HiSea Deliverable 3.6

Report on technical requirements for the service platform

Work Package Number: 3

Work Package Title: Service Specifications and User Reouirements

HISea Project Information	
Project full title	High Resolution Copernicus-Based Information Services at Sea for Ports and Aquaculture
Project acronym	HiSea
Grant agreement number	821934
Project coordinator	Dr. Ghada El Serafy
Project start date and duration	1st January 2019, 30 months
Project website	https://hiseaproject.com/

Deliverable Information	
Work package number	3
Work package title	Service Specifications and User Requirements
Deliverable number	3.6
Deliverable title	Report on technical requirements for the service platform
Description	The use case scenarios are analysed and translated into platform requirements as soon as they are described. Functional, robustness and stress requirements will provide top level services description in line with use cases description and data governance. These requirements are described without any consideration of the HiSea platform architecture to ensure an end-to-end services definition.
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Revision number	11
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0.1	05.08.2019	create structure, edit content	Danny Pape
0.2	02.09.2019	Add User Statements	Danny Pape
0.3	06.09.2019	Add User Requirements	Danny Pape
0.4	13.09.2019	Add Technical Requirements	Danny Pape
0.5	17.09.2019	Add Service Definitions	Danny Pape
0.6	23.09.2019	Integrate User Partner Comments/Requests	Marc Tanner, Eleni Geropanagiotis
0.7	01.10.2019	Update Executive Summary & Conclusion	Danny Pape
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Approvals

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Executive Summary

This deliverable D3.6: Report on technical requirements for the service platform, provides user and technical requirements, which are needed to filter the user needs and organise the development of the components of HiSea. The results of this deliverable are mainly based on the results of Task 2.2: End-user's feedback analysis (M1-30). HiSea takes the end-user centred approach seriously and therefore collected and assessed information from the Stakeholders Advisory Board (SAB) in order to extract requirements.

Specifically, this deliverable took statements from the SAB and the HiSea user partners and listed them in a table. These statements were analysed and translated into user requirements in a defined syntax to prioritize the requirements at an early stage. Sixty-four user requirements were extracted from the workshops with end user stakeholders. These were, divided to 24 "must", 26 "should", 10 "may" and finally 4 "must not" requirements. which were then translated into technical requirements Many of the user requirements could be merged, so the technical requirements generated 46 entries. These entries were each assigned to a category that could encompass "UI/UX, Functionality, Robustness and Stress. Based on the extracted user and technical requirements, 9 HiSea services are defined which fit the needs of the users and have been selected for development within the HiSea project. that should be developed. These services are concentrated around the main business of HiSea - "water quality".

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1 Introduction

The document "D3.6 Report on technical requirements for the service platform" is aimed primarily at project developers and describes the needs that will guide their work in developing the HiSea platform.

This deliverable is broken down into the following sections:

- Section 2: Scope and Methodology: Describes the adopted methodology for conducting the whole process of requirements gathering
- Section 3: Requirements Specification: Describes the actual list of requirements, its origin, structure, and meaning
- Section 4: Conclusions and Future Work: Provides the conclusions of this task's work

2 Scope and Methodology

Requirements development is one of the main activities to be carried out for the definition of a project's scope, and the basis of project design. Its purpose is to elicit, analyse, and establish the user needs and transform them into requirements. Gathering requirements is an iterative process of defining statements about an intended functionality of the system which specify what should be implemented to fulfil and accomplish that functionality.

