Sjøfartsdirektoratet
Norwegian Maritime Authority

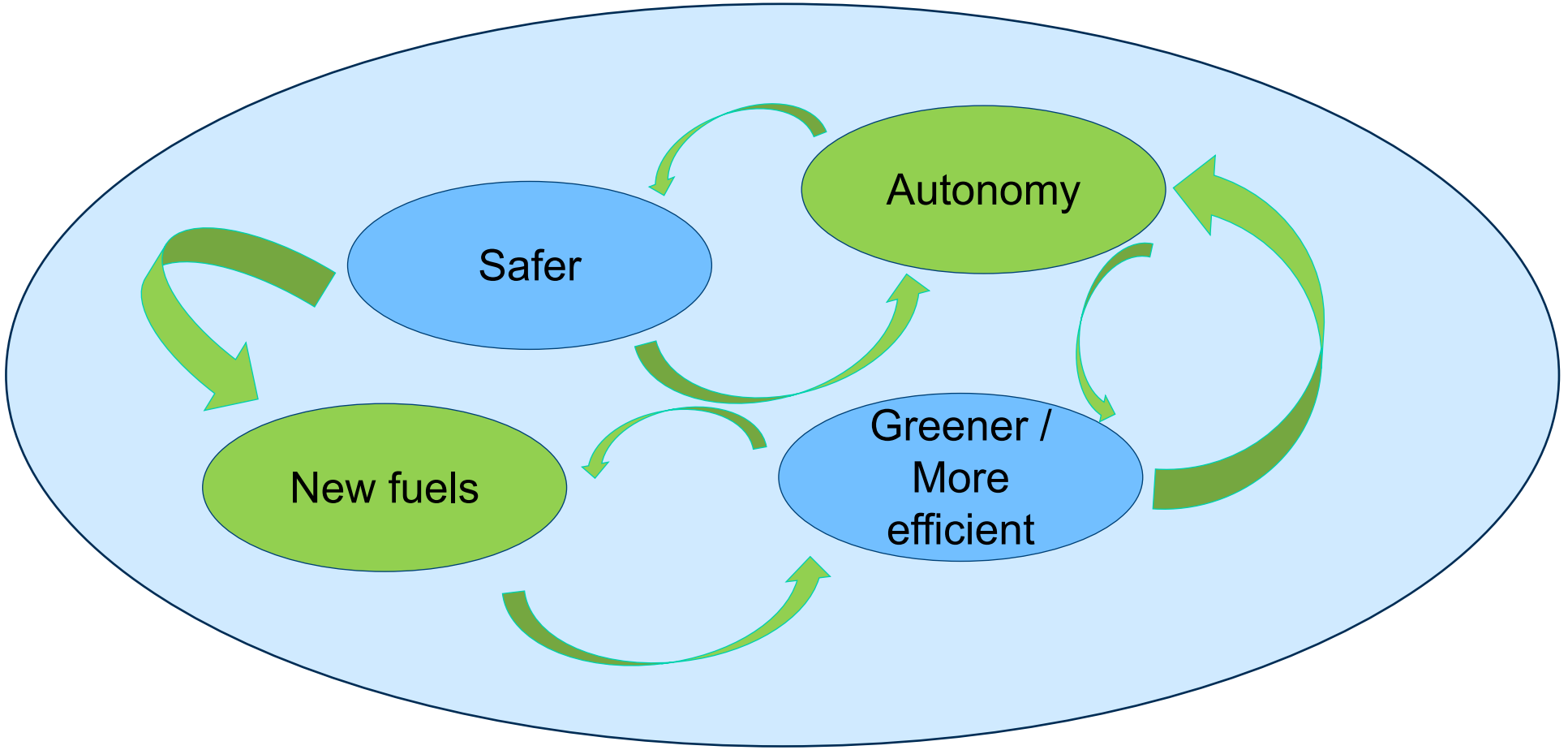
26.04.2023

Utviklingen innen autonome og ubemannede skip og rollen til kontrollrommet med tanke på sikkerheten

HFC

Nils Haktor Bua, Section for new maritime technology

Den foretrukne maritime administrasjonen


Autonomy
Safer
New fuels
Greener /
More
efficient

Section for new maritime technology

Sjøfartsdirektoratet
Norwegian Maritime Authority

Norwegian waters VS international waters

Ship Safety and Security Act

IMO

MSC.1-Circ.1455

INTERNATIONAL MARITIME ORGANIZATION

E

4 ALBERT EMBANKMENT
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MSC.1/Circ.1455
24 June 2013

GUIDELINES FOR THE APPROVAL OF ALTERNATIVES AND EQUIVALENTS AS PROVIDED FOR IN VARIOUS IMO INSTRUMENTS

1 The Maritime Safety Committee, at its ninety-second session (12 to 21 June 2013), with a view to providing a consistent process for the coordination, review and approval of alternatives and equivalents with regard to ship and system design as allowed by the 1974 SOLAS Convention, as amended, and other mandatory IMO instruments, approved the annexed *Guidelines for the approval of alternatives and equivalents as provided for in various IMO instruments*.

