



IALA GUIDELINE

G1155 THE DEVELOPMENT OF A DESCRIPTION OF A MARITIME SERVICE IN THE CONTEXT OF E- NAVIGATION

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1. INTRODUCTION

This Guideline is aimed to assist members and/or other international organizations in the development and implementation of a Maritime Service (MS) in the context of e-navigation. The MS are described in IMO *MSC.1/Circ. 1610* on initial descriptions of Maritime Services in the context of e-Navigation and will be further developed by the appointed standardization body. This document will assist in the production of a Maritime Service description and is the interconnection between the high level description of the Maritime Services and the Technical Services to be developed.

1.1. THE OVERARCHING E-NAVIGATION ARCHITECTURE

IALA Guideline *G1113 Design and implementation principle for harmonized system architectures of shore based infrastructure* (ed. 1) describes the overarching foundation for e-Navigation Architecture. Most MS depend on the exchange of data and for that purpose it is essential that a common understanding of the data is described in a standardized data model and stored in an appropriate repository (for example the IHO or IALA Registries).

As stated in Recommendation *RO140 (eNAV-140) The Architecture for Shore-based Infrastructure 'fit for e-Navigation'* and in *G1113*, the development of e-Navigation related services should be based on user (information) needs. This means that the objective of the MS, the user need, the information need, user requirements, etc. are described in a way that can later be translated into Technical Service Specifications and one or more technical designs, by engineers.

2. SCOPE

This Guideline is intended to assist IALA members in the development of Maritime Services in the context of e-Navigation. This guideline is designed to challenge them to specify their user and information needs, in greater detail, and identify intended goals so that they can be translated into service specifications and technical design documentation required for the development of the service.

The scope is limited to the production of a MS description.

3. E-NAVIGATION SERVICE DEVELOPMENT PROCESS

An agile approach is commonly used for the development of IT based services. In an Agile organization, business and IT work together on the development of the service. They interactively discuss information and user needs etc. and develop the software solution in an iterative way where the usability is frequently demonstrated to the end user. Information exchange between business and IT is conducted in an informal setting where teams work together on a daily basis. This working arrangement is not possible in the case of the development of e-Navigation MS since the information transfer regarding the MS is a pan committee and even a pan organization activity. Therefore, it is necessary to follow a more structured way of working where a defined process is followed and information about an MS is well documented. The relationship between the different required documents is critical for the development process. The relationship between the documents and relation with other aspects in the development process is represented in Figure 1.

