Renauld Hock, MScEng.
Commander
Programme Manager
DGMRSys-N/rMCM

21May2024

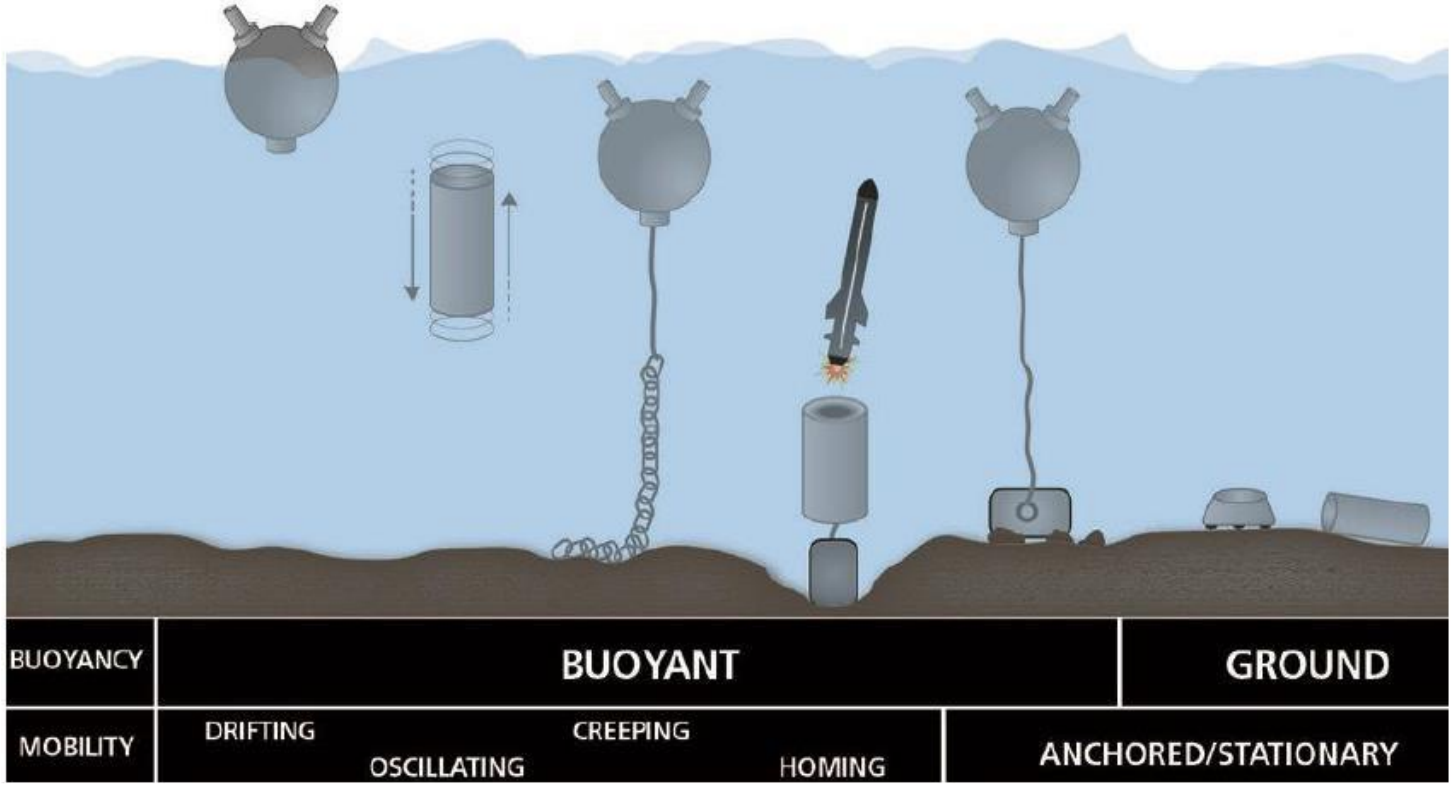
DEFENSIE
LA DÉFENSE

Ministerie van Defensie

Belgian-Dutch MCM replacement programme

Innovative and (R)evolutionary

Ever-Evolving Sea Mine Threats



Mines with counter-counter measures

Mobile mines

Smart weapons systems

Innovative and (R)evolutionary

UNCLAS

Current threats

- Red Sea

Houthis deploy sea mines since 2015

Mostly in the coastal strip

Killed dozens of Yemeni fishermen

Current threats

- Black Sea

Sea mines in both UKR & RUS ports

Detached mine in high sea (several incidents)

TUR, BUL & ROU join force against sea mine threat

Innovati

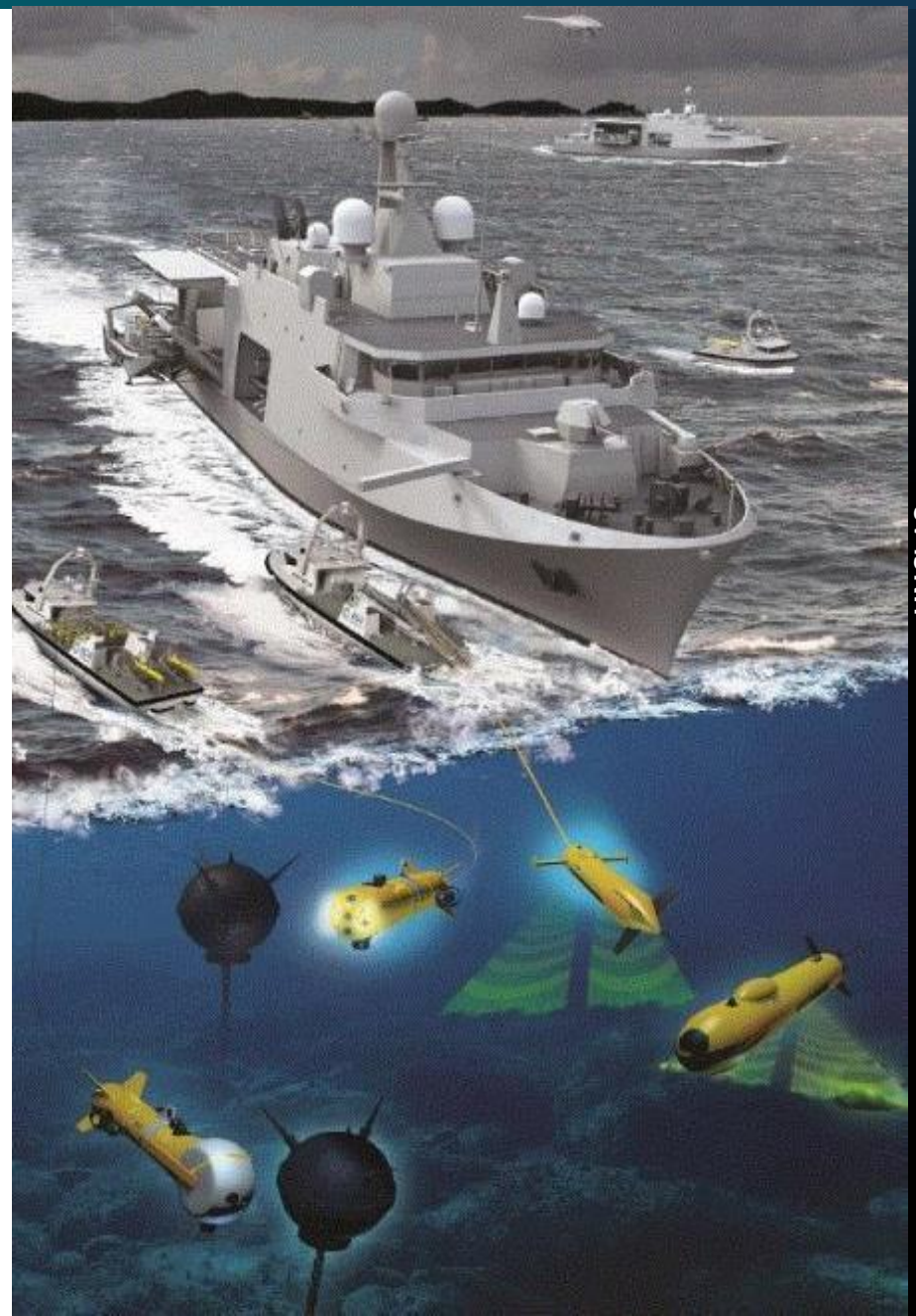
Navtrack

1 CONOPS

2 Contract
- Process
- Scope
- Execution
  - Time
  - Product
- Challenges & Opportunities

3 Conclusion

4 Q&A



Innovative and (R)evolutionary

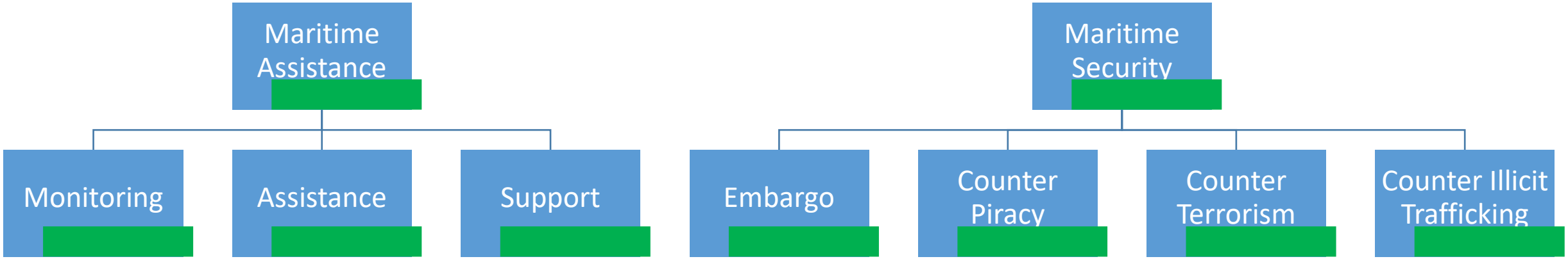
CONOPS - Primary Tasks: NMW

- Naval Mine Warfare
  - Defensive
    - Passive
      - Localization
      - Risk reduction
      - REA
      - Self-Protection
    - Active
      - Sweeping
      - EOD
      - Hunting
  - Mining

Possible but not part of the rMCM programme

Innovative and (R)evolutionary

CONOPS - Secundary Tasks: MA & MSO



Innovative and (R)evolutionary

CONOPS – overcoming shortfalls

ROV, LAUV, MIDS, …

MCM "PLATFORM"

CURRENT MCM (LEGACY)

Recognised shortfalls

- *Transit speed*
- *Operations Time*
- *Covert operations*
- *Risk for personnel*
- *Limited self-defence*
- *Limited COMMS*
- *Limited endurance*
- *Staff facilities*
- *Drifting /buried mines*

rMCM PF
System of Systems

Dedicated Platform

STAND-OFF MMCM

UAV

USV

ROV, TSSS, TSAS, Sweep,
M-AUV, MIDS, divers …

M-AUV

Innovative and (R)evolutionary

Platfom of Opportunity
Shore based

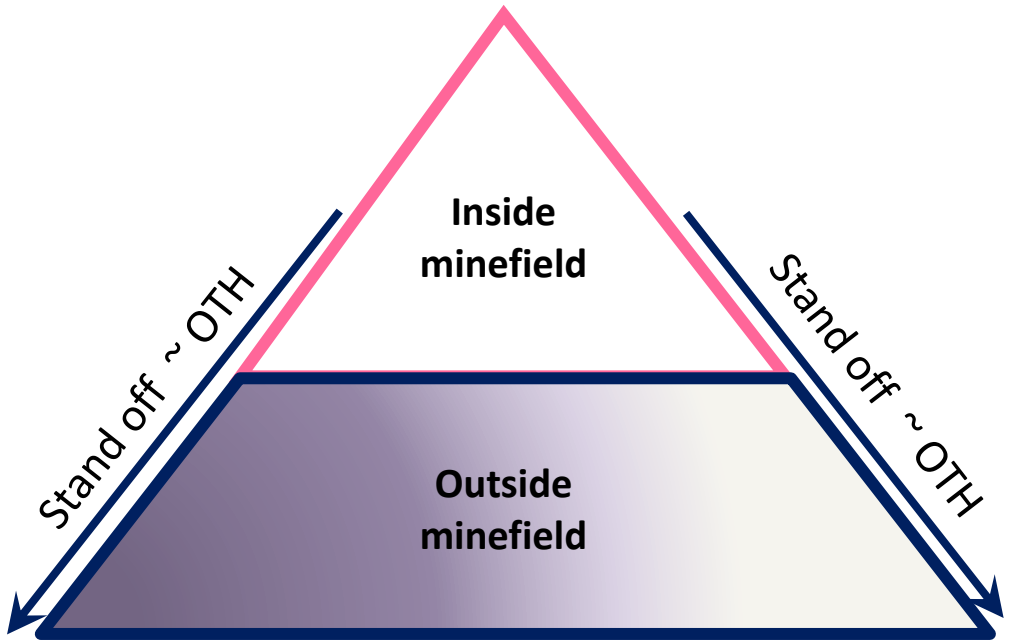
rMCM C2
Containerized TB

CONOPS – overcoming shortfalls

Enhanced Capabilities

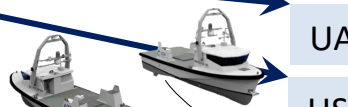
- *Deployed worldwide - High readiness*
- *Joint & combined env.*
- *Permissive. & non perm. env.*
- *Efficient, effective and safe manner*
- *Covert posture*

