



# ISO STANDARD ON MASS TERMINOLOGY

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# New ISO 23860 standard on terminology



Form 4: New Work Item Proposal

Circulation date: 2018-11-09	Reference number: <a href="#">ISO/NP 23860</a> (to be given by Central Secretariat)
Closing date for voting: 2019-02-01	<a href="#">ISO/TC 8</a>
Proposer (e.g. ISO member body or A liaison organization) <a href="#">ISO/TC 8</a>	<a href="#">N 1331</a>
Secretariat <a href="#">SAC</a>	

## Scope of the proposed deliverable.

Definitions of terminology for description of MASS concepts related to automation of the operational processes of MASS. This includes the context of the MASS automation system as well as the automation systems themselves and their taxonomy.

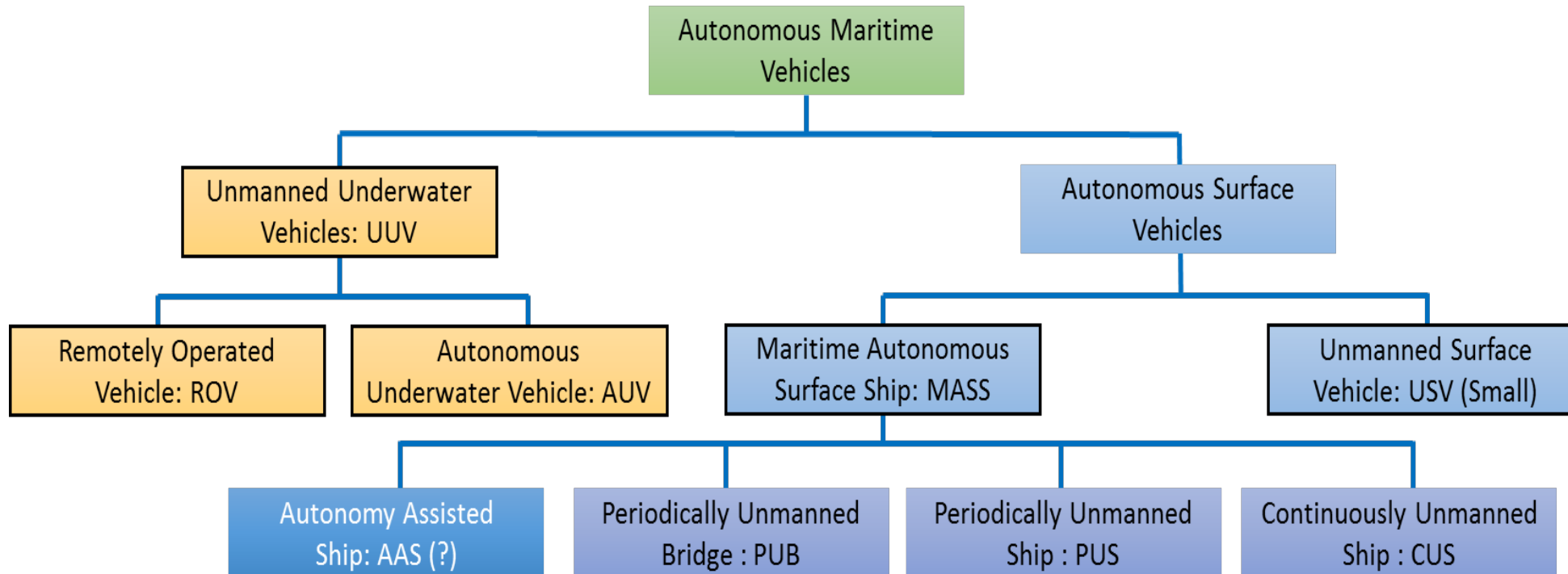
## Purpose and justification of the proposal\*

Most current publications related to the operational aspects of MASS suffer from a lack of standardized terminology. This makes it difficult to compare approaches to automation, to division of responsibilities between human crew and automation and creates problems in defining unambiguous scopes of new studies into the subject. This standard will alleviate these problems and will create a common understanding of what MASS is and is not.

