advanced service).
- (4) Others.

Both, private organizations and public administrations highly valued access to the actual MI-SAFE modelling outputs (Educational and Expert services) as well as the Advanced services (services 2-4). However, the main interest of public administrations was in Advanced services that focus on generating new functionalities, whereas private organizations highlighted other types of Advanced services.

These other values included (1) integration of XBeach modelling with vegetation into end-users workflow, (2) capacity to integrate MI-SAFE functionalities with other OS models; (3) capacity to increase the spatial resolution to apply the functionalities to a very local scale (< 5m), (4) capacity to model different scenarios, projections and classifications (e.g. national/regional scenarios), (5) capacity to model the effects of potential system interventions (e.g. infrastructure works), and (6) capacity to add temporal analysis to the functionalities.

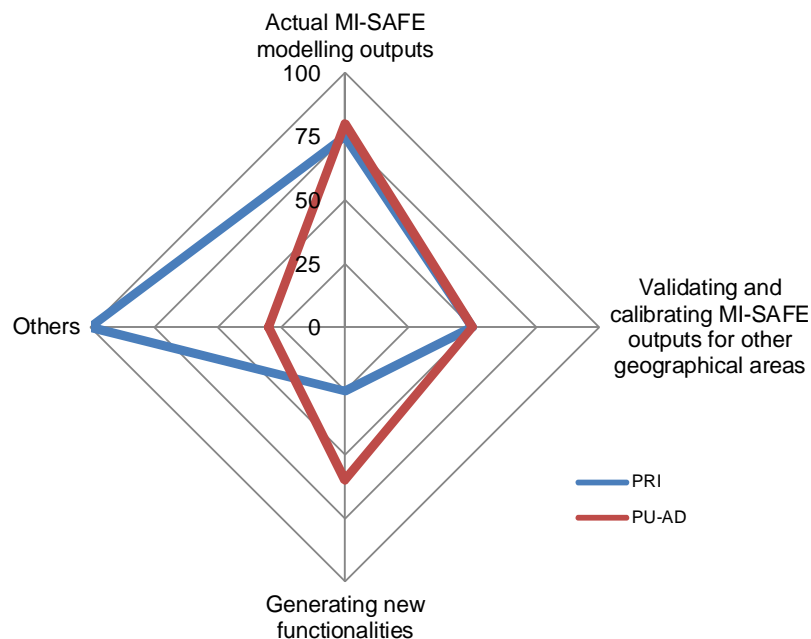


Figure 8. Summary of MI-SAFE OS modelling service potential demand according to consulted end-users. The responses of the end-users have been grouped by customer archetypes, including private companies (PRI, blue) and public administrations (PU-AD, red).



3.5 End-user preferred way of receiving MI-SAFE services

During the consultation, end-users were asked to select what would be the format they preferred for requesting MI-SAFE Advanced services, according to the options:

- (1) Consultancy. This format implies subcontracting the MI-SAFE expert consortium to fully develop the requested services.
- (2) Training. This format is offered to end-users with human resources without the expertise to develop MI-SAFE advanced services, but with capacity to build this expertise. This format implies subcontracting the MI-SAFE expert consortium to train technical teams to develop in-house the requested MI-SAFE Advanced services.
- (3) Support. This format is offered to end-users with human resources familiar with the expertise to handle MI-SAFE Advanced services, but with needs on technical support to solve technical issues during the in-house development of requested Advanced services. This format implies subcontracting the MI-SAFE expert consortium to solve specific technical issues.
- (4) Others. This format allows the discussion of other formats different to the previous ones to request MI-SAFE advanced services.

Most of the end-users consulted agreed on the preference of using a consultancy agreement as the format for requesting MI-SAFE Advanced services ([Figure 9](#)), from these end-users, a small number also expressed interest in training and support, particularly in the case of a high demand of specific Advance services. End-users selecting other formats offered use of specific project R&D budgets, partnership in future EU projects or exchange of PhD students to explore the wealth of information. From all of the consulted end-users, only two of them (1 PRI and 1 PU-AD) expressed no short-term interest, in any of the services provided by MI-SAFE. With the reasons given; “at present in their geographical regions of work there was not a demand from administrations for NBS”, and “in the short term, they are mainly interested in the Educational service and later consultancy would be helpful”.