rMCM PF
System of Systems



Dedicated Platform

STAND-OFF MMCM



UAV

USV

ROV, TSSS, TSAS, Sweep, M-AUV, MIDS, divers …

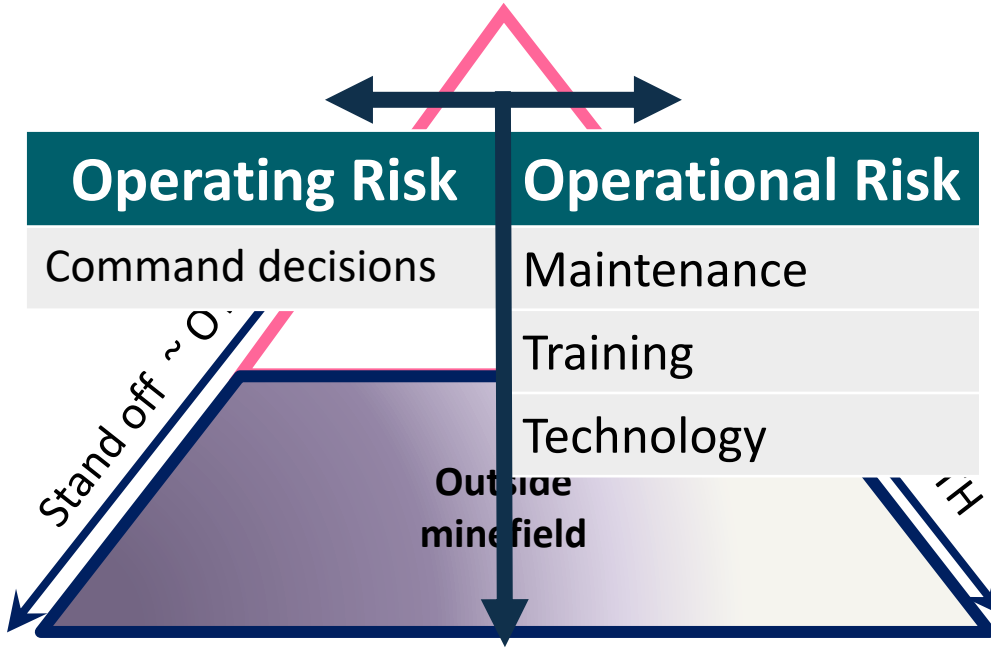
M-AUV

Innovative and (R)evolutionary

Platfom of Opportunity
Shore based

rMCM C2
Containerized TB

CONOPS – overcoming shortfalls



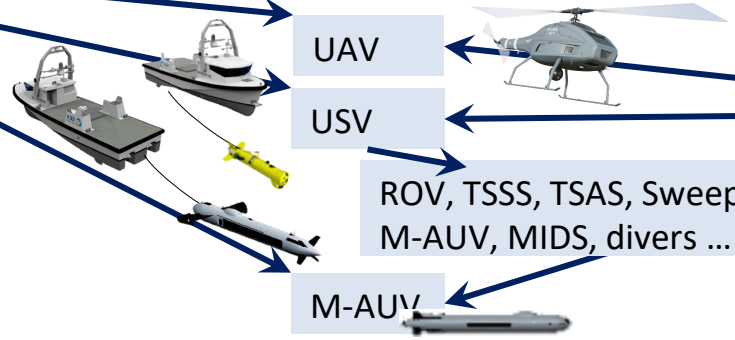
➔ Building trust:

Uncrewed where possible, crewed where necessary

rMCM PF
System of Systems

Dedicated Platform

STAND-OFF MMCM



- UAV
- USV
- ROV, TSSS, TSAS, Sweep, M-AUV, MIDS, divers …
- M-AUV

Platfom of Opportunity
Shore based

rMCM C2
Containerized TB

Innovative and (R)evolutionary

CONOPS – Validation challenge ➔ tests

Technological

North Sea Unmanned Trials

MCM : Sep 16 – Jun 17

COMMS : Nov 16

Operational

CDAG (Concept Development Game Assessment)

Dec 16 – Mar 17

Technical & Budgetary

Market consultations Jul 17

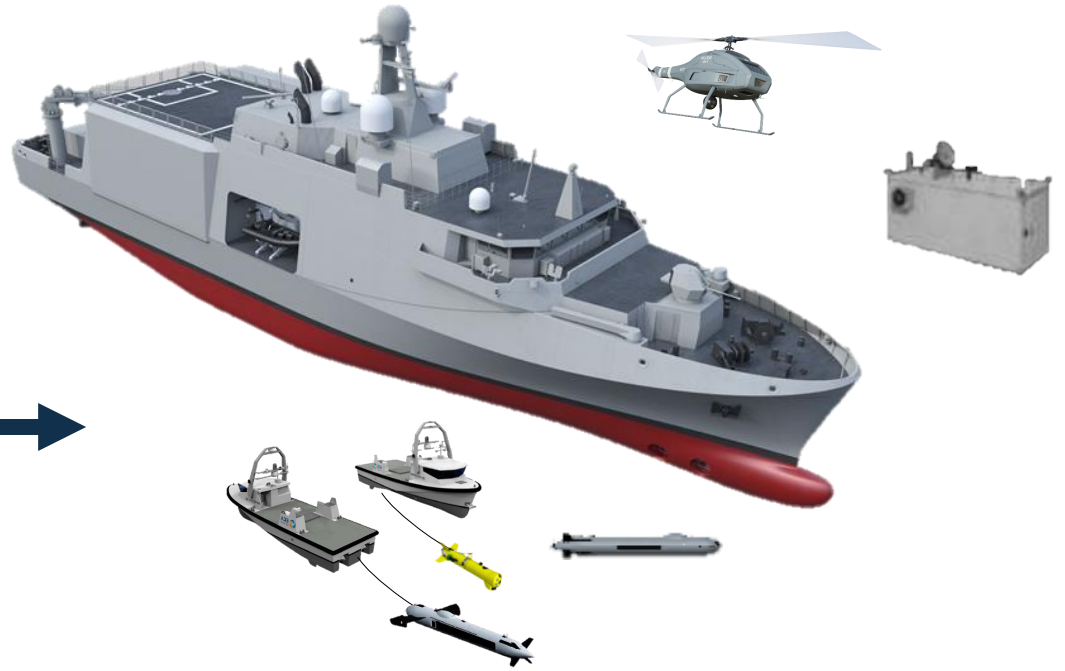
Since 2016:
continuous follow-up
and preparation for
continuous upgrades

Innovative and (R)evolutionary

CONOPS - Paradigm shift

Battleship	Aircraft Carrier
System	System of Systems
Centralized: ▪ Fire power ▪ C4I	Decentralized: ▪ Fire power ▪ C4I
	Command & Control
	Covered Area / Area of Influence

Conclusion - Paradigm shift



Aircraft Carrier	Future Naval Capabilities
System of Systems	System of Systems – **Uncrewed**
Decentralized: • Fire power • C4I	Decentralized/Network Centric – **Uncrewed & Auto.**: • Fire power, C4I • **Disruptive technologies, continuous evolut°**
Command & Control	Command & Control - **Uncrewed & Auto.**
Covered Area / Area of Influence	Covered Area / Area of Influence

Conclusion - Paradigm shift

China Builds World's First Dedicated Drone Carrier

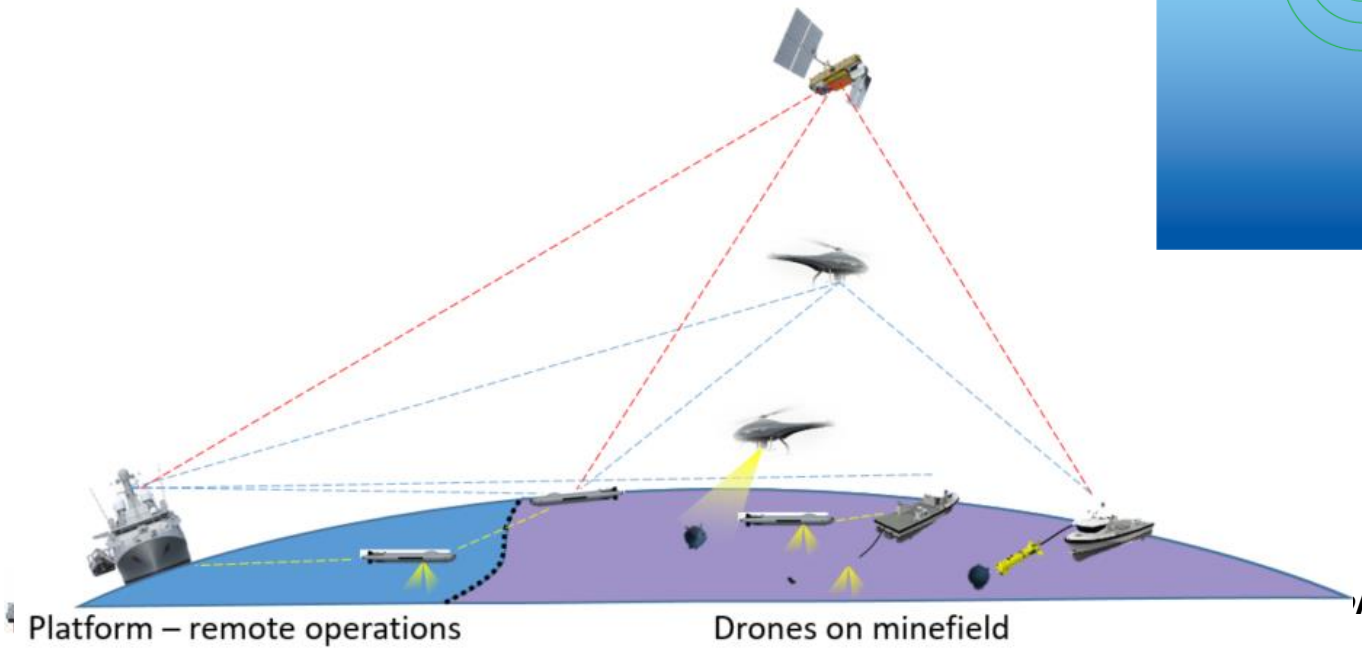
Aircraft Carrier	Future Naval Capabilities
System of Systems	System of Systems – **Uncrewed**
Decentralized: • Fire power • C4I	Decentralized/Network Centric – **Uncrewed & Auto.**: • Fire power, C4I • **Disruptive technologies, continuous evolut°**
Command & Control	Command & Control - **Uncrewed & Auto.**
Covered Area / Area of Influence	Covered Area / Area of Influence

Conclusion - Paradigm shift

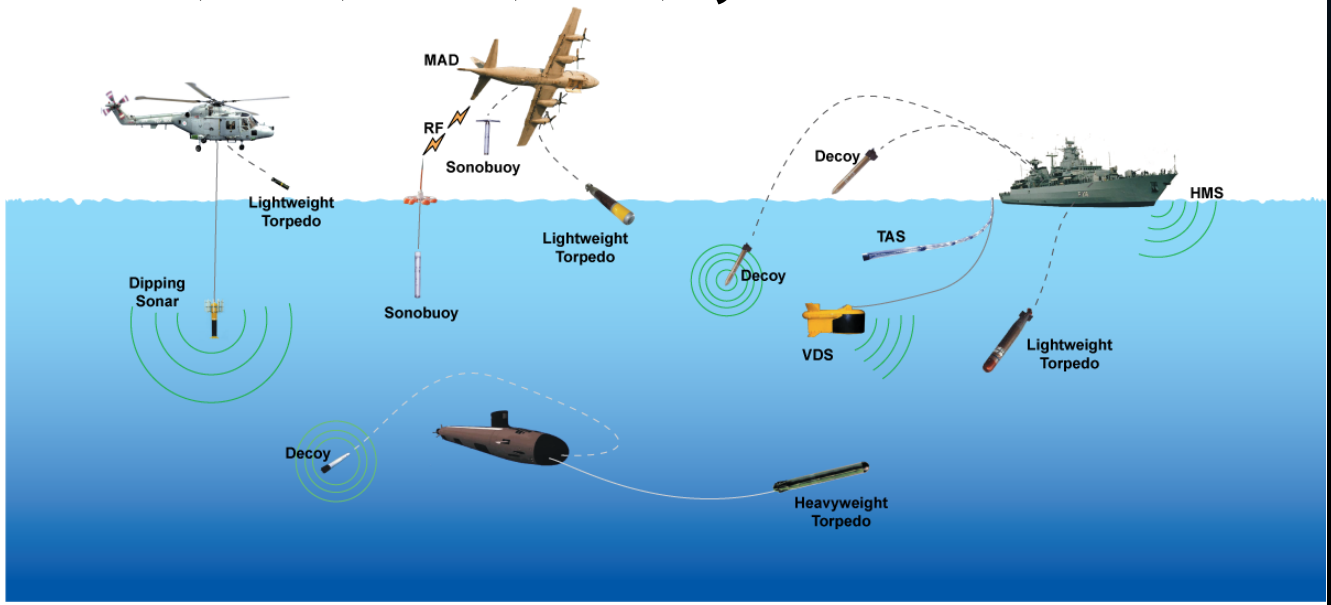
- **Future Naval Capabilities examples**
  - **Network centric**
  - **Even more interaction between warfares: NMW, ASW, ASuW, AAW, Cyber**

Naval Mine Counter Measures

- Uncrewed Vehicles
- Remote operated Vehicles



lutionary



Anti Submarine Warfare

- *Towed sonars*
- *Decoys & sonobuoys*
- *Sonar & torpedo's (Helicopters)*

Binational Programmes

- **A challenge offering opportunities**

➔Best of each partners

➔Designed to allow access to other partnership

MoU June 2018:

- rMFF: 04 ASWF
- rMCM: NMWC with 12 PF's, TB's, SIM

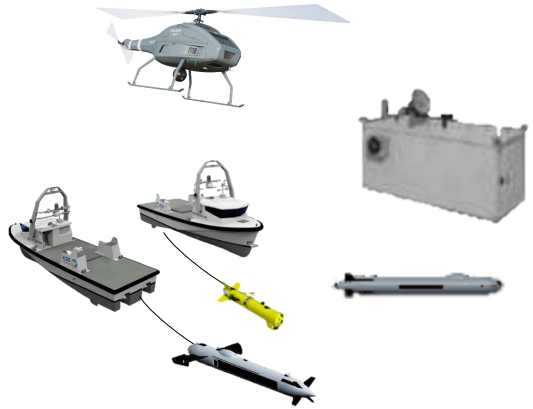
Innovative and (R)evolutionary

Scope: new Naval Mine Warfare Capability (NMWC)

12 MCM Platfoms

L (m)	W (m)	D (m)	T (T)	S (kts)	PAX
82,6	17,0	3,87	2.800	15,3	30 - 63

- Dedicated MCM PF with Military characteristics: HMS, acoustic & electromagnetic discretion, shock resistance, Cybersecurity, COMMS, FP & self-defense
- LARS for 2 USV & Helideck