It is not likely that other organizations will undertake this task. IMO would be a natural candidate, but the work requires wider expertise and more details than an IMO working group can easily muster.

# Different types of ships

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# Unmanned vs. autonomous

Personnel type	Present or not on ship
Navigation	None on board
Engineers	Not active
Other crew	Active
Passengers	

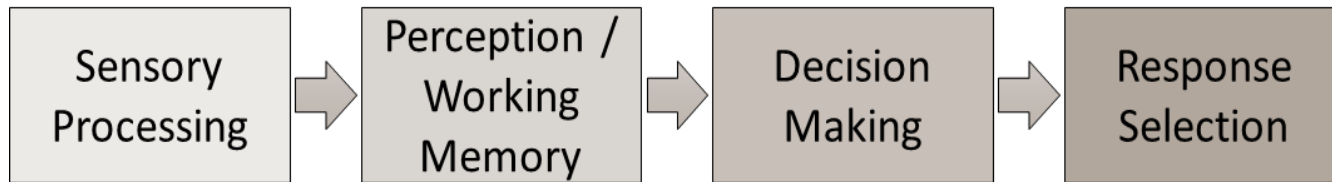
- 0 – *None.*
- 1 – *Backup.*
- 2 – *Available.*
- 3 – *In control.*



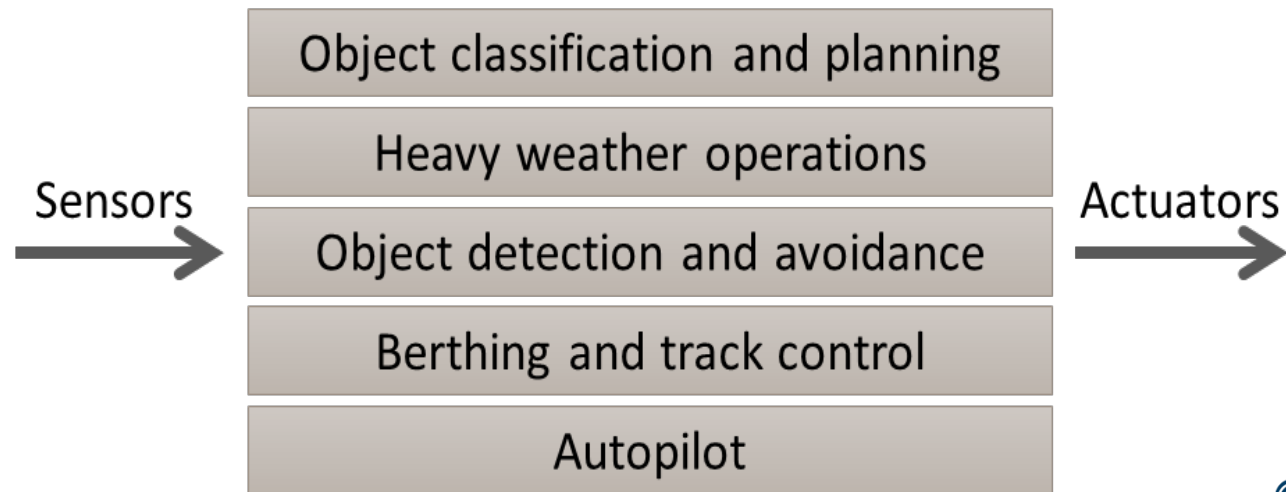
Shore or ship in control?

# Type of automation

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Human intervention pipeline



Human intervention as hierarchy

# Type of automation

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*DA0 - Operator controlled.*

