

DESIGNING FOR FUTURE SUBMARINE CAPABILITY

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Submarines are Important for Swedish Security Policy

- Control of the underwater domain is of strategic importance
- Sweden has long and successful experience of submarine operations
- Sweden has long and successful experience of AIP submarine design and construction (A14S, A17S, A19)

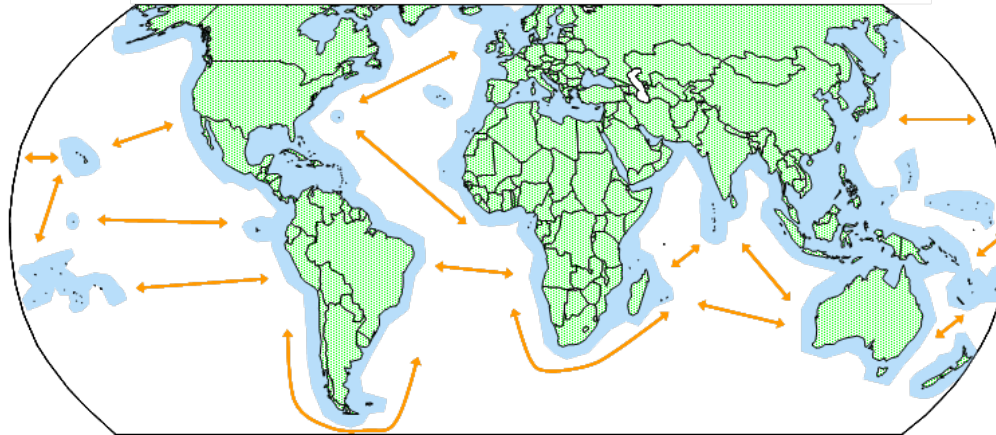


Swedish Government has decided to acquire the Next Generation Submarine

Customer Requirements - Design Influencing Factors

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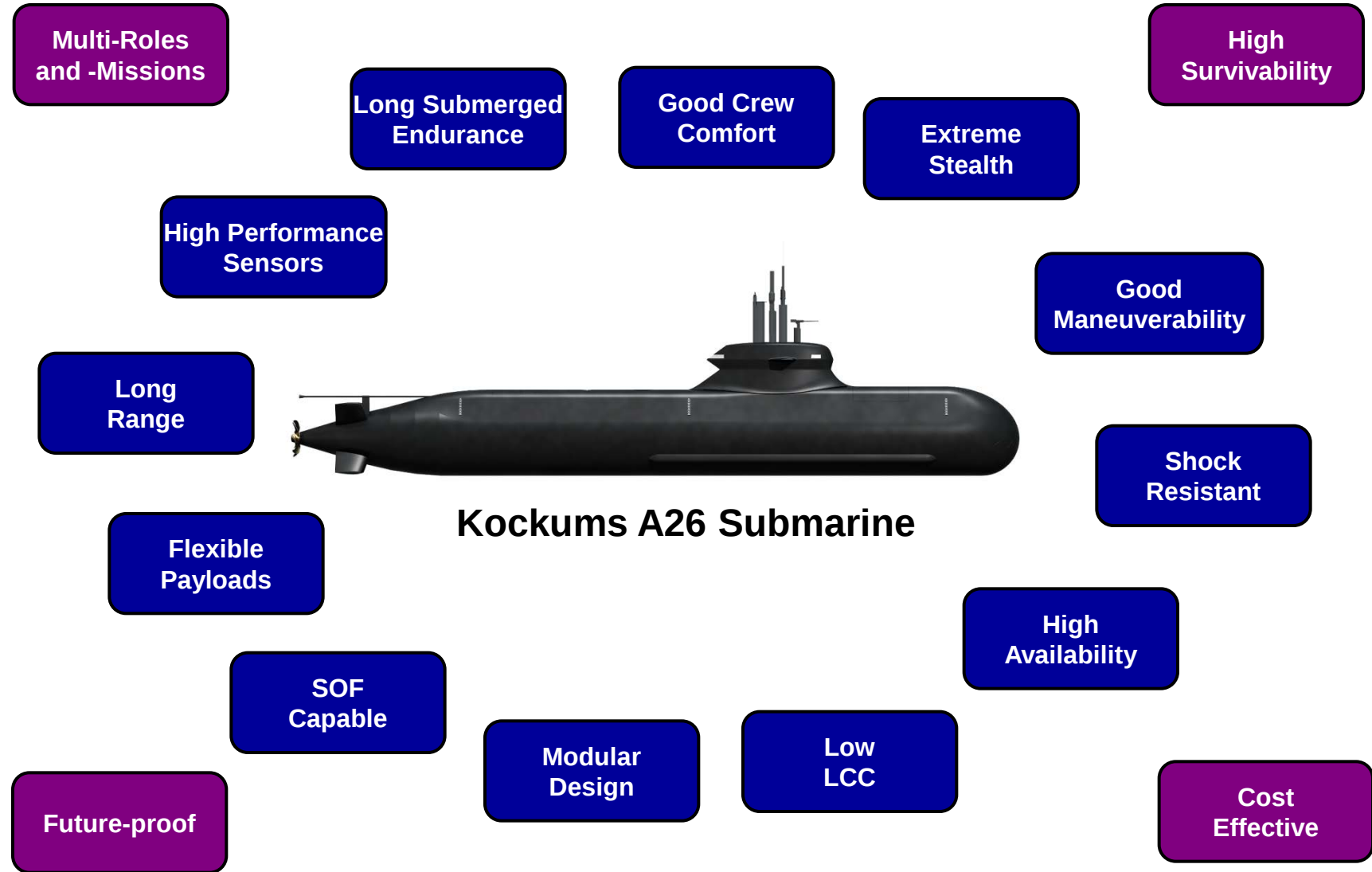
- Operations will take place anywhere in the world
 - Engagement focus in the littorals with effective ocean transit
- The Submarine will be part of a larger network
- New payload types, with new capabilities, sizes and shapes, will be used
- Special Operation Deployments will gain importance
- Threat environment will be in the full spectrum of conventional - asymmetric and high - low
- Adversary sensors will gain performance
- Traditional ASW/ASuW capability
- New types of submarine missions will emerge
- High level of availability