MCM Toolbox

±100 Tools

- USV (unmanned & manned)
  - Divers/EOD/FP
  - TSAS
  - AUV
  - MIDS (2 type of ROVs)
  - Sweep (IMS)
- UAV (EO/IR & LiDAR)
- Containerized C2

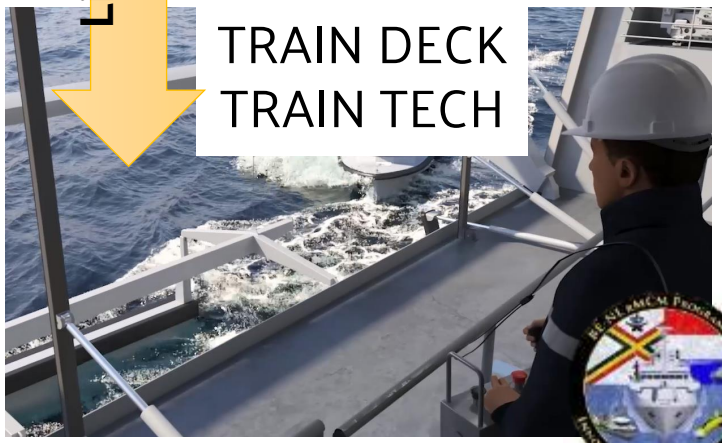
Innovative and (R)evolutionary

TACT SIM
TRAIN CIC
TRAIN TECH

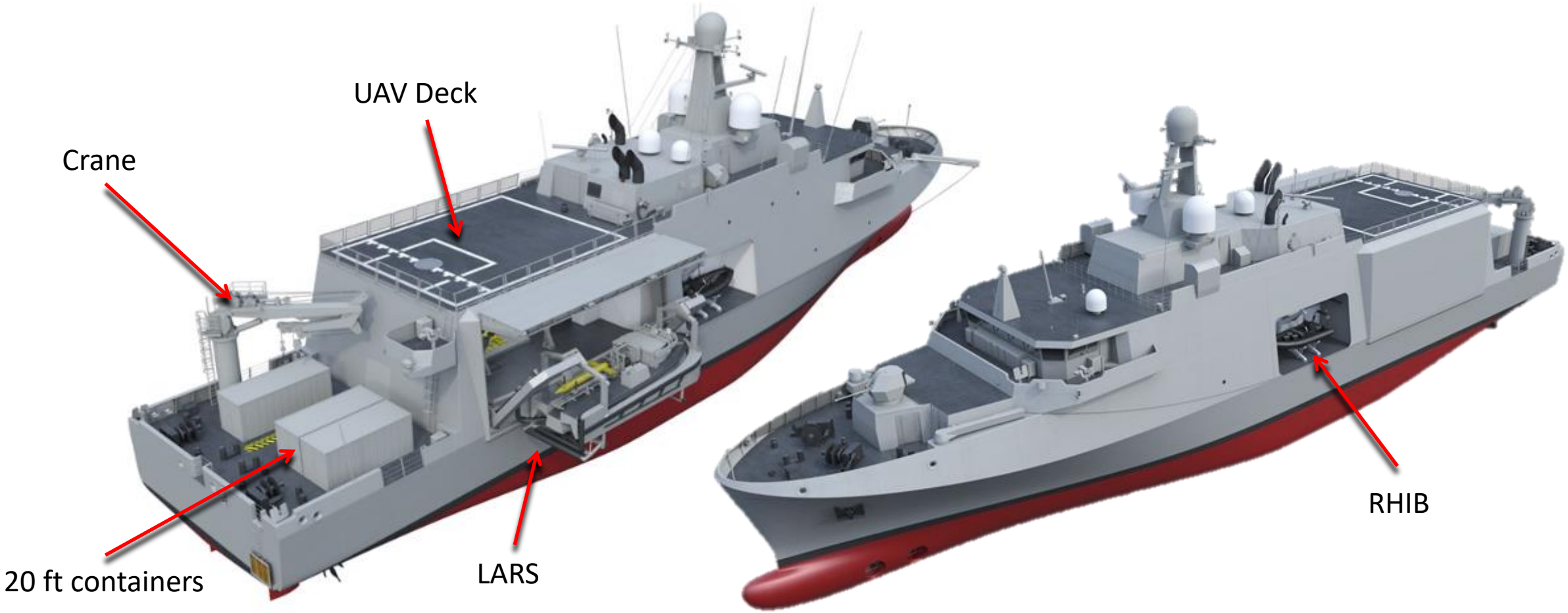
Linked in common scenario

Simulator

VR SIM
TRAIN DECK
TRAIN TECH

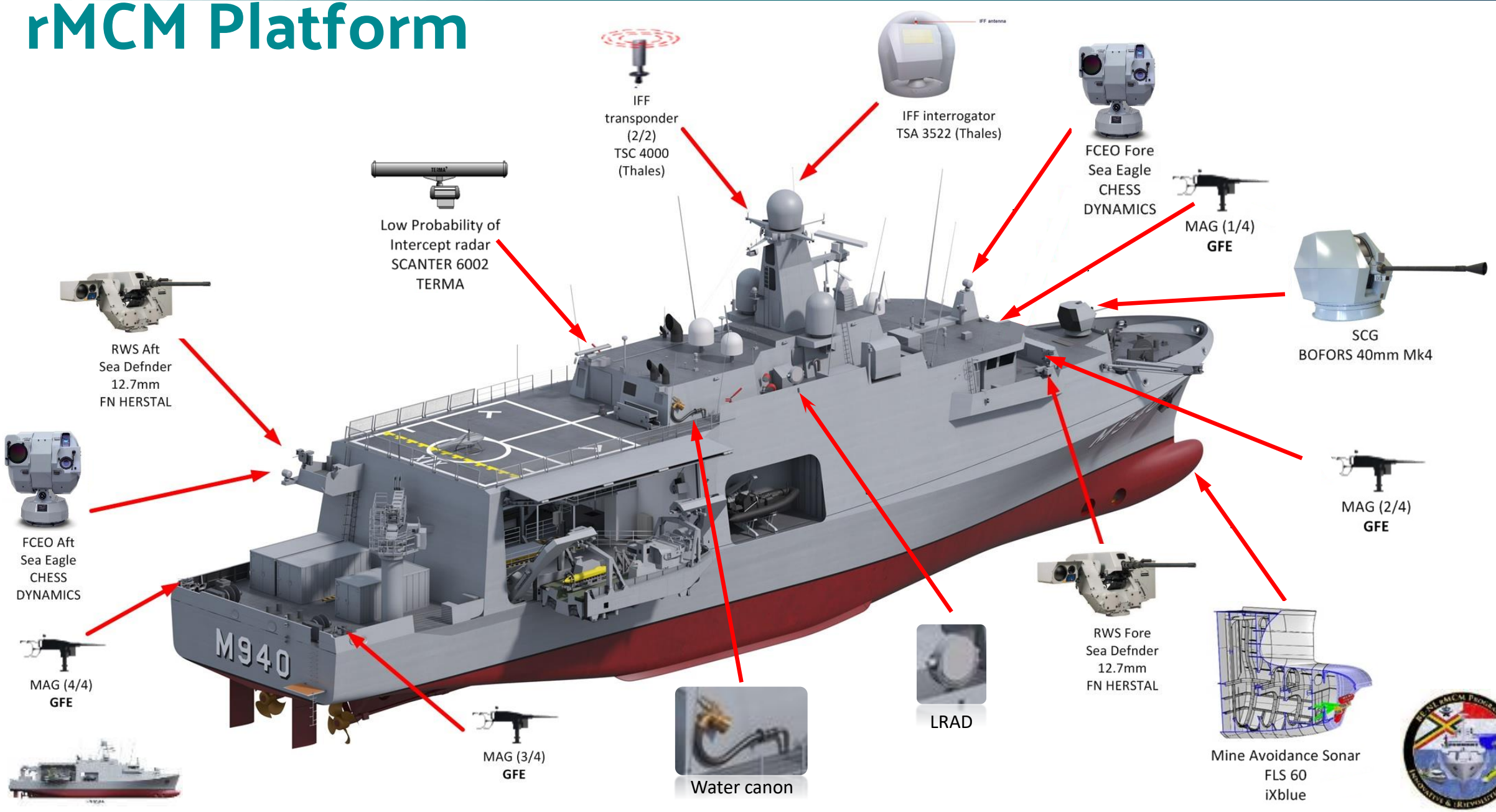


rMCM Platform



Length (m)	Width (m)	Draught (m)	Bridge (m)	Mast (m)	Tonnage (ton)	Speed (kts)	Accomodation
82,6	17,0	3,87	9	23,8	2.800	15,3	30 - 63

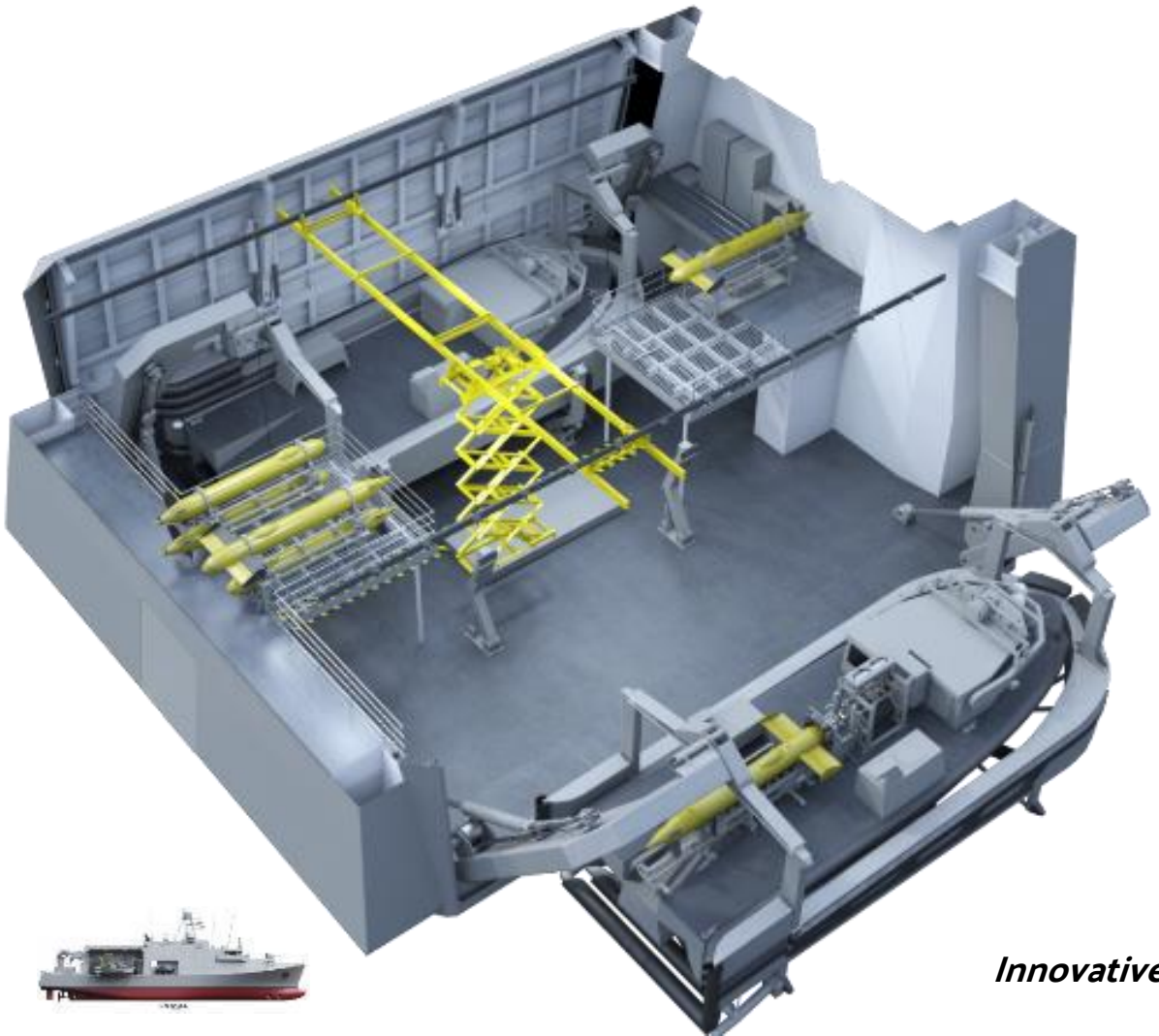
rMCM Platform



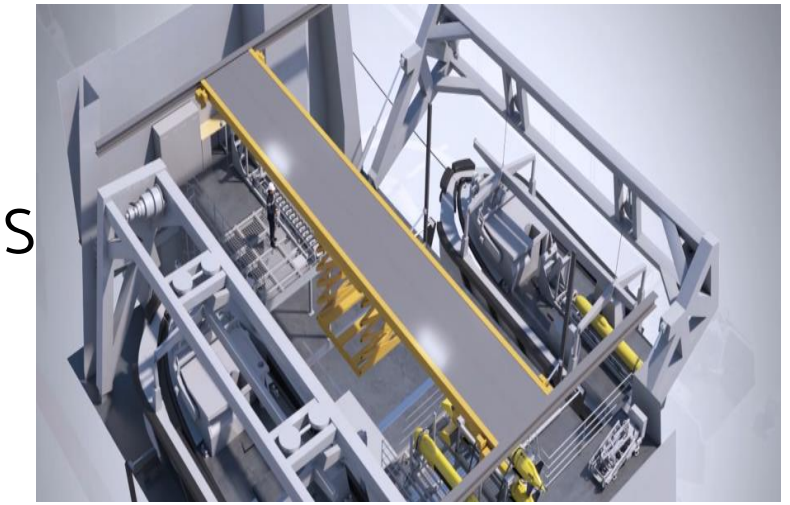
rMCM Platform – Conventional requirements

- Compliant to all applicable NATO Allied Force Standards
- Compliant with all classic IMO Standards:
  - MAPROL TIER III
  - SOLAS
  - COLREG
  - …

Toolbox Area –Mission bay



- 2 Heavy USV LARS
- 1 ammunition lift
- 1 gantry crane
- 1 rail-guided heavy-duty trolley
- 1 multipurpose crane
- UAV facilities