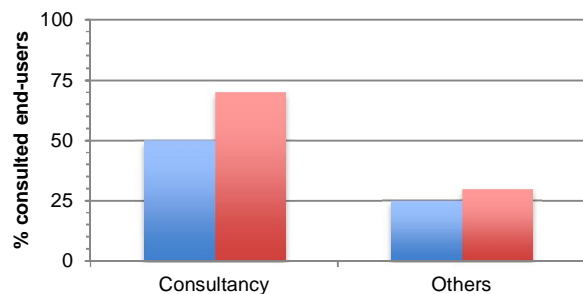


Figure 9. Summary of format for demanding Advanced MI-SAFE services on request according to consulted end-users. The responses of the end-users have been grouped by customer archetypes, including private companies (PRI, blue) and public administrations (PU-AD, red). See text for details on other formats.



4 How to move forward

Regarding the development of the MI-SAFE viewer, we are currently only foreseeing small updates related to results from the analysis of field and EO data that were not yet included in the MI-SAFE viewer at the time of the end user interviews. The focus for the rest of the project will be on the business case side and further developing the Advanced services related to the viewer.

In the period towards the closing of the project the emphasis will be on furthering interaction and collaboration with the open source and open data user communities and selected third parties to establish Service Level Agreements (SLA's) and implementation of (Advanced) services. Furthermore, we are identifying suitable events to disseminate FAST project outcomes and the associated MI-SAFE package. The MI-SAFE package will be further consolidated within the Deltares hardware and software infrastructure.

For interactions with the end user communities we are executing a FAST summer course at the University of Cadiz, we have planned interaction with the XBeach communities through the XBeach events that are scheduled and we are planning for a FAST specific session at the Delft Software Days in the fall of this year. In November the project will be presented at the EU Flagship meeting on Nature Based Solutions in Tallinn (Estonia). Likely other suitable venues will be identified in the coming period to further broaden our potential client base for SLA's.

From the end user interviews discussed in this report, it is clear that there is an interest for the Advanced services with end users, mainly for consultancy. Therefore, our aim is to continue conversations with key end users and the Advisory Board to help broadcast the MI-SAFE package and collect further information on the details of these consultancy services; what these should look like and what kind of pricing is appropriate. It seems that training services are less highly demanded, however, we think that for specific key end users, we need to explore this option further in the coming months. Interactions with specific third parties (governments, consultancy firms, etc.) for reaching SLA's and developing Advanced services are foreseen but are not specific at the moment of writing this report. We do have several ideas for testing out the tool in areas outside of the FAST case study areas and generate some revenue from that, while simultaneously demonstrating the MI-SAFE viewers' capabilities. We aim to have such test events finalized before the summer.



Annex I. Semi-structured last-round interview script

Key points to remember:

- The point of the interview is to learn about them, not to sell to them
- The trick to get people to talk more is by asking them open-ended questions like "What do you usually do to solve this problem." and not "Is this how you solve this problem nowadays?"
- Always with our demo, and seeing their faces and reactions

Welcome and setting the context

We are building the MI-SAFE package that provide you with an on-line viewer that quantifies in useful formats some of the ecosystem services that provide coastal vegetation on flood risk management, introduce very briefly the focus of the FAST project and the objective of the interview.

Collect demographics

Collect basic information about the interviewed and the organization represented.

MI-SAFE package presentation

Our aim here is to demonstrate how to use the MI-SAFE viewer (workshop) to reach the products and services included in MI-SAFE package (Annex IV) During the presentation, we will offer to the end-user to play on-line with the MI-SAFE viewer showing directly how to use this tool to obtain the results on wave attenuation, but also how to access the data services and ways to request additional services (community form).