This deliverable focusses on the requirements for services in the HiSea platform and includes insights from the stakeholders who will be the end users of the HiSea platform when it is developed. This collected includes HiSea use cases and input collected from end users at events such as stakeholder workshops that were held in Valencia at Valenciaport and in Athens at Selonda. Taken together, the requirements address the needs of relevant stakeholders, and requirements from external systems which will be connected with the HiSea Platform. The main activities for defining the scope of HiSea services and their relevant designs will be the following:

- Analysing the use cases and extracting special user needs / requirements
- Evaluating the results of the user workshops held in Valencia and Athens
- Transformation and refinement of the stakeholder statements into platform requirements
- Analysis of the requirements, ensuring they are necessary and sufficient

For defining platform requirements, all of the above-mentioned actions and best practices have been implemented, including the analysis of documentation, face-to-face meetings, and workshop results from stakeholders' requirements meetings. Each platform requirement provides traceability, to show the source. This traceability is provided with IDs. It is expected that this traceability will be extended to trace and interconnect the requirements with product design and development evidence, as well as with test scenarios and test cases.

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2.1 Objectives

The main objective of this task is to establish clear boundaries for the scope of the technical side of the HiSea project. This means the elicitation of requirements will create a base not only for the development work but also of what will satisfy the stakeholders of the HiSea project. These stakeholders will be the users of the HiSea services.

The objective is therefore to obtain a clear definition of the set of HiSea functionalities, a set of technical requirements that are sufficient and realisable, as well as the definition of the project's scope and boundaries (i.e. what is in-scope and what is out-scope), resulting in a traceable network of requirements.

As the HiSea consortium is very heterogeneous in terms of the characteristics of the different partners, it was important to use this value as an add-on advantage, where we can find:

- Industrial partners that are close to the industrial reality and can provide valuable insights into the needs of the real industry.
- Research institutes that provide the HiSea project with a mission and a clear vision, an objective view over the target achievements and functionalities to be reached, and the results that will be considered a breakthrough over the existing state of the art.
- SMEs and other technical partners that have a lot of experience supporting the technology industry and are always updated on the latest trends, which can help a lot with the analysis of the market alternatives, existing services, platforms, and methodologies.

Hence, the added value of having such a valuable panel of partners is to be able to capture the best of each partner's contributions and to balance between the expertise and savvy of the experienced, and the novelty of the hi-tech rookies. The activities comprised in this task were aimed at using the complemented contributions from these profiles, in order to obtain multiple, alternative, and heterogeneous visions of the needs and project scope.

2.2 Roadmap to get platform requirements

The first stage on the preparation for doing the requirements elicitation was to identify the relevant stakeholders. Besides identifying the stakeholders, there was the need to determine a representative of each stakeholder, somebody that can help to understand the stakeholder views and who can validate the finalised requirements. As there are only two user partners in HiSea with different application areas, each will provide one representative.

- Use Case: Ports from ValenciaPort, represented by Rafa Company
- Use Case: Aquacultures from Selonda, represented by Eleni Geropanagiotis

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Additionally, the user needs will be enriched with information from the stakeholder workshop results, that also includes user needs gathering from external interested parties, such as ports all over Europe (e.g. North Sea, Mediterranean Sea) and aquacultures mainly based in Greece.

First, the existing documents (e.g., DoA) were analysed in order to extract basic user needs coming from the HiSea partners Selonda and Valenciaport. After all information has been elicited from documents and the workshops, further information will be taken into consideration such as external systems that will be integrated into HiSea (e.g. results from former European projects such as AQUASAFE, or software brought along from project partners such as FEWS).

The wealth of information must first be evaluated and categorised to translate such user requirements into platform requirements. The results obtained must also be differentiated between software and system requirements to weigh the single requirements and their purpose. Of course, the traceability should not be lost, so the final technical requirements will be transformed into tables assigned by IDs that they can be tracked down to its source.

2.3 Definition of Requirements Source

This deliverable grew side-by-side with the outcomes of two workshops including the Stakeholder Advisory Board (SAB). The results of the workshops have been written down in the Deliverable 2.1 Report on User´s feedback and are used to get a holistic overview of the needs of potential customers. Both workshops goal was to get information about the market and the current needs, and each workshop was tailored to specific needs for ports (workshop Valencia) and aquacultures (workshop Athens). There, the SAB attendees were interviewed and filled out questionnaires and surveys to get as much as possible information for the HiSea platform.