Innovative and (R)evolutionary

Toolbox Area – LARS

Innovative and (R)evolutionary

rMCM Platform – Aviation System Arrangement

Aviation deck fitted with VERTREP marking and deck cleats

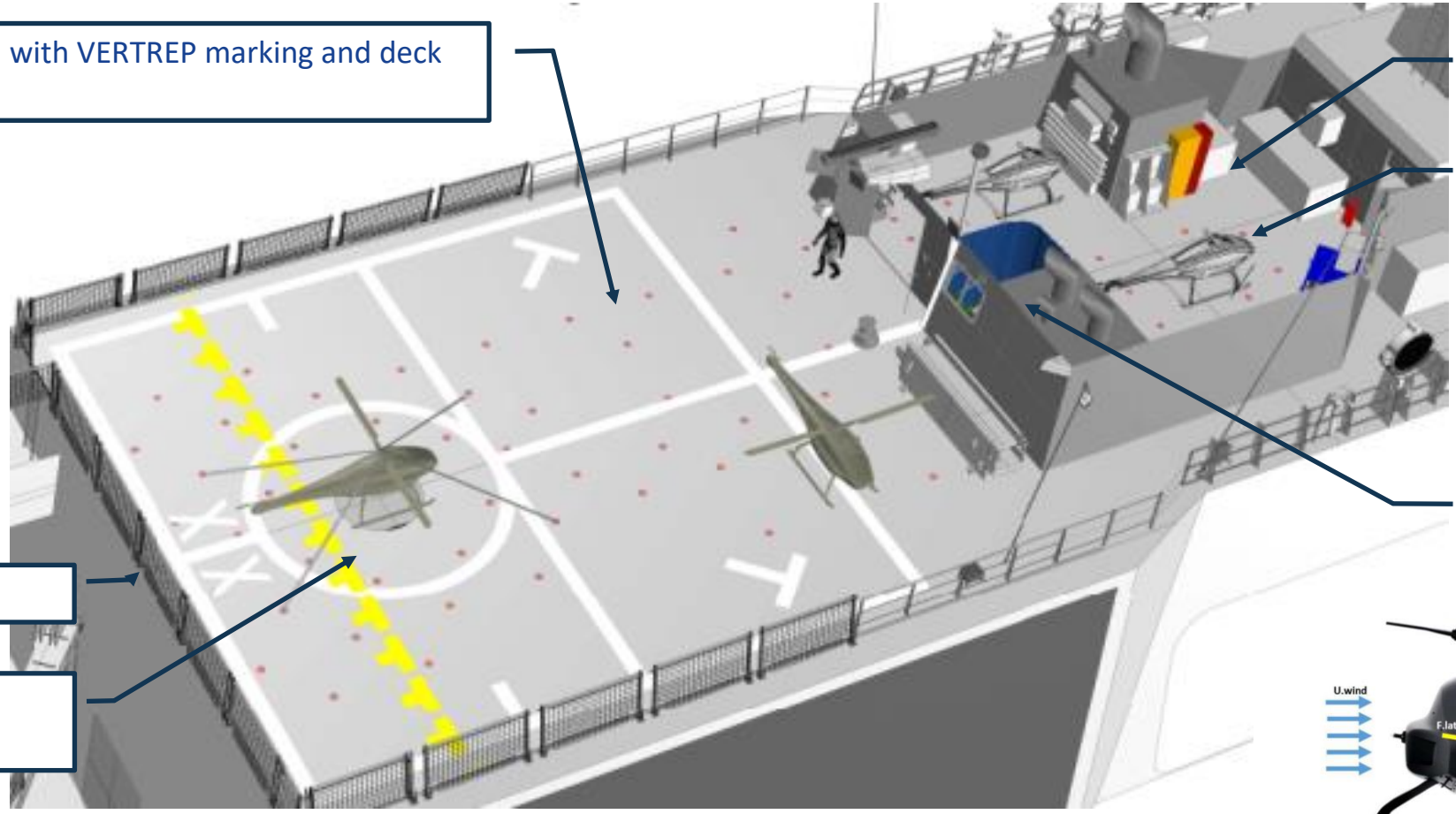
Aviation Hangar

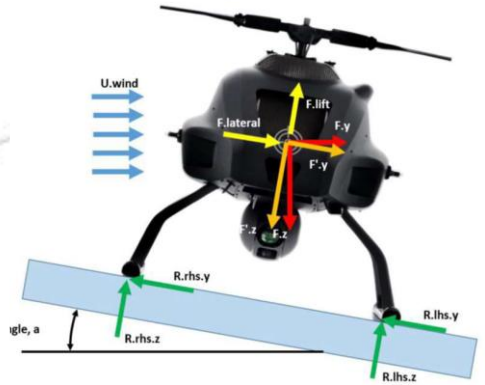
2 UAV storage

FDO office

Foldable panels

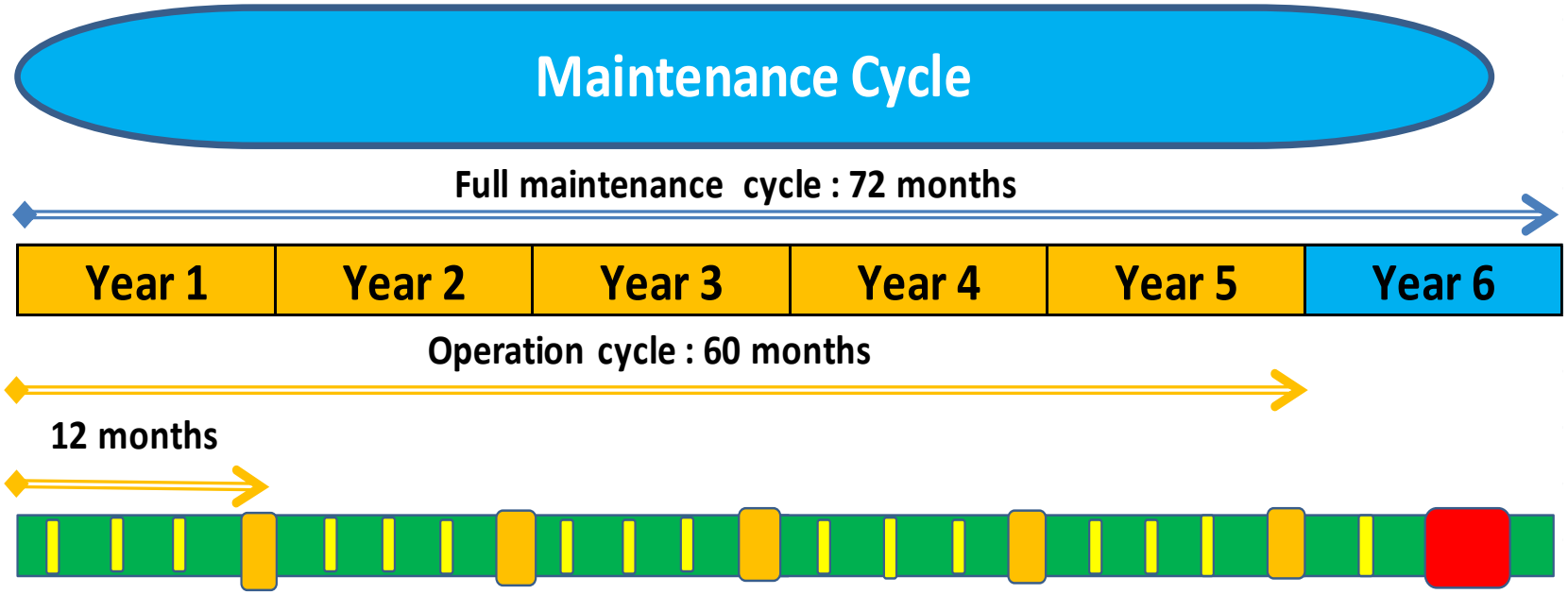
Landing grid
Ø1,8m





Innovative and (R)evolutionary

rMCM Platform – Operational Cycle



UP 1 10 days

UP 2 30 days

UP 3 16 weeks

Ship available

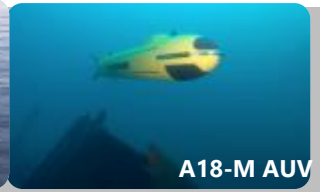
Innovative and (R)evolutionary

rMCM Toolbox – Overview

DETECTION
CLASSIFICATION


UAV


INSPECTOR 125 USV


A18-M AUV


T18-M Towed SAS

IDENTIFICATION


INSPECTOR with 2 SEASCAN


SEASCAN

NEUTRALISATION


INSPECTOR with 2 SEASCAN


& 6 K-STER


SWEEP

Innovative and (R)evolutionary

rMCM Toolbox – Overview

Unmanned Aerial Vehicle
SKELDAR V200C

Unmanned Surface Vehicle
INSPECTOR-125

Towed Sonar
T-18M UMISAS Sonar

TAXI

Autonomous Underwater Vehicle
A-18M UMISAS sonar

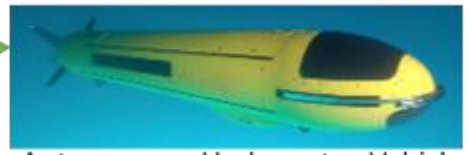
SEASCAN

Remote Operated Vehicles

Expendable MDS:
K-STER

Influence Mine Sweep

C2-Container



Autonomous Underwater Vehicle
A-18M UMISAS sonar

Divers

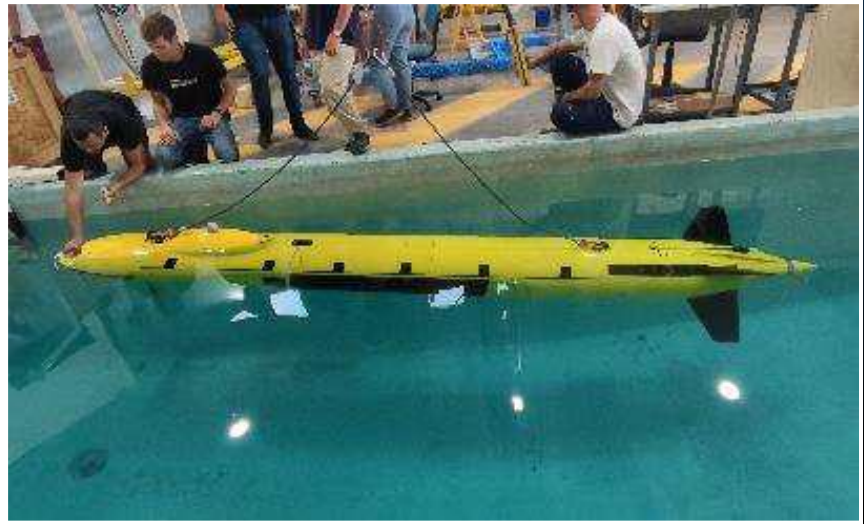
Innovative and (R)evolutionary

rMCM Toolbox – USV

2 types: Hunt or Sweep

- **Unmanned missions**
  - Detect & classify
  - Identify & Dispose
  - Minesweeping
  - AUV Taxi
- **Manned missions**
  - Divers / EOD
  - Force Protection

rMCM Toolbox – AUV A18M



CHARACTERISTICS	
Dimensions	Length: 4.5m Diameter: 465mm
Weight	
Max Speed	
Nominal Speed (ops)	
Min Speed (ops)	
Battery Capacity	
Altitude	
Operating Depths	
Standoff Range	
Coverage Rate	

