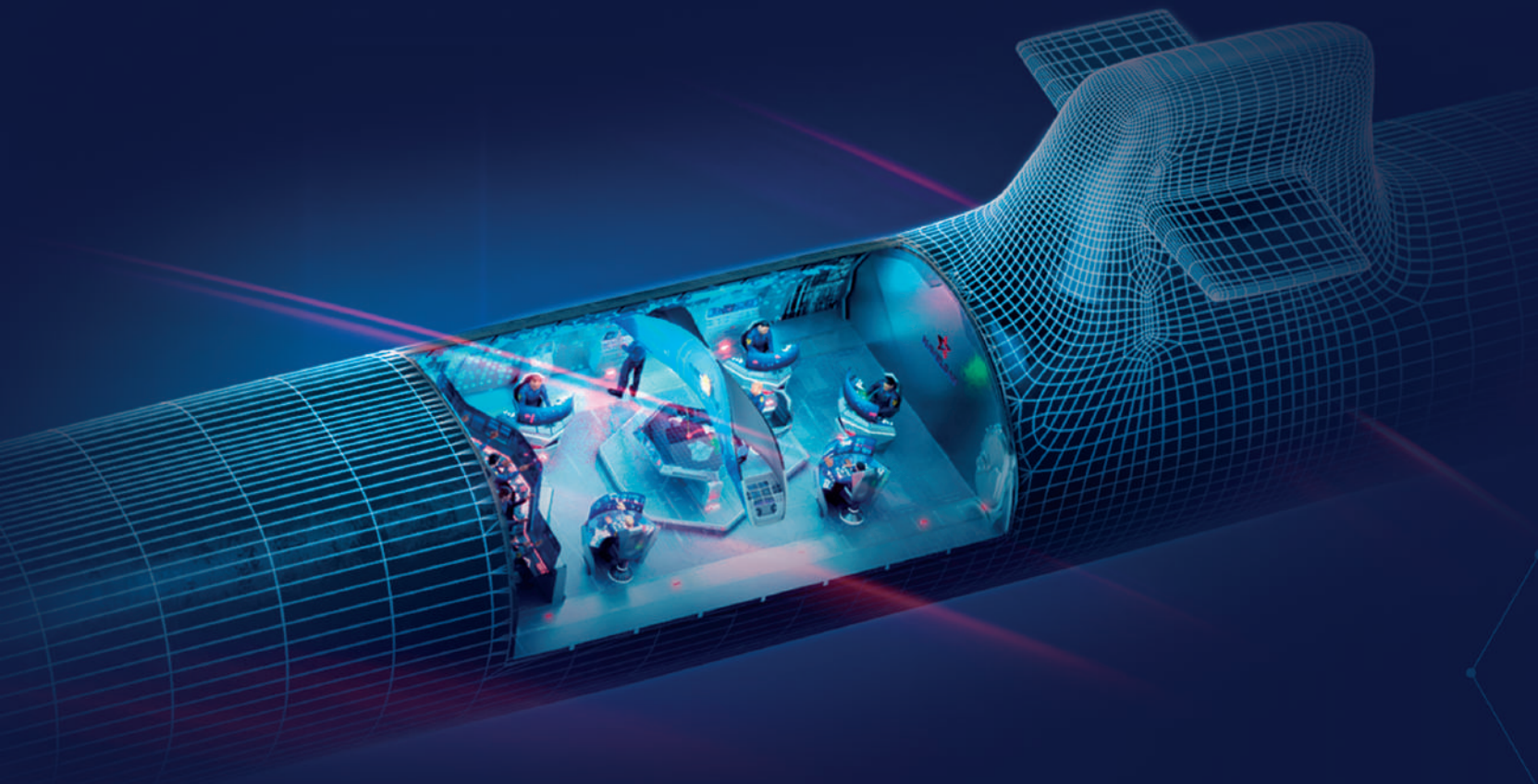


4TH GENERATION SUBMARINE CMS



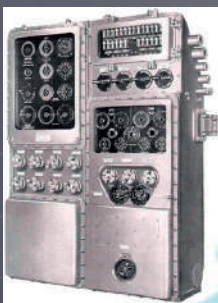
UNITED COMMAND AND CONTROL CONCEPT (4th GENERATION SUBMARINE CMS)

HOLISTIC APPROACH IN MANNED, UNMANNED SUBMARINES, AND UUVS (TACTICAL LEVEL)

EVOLUTION OF INTEGRATED SUBMARINE COMBAT MANAGEMENT SYSTEMS (CMS)

- Introduced in the late 1970's, Integrated CMSs have seen little change in their basic concept. They have only evolved in the same functional areas by integrating more advanced sensor and weapon systems. These areas are TMA solutions, track management, weapon control features, navigation and tactical picture support.
- Today's Submarine CMSs mainly produce data that meets the TMA solution for target tracking and weapon control.