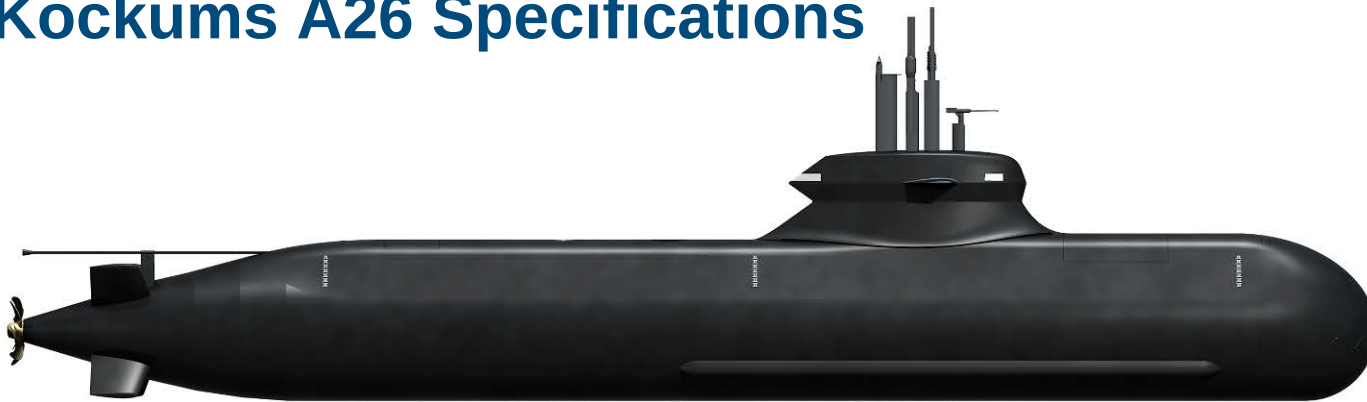
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- A large, dark blue submarine is shown underwater, angled upwards from the bottom left towards the top right. The submarine's conning tower is visible, and a small white wake is seen at the stern. The background is a clear blue water.
- Next generation submarine for Royal Swedish Navy
 - Swedish Government decision to acquire 2 units
 - Design contract placed in 2010
 - Construction contract in 2012
 - Deliveries in 2019-2020

The Design Challenge

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Kockums A26 Specifications



Length overall..... ~ 62 m
Draught, surfaced..... ~ 6 m
Displacement surface..... 1 800 tonnes