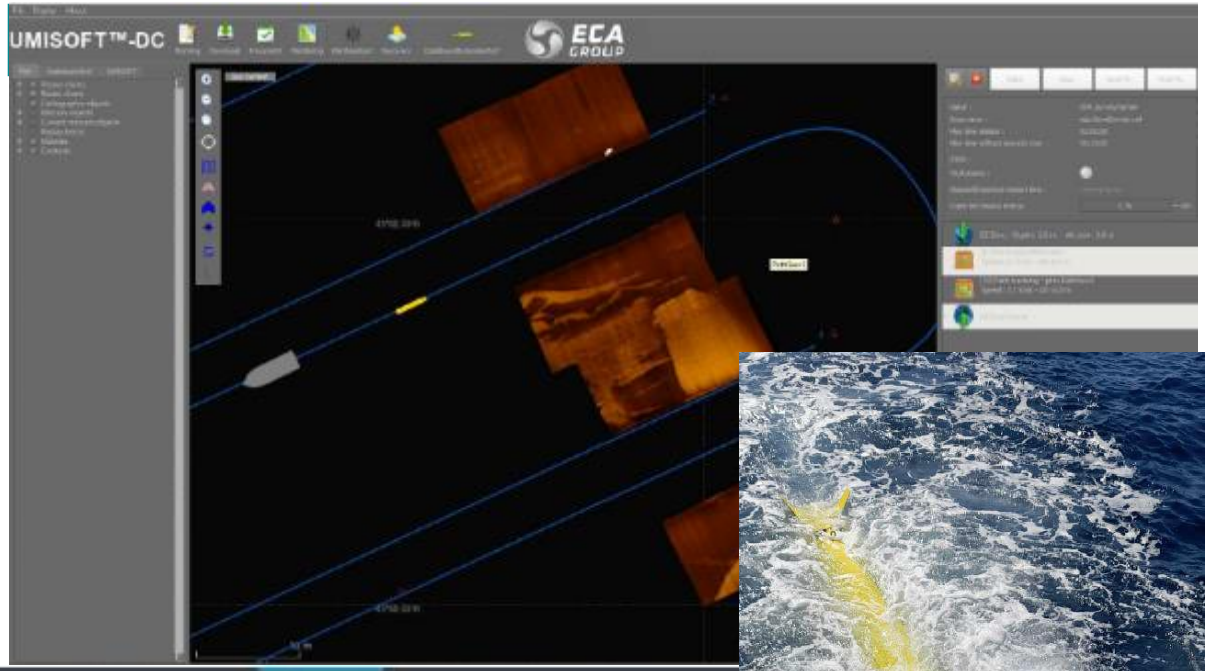
Classified

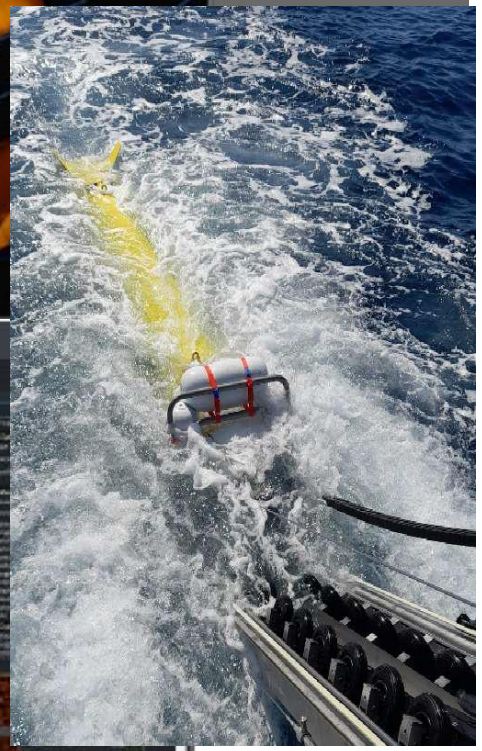
Innovative and (R)evolutionary

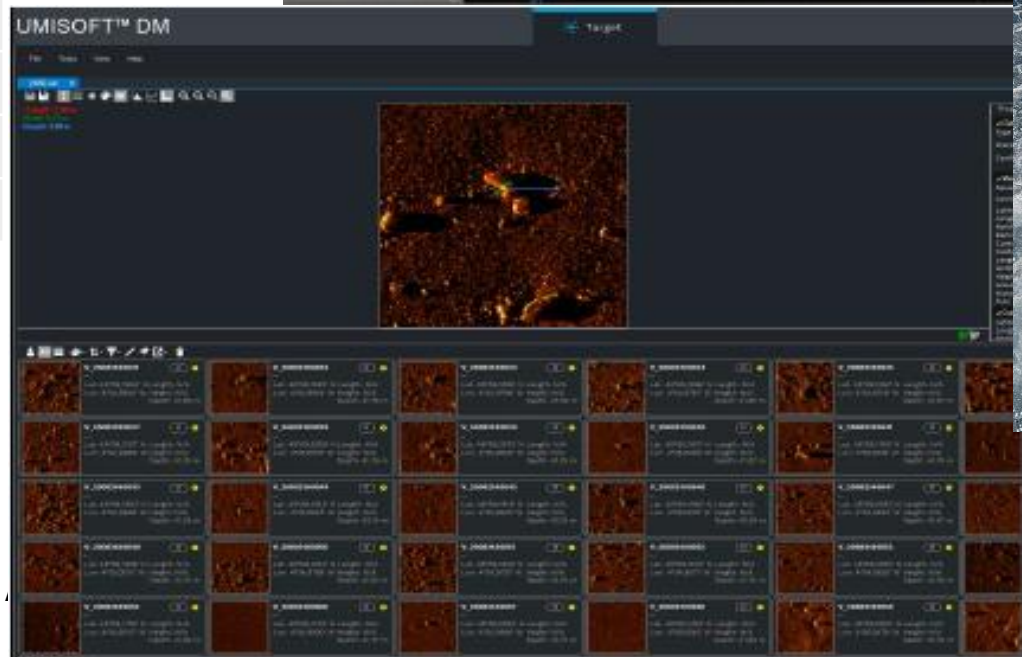
rMCM Toolbox – TSAS T18

CHARACTERISTICS	
Dimensions	Length: 4.7m
Weight	
Nominal Speed (ops)	
Min Speed (ops)	
Endurance	
Operating Depths	
Operating Altitude	
Coverage Rate	

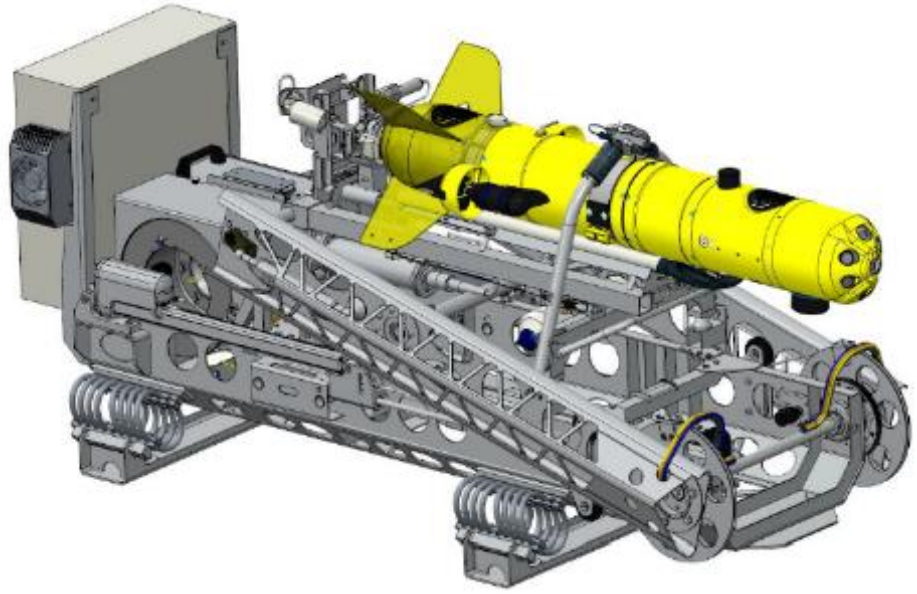
Classified







rMCM Toolbox – MIDS: Seascan & K-STER-C



Innovative and (R)evolutionary

rMCM Toolbox – UAV Skeldar V200

1. MCM

- D-C-I
- MCM support
  - REA
  - Comms relay (AUV; USV)

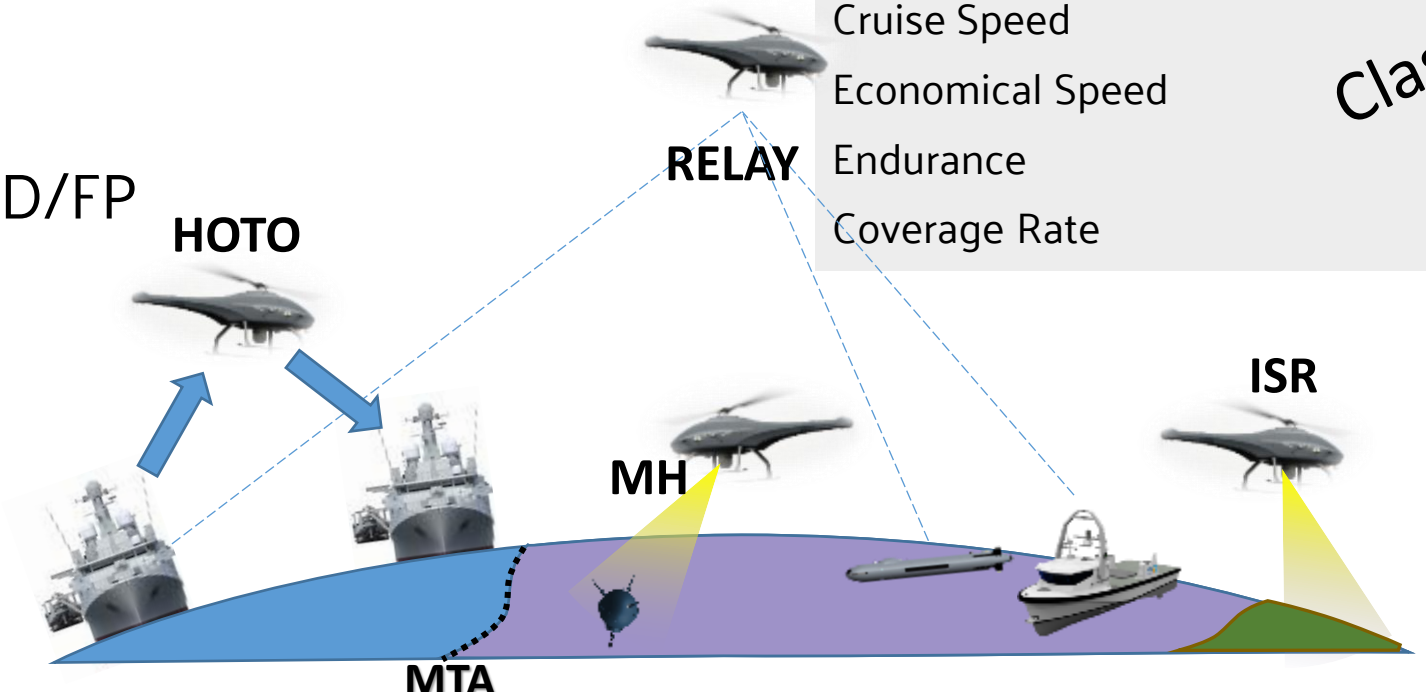
2. ISR

- Fused RMP
- Target reporting unit for SD/FP
- SAR

Payloads :
Comms relay
+ EO/IR
OR
+ LIDAR

CHARACTERISTICS	
Dimensions	Rotor diameter: 4.6m Airframe length: 4m Height: 1.3m Width: 1.2m
Max Takeoff Weight	
Max Speed	
Cruise Speed	
Economical Speed	
Endurance	
Coverage Rate	

Classified

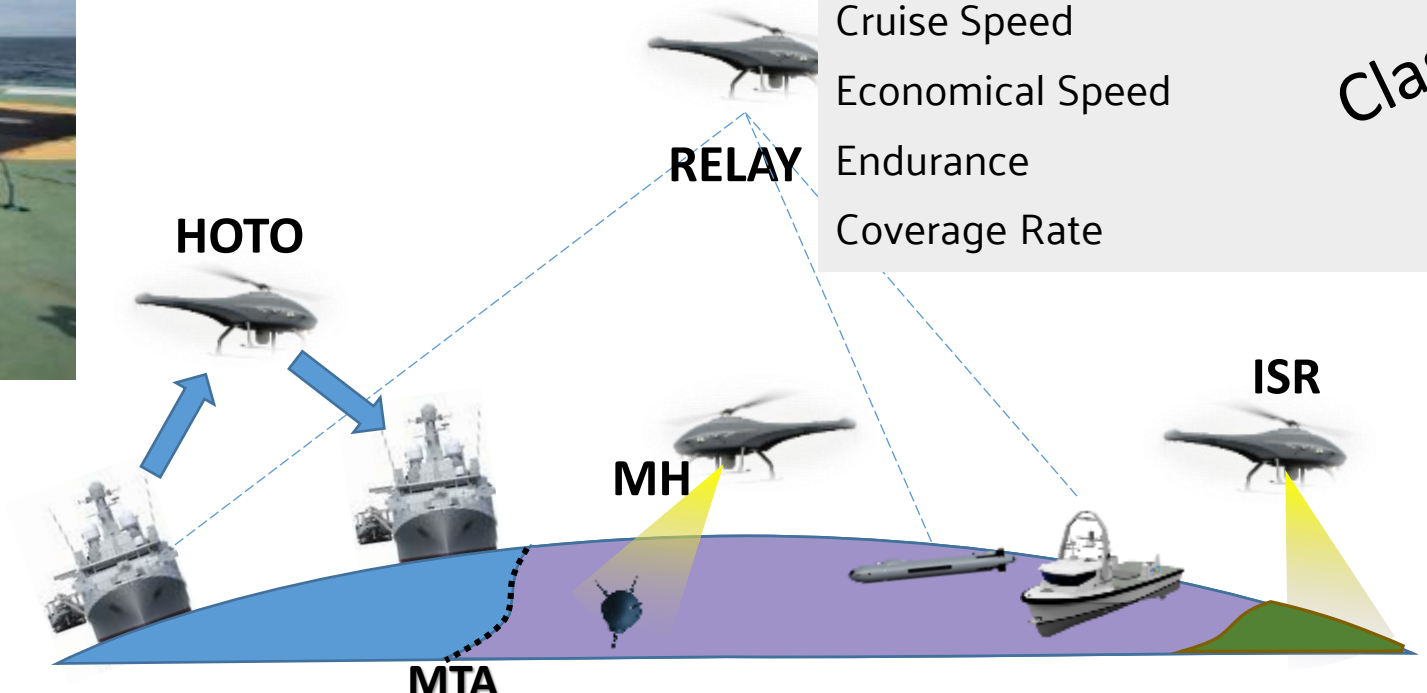


rMCM Toolbox – UAV Skeldar V200

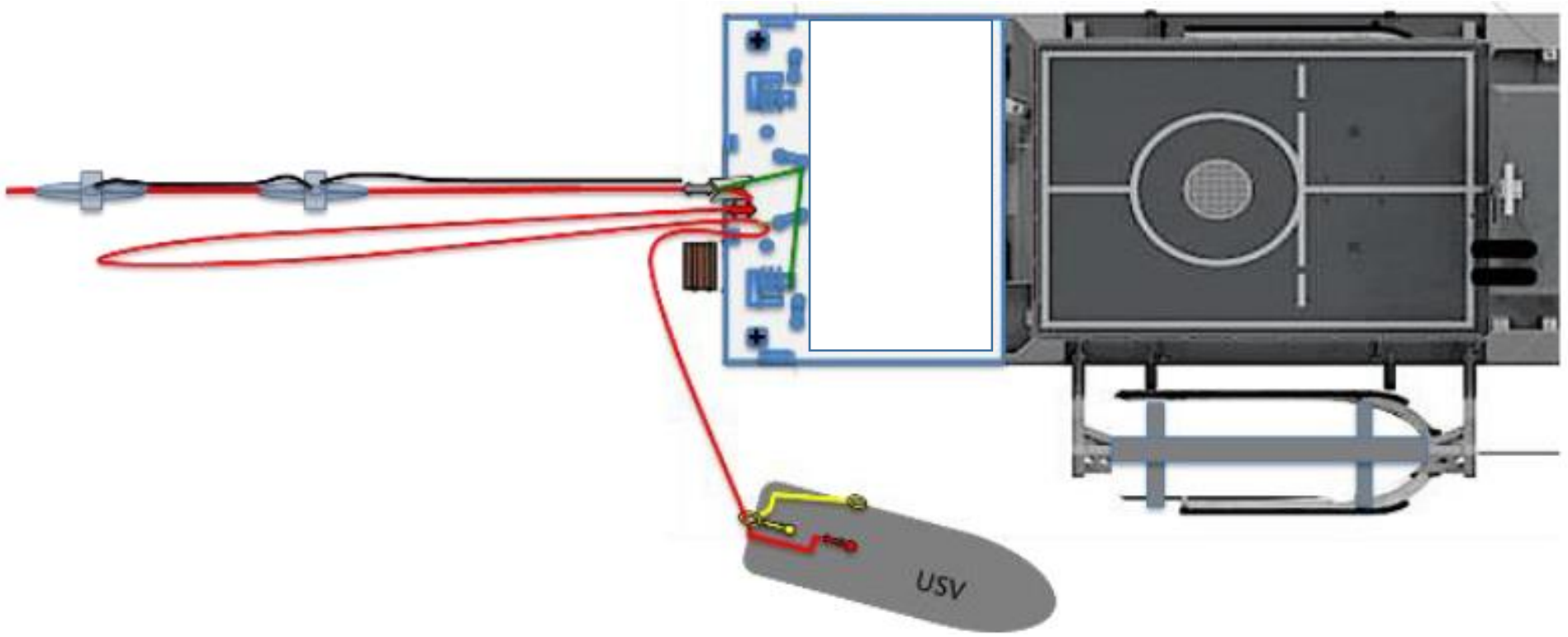
Payloads :
Comms relay
+ EO/IR
OR
+ LIDAR