The information needed from this part of the interview is:

- 1) How useful are the existing MI-SAFE products and services for the end-user
- 2) Is there any interest in producing similar products for new areas? (Exploring the interest in services similar to the existing ones)
- 3) Is there any interest in producing new services? (Exploring the demand on new functionalities)

Wrapping up (asking for permission to follow up and referrals)

It's time to agree on the next steps and thanks for spending their time on the consultation round.

Would you be interested in participating in a webinar to introduce the MI-SAFE package to the entire group of your institution that could be interested in it? (Will they be interested in contacting their group or sending us the contact information to organize a webinar on the use of the MI-SAFE package?)

Filling in the Google form

Fill in the Google form for this interview: <https://goo.gl/forms/velafkscD2psWxuK2>



Annex II. MI-SAFE package fact-sheet

To engage end-user for the 3rd round of interviews, the partners can send to end-users the fact-sheet for the MI-SAFE package and a summary of the presentation to discuss during the consultation (see next Annex). A high resolution version of the MI-SAFE package fact-sheet is available in the wiki of the FAST project: <https://publicwiki.deltares.nl/display/FASTEUF7/Workpackage+5?preview=/96240540/129009928/MI-SAFE%20Fact-sheet3.pdf>

MI-SAFE services and products fact-sheet

FAST is developing MI-SAFE to provide services to help design nature based flood risk strategies in foreshores.

MI-SAFE viewer
fast.openearth.eu/expert

MI-SAFE includes a viewer to show the potential of foreshore wave attenuation and also gives an easy access to products and services generated by FAST.



MI-SAFE service description	Product/Service	Access	FAST expertise
Bathymetry/topography OGC data			
Global	SRTM15+, SRTM30		
Global intertidal elevations	FAST-IE	WMS/WCS	MI-SAFE viewer
Regional/Local topography			
	EMODNet		
Regional/Local topography: Land (10 - 1 km ²)	Lidar, UAV, Ground-lidar, dGPS4	MI-SAFE Advanced	
Vegetation OGC data			
Global	FAST-GLC2009_VEG, FAST-CLC2012_VEG	WMS/WCS	
Global/coast	FAST-Veg_GEE		MI-SAFE viewer
Local (10 - 1 km ²)	FAST-NDVI, FASTLAI, UAV, Ground-Spectrometry, Ground-Sampling	MI-SAFE Advanced	
Water level and wave statistics			
Global/Coast water statistics	ERA-interim	WMS/WFS	MI-SAFE viewer
Regional/Local near-shore water modelled statistics	FAST-SWAN, FAST-XBEACH-VEG (1D and 2D)	MI-SAFE Advanced	
Local shallow water measured statistics	Ground-Measurements		
OS Modelling			
Open Source Modelling	XBeach with vegetation, Flexible integration using OGC data streams	OpenEarth / MI-SAFE Advanced	

MI-SAFE Advanced services may include: Data collection, review, quality check and support. Available on two formats: Consultancy and/or training



Annex III. MI-SAFE demo: Short pitch

To engage end-user for the 3rd round of interviews, you can send them a summary of the presentation to discuss during the consultation (MI-SAFE demo short pitch). A PowerPoint version of this presentation is available in the wiki of the FAST project:

https://publicwiki.deltares.nl/download/attachments/96240540/FAST-end-users_Pitch_short_v0.3.pptx?version=1&modificationDate=1489058214132&api=v2

MI-SAFE Products and Services

Final end-user consultation



Facing climate change coastal issues

- Flood risk is one of the most pressing challenges facing coastal managers...



...and it is going to get worse

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Facing climate change coastal issues

- Nature-based engineering is cost-effective...

...but not always taken into account by decision-makers.

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Effective green flood safety solutions

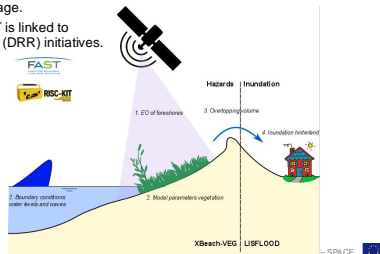
Why now?

- Raising coastal threats and awareness of potential of Nature-Based solutions.
- Decision makers need verifiable demonstration of benefits.
- Engineers need trusted and practical tools that include Nature (specially in data scarce areas).

