



BETTER SHIPS, BLUE OCEANS

VOORONDERZOEK VTS VOORBEREID OP DE INTRODUCTIE VAN AUTONOME SCHEPEN

Stappenplan om functionele eisen vast te stellen

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EXECUTIVE SUMMARY

Developments in Maritime Autonomous Surface Ships (MASS) have made significant progress in recent years. The Port of Rotterdam is well aware that MASS vessels will have an impact on the operation in the port and more specific on the Vessel Traffic Services (VTS) provided in the port. This research includes a preliminary study on the impact of MASS vessels on the VTS operation resulting in a project approach defining user requirements for future VTS operation handling MASS. The preliminary study consists of: a limited literature study, development approach, future MASS scenarios, current VTS viewpoint, stakeholder inventory and the collective research goal.

Literature survey

A literature survey was conducted in a top-down and bottom-up manner. This survey gives little insight on the VTS impact by the introduction of MASS vessels. The complex change in operation due to the introduction of MASS vessels will require various technological challenges in which various operational parties will be involved. A broad and structured approach will be required to apply defining the required levels of services, tasks, roles, procedures, best practices and the development of new technological support tools. Literature so far provides minimal directions defining requirements for future VTS.

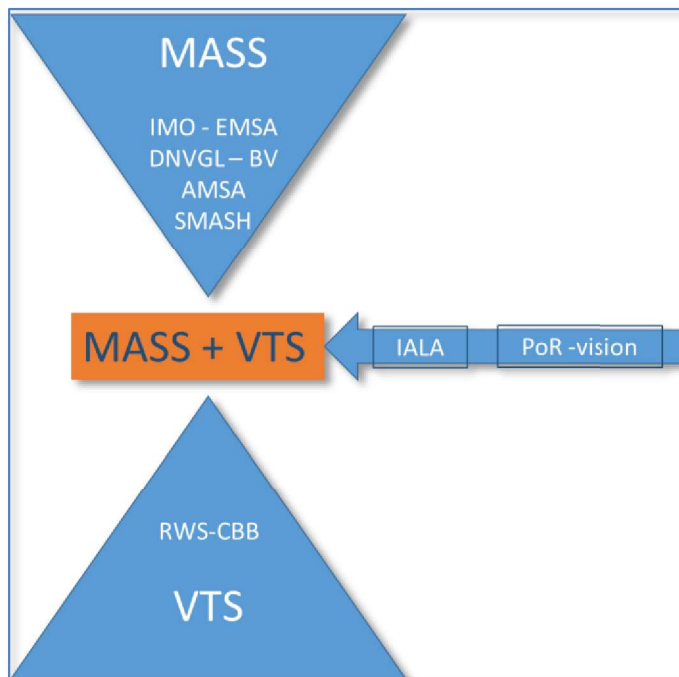


Figure E1 Literature survey top-down and bottom-up.

Development approach

The socio-technical system in which VTS personnel is performing its job is expected to change significantly in the coming decade. Due to the fact that it is not clear in which direction the changes will develop, an iterative exploring development approach is chosen. This includes a lifecycle approach from defining a future operational concept up to the definition of user requirements for a future VTS operation. An important element in this approach is having a flexible experimental VTS environment for user-in-the-loop evaluation of materialised future scenarios.

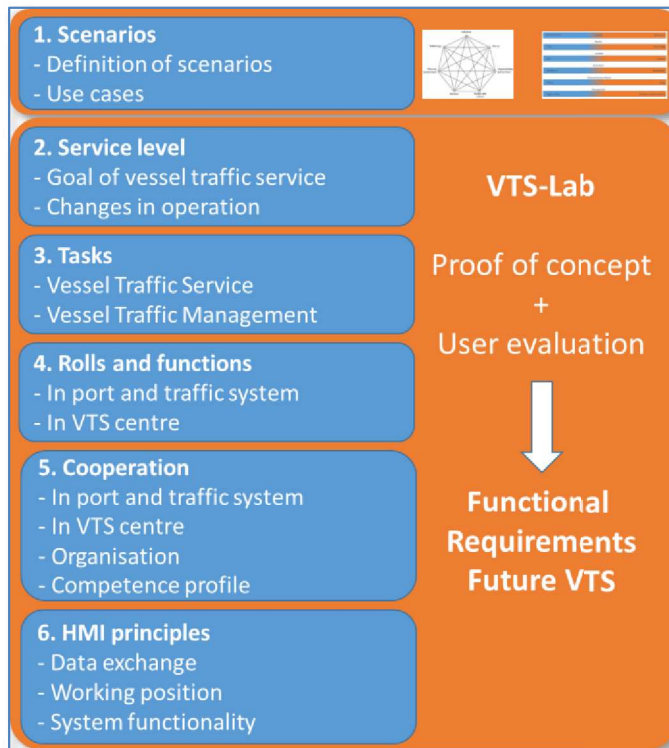


Figure E2 Development approach to define user requirements future VTS

Future MASS scenarios

Future scenarios including MASS operations are difficult to predict. However, it is clear that each future scenario will be defined by a limited set of key parameters. These key parameters are presented and some example scenarios are given in which certain settings are chosen per key parameter. These key parameters define the level of automation of the MASS vessels and its type of operation relevant for the VTS operation. By defining settings per key parameter different future scenarios can be defined. This may cover different port operations or creating an overall scenario based on expected sub-scenarios of the future operation. Key parameters are seen as settings on a continuum rather than binary values.

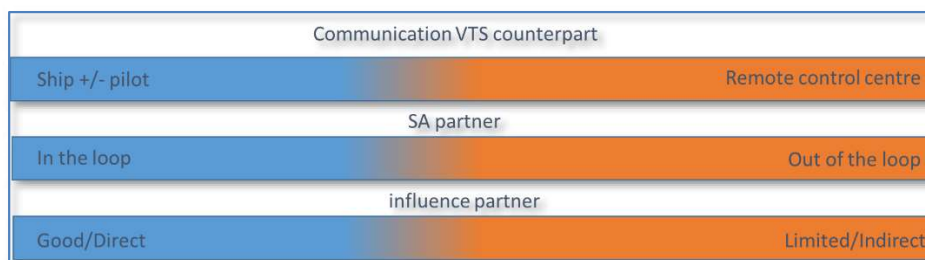


Figure E3 Example set of key parameter by means of sliders.

Current VTS viewpoint

Based on interviews with VTS operators a set of key parameters is defined describing the operation from the viewpoint of a VTS operator. This set of key parameters defines for example the level of services and support required, the type and amount of data to be exchanged etc. for different types of vessels. These key parameters are added to the set of key parameters defining a future VTS operation.

Stakeholder inventory

A limited stakeholder inventory has been conducted. All interviewed stakeholders indicate to have a definite interest in MASS development and the impact on their VTS operation. Being prepared for future visiting MASS vessels in their ports is deemed essential to start preparing now. Different views on how

MASS operation will impact the VTS operation on various ports is observed. All interviewees indicate to be interested in participating in a follow-up project zooming in into the future VTS operation handling MASS vessels in combination with conventional vessels.

Collective research goal

The collective goal is to take a flexible approach defining functional requirements for future VTS operation, tailored for specific individual ports, though with a thorough common basis.

This report illustrates a project approach defining user requirements for future VTS operation handling MASS vessels as well as conventional vessels. This project approach covers:

- A combined top-down (MASS developments) and bottom-up (VTS service needs) approach
- Taking into account the whole socio-technical environment of VTS operation
- VTS operator centred approach by using an experimental lab as central development platform
- A common knowledge basis concerning future VTS operation
- Definition of user requirements as starting point for future VTS system development