CHARACTERISTICS	
Dimensions	Rotor diameter: 4.6m Airframe length: 4m Height: 1.3m Width: 1.2m
Max Takeoff Weight	
Max Speed	
Cruise Speed	
Economical Speed	
Endurance	
Coverage Rate	

Classified

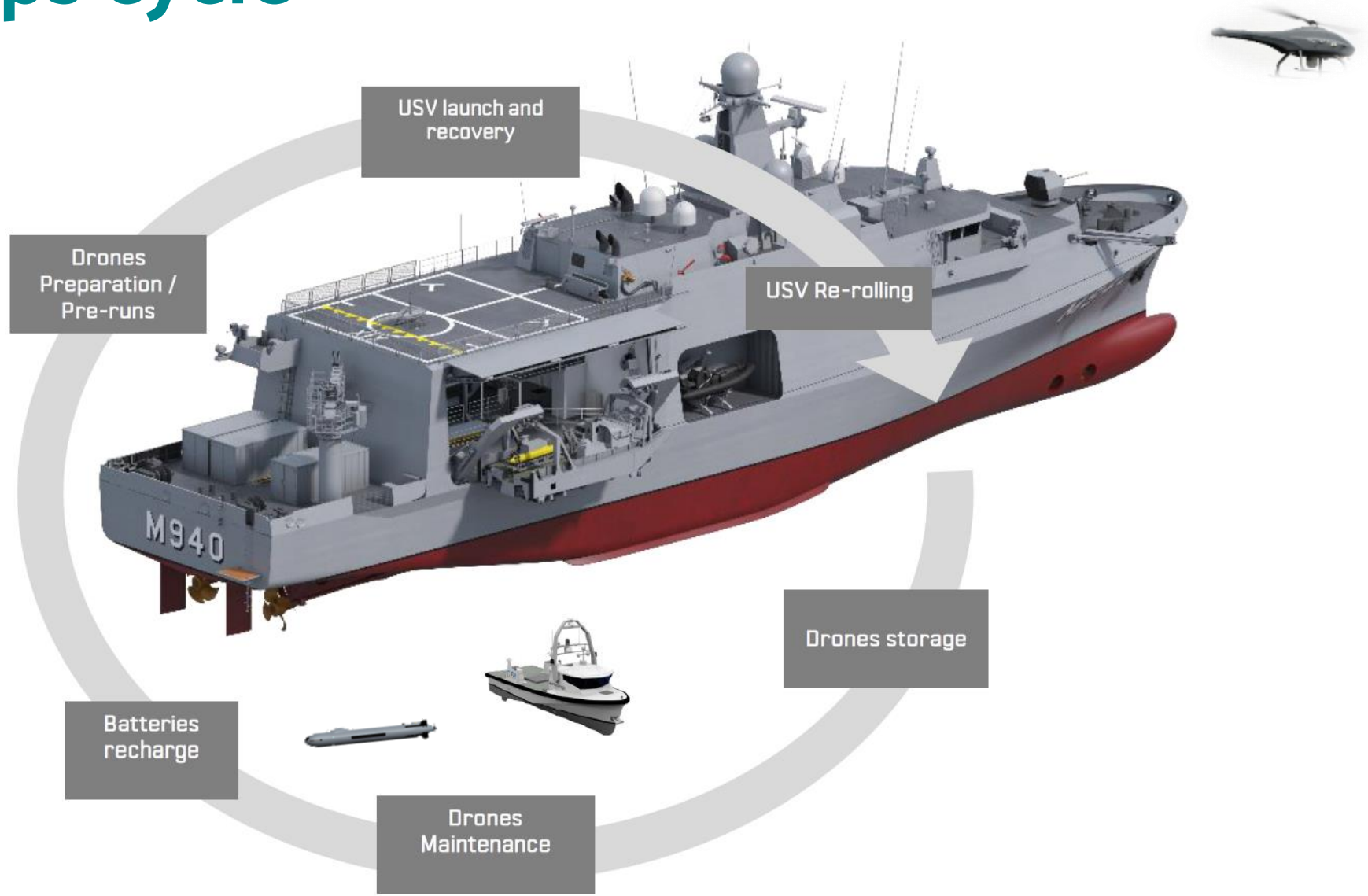


rMCM Toolbox – Influence Minesweeping System



Innovative and (R)evolutionary

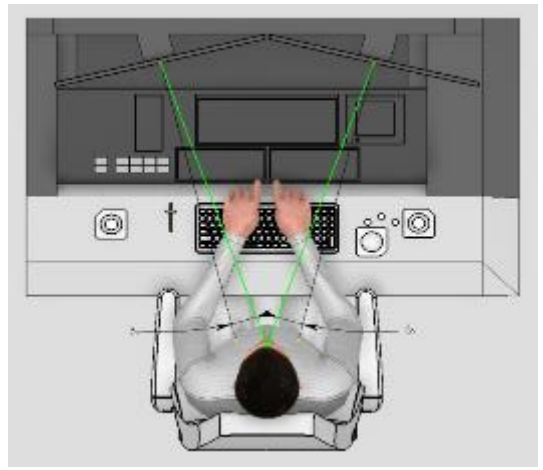
rMCM Ops cycle



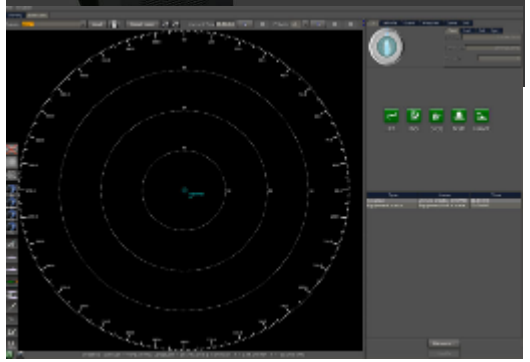
Innovative and (R)evolutionary

rMCM Mission System

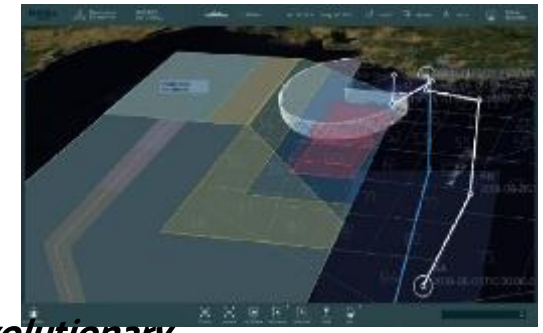
- All Multifuctional Consoles



- Principal Warfare System



- Mine Warfare System



Innovative and (R)evolutionary

Simulator

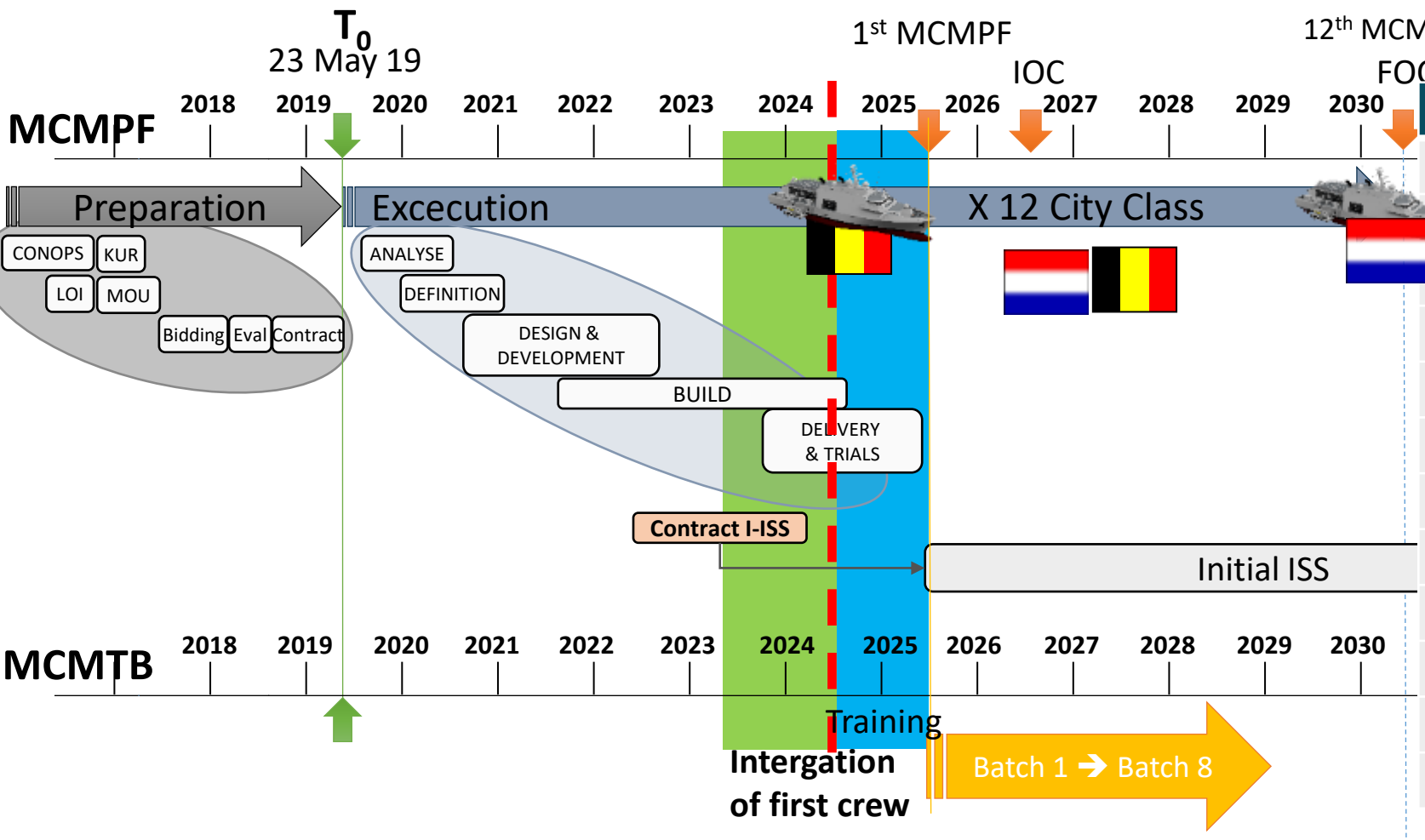
TACT SIM
TRAIN CIC
TRAIN TECH

Linked in common scenario

VR SIM
TRAIN DECK
TRAIN TECH

Target Audiance	System simulated
Recruits	Ship discovery in VR
OPS personnel	CIC (MWS, PWS)
NAUT personnel	Deck in VR
TECH personnel	IPMS, EIB

Adjusted schedule on 4 firsts MCMPF & TB's



MCMPF#	Delivery	New Delivery
1 &TB	Dec 24	Aug25 (+8m)
&TB	Jun 25	Nov -Dec25 (+5-6m)
3	Jan 26	Mar 26 (+2m)
4	Jun 26	Jul26 (+1m)
5	Dec 26	Dec 26
6	Jun 27	Jun 27
7	Dec 27	Dec 27
8	Jun 28	Jun 28
9	Dec 28	Dec 28
10	Jun 29	Jun 29
11	Dec 29	Dec 29
12	Jun 30	Jun 30

→ Limited ops impact (current capabilities available)

Innovative and (R)evolutionary

Current development

- MCMPF's:
  - Production ongoing:
    - MCMPF #1 First Sea Ongoing & Keel laying of MCMPF #6 planned in Jun24
  - FAT ongoing
- MCMTB's:
  - Production ongoing
  - FAT ongoing
- SIM:
  - Building and first version ready
  - Development on next version ongoing (in parallel of PF/TB)
- Preparation of the introduction of the new Naval Mine Warfare Capability (NMWC- rMCM remain program name):
  - Training starts next week
  - Developing the Procedures
  - Adapting Infrastructure

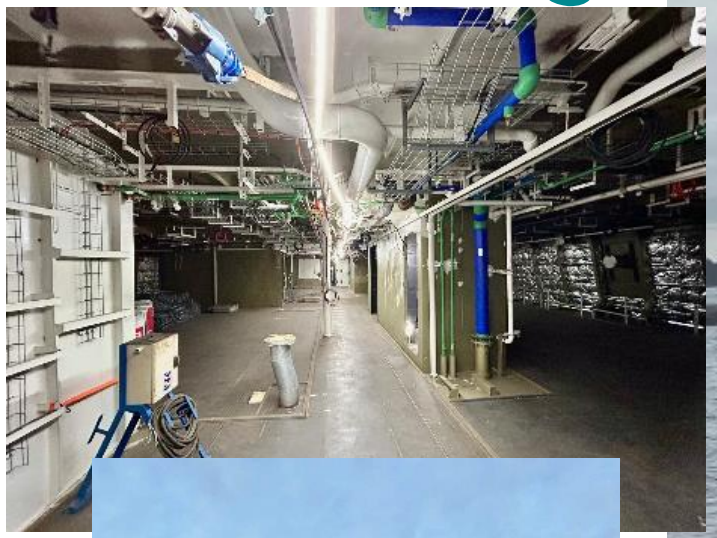
➔ Challenge to have all those activities in parallel