2 Administrations and non-governmental organizations are invited to bring the annexed Guidelines to the attention of shipowners, shipbuilders, designers and system manufacturers.

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Class guidelines

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CIRCULARS

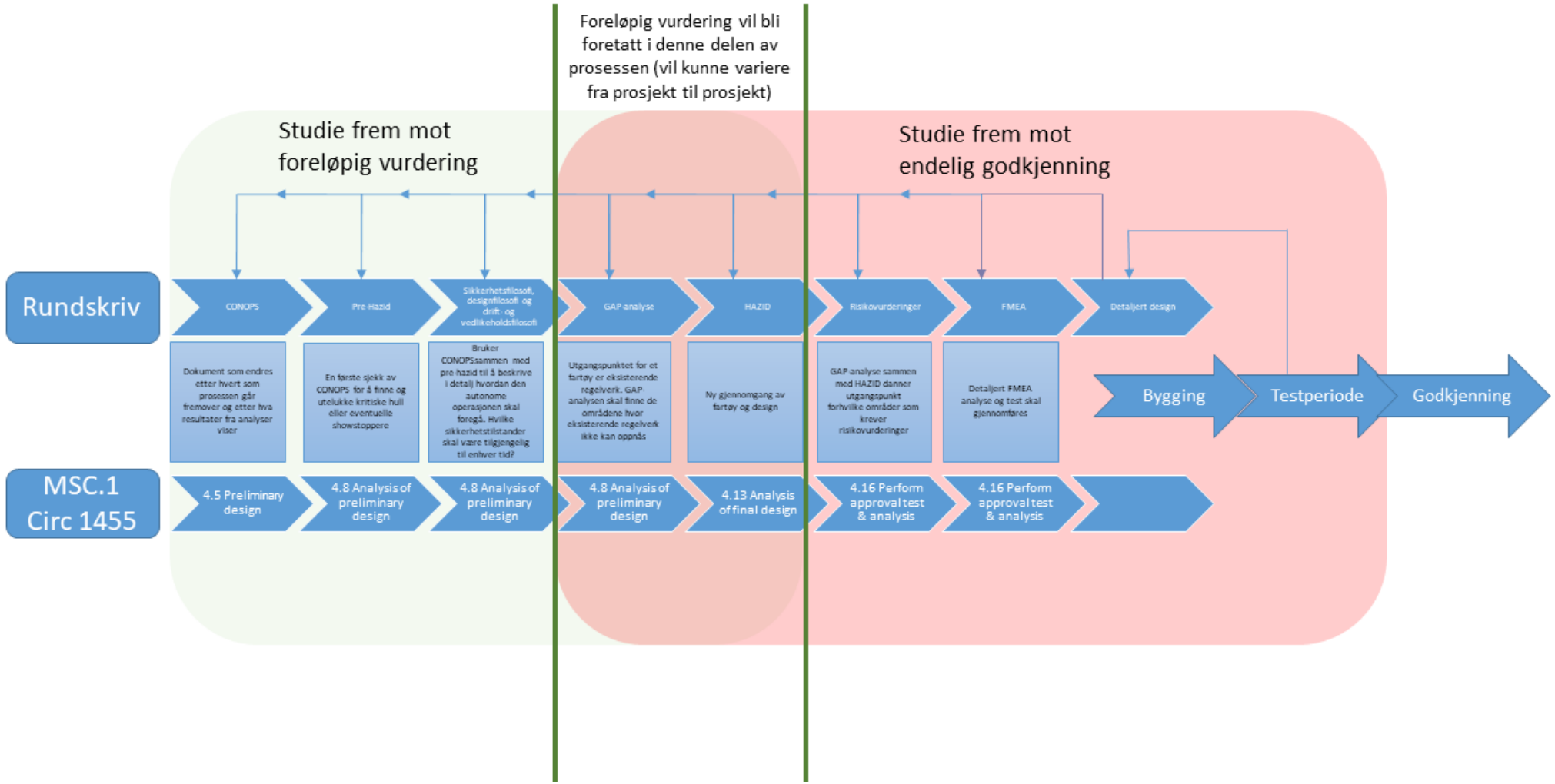
DATE: 8/27/2020 VALID TO: 12/31/2025 SERIES: RSV NUMBER: RSV 12 - 2020 CASE NUMBER: 2020/37328-1 SDM/JKS
CANCELS: FØRINGER I FORBINDELSE MED BYGGING ELLER INSTALLERING AV AUTOMATISERT FUNKSJONALITET, MED HENSIKT Å KUNNE UTFØRE UBEMANNET ELLER DELVIS UBEMANNET DRIFT