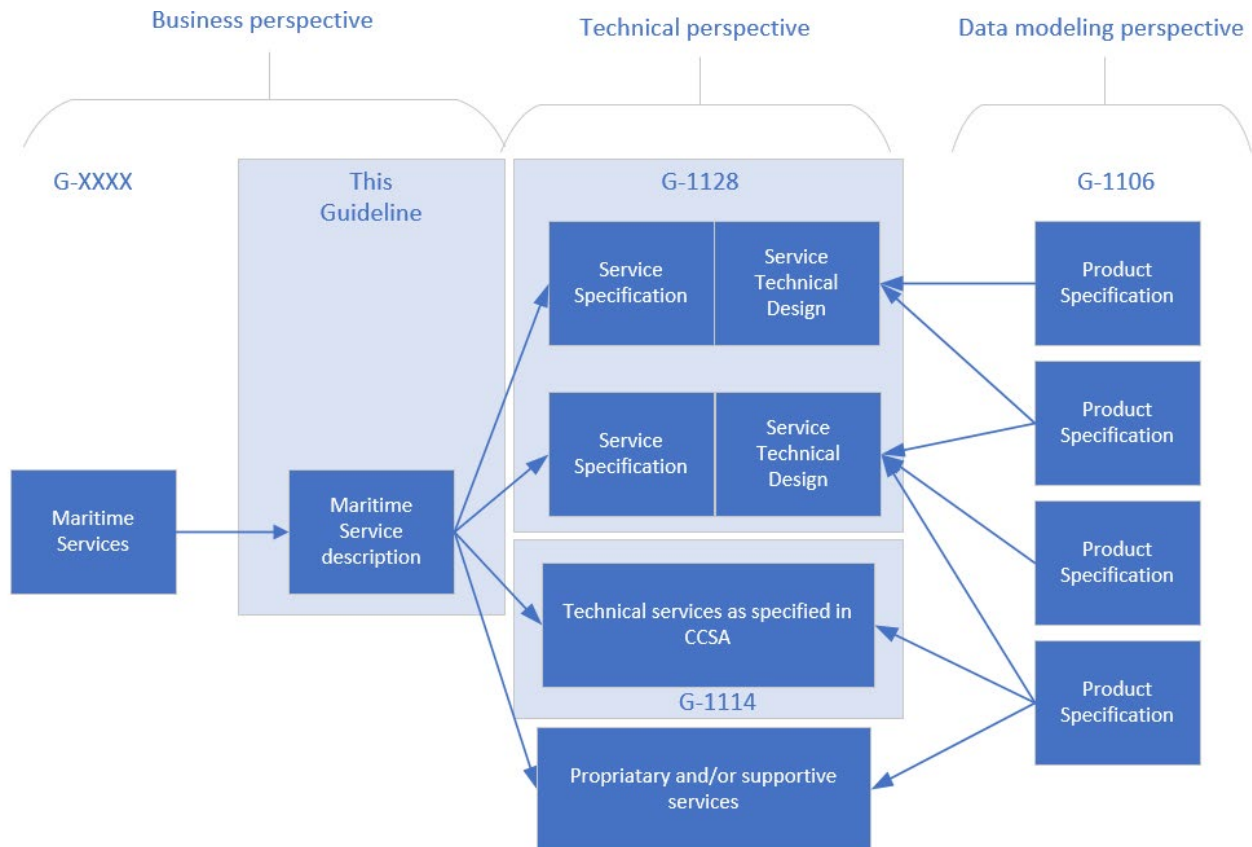


Figure 1 Relationship between Maritime Services, Maritime Service description, Technical Services and Product Specifications.

3.1. REQUIREMENT TRACEABILITY

For the development of a MS, information is transferred between different stakeholders. In the case of information transfer there is a risk that information gets lost, resulting in loss of functionality at the end of the development process. To mitigate this, it is necessary that requirement traceability is a part of the development process. IALA Guideline *G1133 Requirement Traceability* gives guidance on this topic and should be used for this purpose. Information needs, user needs, and requirements should be made explicit and in every step in the development process it should be made clear how the requirement is fulfilled.

4. MARITIME SERVICE DESCRIPTION

The Maritime Service description should provide all the information needed to make a *G1128 (The specification of e-Navigation Technical Services)* based service specification and technical service design and/or provide the information for the developer to determine if other technical services are required. The MS description should i.e., describe a full information need analysis and the derived data needs. The MS description should consist of the following main components:

- Context and goal of the MS
- Relation with MS
- Business architecture with a Business Process Model (BPM) [7]
- User needs, information needs, high level functional and non-functional requirements
- Requirements traceability matrix

4.1. CONTEXT AND GOAL OF THE MARITIME SERVICE

An MS description should give a clear view what is to be achieved by the service. It should give the reader a clear description what the MS goal is. It provides information about what this service must provide from the different stakeholders' perspectives, i.e., those at the shore side (authorities, service providers, etc.) and the users of the service at the ships side.

4.2. DESCRIBING THE SERVICE

E-Navigation is about the sharing of information between ship and shore. Therefore, it is essential that the information needs that have to be fulfilled by the service are unambiguous. An information needs analysis can be helpful in case this is not yet clear. The analysis makes the information need explicit and provides context for the quality of the information and is a reference for the data needed to provide the information. The MS description does not have to contain information about the data. The data needed for the provision of the information is a part of the technical design of the service.

