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National MASS regulatory and technological development

Industry stakeholders' perspective on the regulatory framework

IMO Seminar on Development of a Regulatory Framework for MASS
5 to 6 September 2022

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CONFIDENCE, PREDICTABILITY and TIMELINE

Strategy – Investment - Production

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GRADUAL DEVELOPMENT and DEPLOYMENT

An ship is a system of systems

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GRADUAL DEVELOPMENT and DEPLOYMENT

An autonomous ship is a system of integrated systems

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FUNCTIONAL APPROACH

Objective - Purpose

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Levels of automation (modified from SAE-levels)

0	**Basic automation**	Human controls the vessel manually or with the help of simple unit-automation (e.g. autopilot).	Human controls the vessel.
1	**Assisted operations**	The system assists in operations by automation of observations or controls but does not make the connection of these two by the system. (e.g. DP systems)	Hands-on, eyes-on, mind-on
2	**Partial automation**	Automatic operation of at least one full function/operational mode. System monitors the actual situation and possibly executes actions to mitigate risks while keeping the operator informed. Operator may approve of action.	Hands-off (sometimes), eyes-on, mind-on
3	**Conditional automation**	Automatic operation of at least one full function/operational mode. System suggestions are executed automatically. In good conditions human tasks could be replaced by a machine for a short (relative to the situation) period.	Hands-off, eyes-off (sometimes), mind-on
4	**High automation**	Automatic operation of at least one full function/operational mode. System suggestions are executed automatically. Human tasks (those automated) are executed by a machine to high extent. Machine alerts human if situation is unclear.	Hands-off, eyes-off, mind-off (sometimes)
5	**Autonomous**	Fully autonomous operation of at least one full function/operational mode. Human operator is not needed in those functions/operational models which are automated.	Hands-off, eyes-off, mind-off = human-off

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UNIFORM VOCABULARY

Definitions - Terminology

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UNIVERSAL ASSURANCE

Certified components and software

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UNIFORM APPROVAL CRITERIA and PROCEDURE

Approval – Survey - Certification

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NATIONAL MASS REGULATIONS

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Thank you for your attention.