Guidance in connection with the construction or installation of automated functionality aimed at performing unmanned or partially unmanned operations

This Circular describes the documentation requirements and principles applied in the administrative processing of ships that are to be autonomous, and fully or partially remotely operated.

		MSC.1/Circ. 14552020	RSV
		4.5	
1. Preliminary Design	1.1 Concept of operation - CONOPS	4.5	7.1
	1.2 Pre-HAZID		7.2
	1.3 Safety philosophy		7.3
	1.4 Design philosophy		7.4
	1.5 Operation and maintenance philosophy		7.5
		4.8	
2. Analysis of preliminary design	2.1 Updated Pre-HAZID with associated		7.2
	2.2 Risk analyses/assessments		7.2
	2.2 Gap analysis		7.6
	2.3 HAZID and risk assessments		7.9
3. Analysis of final design		4.1	
	3.1 HAZID and risk assessments		7.9
		4.1	
4. Performance approval tests & analyses	4.1 Failure Mode and Effect Analysis (FMEA)		7.10
	Test requirements		9

Flytskjema prosess for autonomiprosjekter (detaljert)




Dispensations
Functions
Ship to ROC
Manual to automatic

Remote control/operation center

Functions and responsebility shared between ROC and ship

Remote control/operation center - challenges

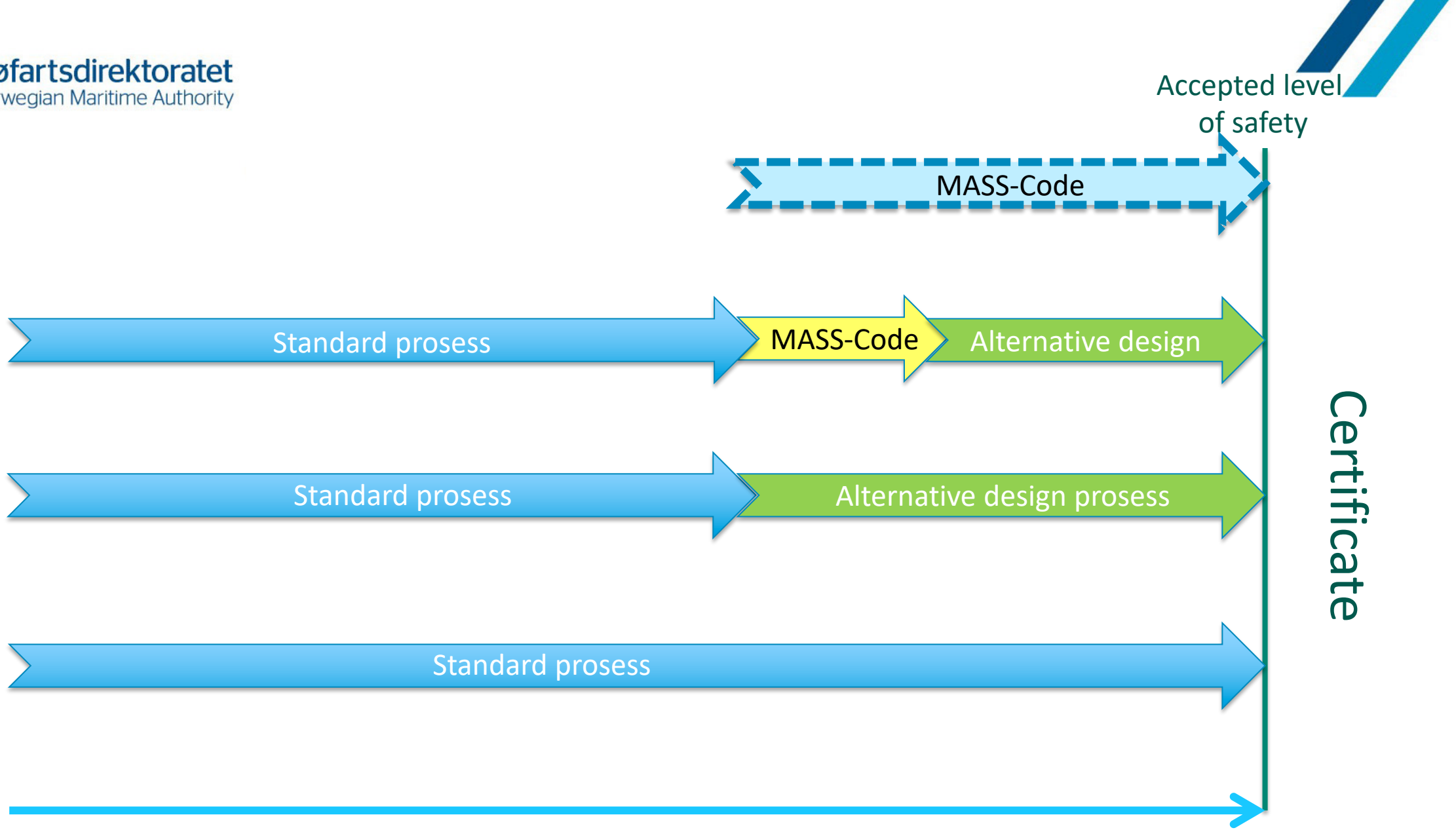
- Today – 1 ship = one bridgeteam vs. future – one control room team handles several ships? How many?
- How reliable and autonomous is the technology - to what extent must the control room monitor or intervene?
- One dedicated control room always handles a ship or may the ship "jump" between control rooms?
- When international - to what extent are we willing to accept unmanned ships in Norwegian waters controlled from abroad?