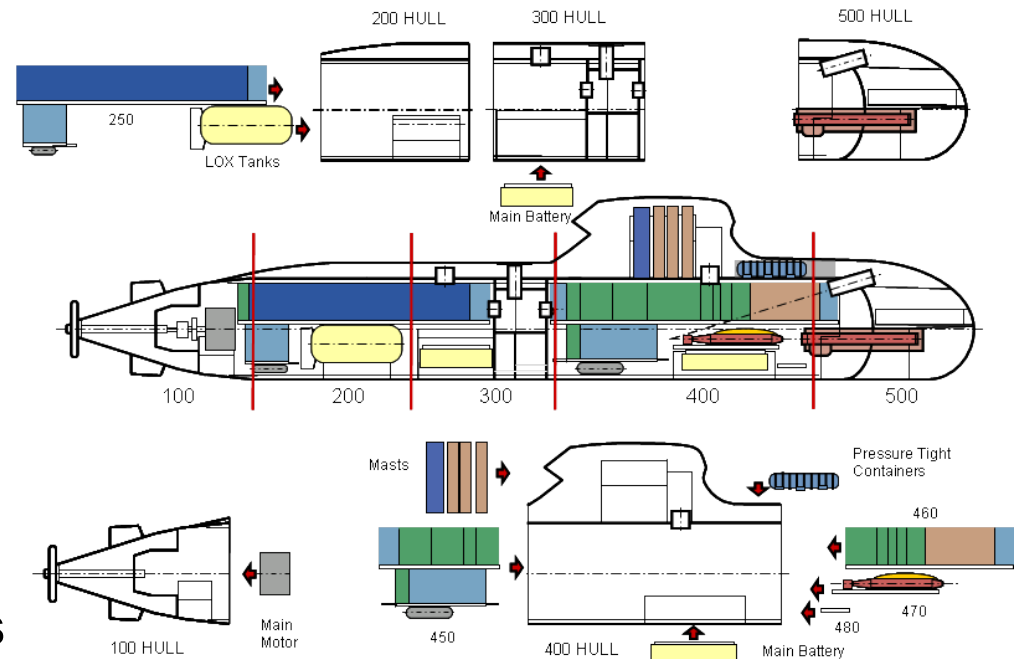


Propulsion..... Stirling AIP & diesel-electric
Standard complement..... 26 persons
Weapons..... 53 & 40 cm torpedoes, mines
Multimission Portal™..... L >6 m, diameter >1.5 m

Modular Design

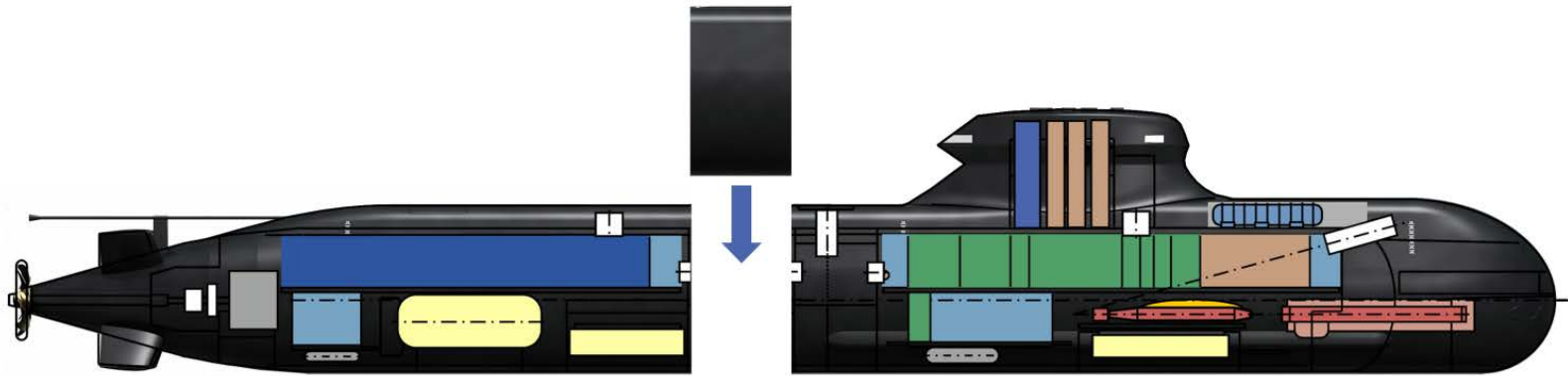
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- o **Kockums design philosophy**
 - o Used in previous submarine generations
 - o Developed further in A26
- o **Efficient construction**
 - o Modules outfitted and tested before assembly
- o **Distributed construction**
- o **Resilient platforms**
 - o Reduces radiated noise
 - o Reduces shock loads
- o **Designed with design margins**
 - o Prepared for future upgrades
- o **Allows for adaptation to customer requirements**