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Effective green flood safety solutions

- FAST has developed data and modelling services to support cost-effective, nature-based shoreline protection ... the MI-SAFE package.
- FAST is linked to other (DRR) initiatives.



Effective green flood safety solutions

Why is MI-SAFE unique?

- Combines world wide coastal coverage and high-resolution local analysis.
- Transparent and verifiable scientific foundations.
- Automated coupling of Earth Observation, water level, waves and vegetation modelling.
- Advanced services catering to your needs.
- Open Geospatial Consortium (OGC) data streams - use with your own system, free access, standard formats.
- Open Source tools - adaptable to your own tool chain.
- Supported by the Open Earth open-source and free software community.
- Made for and with end users.

FP7-SPACE



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 607131.

Grant Agreement number: 607131
 DG Research - FP7 - SPACE - 2013

Meet MI-SAFE

...the products and services generated by FAST

- MI-SAFE viewer
- Open Data
- OS Modeling

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MI-SAFE viewer

- Use **MI-SAFE viewer** to visualize generated products and services, by clicking on the DATA section.
 - Information available at Global (Educational modality) and local high-resolution scale (study sites, Expert modality),

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MI-SAFE viewer

- Use **MI-SAFE viewer** to check potential impact of vegetated foreshores to flood risk reduction for any shoreline in the world, by clicking on RESULTS section -> click site -> click transect.

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Our products and services

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Summary of MI-SAFE services

- MI-SAFE Open Data and OS-modeling services

MI-SAFE service description	Products/Services	Access	FAST expertise
Global/Regional/Local topography OGD data			
Global	SRTM30+, SRTM30	WMS/WCS	MI-SAFE viewer
Regional	FASTie	WMS/WCS	MI-SAFE viewer
Local	FASTie	WMS/WCS	MI-SAFE viewer
Regional/Local topography	EMODnet	MI-SAFE Advanced	MI-SAFE Advanced
Regional/Local topography: Land (0 - 1 km²)	Lidar, UAV, GroundSAR, dGPS4	WMS/WCS	MI-SAFE Advanced
Vegetation OGD data			
Global	FAST-GL2009-VEG, FAST-GL2012-VEG	WMS/WCS	MI-SAFE viewer
Europe	FAST-Veg_DEE	WMS/WCS	MI-SAFE viewer
Global/coast	FAST-VEG, FAST-LAI, UAV, Ground-Spectrometry, Ground-Sampling	MI-SAFE Advanced	MI-SAFE Advanced
Local (10 - 1 km ²)	FAST-VEG, FAST-LAI, UAV, Ground-Spectrometry, Ground-Sampling	MI-SAFE Advanced	MI-SAFE Advanced
Water level and wave statistics			
Global/Coast water statistics	ERA-Interim	WMS/WFS	MI-SAFE viewer
Regional/Local near-shore water modelled statistics (1D and 2D)	FAST-SWAN, FAST-XBEACH-VEG	MI-SAFE Advanced	MI-SAFE Advanced
Local real-time water measurement	Ground Measurements	MI-SAFE Advanced	MI-SAFE Advanced
OS Modelling			
Open Source Modelling	Xbeach with vegetation, FLOWCO integration using OGD data streams	Open source / MI-SAFE Advanced	MI-SAFE Advanced

MI-SAFE Advanced services may include: Data collection, review, quality check and support. Available in two formats: Consultancy and/or training.

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How can we help you?

- What are your regional/local issues?
- What input is needed to help further/solve these issues?
- Are there advanced services you maybe interested in?

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Get in contact

- [FAST website](#),
- [MI-SAFE viewer](#),
- [@FP7FAST](#)
- [FastSpaceProject](#)
- Regional contacts:

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Acknowledgements

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- The **FAST project** team for support and contributions.
- Landsat data courtesy of **USGS**.
- This presentation includes **Copernicus** Sentinel data 2015.
- Comic graphic design and production; **The Pilot Dog**

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Grant Agreement number: 607131
 DG Research - FP7 - SPACE - 2013

Annex IV. MI-SAFE demo: Long pitch

To drive the last end-user consultation, FAST partners has a presentation with technical details of the MI-SAFE package, including the list of products and services on at the three levels: MI-SAFE Educational, Expert and Advanced. End-users are free to reduce or adapt this presentation according to the profile of the interviewed end-user.