After the information analysis is complete, the MS description should provide information about the intended usage of the service and fulfilment of the information needs. It can be difficult for people at the business side of the service to explain their intended business need. To aid in this process there are different proven methodologies that can be used. The most common methodology is to make use of Epics and User Stories, as used in Agile Development. Epics are the description of a (collection of) features of a part of the service. For consistency and simplicity, the document will refer to "Feature Descriptions" and will not make a distinction between Epics and Features.

User Stories are detailed descriptions of parts of the service described from the users' perspective. Feature Descriptions lead to User Stories that can be further designed and programmed by software engineers.

In Figure 2 a small example of the relationship between an Intended Service, and associated Epics, Features and User Stories are represented.

As shown the service is divided into main Features. The desired functionality of the Feature will be transformed into a Feature description and these can be broken down into User Stories. The User Story describes the desired part of the feature from the point of view of the user.

In the MS description the desired Features are translated into Feature Descriptions. It does so by providing a statement such as "As a user ... I want to ... So that...", and it provides criteria to determine if the feature is fulfilled.

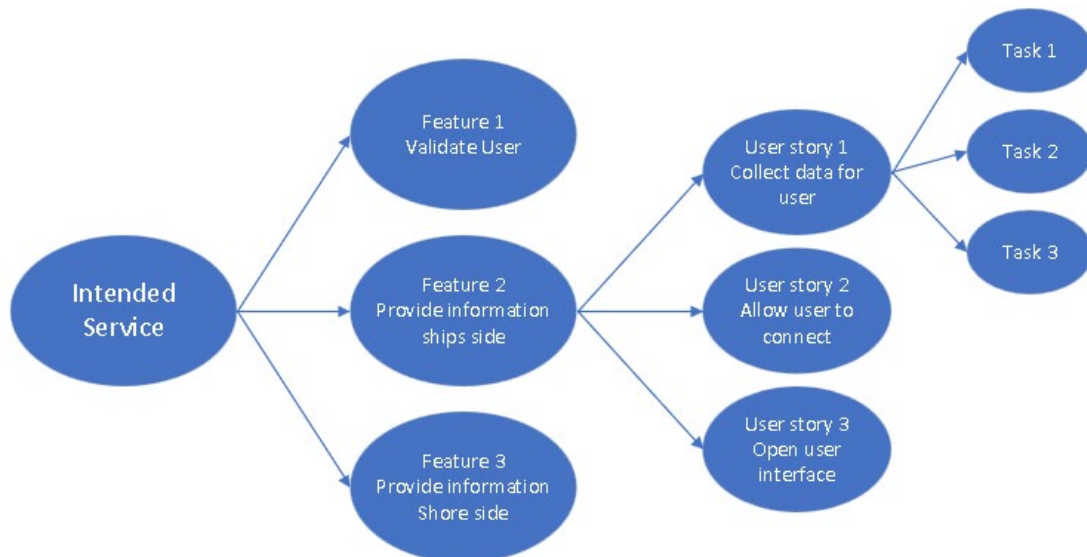


Figure 2 Example of the relationship between an Intended Service, and associated Feature and User Stories.

For an MS description it is sufficient to describe the maritime service at a Feature level.

A Feature consists mainly of the following items:

- A feature description - *Example*: “As a shore side authority I want to send weather warning to all ships in a given area so that the ships can make a decision accordingly”
- Architectural parameters
- Functional and non-functional requirements

The MS description Template in annex A; can assist members with the creation of an MS description. This template is based on the items described in section 4.

When the template is complete it will contain sufficient information to be translated to a service specification and technical design document and determine the need for other supportive or proprietary services.

5. MARITIME SERVICE IMPLEMENTATION CONSIDERATIONS

During the process of the development of the service members should also consider the implementation aspects of the MS from a business perspective. The implementation of a MS will undoubtedly have an impact on the way the service is provided in the current situation. To implement and transition from the current situation to the provision of the new maritime service in the context of e-Navigation it is necessary to determine the required capability at the business (operational) level. This can be done by:

- Business process modelling
- Business process analyses

5.1. BUSINESS PROCESS MODELLING

Business process modelling is a way of making the operational processes for the provision of the intended MS explicit. A business process model describes, visually, on a role level who is doing what, at what point in the process, and the information required by the role for the completion of its part of the process.



