FFI Forsvarets forskningsinstitutt

An Overview of Nations Operating Submarines

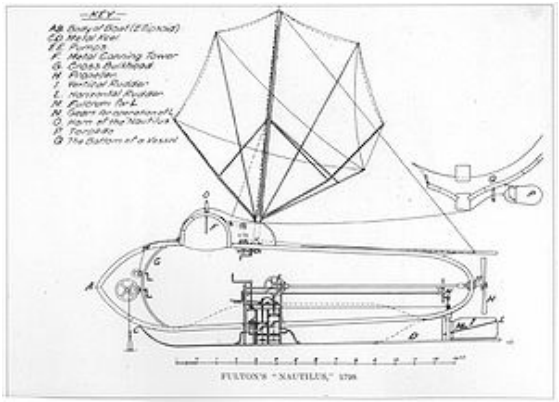
Submarine Capability beyond 2025

Sea Power Seminar 2012 – Special Session on Conventional Submarines

Elling Tveit

Submarine History

The Turtle (1775)



Nautilus (1800)

Type XXI, the first “Elektroboot” (1943)

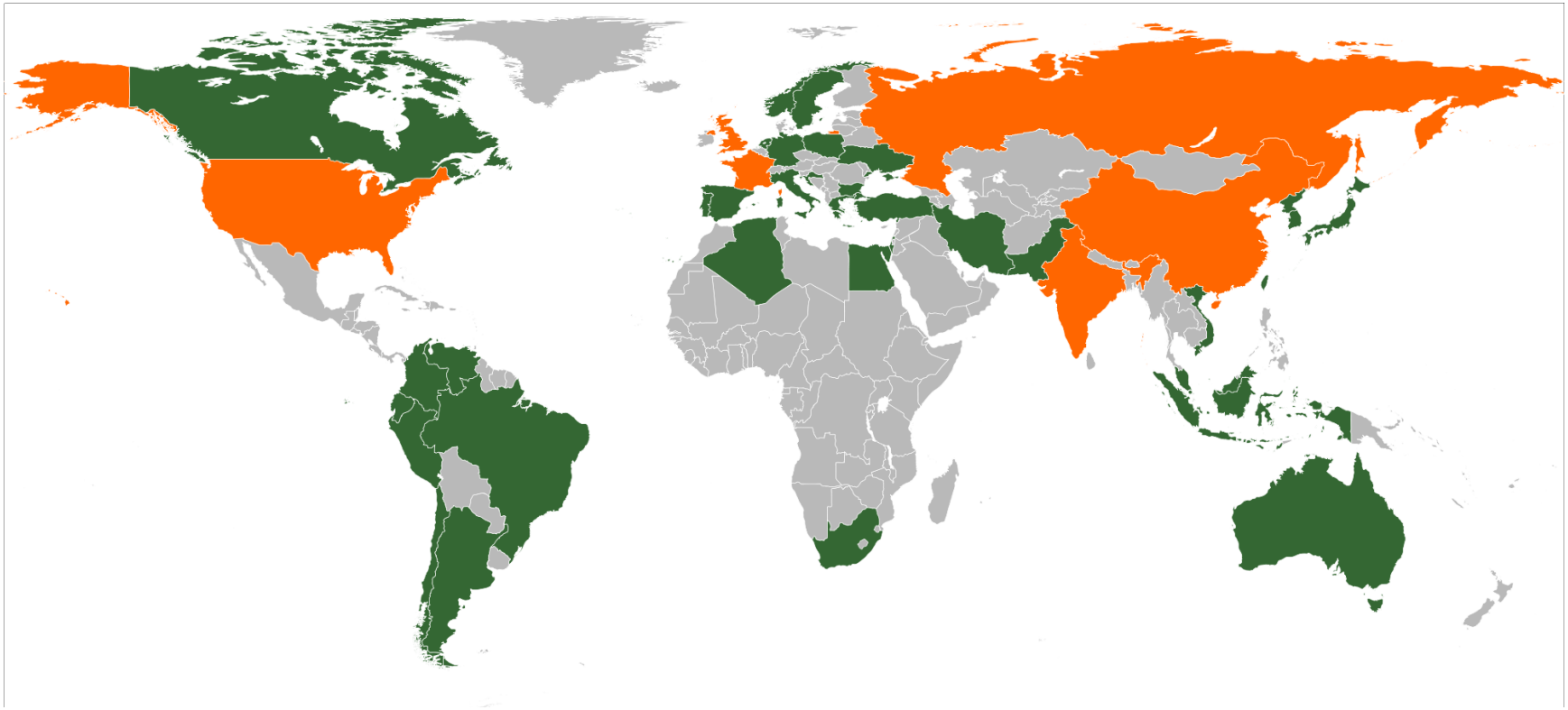
USS Nautilus (1954), worlds first operational nuclear submarine

Type 214, state-of-the-art conventional submarine (2007)