A PowerPoint version of this presentation is available in the wiki of the FAST project: https://publicwiki.deltares.nl/download/attachments/96240540/FAST-end-users_Pitch_v0.5.pptx?version=2&modificationDate=1489401225829&api=v2

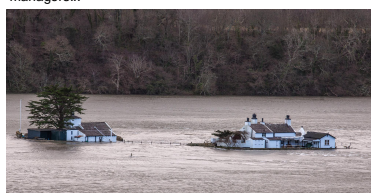
MI-SAFE Products and Services

Final end-user consultation



Facing climate change coastal issues

- Flood risk is one of the most pressing challenges facing coastal managers...



...and it is going to get worse

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Facing climate change coastal issues

- Increasing coastal populations, higher tides...



...higher costs?

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Facing climate change coastal issues

- Nature-based engineering is cost-effective...

...but not always taken into account by decision-makers.

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Effective green flood safety solutions

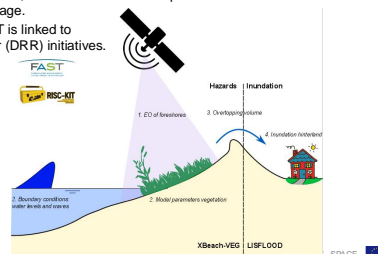
Why now?

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Effective green flood safety solutions

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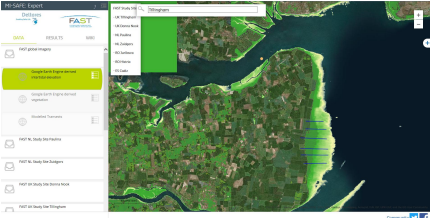
Meet MI-SAFE

...the products and services generated by FAST

- MI-SAFE viewer
- Open Data
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MI-SAFE viewer


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 - Information available at Global (Educational modality) and local high-resolution scale (study sites, Expert modality),



MI-SAFE viewer

- Use [MI-SAFE viewer](#) to check potential impact of vegetated foreshores to flood risk reduction for any shoreline in the world, by clicking on RESULTS section -> click site -> click transect.

Our products and services



MI-SAFE Data services

- Selected and adapted by FAST for coastal, delta and riparian regions.
- Available as Open Geospatial Consortium (OGC) data streams searchable via Catalogue Web Service (CWS), [MI-SAFE online viewer](#) or produced on demand.
 - Elevation (bathymetry and topography)
 - Vegetation (presence, leaf-area-index, types)
 - Wave and water level statistics (Hs, tidal range)

MI-SAFE Data services

Elevation (Bathymetry and Topography)

Scale/zone	Source	Pixel res. (m)	Vert. accuracy (m)	Availability
Global	SRTM15+	500	<10	WMS/WCS
-	SRTM30	90	<10	WMS/WCS
- intertidal	FAST-IE	20	<2	WMS/WCS
Regional/Local	EMODNet	200	<5	On demand
- land	Lidar	<5	<2	On demand
- 10 km²	UAV	<1	0.1	On demand
- 1 km²	Ground-lidar	<0.2	0.05	On demand
- 1 km²	dGPS	<0.02	0.01	On demand

MI-SAFE Data services

Vegetation

Scale/zone	Source	Pixel res. (m)	Type	Availability
Global	FAST-GLC2009_VEG	300	4 classes	WMS/WCS
Europe	FAST-GLC2012_VEG	100	4 classes	WMS/WCS
Global/coast	FAST-Veg_GEE	30	1 class	WMS/WCS
Local	FAST-NDVI	10	NDVI (0-1)	On demand
-	FAST-LAI	10	LAI (m²/m²)	On demand
- 10 km²	UAV	<1	classes/NDVI	On demand
- 1 km²	Ground-Spectr.	<1	spp./NDVI/LAI	On demand
- 1 km²	Ground-Sampling	<1	spp./Veg. props.	On demand