*DA1 – Automatic.*

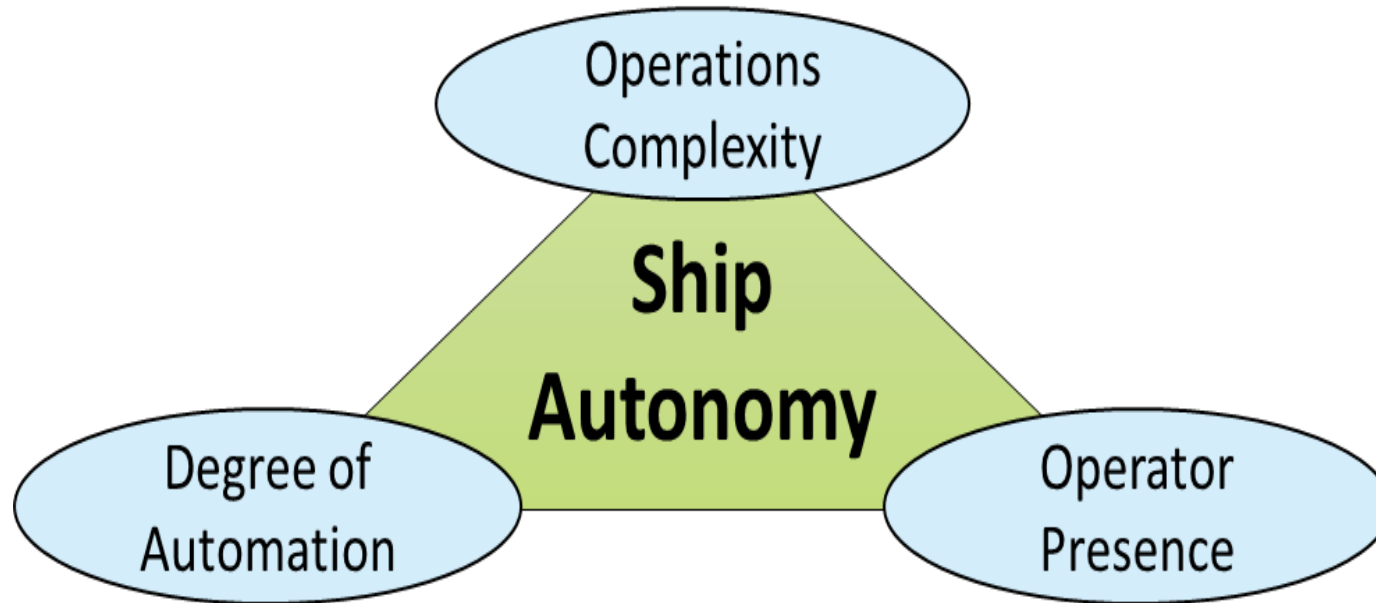
*DA2 – Constrained autonomous.*

*DA3 – Fully autonomous.*

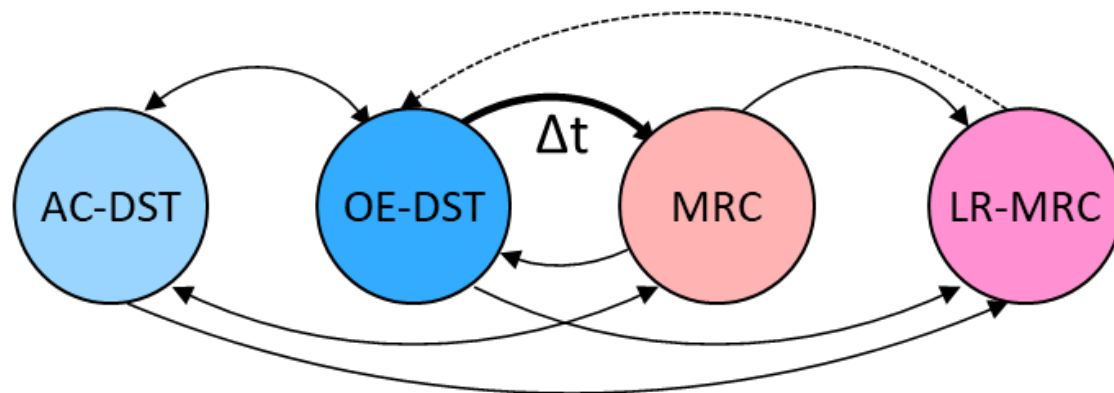
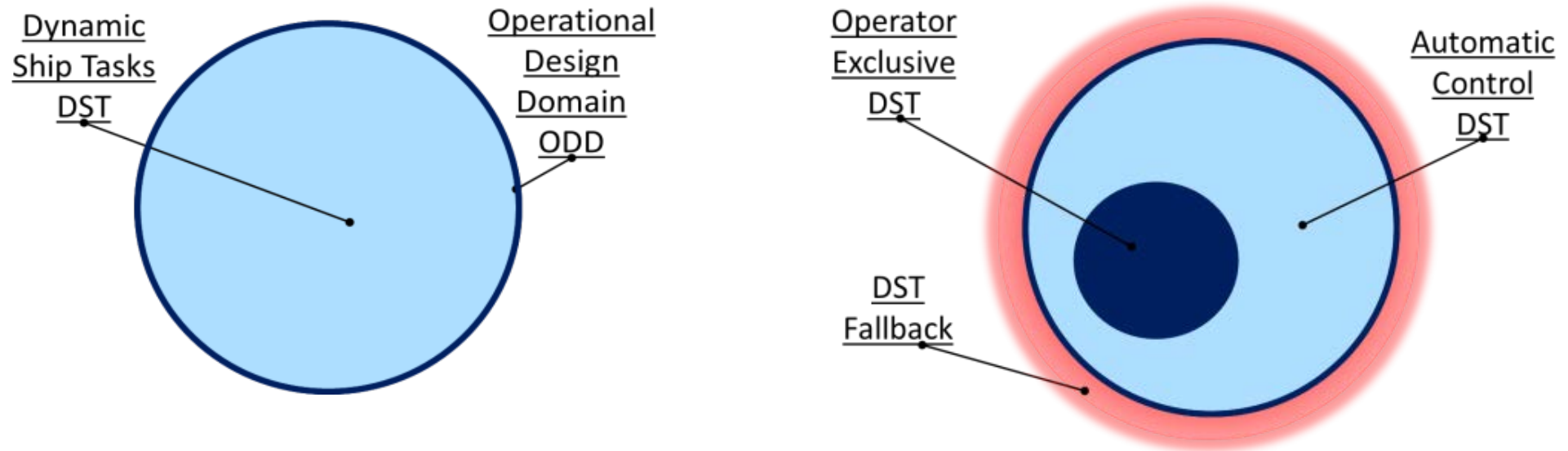
Sheridan's ten LOA	0	1	2	3
human does the whole job up to the point of turning it over to the computer to implement				
computer helps by determining the options				
computer helps to determine options and suggests one, which human need not follow				
computer selects action and human may or may not do it				
computer selects action and implements it if human approves				
computer selects action, informs human in plenty of time to stop it				
computer does whole job and necessarily tells human what it did				
computer does whole job and tells human what it did only if human explicitly ask				
computer does whole job and decides what the human should be told				
computer does the whole job if it decides it should be done, and if so, tells human, if it decides that the human should be told				