Adaptations to other customer's requirements

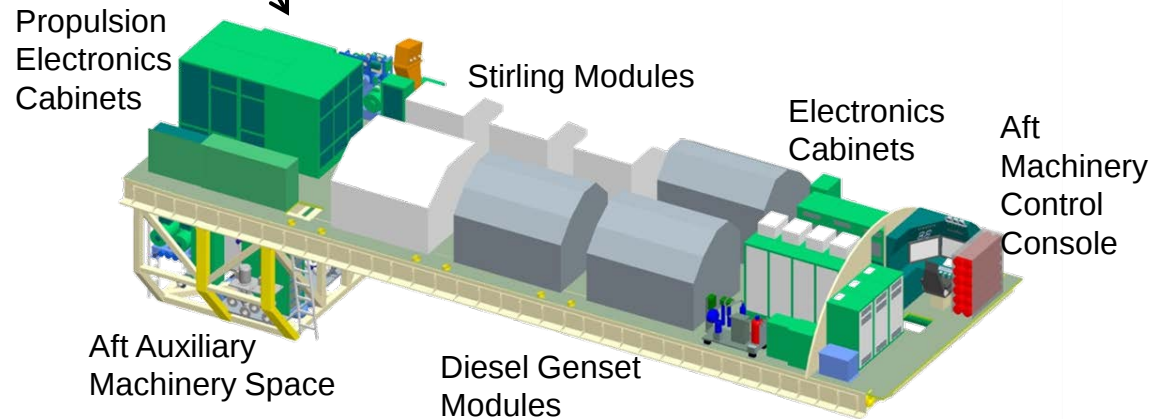
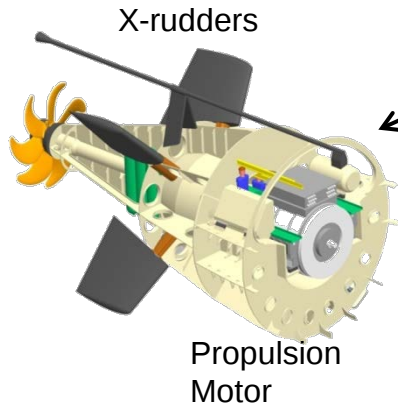
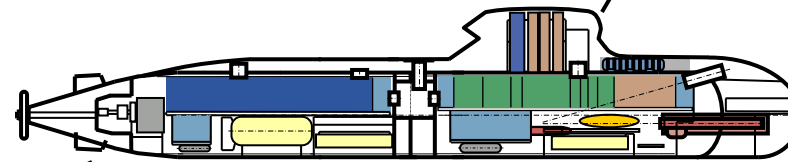
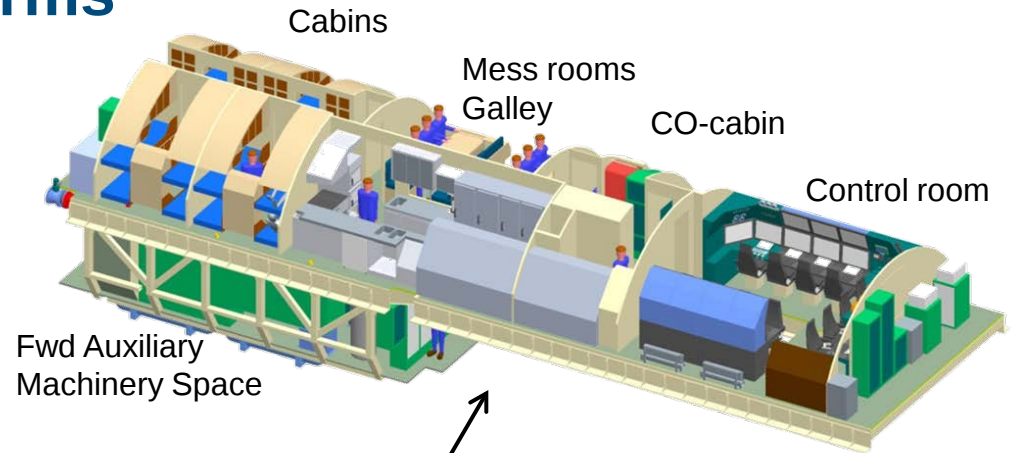
- Range and endurance
- Crew size
- Submerged endurance
- AIP speed
- Indiscretion rate
- New payloads