The output of the MS is harmonized and standardized. The business process model for a service is something that is specific for the organization(s) who is(are) delivering the service.

5.2. BUSINESS PROCESS ANALYSES

A business process analysis helps members to identify what part of their business process model is affected by the new MS. This will make it clear what needs to be done from the business process aspect to build the capability to make the transition.

5.3. OTHER IMPLEMENTATION CONSIDERATIONS

The business process analyses provided information about the change on business processes for the provision of the MS. Other aspects should also be considered such as:

- Organization: for example, is there a need to change the organization structure for the provision of the service? Are personnel competent to deliver the service or is training needed?
- Technical¹: analyse and determine the change to the IT infrastructure for the implementation and provision of the service.

¹ The analyses of the IT infrastructure can only be done after the technical design is done.

5.4. IMPLEMENTATION CONSIDERATIONS FOR THE MS DESCRIPTION

The business impact of the implementation of a MS can be different for each IALA member organization. However, it should be recognized that for most identified MS's there is already a substantial amount of the business process described and harmonized. These parts should be described in a business model and provided as business architectural constraints for the service specification development.

6. DEFINITIONS

The definitions of terms used in this Guideline can be found in the *International Dictionary of Marine Aids to Navigation* (IALA Dictionary) at <http://www.iala-aism.org/wiki/dictionary> and were checked as correct at the time of going to print. Where conflict arises, the IALA Dictionary should be considered as the authoritative source of definitions used in IALA documents.

7. ABBREVIATIONS

IMO	International Maritime Organization
IT	Information Technology
MS	Maritime Services

8. REFERENCES

- [1] IALA. Guideline G1120 Disaster Recovery
- [2] IALA. Guideline G1113 Design and Implementation Principles for Harmonized System Architectures of Shore-based Infrastructure
- [3] IALA. Guideline G1133 Requirement Traceability
- [4] IALA. Guideline G1114 A Technical Specification for the Common Shore-based System Architecture (CSSA)
- [5] IALA. Recommendation R0140(ENAV-140) The Architecture For Shore-Based Infrastructure "Fit For E-Navigation"
- [6] Agilereference.org
- [7] The Complete Business Process Handbook, Body of Knowledge from Process Modelling to BPM, Volume 1, Mark von Rosing, Henrik von Scheel and August-Wilhelm Scheer, ISBN: 9780127999593, December 2014



ANNEX A MARITIME SERVICE DESCRIPTION TEMPLATE

Maritime Service description for the **xxx** Service



INTRODUCTION

The *blue italic text* is meant to be replaced by those producing the Maritime Service description. The non-italic text is not necessarily meant to be replaced but may be used as example text.

PURPOSE OF THE DOCUMENT

This template shall support the service architects in creating a description of the services (put down in writing) at a high level of abstraction. This template provides descriptive instructions for the intended content for each section. Formally, such instructions are written in blue italic font – they shall be deleted when writing the actual service specification document. In addition, some parts of this template provide suggested text fragments that may be directly re-used in the service specification document. Such proposed text fragments are given in black normal font.

The purpose of this description is to provide information needed to develop the service specification(s) and the technical service(s).

CONTEXT OF THE MARITIME SERVICE

This section provides information about the context of the Maritime Service.

The context of the Maritime Service gives the service specification developer information about the rationale of the service.

OBJECTIVE OF THE SERVICE

This section provides information about the objective(s) of the Maritime Service.

The Maritime Service should have clear objectives. These objectives should be described in Specific, Measurable, Achievable, Realistic, and Timely (SMART) terms. The section should give a clear description of what the Maritime Service is intended to do.

INTENDED USERS OF THE SERVICE

This section provides information about the intended users of the service.