# Characterization of autonomy

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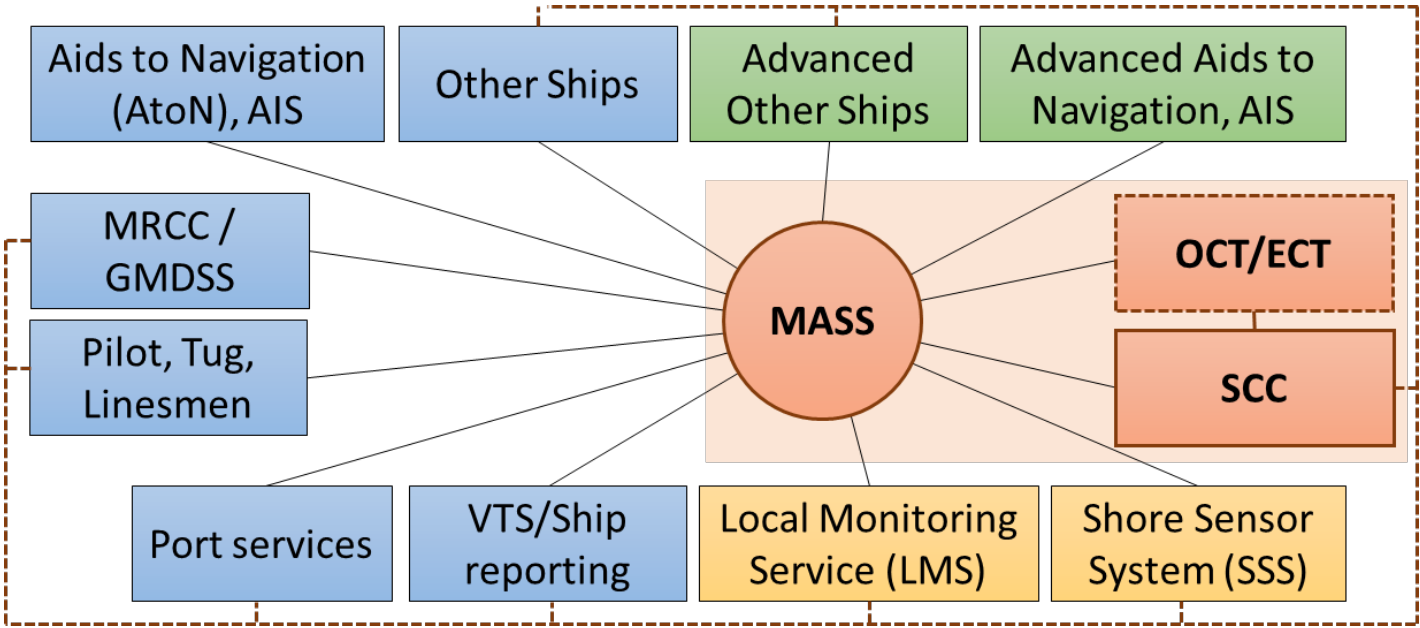
# Use some ideas from SAE J3016 ?