3 Requirements Specification

The Description of Action (DoA) states that the HiSea platform will be co-designed together with the intended end-users. Therefore, the collaboration with the Stakeholder Advisory Board (SAB) is of high importance and the source of the requirements. In the following tables, it is evident that the priority follows the scope on water quality, as this is the primary goal of HiSea.

3.1 Requirement Statements

As described in the previous sections, finished and advanced deliverables are analysed in order to extract requirements according to user preferences. Starting with the DoA, original statements of planned use cases were considered to get a starting point of the requirements specifications. These original requirements were then refined in order to specify the needs of the users with help of D2.1 Report on the users' feedback, which also included a deep analysis of two workshops that have been held with the SAB.

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The gathered statements are listed in the table below with unique identifiers in order to keep the traceability of each requirement.

Table 1:User Statements

ID #	Text	Source
WS001	Interested in environmental measures (e.g., air, waste, soil, noise, works and water)	D2.1 – Requests from Port Workshop
WS002	Monitoring of water quality (e.g., hydrology, microbiology, planktonic and benthic communities)	D2.1 – Requests from Port Workshop
WS003	Maintaining water quality: boat patrols along the port waters and collects all kind of wastes daily	D2.1 – Requests from Port Workshop
WS004	Maintaining water quality: Fight against pollution with a self-protecting plan and an inner maritime plan. Necessary information and means to respond come from the Emergency Control Centre	D2.1 – Requests from Port Workshop
WS005	Compliance of regulations (Water Framework Directive, ROM 5.1.13, others)	D2.1 – Requests from Port Workshop
WS006	Improvement of all port waters	D2.1 – Requests from Port Workshop
WS007	The current information and available data related to water quality has inter alia limited resolution and is difficult to handle	D2.1 – Requests from Port Workshop
WS008	Water quality is directly linked with the company´s productivity	D2.1 – Requests from Aquaculture Workshop
WS009	Sustainability and water quality preservation affects consumers and local communities´ perception of aquaculture products	D2.1 – Requests from Aquaculture Workshop
WS010	Temperature and oxygen are monitored daily, but it is restricted because of measurements with hand meters	D2.1 – Requests from Aquaculture Workshop
WS011	Physicochemical analysis for many parameters is done only every few months	D2.1 – Requests from Aquaculture Workshop

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WS012	Real-time or even high-frequency data are not available	D2.1 – Requests from Aquaculture Workshop
WS013	Tools for alerting to changes in water quality are lacking	D2.1 – Requests from Aquaculture Workshop
WS014	Port Management: Activities focused mainly on sheltered waters in port areas	D2.1 – Ports Questionnaire: Organisation related Analysis
WS015	Search for pollution: Activities focused on inner and outer port waters	D2.1 – Ports Questionnaire: Organisation related Analysis
WS016	Activities focused mainly on coastal waters	D2.1 – Ports Questionnaire: Organisation related Analysis
WS017	Rescue pollution activities	D2.1 – Ports Questionnaire: Organisation related Analysis
WS018	Fight against pollution	D2.1 – Ports Questionnaire: Organisation related Analysis
WS019	The minor part is interested in high resolution satellite image analysis corresponding to a search and rescue profile	D2.1 – Ports Questionnaire: Organisation related Analysis
WS020	Emergency early warning system	D2.1 – Ports Questionnaire: Organisation related Analysis
WS021	Monitoring of water surface (objects and spills) and underwater (sediments, bathymetry)	D2.1 – Ports Questionnaire: Organisation related Analysis
WS022	Internal and external monitoring and area control to the port area	D2.1 – Ports Questionnaire: Organisation related Analysis