Give a clear description about the users or groups of users intended to make use of the Maritime Service. This can be shipboard users and/or shore side users, such as maritime authorities, pilots, port authorities, etc.

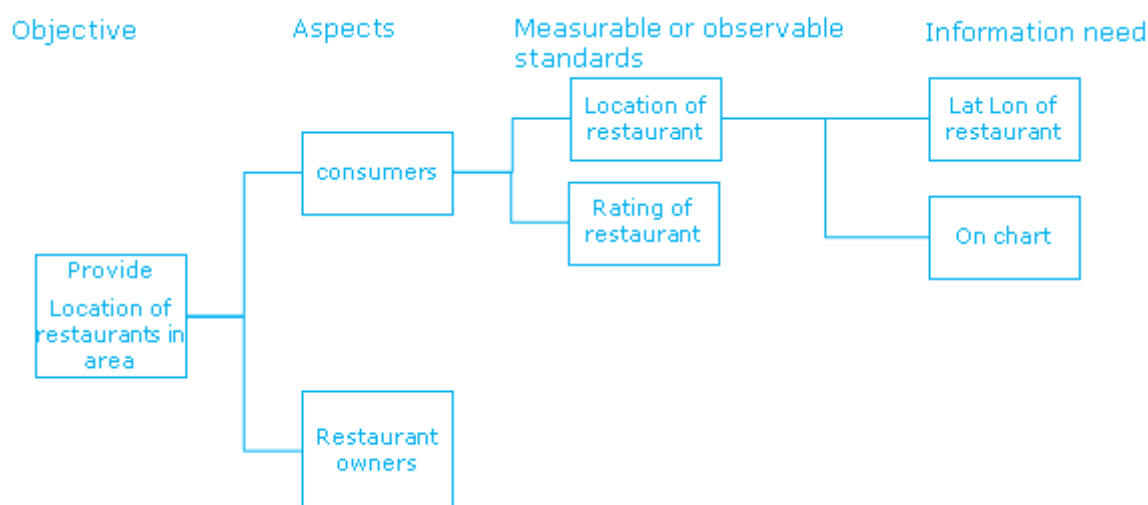
INFORMATION NEEDS

This section provides the information needs that are to be fulfilled by the Maritime Service.

This section should state very clearly the information needs the Maritime Service covers. Information needs may be different for the different users of the Maritime service.

There are numerous techniques that can be used to obtain the information needs. There is no prescribed method to do this as long as the information needs are described in a clear way.

For example: Use the objective of the service as the starting point for the analysis. Based on the objective identify the most important aspects of the (sub)objective. From the aspects you can derive measurable or observable standards. This then will lead to the specific information needed. Figure 1 shows a practical schematic example of this method of information analysis.



Schematic example of information analysis

The results of the information analysis need to be captured in a matrix. This is necessary for requirement traceability and ensures that the objectives are being realized.

Table A1 *By the service provided information needs*

<i>Provide location of restaurants in area</i> information need matrix				
Aspects	Measurable/observable standards	Information need ID	Information need	Necessary operations
<i>Consumers</i>	<i>Location of restaurant</i>	<i>C.IN.1</i>	<i>Lat Lon of restaurant</i>	<i>Convert from X,Y</i>
<i>Consumers</i>	<i>Location of restaurant</i>	<i>C.IN.2</i>	<i>Rating of restaurant</i>	<i>None</i>
<i>Consumers</i>	<i>Rating of restaurant</i>			
<i>Restaurant owners</i>				

FEATURES

This section describes the main features. Table 2 lists the main features and the descriptions of the Maritime Service.

Description of the features of a service will provide the developer of the service specification the input for the development. For the description of the features it is helpful to use the following guidance:

The feature should be described as a statement: “As a <type of user> I want to <do something> so that <some reason>.”

As a check the INVEST² method can be used to assess the quality of the feature description.

A good feature description should be:

- *Independent (of all others)*
- *Negotiable (not a specific contract for features)*
- *Valuable (or vertical)*
- *Estimable (to a good approximation of the development effort)*
- *Small (This applies more for the underlying user stories)*
- *Testable (in principle, even if there is not a test for it yet)*

The feature descriptions need to be documented. This necessary for traceability and ensures that the features are being realized.