MRC: Minimum Risk Condition



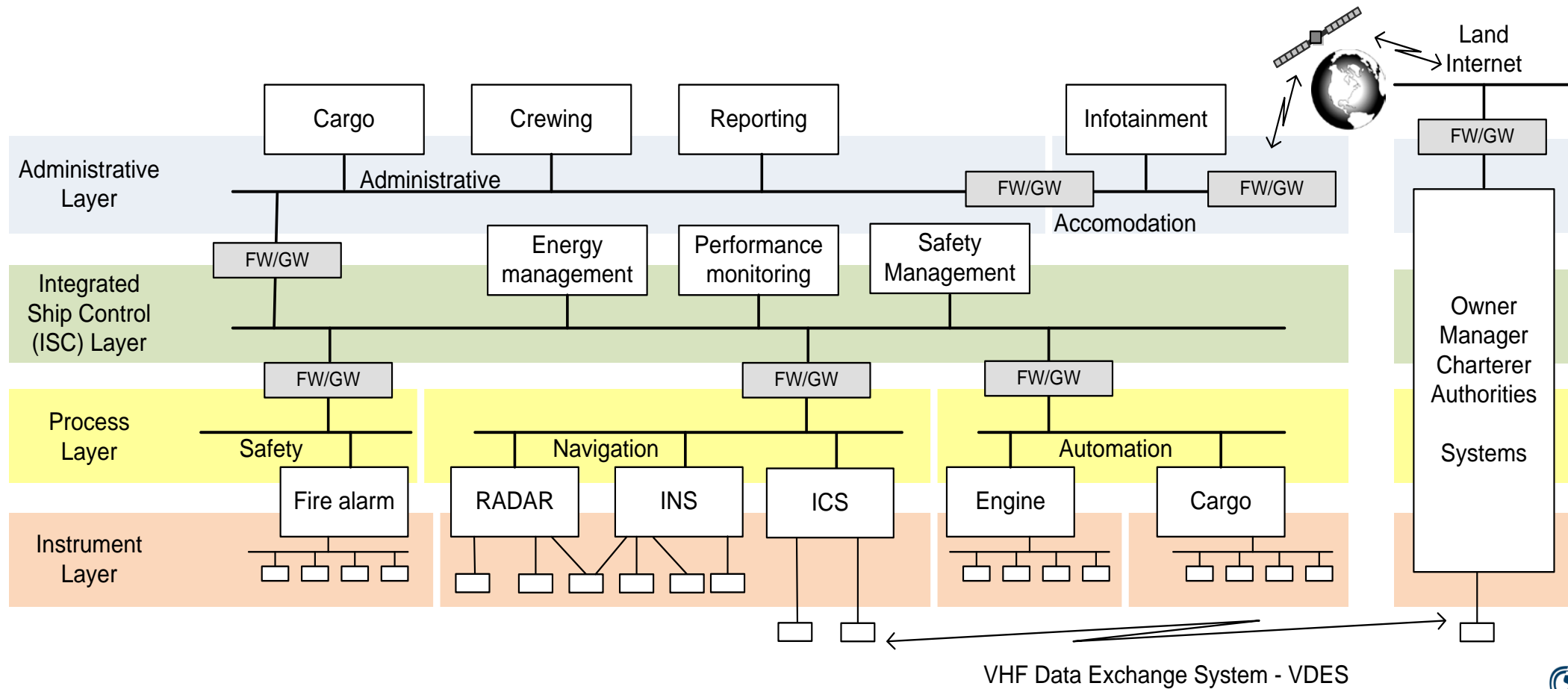
# Context of the autonomous ship



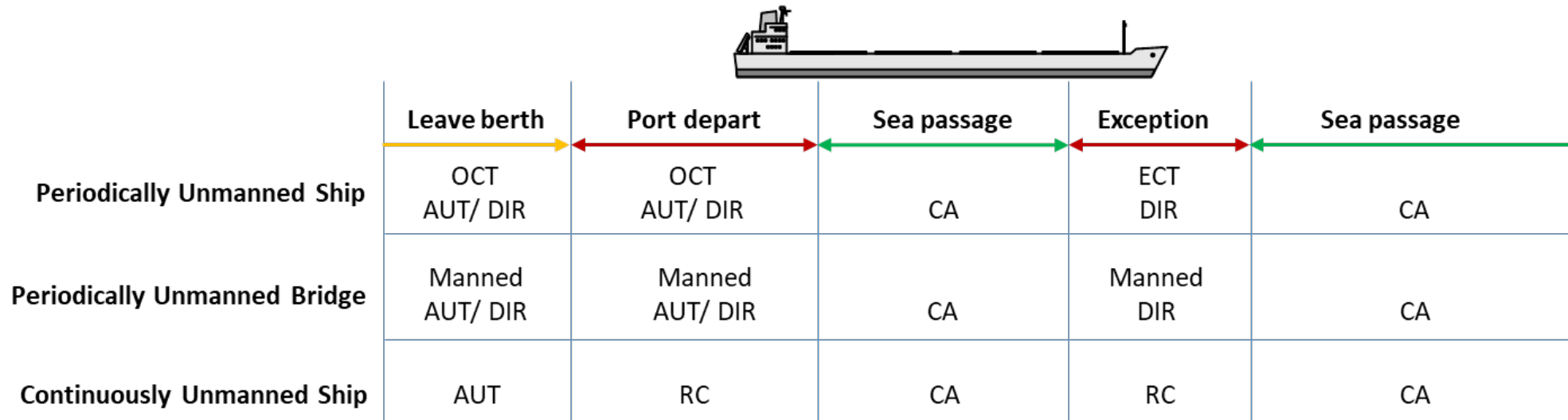
Ship navigation, but also

- commercial operations
- cargo operations
- ...