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WS023	Water quality parameter validation method verified by EU	D2.1 – Ports Questionnaire: Organisation related Analysis
WS024	Reduce pollution	D2.1 – Ports Questionnaire: Organisation related Analysis
WS025	Improve Safety	D2.1 – Ports Questionnaire: Organisation related Analysis
WS026	In situ type measurements are the most commonly used	D2.1 – Ports Questionnaire: technical related Analysis
WS027	Neither of port nor coastal water management profiles is using any type of modelling	D2.1 – Ports Questionnaire: technical related Analysis
WS028	14% are using products such as COPERNICUS, NOAA and their own on-site products to predict the trajectories of objects and chemical spills to fight against pollution.	D2.1 – Ports Questionnaire: technical related Analysis
WS029	Based on #028, they are also using specific models, such as SARMAP, OLIMAP and self-built models.	D2.1 – Ports Questionnaire: technical related Analysis
WS030	14% of answers reveal the use of less complex online platforms	D2.1 – Ports Questionnaire: technical related Analysis
WS031	Others use the data for predicting water trajectories of threatening objects and/or chemical spills, and would like to continue using this same data in more advanced modelling	D2.1 – Ports Questionnaire: technical related Analysis
WS032	Facilitate regulation compliance	D2.1 – Ports Questionnaire: technical related Analysis
WS033	Facilitate monitoring of environmental impacts caused by port development	D2.1 – Ports Questionnaire: technical related Analysis
WS034	Facilitate water monitoring to reduce pollution	D2.1 – Ports Questionnaire: technical related Analysis

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WS035	Current data is inaccurate	D2.1 – Ports Questionnaire: technical related Analysis
WS036	Current data is difficult to access	D2.1 – Ports Questionnaire: technical related Analysis
WS037	Current data is difficult to handle	D2.1 – Ports Questionnaire: technical related Analysis
WS038	There is no reliable real-time data	D2.1 – Ports Questionnaire: technical related Analysis
WS039	Current analytic methods are limited	D2.1 – Ports Questionnaire: technical related Analysis
WS040	Costs are problems for potential users	D2.1 – Ports Questionnaire: technical related Analysis
WS041	File formats are problems for potential users	D2.1 – Ports Questionnaire: technical related Analysis
WS042	Temporal resolution of data are problems for potential users	D2.1 – Ports Questionnaire: technical related Analysis
WS043	50% of the respondents have not identified any tools they wish to use	D2.1 – Ports Questionnaire: technical related Analysis
WS044	Users want quality management tools for water quality forecasting	D2.1 – Ports Questionnaire: technical related Analysis
WS045	Users want quality management tools for oil spills identification	D2.1 – Ports Questionnaire: technical related Analysis
WS046	Users want quality management tools for water trajectory modelling	D2.1 – Ports Questionnaire: technical related Analysis
WS047	Users want quality management tools for water parameter measuring and monitoring	D2.1 – Ports Questionnaire: technical related Analysis

As the user needs are more or less end user driven, most of them are considering the service itself, which basically runs on the HiSea platform, but not the platform itself.

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3.2 Requirement Extractions

After collecting all important statements that have been analysed, they must be transferred into special requirement phrases, which also indicate the importance/priority of the requirement. Therefore, each requirement follows the rule to include one of the following statements

- Must: to indicate a very high importance
- Should: to indicate high importance
- May: to indicate a low importance
- Must not: to indicate that the requirement is captured, but will not be considered during development

Going forward the development should follow these priorities exactly, to prioritise all "must" requirements, followed by the “should” requirements, and finally all "may" requirements will be processed.

After the evaluation of the workshop and questionnaire results, some requirements were specified and these are considered and transferred to the platform requirement specification with the intended grammar (must, should, may). In addition, a category is provided in order to show the context of the requirement. The category is divided into platform and service requirements. The main difference between those requirements is, for platform requirements it mainly concerns the business logic of HiSea. For service requirements, it is mainly about the interaction of the users with the HiSea platform. Of course, both categories can be set to a single requirement, if it affects both. In the future, the requirements may be updated to follow new findings.