Example of extending the A26 with a new hull module for e.g. more fuel or new payloads

Modular Design – Platforms

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The Stirling AIP System

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- o **Increases submerged endurance dramatically**
 - o High efficiency
- o **Low signatures**
 - o No increase in indiscretion range
 - o No IR signature
- o **Proven**
 - o Operational since 1989
 - o Used in all RSwN submarines and by other navies
 - o High availability
- o **Low life cycle cost**
 - o Cost effective solution
 - o Easy to maintain
- o **Simple logistics**
 - o Low sulfur diesel and standard LOX
- o **Can be refitted into existing submarines**
 - o Self-contained AIP plug with all systems

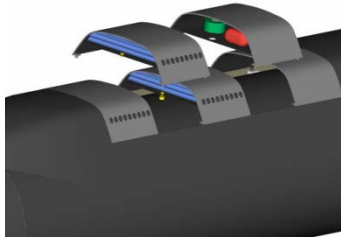


Stirling module



AIP replenishment at sea
(LOX, fuel & weapons)

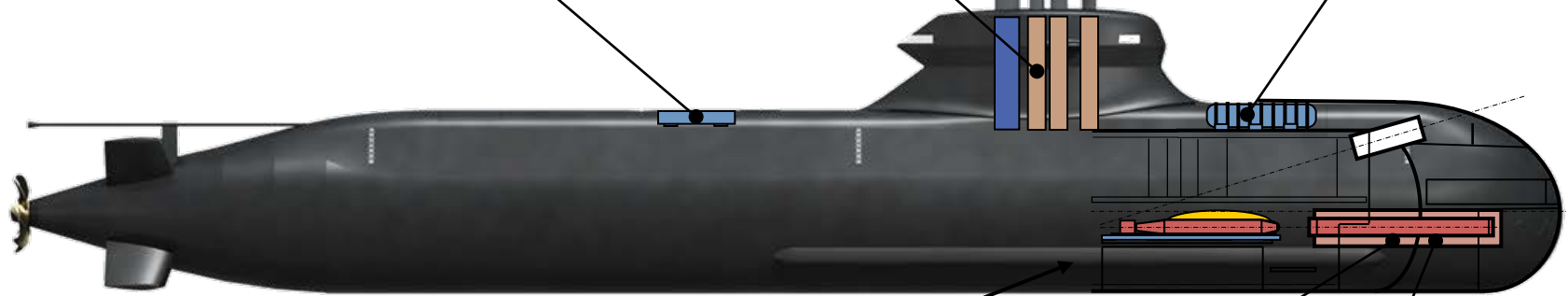
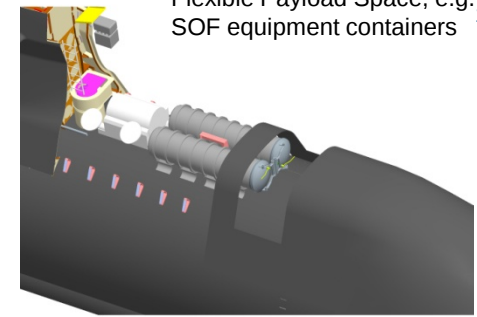
Optional outboard TCM system
or other system



Modular mast system



Flexible Payload Space, e.g.
SOF equipment containers ¹¹

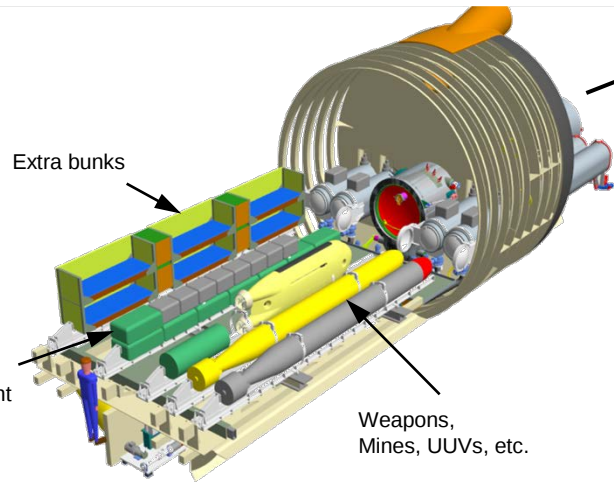


Extra bunks

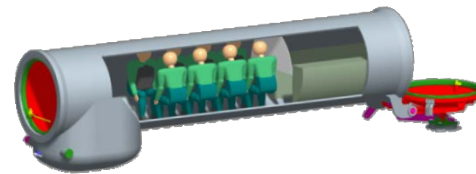
SOF
equipment

Weapons,
Mines, UUVs, etc.