MI-SAFE Data services

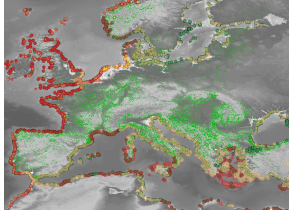
Wave and water level statistics

Scale/zone	Source	Pixel res. (m)	Type	Availability
Global/coast	ERA-interim	-70000, points	Wave height (Hs)	WMS/WFS
Global/coast	Muis et al.(2016)		Water level (MSL)	WMS/WFS
Regional/Local	FAST-SWAN	1000	Hs, MSL	On demand
-	FAST-XBEACH-VEG-1D	transects	Hs, MSL	On demand
-10 km ²	FAST-XBEACH-VEG-2D	20	Hs, MSL	On demand
-1 km ²	Ground-Measurement	transects	Hs, MSL	On demand

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MI-SAFE Data services

Where does vegetation potentially reduce flood risk in Europe?



The Educational services of MI-SAFE allows to overlap layers of variables necessary to identify interesting areas with potential for nature based solutions (e.g. elevation, MSL, Hs and vegetation), testing the potential role of the vegetation on wave attenuation.

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Open Source Modeling

- XBEACH with vegetation - calibrated and validated by FAST for coastal, delta and riparian regions.
- Flexible integration using OGC data streams (inputs and outputs).
 - Built into Delft Dashboard - easy connection to Delft3D, LISFLOOD, ect.

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Open Source Modeling


Linking OS models

- Modeling workflow offshore to inshore flooding at Tillingham
 - Hs, MSL from Glo model
 - Propagate Hs/MS nearshore (SWAN)
 - XBEACH-VEG-2D propagate Hs/MSI elevation/vegetati dyke
 - LISFLOOD propa flooding into hinte

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Open Source Modeling


Modeling hazards (i.e. overtopping) at Tillingham saltmarsh with Xbeach + Vegetation (3D)



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Open Source Modeling

Modeling inundation (i.e. flooding) at Tillingham saltmarsh with LISFLOOD



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Open Source Modeling

Easy integration

- Delft Dashboard, Matlab
- QGIS, ArcGIS
- Python, R
- Cloud deployment - Computing as a Service (CaaS) platforms

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Advanced services

- Generation of new/improved information.
- Development of new model functionalities, calibration and validation.
- Consultancy, training and support.

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Advanced services

Generation of new/improved information

- In situ and remote (Earth Observation) data collection, processing and reporting.
 - Elevation; dGPS, UAVs, air/ground Lidar, EO
 - Vegetation; field surveys, UAVs, EO
 - Wave attenuation; field measurements, long-term deployments
 - Sediment dynamics; field measurements

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Advanced services

Development

- Generation of new algorithms and data fusion, calibration and validation of model outputs in different regions.

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Advanced services

Consultancy, training and support

- On Data collection, setting up EO workflows, tuning models, OGC data streams, large-scale deployments.

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Advanced services

Consultancy, training and support


- On Data collection, setting up EO workflows, tuning models, OGC data streams, large-scale deployments.

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Get in contact

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- [MI-SAFE viewer](#).
- @FP7FAST
- FastSpaceProject
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END-USERS CONSULTATION

Summary of MI-SAFE services

- MI-SAFE Open Data and OS-modeling services

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How can we help you?

- What are your regional/local issues?
- What input is needed to help further/solve these issues?
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END-USERS CONSULTATION

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Annex V. Google form structure for end-user interviews

The link to this Google form is available in the wiki of the FAST project: <https://goo.gl/forms/velafkscD2psWxuK2>

FAST - Final End-user consultation feedback

The objective of this interview is to gather information on how useful are the products and services generated by FAST (MI-SAFE package) for the end-users and to establish the potential interest of end-users in additional advance services.