Table 2: User Requirements

Origin ID	Requirement ID	Requirement	Category
WS001	U001	The HiSea Platform must not provide environmental measurements for air.	Platform
WS001	U002	The HiSea Platform must not provide environmental measurements for waste.	Platform
WS001, WS047	U003	The HiSea Platform must provide environmental measurements for water.	Platform
WS001, WS047	U004	The HiSea Platform must not provide environmental measurements for noise.	Platform

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WS001, WS047	U005	The HiSea Platform must not provide environmental measurements for soil.	Platform
WS002, WS047	U006	The HiSea Platform must provide monitored information about the hydrology of water.	Platform / Service
WS002, WS047	U007	The HiSea Platform must provide monitored information about the microbiology of water.	Platform / Service
WS002	U008	The HiSea Platform must provide monitored information about the planktonic of water.	Platform / Service
WS002	U009	The HiSea Platform must provide monitored information about the benthic communities of water.	Platform / Service
WS003, WS004, WS021, WS024, WS046	U010	The HiSea Platform must detect waste on the surface of the water.	Platform / Service
WS003, WS024	U011	The HiSea Platform must show the waste of the surface on a map.	Service
WS004	U012	The HiSea Platform should connect to other external systems (such as Emergency Control Centre for ports) to support already using technologies for alerting, etc.	Platform
WS004	U013	The HiSea Platform should be extendable to extend analytics/data pre-processing.	Platform
WS005, WS023, WS032	U014	The HiSea Platform should help to comply with regulations, such as Water Framework Directive, ROM 5.1.13, etc.	Platform / Service
WS006, WS014, WS015	U015	The HiSea Platform must provide services to analyse a concrete area.	Platform
WS006	U016	The HiSea Platform must provide alerts for water pollution in a well-defined area.	Service
WS007, WS019	U017	The HiSea Platform should have a better resolution as the current systems.	Platform / Service

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WS007	U018	The HiSea Platform water information and data must be easier to handle.	Platform
WS008	U019	The HiSea Platform must monitor the water quality continuously (e.g.: Oxygen, temperature, turbidity, currents, etc).	Service
WS008	U020	The HiSea Platform must alert the user as soon as quality losses are noticed.	Platform / Service
WS008	U021	The HiSea Platform must display any predictions of water quality degradation.	Service
WS009	U022	The HiSea Platform must ensure to use accurate and up to date data.	Platform
WS009	U023	The HiSea Platform must have a reliable uptime with a high failure safety.	Platform
WS010	U024	The HiSea Platform should monitor the level of oxygen in water periodically (i.e. in real-time).	Service
WS010	U025	The HiSea Platform must minimize the efforts needed to monitor water quality.	Platform
WS011	U026	The HiSea Platform should provide services to increase the monitoring of parameters for physiochemical analysis of water.	Platform / Service
WS012, WS038	U027	The HiSea Platform must provide real-time or high-frequency data.	Platform
WS013	U028	The HiSea Platform should alert the user to changes in water quality.	Service
WS015, WS026	U029	The HiSea Platform should allow variability in the range of monitoring limited areas.	Service
WS016	U030	The HiSea Platform should provide a service specialized for coastal waters	Service
WS017, WS018, WS024	U031	The HiSea Platform should provide a forecast for the position of dangerous flotsam.	Platform

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WS017	U032	The HiSea Platform should detect and visualise dangerous flotsam or other pollutions.	Service
WS018, WS024	U033	The HiSea Platform should forecast pollution spreading dependent on weather forecast and currents.	Platform
WS020	U034	The HiSea Platform should provide an early warning system for emergencies.	Service
WS020, WS026	U035	The HiSea Platform may connect to other alerting systems for regional locations.	Platform
WS021, WS024	U036	The HiSea Platform should be able to measure underwater sediments.	Platform / Service
WS022	U037	The HiSea Platform may be able to provide bathymetry readings.	Platform / Service
WS025, WS026	U038	The HiSea Platform should warn the user for environmentally harmful locations.	Service
WS027	U039	The HiSea Platform must use models to process and visualise data.	Platform
WS027	U040	The HiSea Platform should make access to models as convenient as possible.	Platform
WS028	U041	The HiSea Platform must increase the usage of COPERNICUS data.	Platform / Service
WS028	U042	The HiSea Platform may increase the usage of NOAA.	Platform
WS028	U043	The HiSea Platform may integrate existing on-site sensors.	Platform
WS029	U044	The HiSea Platform may implement SARMAP models.	Platform
WS029	U045	The HiSea Platform may implement OLIAP models.	Platform
WS029	U046	The HiSea Platform may implement self-built models from the SAB.	Platform
WS030	U047	The HiSea Platform must be easy to use.	Platform / Service