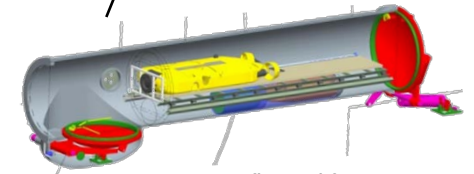
Flexible Stowage Compartment



MMP configured for diver
lock in and lock out



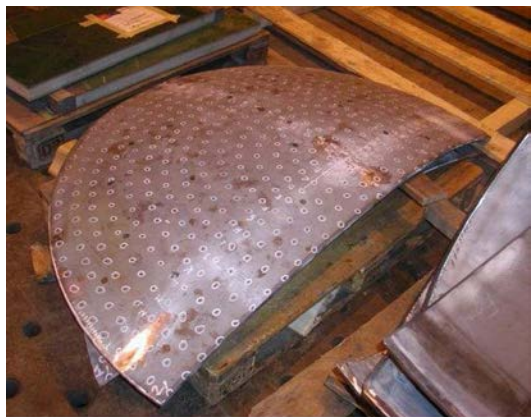
MMP configured for UUV
launch and recovery



A26 Flexible Payload Concept

Kockums A26 – Various Ongoing Design Tests

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Bulkhead welding tests

Habitability mock-ups

Hydrodynamic tests

Conclusions

The Next Generation Submarine (A26):

- Building on the success of A17S and A19
- Including many more features and abilities

The submarine design must be innovative and future-proof

Modularity and flexibility key design elements

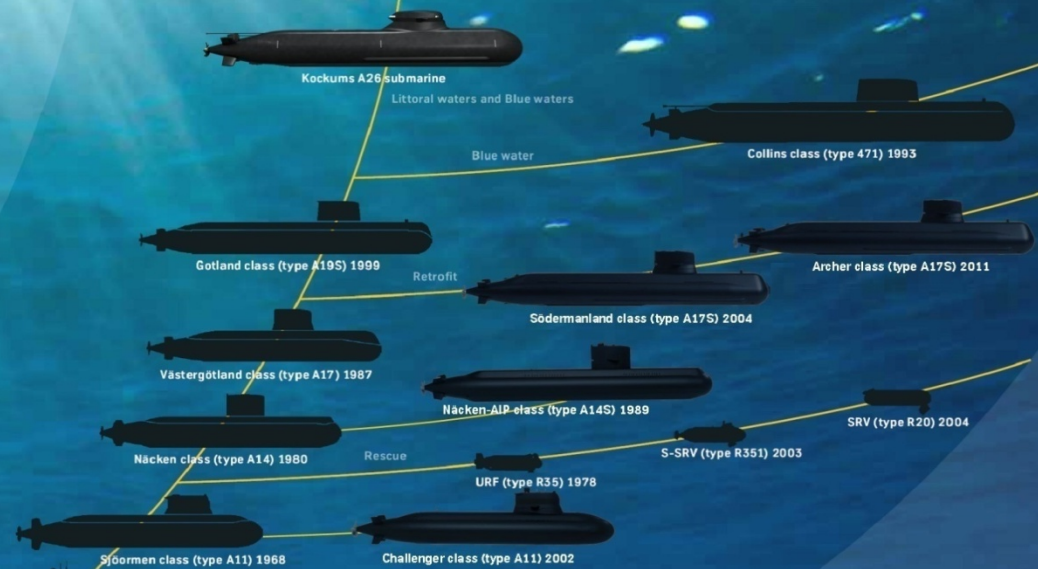
- Modularity in general arrangement and hull design
- Modularity in systems and sub-systems
- Modularity in systems integration
- Modularity and flexibility in payload integration

Delivery of the first batch of two submarines in 2019-2020

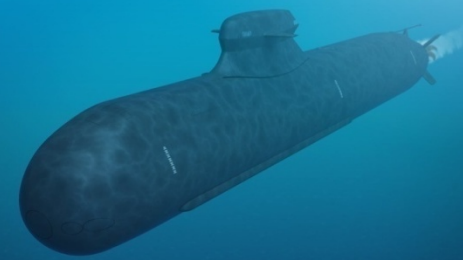
“The world’s most modern submarine designed for future challenges”

Submarines

Tailor-made. By Kockums.



*Thank you for your
attention!*



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