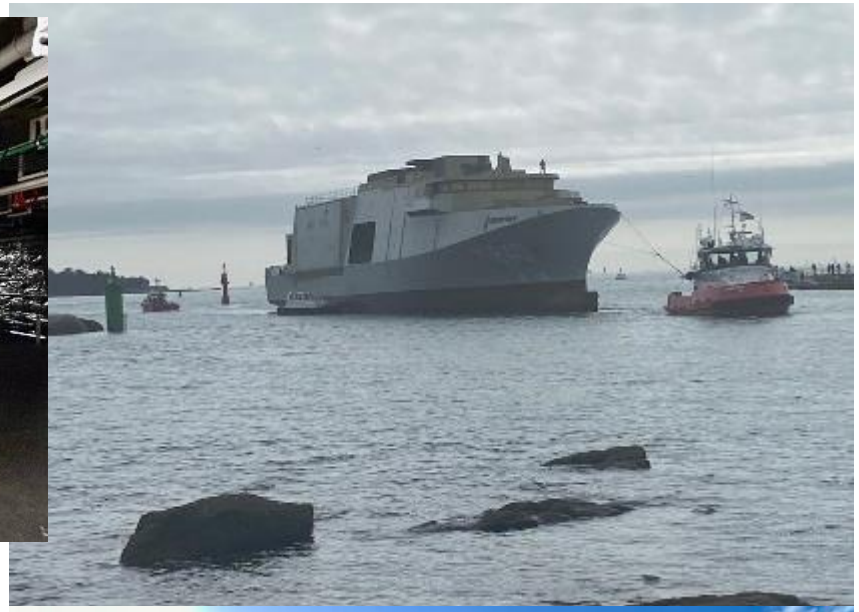
MCMPF #1 - M940 BNS Oostende in Concarneau

- Launched
- Powered-up
- First Sea Ongoing: Jun24

(R)evolutionary

MCMPF #2 - M840 Zr.Ms. Vlissingen in Lorient





Launched

Power-up : mid 24

Innovative and (R)evolutionary

MCMPF #3 - M941 BNS Tournai

Keel Laid
Launch: Jul24

Innovative and (R)evolutionary

MCMPF #4 - M841 Zr.Ms. Scheveningen in ROU

- Keel laid
- Launching in ROU : end 24

MCMPF #5 – M942 Brugge

Keel laid

Launching in FRA: Begin 25

Hull constructed in Lorient, FRA instead of ROU

➔ ATG Giurgiu ramping-up

Innovative and (R)evolutionary

MCMPF #6 – M842 IJmuiden

First Steel Cut
Keel laying: Jun 24

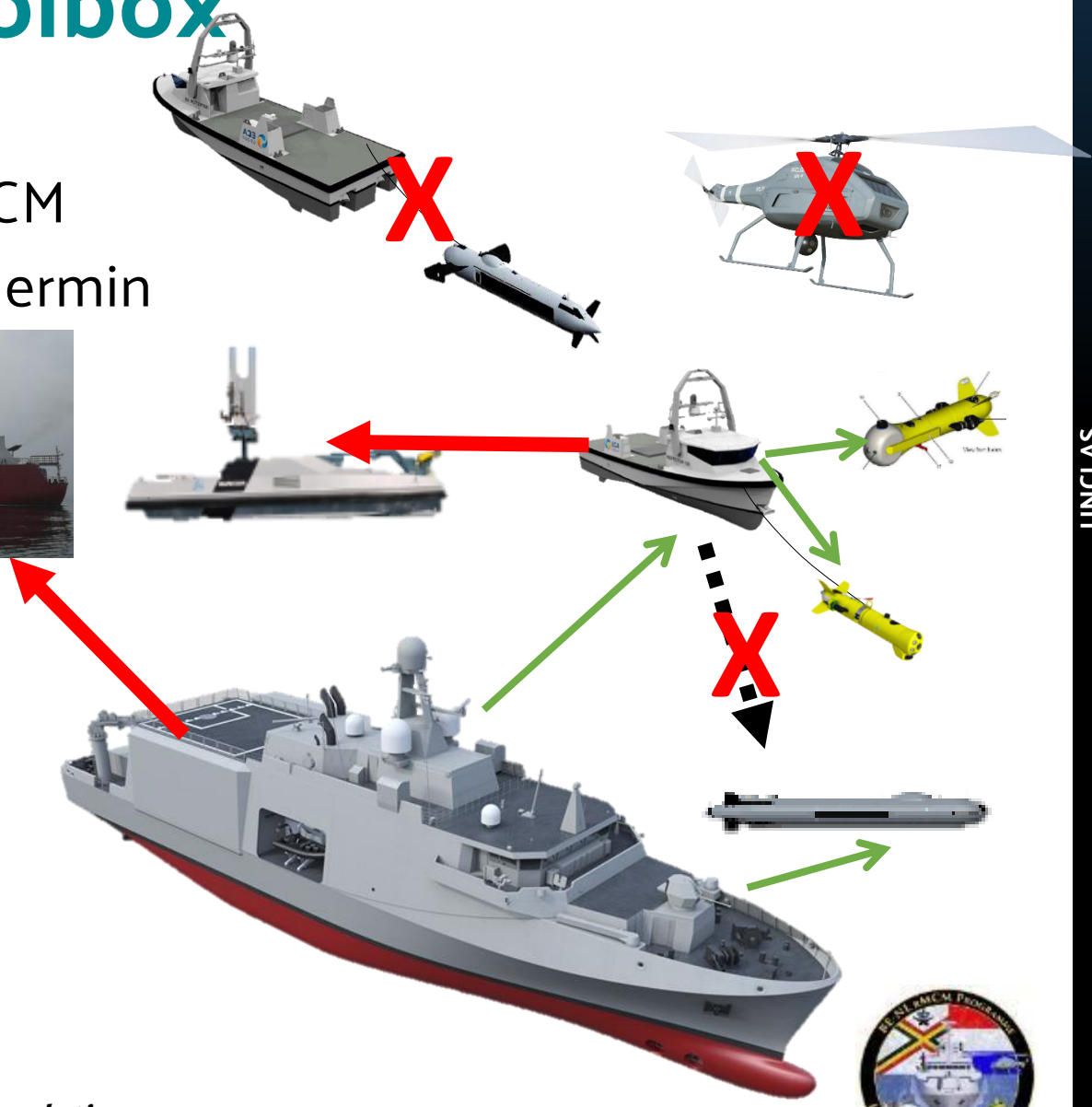
Toolbox

- First successful tests on TB
- C^2 Containers : Integration ongoing in La Garde
- TB-PF (SW&HW) integration :
  - Detailed planning
  - Dedicated integrated team of both industries

Innovative and (R)evolutionary

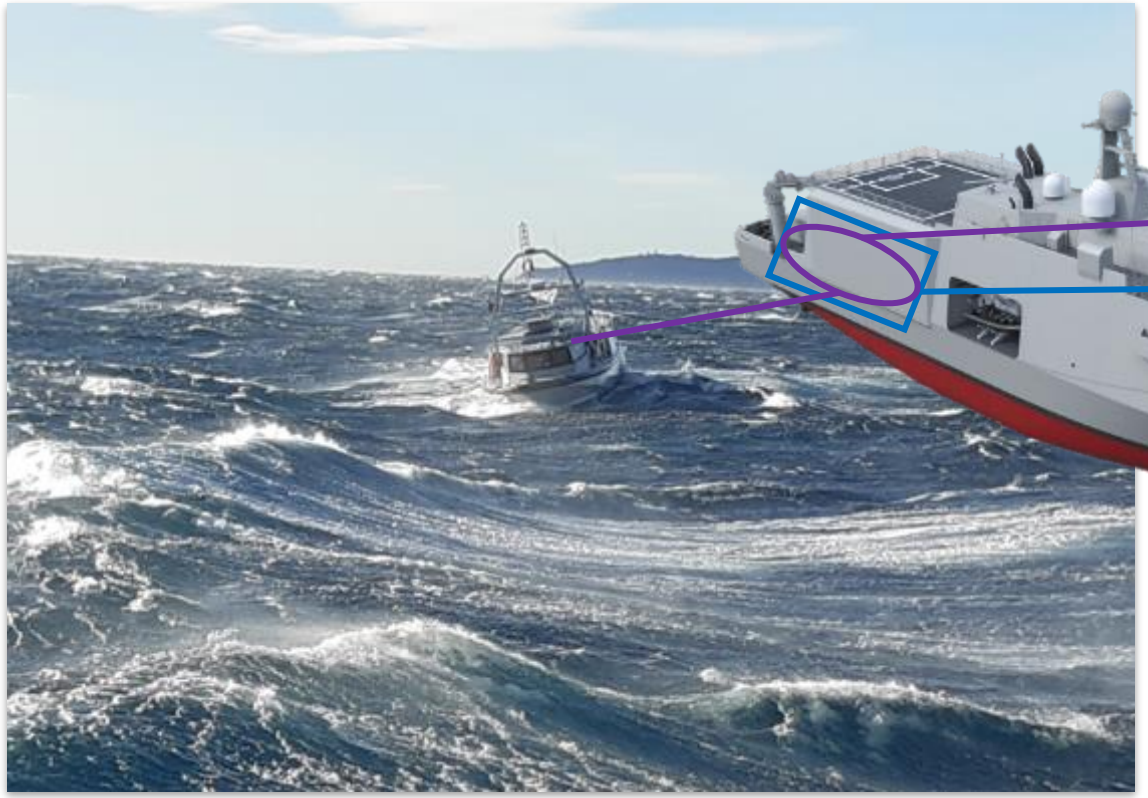
OT&E contract on MCM Toolbox

- NLD contract
  - Scope en specs OT&E not identical to rMCM
  - Info sharing with rMCM & NATO COE Eguermin
- Objectives: **Preparation**
  - Builing up knowledge
  - Way of working
  - Effectivity & efficiency evaluation
  - Maintenance & training
  - Improving product with industry



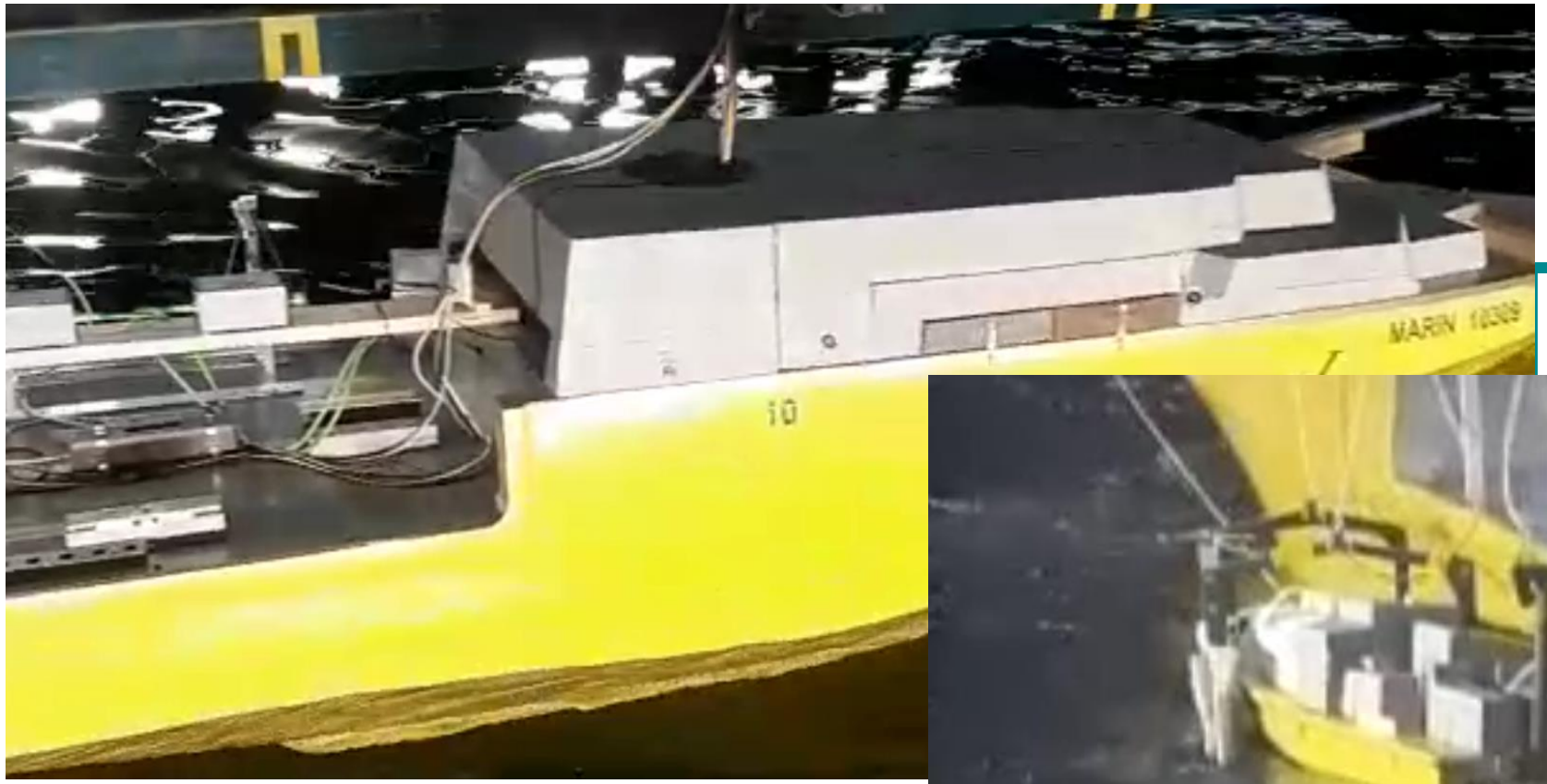
Innovative and (R)evolutionary

LARS - Successful tests at sea (SS3-4 → SS5-6)



Innovative and (R)evolutionary

LARS - Successful model tests SS5-6 in NLD



Final design consolidation ongoing

Interest of other Nations

- Open for other collaboration
  - Binational programme
  - Admission of additional participants through dedicated MoU
- BEL-NLD-FRA MoU signed in Aug 2023
- Discussion with Gov and Industry ongoing

MINISTÈRE
DES ARMÉES
Liberté
Égalité
Fraternité

COMMUNIQUÉ DE PRESSE
DU MINISTRE DES ARMÉES

Paris, le 18 octobre 2022

Déclaration conjointe de la France, de la Belgique et des Pays-Bas portant sur les bâtiments de guerre des mines

- **À l'occasion du salon Euronaval, la France, la Belgique et les Pays-Bas se sont mis d'accord sur une coopération visant à promouvoir les synergies et les avantages mutuels en ce qui concerne les capacités de guerre des mines nationales. L'objectif est ainsi d'accroître l'efficacité de leurs programmes respectifs et de renforcer l'interopérabilité de leurs systèmes nationaux de guerre des mines.**
- **Cet accord a été formalisé ce mardi 18 octobre 2022 lors d'une rencontre entre les représentants de la Direction générale de l'armement (DGA), de la Direction Générale des Ressources Matérielles (DGMR) et de l'Organisation néerlandaise des matériels de défense (DMO), respectivement l'ingénieur général de l'armement hors classe Gael Diaz de Tuesta, le lieutenant-général Frédéric Goetynck et le vice-amiral Arie Jan De Waard.**

La France a notamment confirmé sa décision de lancer la conception des navires français de guerre des mines sur la base de celle des navires du programme binational belgo-néerlandais rMCM. Ainsi, les nations partagent les objectifs de maximiser les communautés de conception afin de créer des opportunités pour un soutien en service conjoint spécifique et toute autre activité conjointe liée aux capacités de guerre des mines.