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WS030	U048	The HiSea Platform should be understandable for novices.	Platform / Service
WS031	U049	The HiSea Platform should have more advanced modelling with the currently used data.	Platform
WS031	U050	The HiSea Platform should have an interface to connect to existing data sources.	Service
WS031	U051	The HiSea Platform may reuse existing data	Platform
WS033	U052	The HiSea Platform should show long-term changes	Service
WS034	U053	The HiSea Platform should provide fast and easy ways to visualise data	Platform / Service
WS035	U054	The HiSea Platform must provide very accurate data to the user. Data is not allowed to be rounded or similar.	Platform
WS036	U055	The HiSea Platform must provide data visualisation and interaction easily accessible.	Platform / Service
WS037	U056	The HiSea Platform should be able to represent data relationships and dependencies in a simplified way.	Platform
WS038	U057	The HiSea Platform should provide a reliable real-time data stream.	Platform / Service
WS039, WS043	U058	he HiSea platform should have at least the same functionality as the already used User Partner systems.	Service
WS040	U059	The HiSea Platform may be worth the prize users have to pay.	Platform
WS041	U060	The HiSea Platform must use standardized file formats.	Platform
WS044	U061	The HiSea Platform should provide forecasting material for different models.	Platform
WS044	U062	The HiSea Platform should provide forecasting material for different measurements (in particular water quality)	Platform
WS045	U063	The HiSea Platform may provide management tools for oil spills identification at night	Service

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WS046	U064	The HiSea Platform must provide quality management tools for water trajectory modelling	Service

3.3 Technical Requirements

The technical requirements are the result of an analysis of the user requirements, compiled in section 3.2. Each user requirement was analysed regarding the technical reference. Of course, the number of technical requirements can increase in the future, due to additional user requirements, etc. To ensure the traceability, the technical requirements have a "Technical Requirement ID" and additional IDs of related user requirements. Furthermore, each technical requirement is categorised into different types. The possible types are:

- **Functional:** This requirement describes a functionality that will be realized within the HiSea platform. This can either be component or service-based
- **Robustness:** This requirement contains features to guarantee a working environment and be resistant against failures.
- **Stress:** This requirement needs to be tested against resources consumption features, in order to be reliable even if the utilisation is high.
- **UI/UX:** This requirement is set in order to guarantee a user-friendly functionality

Table 3: Technical Requirements

Technical Requirement ID	User Requirement ID	Technical Requirement	Type
T001	U001	The Download Module must not be connected to a specific source to get environmental measurements for air.	Functional
T002	U002	The Download Module should be connected to a specific source to get environmental measurements for waste.	Functional
T003	U003	The Download Module must be connected to a specific source to get environmental measurements for water.	Functional

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T004	U004	The Download Module must not be connected to a specific source to get environmental measurements for noise.	Functional
T005	U005	The Download Module must not be connected to a specific source to get environmental measurements for soil.	Functional
T006	U010	The Download Module should be connected to a specific source to get information about waste detection of the surface of the water.	Functional
T007	U001, U002, U003, U004, U005	Before each incoming data gets stored into the database, it must be checked for the format and if necessary harmonized into a common format.	Functional
T008	U001, U002, U003, U004, U005	Environment measurements, Sensor data, etc. must be stored in the HiSea platform storage to make it accessible to models, services, analytics, etc.	Functionality, Robustness
T009	U006, U007, U008, U009, U020	The HiSea platform must provide APIs to get datasets for a defined type and a defined timespan.	Functionality, Robustness
T010	U011	The HiSea platform must provide models to monitor waste on a surface of the water, that can be visualised in services for end users.	Functional, UI/UX
T011	U011	HiSea models must be accessible easily from services to be visualised.	UI/UX