To facilitate the homogenous analysis of the results, we request the FAST partners to fill in this Google form after every interview (one form per end-user). The form is intentionally generic and short to make it easy to summarize the results, but do include any extra information you think is relevant in the 'Other' text boxes and the final 'Extra information' section.

1. End-user general data

Basic information about the interviewed and the organization represented

- **Country**

- The Netherlands
- United Kingdom
- Romania
- Spain

- **Consulted End-user ***

Name of the person interviewed, their position and the organization they represent.

- **Profile of the organization ***

Is it a public institution such as a national agency, private such as a consultancy or a NGO or research institution? Public: Public administration; Private: Private company; NGO: NGOs and research institutions

- Public
- Private
- NGO
- Other: _____

- **Geographical reach of the organization**

Where is the general geographic region that they carry out their activities?

- European
- National
- Regional
- Other: _____



2. End-user working area and issues of interest

This section aims to identify issues and area of interest for potential MI-SAFE advanced services (location, scale, resolution). Trying to establish which potential services could we tailor for specific end-user needs (i.e., exploring the interest in developing new services).

- In which type of coastal zone do you usually develop your activities?

Please specify the geographical area and the type of area (estuaries, beaches, bays, ect.) they usually work with.

- What are the main issues you face in your work that are relevant to the FAST project? *

Please, specify the types of processes (waves, flooding, water quality) they usually work with and the corresponding spatial (1000, 100, 1, km2) and temporal (100, 10, 1 years) scales.

- Do you get the impression that MI-SAFE is providing a service that will help you to deal with these issues you face?

3. End-user specific interest in MI-SAFE services

The aim of this section is trying to evaluate how useful are the existing MI-SAFE products and services for the end-user and explore the interest in producing similar products for new areas (exploring the interest in services similar to the existing ones).

- How do you think you would use the MI-SAFE viewer? *

- Demonstrate the utility of foreshore vegetation within coastal protection.
- Use of the data layers to explore information on elevation or vegetation.
- Access to download OGC data layers
- Access to expert services from the MI-SAFE team
- Other: _____

- Which OGC data services are you interested in? *

Open Geospatial Consortium (OGC) data layers; these are the standard free layers provided by MI-SAFE and are usable in most processing systems. Tailor-made (private) layers are also possible.

- Download the existing OGC data to use in your own data processing system (if yes, please specify what processing system you use and what layer/s (elevation, vegetation, ...) interest you below)
- Generating new OGC data for your specific area (if yes, please specify what type of data and what geographical area are you interested in using below)



- Validating or calibrating existing OGC data for your specific geographical area (if yes, please specify what type of data and what geographical area are you interested in below)
- Other: _____

- **At which scale do you need the OGC data service ***
 - Global scale
 - Regional scale
 - Local scale (please, use the last option to specify details on resolution and/or scale)
 - Other: _____

- **Which Open Software services are you interested in? ***
 - I am interested specifically in the outputs that the MI-SAFE viewer is producing.
 - Validating and calibrating the MI-SAFE viewer outputs for my specific geographical area.
 - Generating new functionalities to model different process (if yes, please specify the type of process you need to model)
 - Other: _____

- **In what format of services are you interested? ***
 - Consultancy (I would subcontract the FAST consortium to develop the services)
 - Training (I would subcontract the FAST consortium for training our people to develop these services)
 - Support (I would subcontract the FAST consortium to provide support on the use of the MI-SAFE viewer, to use OGC data or insert new functionalities into our in-house system)
 - Others: _____

4. Identifying specific MI-SAFE service request

The aim of this section is to identify the role of the FAST partners on potential requested services, please fill in the next two tables

- **Specific OGC data service end-user interest**

	Elevation	Vegetation	Wave and Water level statistics
New information			
Validation/Calibration			
Field work			
EO processing			
Data fusion			

If others, please describe: _____

- **Specific Open Source Modeling interest**

	XBeach	XBeach with vegetation	Other OS models
New sites calibration/validation			



New algorithms (new processes)			
Flexible integration (model combinations)			
Adapting to end-user workflow processes			

If others, please describe: _____