Les navires français devraient être commandés en 2023, avec une date de livraison en cours de discussion, via le programme SLAM-F. De leur côté, les navires de la Marine belge et de la Marine royale néerlandaise rMCM devraient être livrés à partir de 2024.

S'appuyant sur 30 ans de coopération dans le domaine des chasseurs de mines de la classe tripartite, la France, la Belgique et les Pays-Bas réaffirment désormais leur volonté d'accroître leur intégration et leur efficacité dans le domaine MCM. Ils reconnaissent également que cette coopération dans ce domaine reste plus que jamais nécessaire pour relever les défis de demain et renforcer les capacités de défense européennes.

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Direction générale de l'armement
Service de presse
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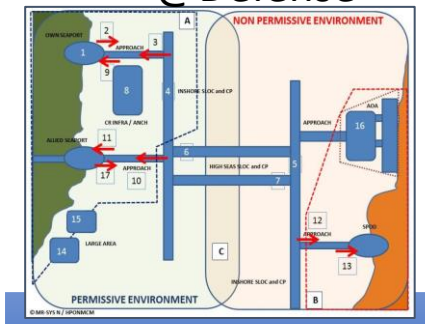
Continuous development & evolution

- MCMPF designed for 30 years and TB/SIM to be regularly upgraded

Operational concept &
Key User requirements
@Defense



Contract & Development

NAVAL GROUP ECA GROUP

Concept evolution & consolidation
@ MUS-I (NATO)

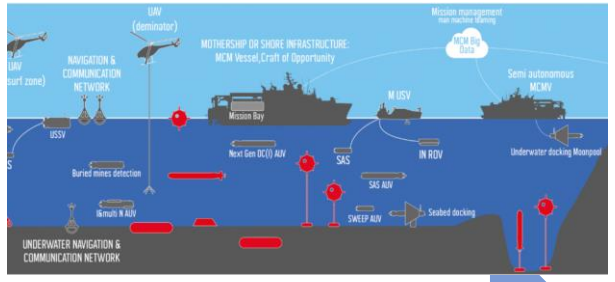
NATO OTAN

S&T organization
Centre for Maritime Research & Experimentation

@ PESCO (EU)

EUROPEAN DEFENCE AGENCY

MIRICLE (EU)
E=MCM (EU)



LoI → MoU BEL-NLD

Ongoing Cooperation BEL-NLD (+ FRA)

Multinational ? Cooperation

Feasability & consolidation
@ Industry





Development @ MCM & Cyber LAB's
Industry, Academic & Defense

UNCLAS

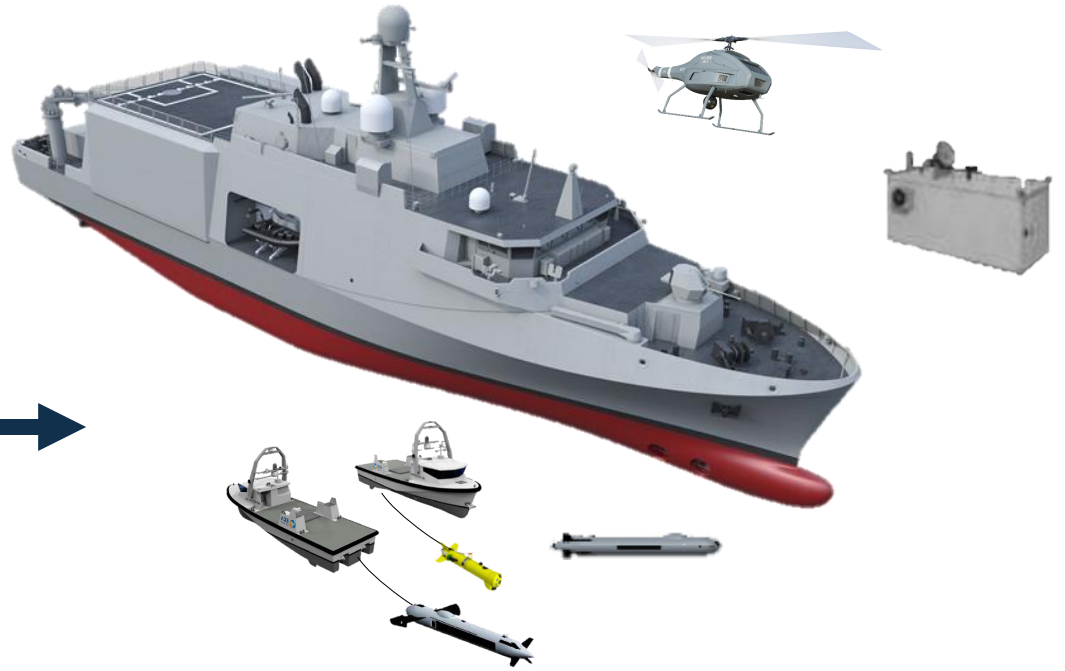
Programme Challenges

Challenges	Mitigation	Opportunities
New Concept	Early and continuous testing Continuous evolution through ISS, Labs, …	Cooperation with industry Cooperation with other Nations Knowledge build-up More than NMW only: application in other Warfare
Rapid tech. evolution		
Data & AI integration	Data collection strategy AI iteration Quality check (real life)	
Binational	Full integrated binatioal team Best of both, burden sharing	Best of both, burden sharing: OT&E New collaborations possible from lower (LL) to higher level on integration (entry in the program through MoU)
Integrated use of uncrewed systems	NLD OT&E project Early integration of crew	Embrace the paradigm shift Motivating for (young) crew Knowledge build-up for other application in other Warfares

Concluding remarks

- New innovative & (r)evolutionary MCM concept
  - Disruptive ”stand-off” concept with cutting edge Toolbox
  - A flexible drone carrier vessel for next generation MCM capabilities & more
- Challenging (project office, also for industry)
- Importance of trials, research, development, innovation and continuous evolution
- Integration = key factor to success
- Possibilities of exchange and collaboration

Conclusion - Paradigm shift



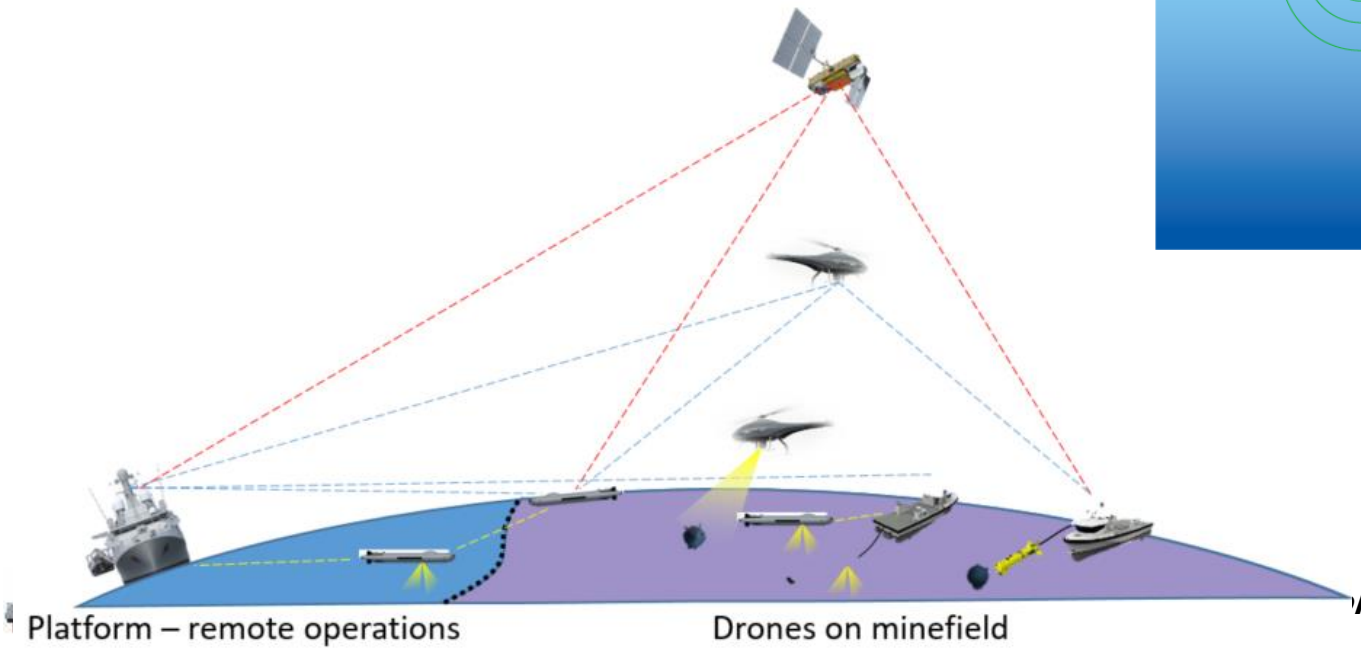
Aircraft Carrier	Future Naval Capabilities
System of Systems	System of Systems – **Uncrewed**
Decentralized: • Fire power • C4I	Decentralized/Network Centric – **Uncrewed & Auto.**: • Fire power, C4I • **Disruptive technologies, continuous evolut°**
Command & Control	Command & Control - **Uncrewed & Auto.**
Covered Area / Area of Influence	Covered Area / Area of Influence

Conclusion - Paradigm shift

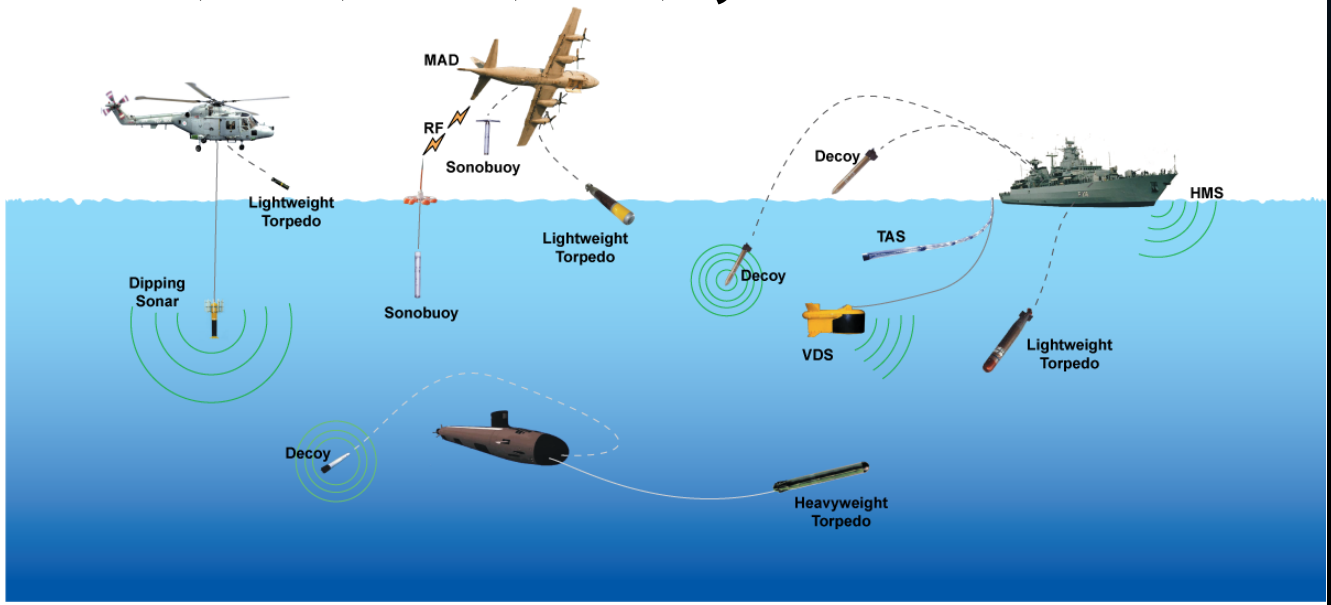
- **Future Naval Capabilities examples**
  - **Network centric**
  - **Even more interaction between warfares: NMW, ASW, ASuW, AAW, Cyber**

Naval Mine Counter Measures

- Uncrewed Vehicles
- Remote operated Vehicles



lutionary



Anti Submarine Warfare

- *Towed sonars*
- *Decoys & sonobuoys*
- *Sonar & torpedo's (Helicopters)*

DEFENSIE
LA DÉFENSE

Ministerie van Defensie

Questions

Answers