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T012	U012, U050	The HiSea Platform should be extendable in terms of accessing APIs from external sources.	Robustness, Stress
T013	U012, U013, U035, U043	The HiSea platform should support external software modules independent from programming languages.	Robustness
T014	U013	The integration of new analytic and processing modules must be easy and quick.	Robustness
T015	U016, U020	The platform must have analytic algorithms in order to trigger alerts to various apps.	Functionality
T016	U017	The platform must ensure to provide high-resolution models.	Functionality, UI/UX
T017	U018	The platform must provide a wide range of water measurements for different services, which are easy to retrieve.	Functionality
T018	U020	The platform must deliver data as soon as it is ready.	Robustness
T019	U021	The platform must provide the ability for models to predict any context-based incidents (e.g. water degradation).	Functionality
T020	U022, U054	The platform must take care of the reliability and accuracy of the data it provides. Received data are not allowed to be changed (consciously and unconsciously).	Robustness, Stress

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T021	U023	The platform must be robust in order to handle erroneous data from sources.	Robustness
T022	U023	The master version of the HiSea platform must always be in a stable version to increase failure safety.	Robustness, Stress
T023	U025	APIs must be designed consistently.	Robustness
T024	U025	Error Codes must be transparent and comprehensible	Robustness
T025	U024, U027, U057	The platform must be able to deliver a real-time stream to services.	Functionality, Stress
T026	U027	The platform must be able to deliver high-frequency data to services	Functionality
T027	U031, U061, U062	The platform should have analytic tools to provide forecasts for dangerous flotsam (e.g. position)	Functionality
T028	U033	The platform should have analytic tools to provide forecasts for pollution spreading depended on weather and currents.	Functionality
T029	U036	The platform should get information about underwater sediments from a source.	Functionality
T030	U037	The platform may get information about bathymetry from a source.	Functionality
T031	U038	The platform should get information about environmentally harmful locations.	Functionality

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T032	U039	The platform must integrate models that are usable in services.	Functionality
T033	U040	Models must be able to be integrated with only a few clicks, including configuration	Stress
T034	U041	The main source of the data must be from COPERNICUS	Functionality
T035	U042	Other sources such as NOAA may be used.	Functionality
T036	U044	The collection of models may have SARMAP models.	Functionality
T037	U045	The collection of models may have OLIAP models.	Functionality
T038	U046	The collection of models may be extendable with custom models from users.	Robustness
T039	U047, U048, U053, U055	The User Interface of the HiSea platform must be user friendly and comprehensible.	UI/UX
T040	U049	The models should be up to date.	Robustness
T041	U051	The platform should be able to transform data structures coming from COPERNICUS, etc. into legacy data structures from existing sources.	Functionality
T042	U053, U055	The platform UI should require only a few clicks to reach the intended goal of the user.	UI/UX

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T043	U058	The HiSea platform should provide a huge range of analytic methods	Functionality
T044	U059	The scope of the HiSea platform may comply with the current scope of actual tools.	Robustness, Stress
T045	U060	The HiSea Platform must use standardized file formats, wherever possible.	Functionality, Robustness
T046	U035	The HiSea platform should have an alerting module	Functionality

3.4 HiSea Services

Based on the user requirements, 9 services were extracted and these will run upon the HiSea platform in order to provide several different functionalities to the users. These services have been extracted from the requirements, but as this is an ongoing process the number of services can increase in the future. The extracted services are validated by the users Valenciaport and Selonda and subsequently rated against their preferred priority. In addition to the service definitions below, the essential requirements of those services are that they should:

- allow variability in the range of monitoring locations.
- use the COPERNICUS source as much as possible.
- be designed user friendly in order to set a low usage barrier.
- provide long-term changes from measurement data.
- comply, if possible, with the regulation's ROM 5.1.13 and/or Water Framework Directive.