1st GENERATION



Mechanical (Analogue)
Fire Control System
1930-1960

2nd GENERATION



Numerical (Digital)
Fire Control System
1960-1970

3rd GENERATION



Integrated
Combat Management System
1970-To-Date

Based on Target Motion Analysis (TMA)
Focus on Torpedo-G/M firing

THE NEED ARISES

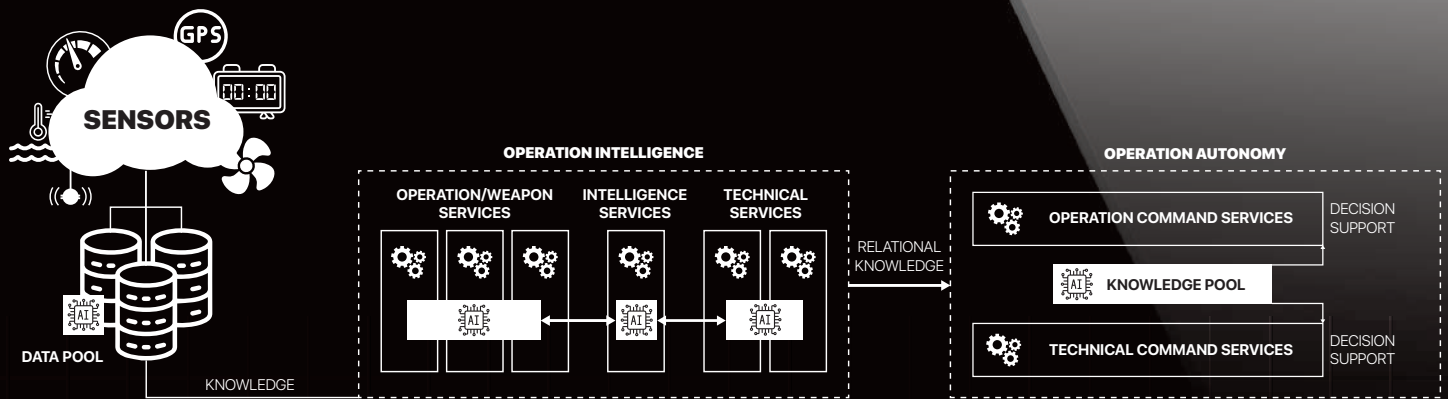
- The amount of data onboard submarine systems and external sources exceeds human perception and cognitive abilities.
- The operational environment's complexity has increased submariners' physical and mental workload; however, personnel recruitment constraints have made it necessary to perform tasks with a smaller workforce.
- As operational conditions change and the physical and cognitive workload increases, equipping submariners with new capabilities is becoming increasingly urgent. These capabilities are crucial for enhancing their performance and ensuring operational success.

UNITED COMMAND AND CONTROL CONCEPT

► Instead of the current TMA-based CMS approach, HAVELSAN's United Command and Control Concept takes the whole submarine as the "Combat System" and holistically covers all business processes in the submarine's basic functional areas with "operational intelligence" and "operational autonomy".

RELATIONSHIPS, PATTERNS AND ANOMALY DETECTION

► Our approach goes beyond mere data production. It harnesses the power of big data to uncover relationships, identify patterns, and detect anomalies across the submarine's all business processes.

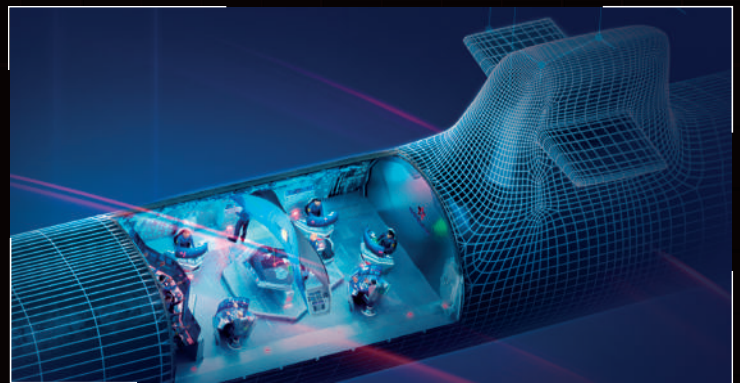


UNMANNED SUBMARINES AND UNMANNED UNDERWATER VEHICLES (UUV)

► Fully autonomous unmanned submarines and UUVs in which humans are not involved in alternative solutions, decision-making, and control processes must have a C2IS with "Operation Intelligence" and "Operation Autonomy" capabilities to achieve the given task. The concept will provide decision support to operators working in command centers of semi-autonomous unmanned underwater vehicles.

4TH GENERATION SUBMARINE CMS

► HAVELSAN adopts the United Command and Control Concept for submarines, unmanned submarines, and UUVs, equipping submariners and UUV operators with new capabilities, and provides "situational awareness" within and across all function areas to enhance their performance.
 ► The "Submarine CIC Orchestration" design complements the human factors and physical dimension of the 4th Generation CMS.



THE CONCEPT IS APPLICABLE TO OTHER PLATFORM CMS, UNMANNED SURFACE VEHICLES AND OPERATIONAL LEVEL C2IS.