Table A2 Feature description table

Feature identifier	Feature description
<i>F.001</i>	<i>Example: As a mariner I want to be able to retrieve the weather forecast for my location at any time so that I can display it on my electronic chart</i>
<i>F.002</i>	

² The acronym INVEST helps to remember a widely accepted set of criteria, or checklist, to assess the quality of a user story. If the story fails to meet one of these criteria, the team may want to reword it, or even consider a rewrite

GUIDING PRINCIPLES

ARCHITECTURAL PARAMETERS

This section describes the architectural parameters for the Maritime Service.

List the architectural parameters for the Maritime Service. Architectural parameters should specify the scope and rationale for the service specification developers. Example: “Maritime Safety Information must be provided within the S-100 data framework.” Rationale: “Harmonization between services must be achieved.”

FUNCTIONAL AND NON-FUNCTIONAL REQUIREMENTS

Functional requirements are mainly derived from the user needs in the development of the service specification process. The OSD is input for the service specification process. Therefore, the functional requirements that can be stated at this stage will be limited.

Non-functional requirements can be drafted during this stage. A non-functional requirement is a specification that describes the system’s operation capabilities and constraints that enhance its functionality but do not affect the functionality itself. Non-functional requirements could be e.g., speed, security, reliability, maintainability, scalability, etc.

Table 3 lists applicable Requirements for the XYZ service.

Table A3 Requirements for the Maritime Service

Requirement type	Requirement Id	Requirement Name	Requirement Text	Feature identifier
<i>Functional</i>				
<i>Non-Functional</i>				

BUSINESS PROCESS MODEL

For the development of the service specification and technical design it is necessary to provide information about the business process of the intended service. A part of the business process model maybe specific for a national authority. For already existing services most parts of the business process is already documented in guidelines and standards.

For the development of the Maritime Service it is necessary to provide a business process model and identify the scope of the part that is meant to be automated by the Maritime Service.

The model should make clear what action is executed by which stakeholder in the process and what information needs to be transferred between them. In Figure 2 an example of a simple business model is provided.

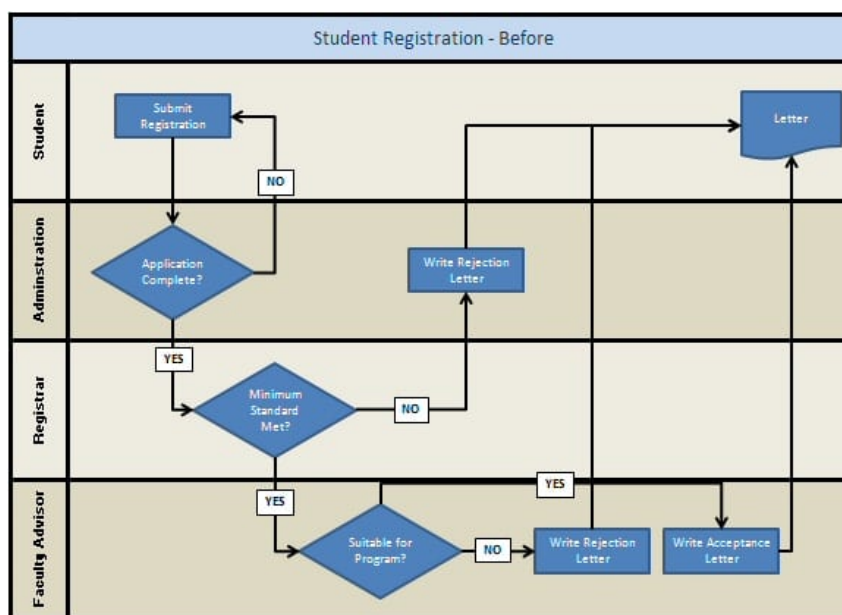


Figure A1 Example of business process model