The following table has a "Service ID" as a unique identifier for each Service and also a collection of "User Requirements IDs" to keep the traceability of the user requirements. The "Service Definition" with the title and a small description of the service and finally a priority, evaluated by the user partners ValenciaPort and Selonda.

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Table 4: HiSea Service Definitions

Service ID	User Requirement ID	Service Definitions	Priority
S001	U001, U002, U003, U004, U005, U006, U007, U008, U009, U019, U020, U024, U028, U021	**Water Analytics Service** A service to monitor the environmental measurements (chemical, biological and physical) for water quality, which also triggers alarms for quality losses, and allows to set periodical measurements. • Hydrology • Microbiology • Planktonic of water • Benthic communities • Oxygen • Temperature • Turbidity • Currents • Etc.	High
S002	U021, U062	**Water Forecast Service** • A service to provide forecasting material for different measurements • A service to predict water quality degradation	High
S003	U010, U011, U031, U033, U063, U064	**Surface Analytics Service** A service to analyse the surface of the water, including a location detector and a forecast based on weather and current conditions • Detect waste on the surface of the water and show it on a map • Detect dangerous flotsam or other pollutions • Identify and locate oil spills at night	High

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		• Quality management tools for water trajectory modelling	
S004	U016	**Water Location Measurement Service** A service that measures water pollution in a well-defined area and gives alerts as soon as a threshold is met.	medium
S005	U036, U037	**Underwater Analytics Service** A service to detect underwater sediments (high priority) and bathymetry (low priority)	High/Low
S006	U012	**Emergency Control Centre Service** A service that connects to the Emergency Control Centre for ports to get data that is used currently	low
S007	U030	**Coastal Water Analytics Service** A service to monitor information specialized for coastal waters.	Medium
S008	U026	**Physiochemical Analytics Service** Improved service to monitor parameters for physiochemical analysis of water	high
S009	U038	**Harmful Location Service** A service to warn users for environmentally harmful locations	high

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4 Conclusion

The basis of the requirements was provided by the end user partners ValenciaPort and Selonda. In addition, other potential HiSea customers were invited to special events hosted by the end user partners and were asked how HiSea could be helpful to improve the operation of their companies. Interviews were conducted, questionnaires were filled in and the findings were presented in **Error! Reference source not found.**,**Error! Reference source not found.**, **Error! Reference source not found.**, and **Error! Reference source not found.**. This document collects the requirements that are desired by the users. These requirements follow a defined syntax (must, should, may, must not) to obtain a prioritization of the individual requirements at an early stage.

The involvement of the users from the early stage of the development was therefore very welcome and will be continued in the future. The future cooperation will also influence other requirements beyond this document. The process of requirements analysis was documented in staggered tables in order to trace exactly where a requirement comes from. IDs were introduced that were linked through the entire process. Initially, statements from user partners and potential users were recorded in order to generate the first user requirements. A fixed syntax has been introduced to the user requirements to indicate the relevance of the requirement.

As obtained, these user requirements were still too general to make technical decisions. Therefore, these requirements were transformed into technical requirements. The technical requirements refer to functionality, robustness, UI/UX and stress. In addition, these technical requirements help developers to plan and implement the HiSea Platform. Subsequently, the user and technical requirements were analysed, and similarities were filtered out. From this, the first HiSea services were extracted and validated and prioritized by the users. This resulted in 9 services that meet the requirements of the users. As the project progresses further ideas will come and requirements will follow. The task will then be to analyse the new requirements and decide whether they will be implemented within the framework of the project. Ultimately, this document provides a basis of requirements that can be extended at any time. Extensions are likely, due to a very close user integration and should also be encouraged.

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