MASS CODE – some output of the work so far

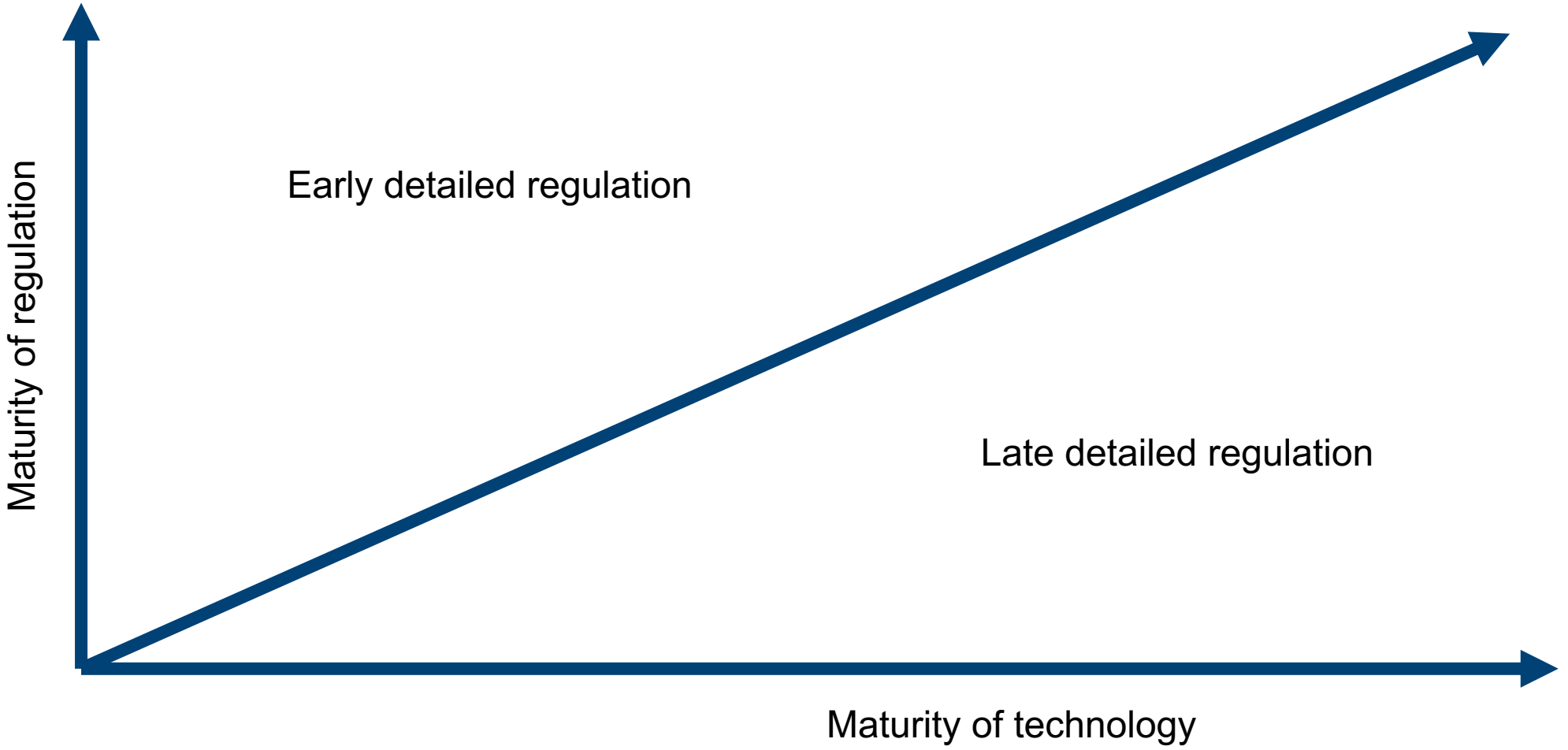
Joint MSC-LEG-FAL MASS Working Group:

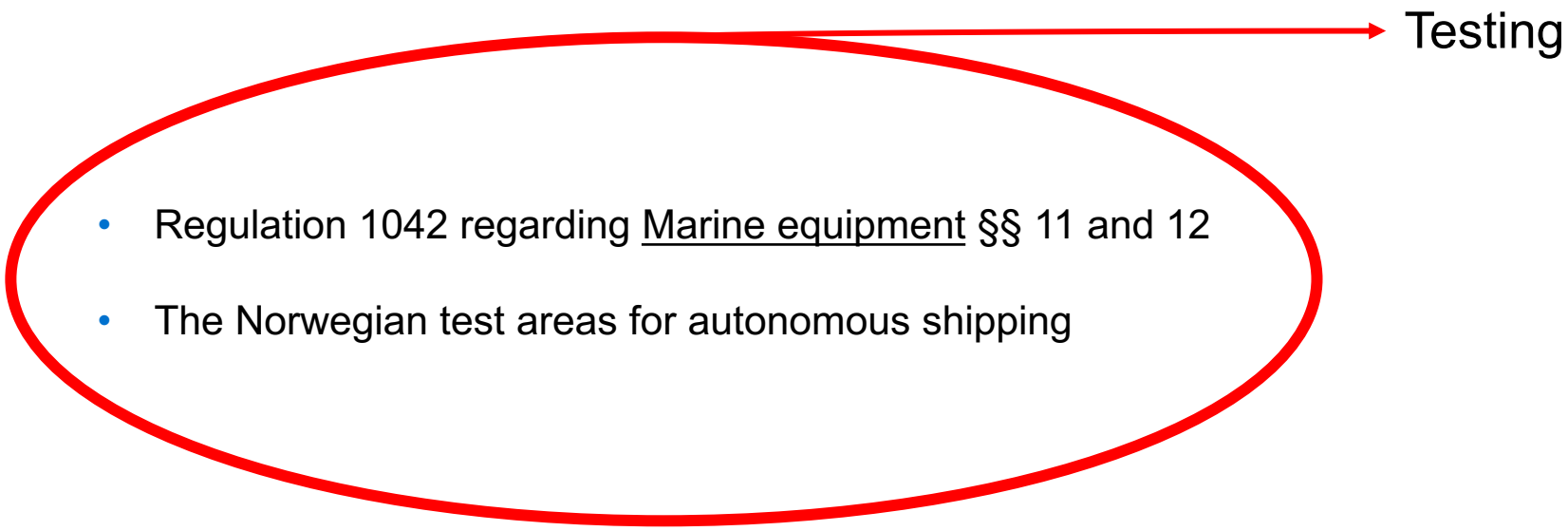
- the Group agreed that:
- .1 there should be a human master responsible for a MASS, regardless of mode of operation or degree or level of autonomy;
- .2 such master may not need to be on board, depending on the technology used on the MASS and human presence on board, if any; and
- .3 regardless of mode of operation or degree or level of autonomy, the master of a MASS should have the means to intervene when necessary.

- the Group agreed to the following definition for a remote operator (see also annex 1):
- “Remote operator means a qualified person who is employed or engaged to operate some or all aspects of the functions of a MASS from a remote operations centre.”


Accepted level of safety
MASS-Code
Standard prosess
MASS-Code
Alternative design
Standard prosess
Alternative design prosess
Standard prosess
Certificate

When to regulate?




Testing
Regulation 1042 regarding Marine equipment §§ 11 and 12
The Norwegian test areas for autonomous shipping

Thank you!

Nils Haktor Bua

Check out:
[New maritim technology - sdir.no]