# Ship systems architecture ?



# Voyage phases

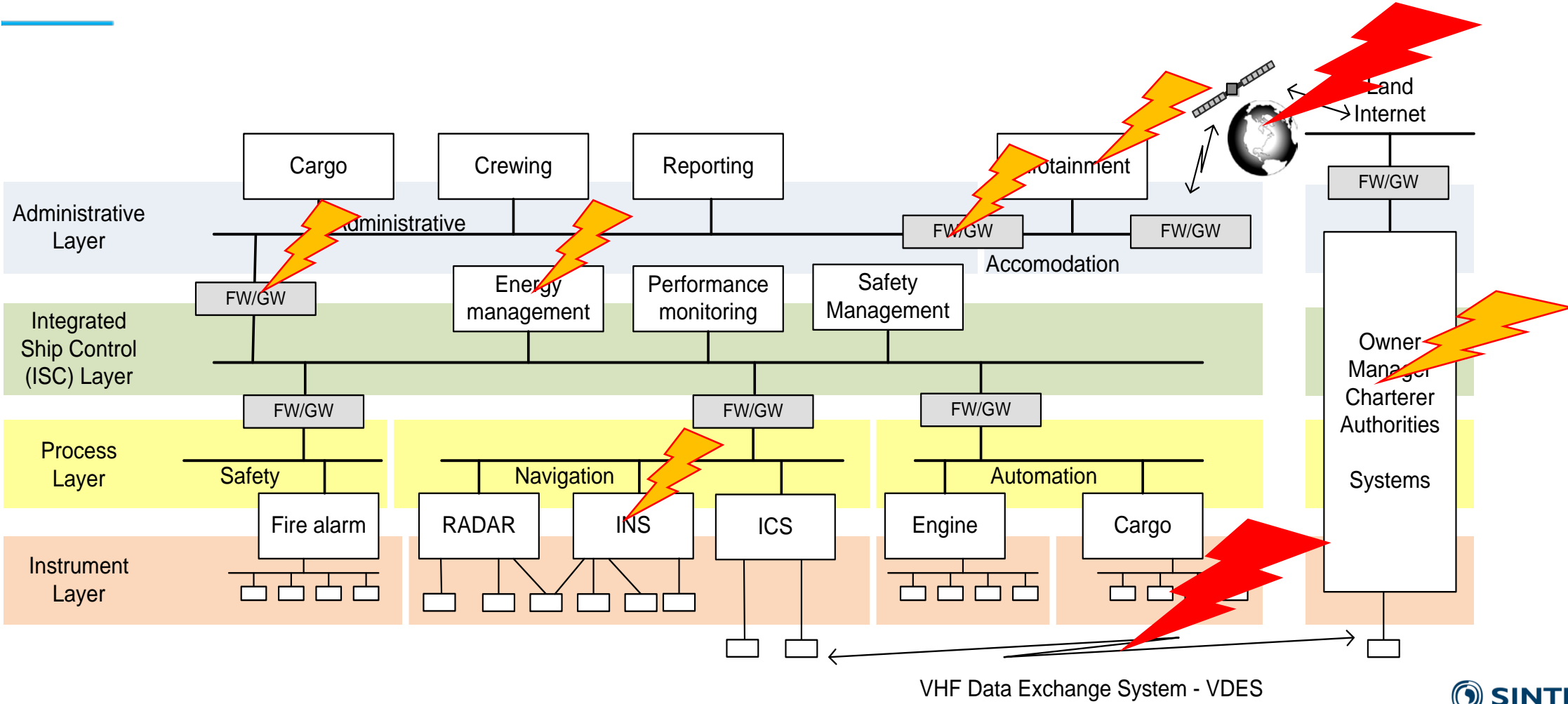


# Ship function decomposition

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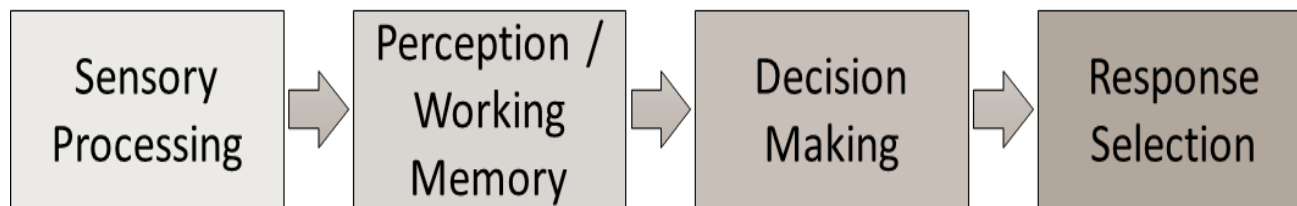
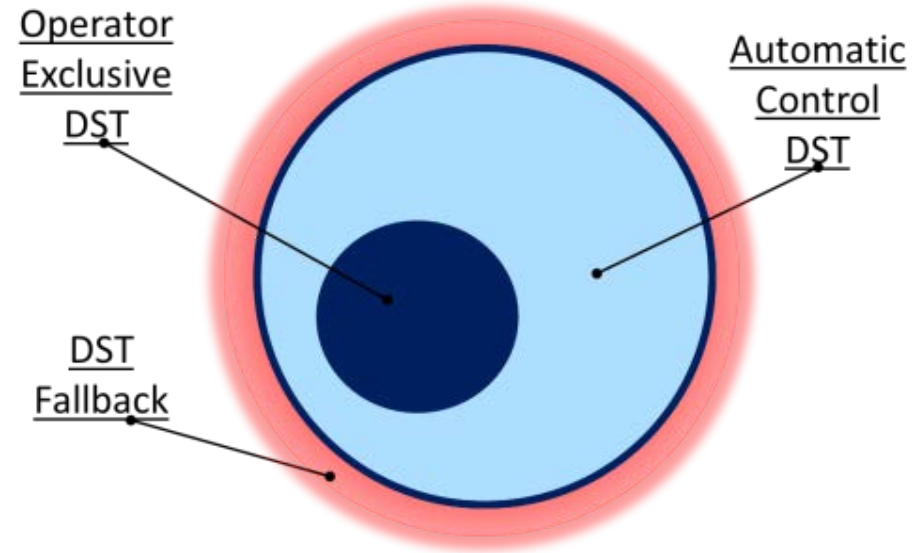
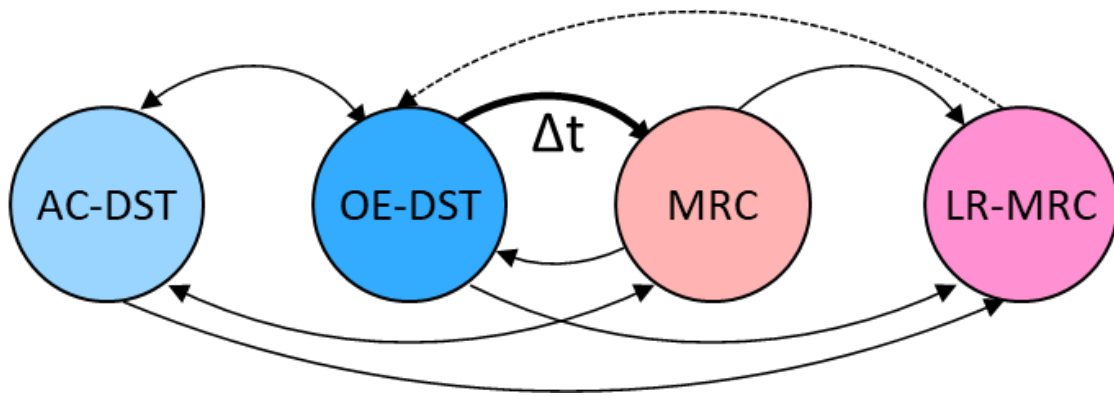
Main group	Sub-group	Use	Description
<b>1. Voyage</b>			
<b>1.1</b>	<b>Plan</b>	SCC	Create and maintain a voyage plan based on instructions from shore and known sailing constraints, including planning for port calls and other events.
<b>1.2</b>	<b>Nautical information</b>	SCC	Keep track of information related to voyage, nautical publications, weather forecasts, tide tables, port instructions, legislative documents etc.
<b>1.3</b>	<b>Location</b>	US	Determine where the ship is and where it is moving in relationship to its voyage plan.
<b>1.4</b>	<b>Economize</b>	US	Monitor and assess the operational and economical parameters of a voyage, including fuel consumption, late arrivals etc. Determine corrective measures.
<b>2. Sailing</b>			

# Cyber security? On what level?





# Human factors? On what level?



# Other standards?

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IMO FAL ship reporting  
harmonization group

Harmonized Data Modelling  
Group – S-100

Individual data modelling  
developments in IEC and ISO

Digital Transport  
Logistics Forum

# How much is applicable to ordinary ships ?

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- ICT Architecture
- Context (parts)
- Automation and human factors
- Cyber security?
- Functional decomposition
- ???



Teknologi for et bedre samfunn