Conventional Submarine Market

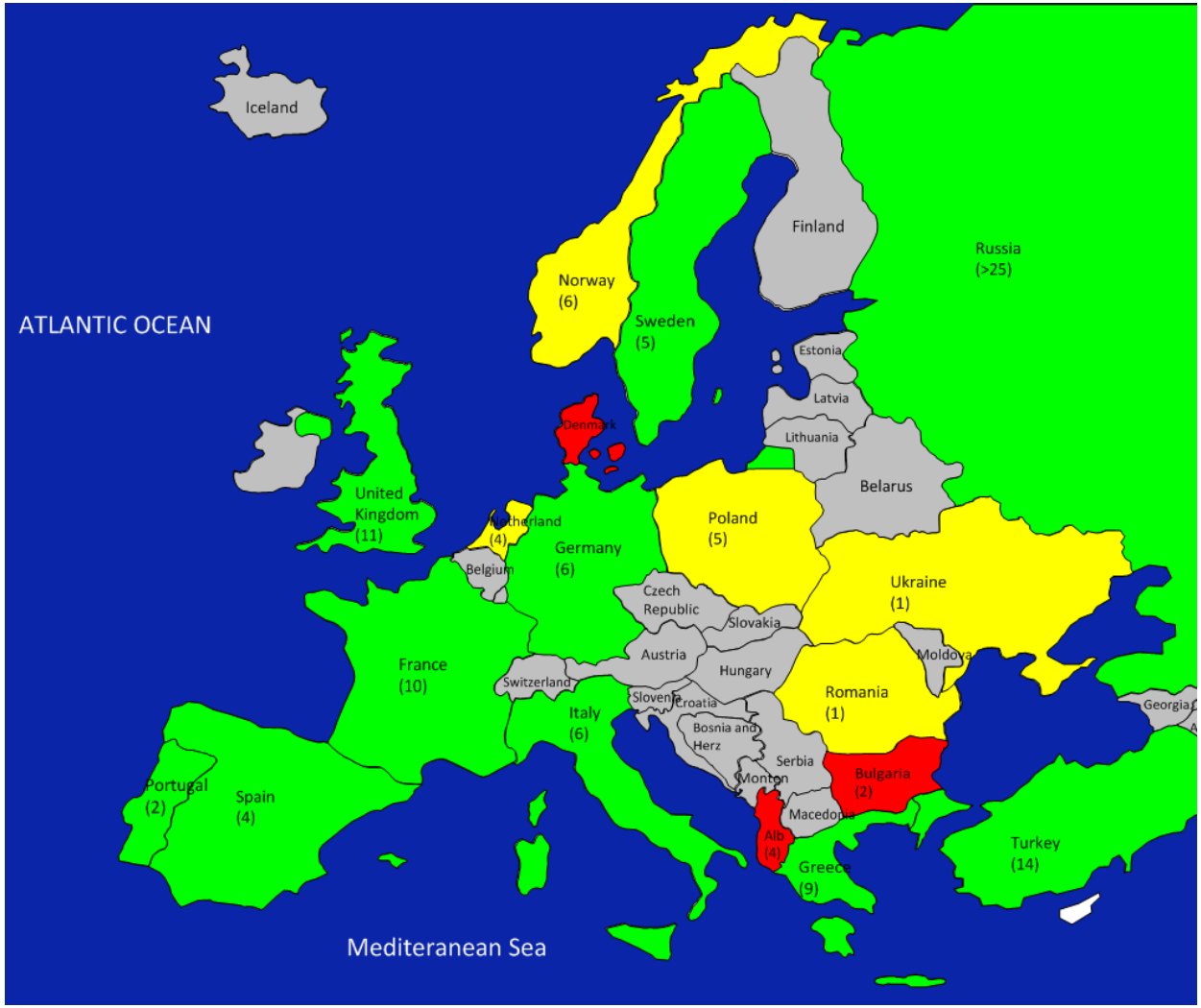
- Since the end of the Cold War, the total number of active submarines in the world has fallen
  - largely as a result of large-scale decommissioning of former Soviet vessels
- Group of countries exporting submarines has remained relatively small
  - France, Germany and Russia are the three most active exporters
- DCNS (France) and HDW (Germany) are the two principal submarine producers
- Many Russian diesel-powered submarines in China, Iran, and India
- The number of countries operating submarines has increased
- Regional tensions in the Middle East, and South and East Asia, have driven submarine procurement

Submarine Nations in the World



Map showing submarine operators (green) and nuclear submarine operators (orange)

Submarine Nations in Europe



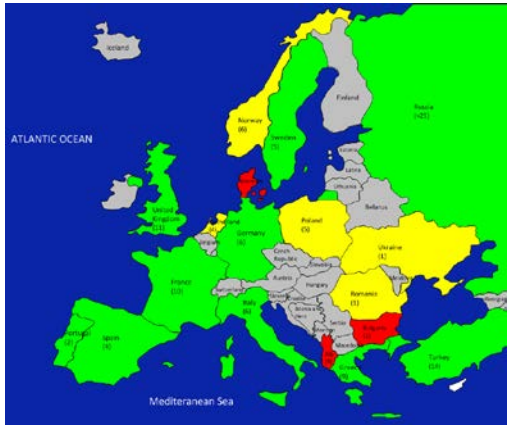
Subs with AIP - (SSBN/ SSN / SSK)

Subs without AIP - (SSK)

Subs decommissioned

(number of submarines in structure)

Former Submarine Nations



- Albania
  - former Soviet-submarines, officially retired in 1998
- Bulgaria
  - last submarine decommissioned in November 2011
- Denmark
  - defence agreement 2005-09 put an end to the 95 year old submarine service, in practice ended in 2003 after Viking-exit

Countries Planning Renewal of Submarine Fleet

- Sweden: A26-class
- Germany: Next generation after Type 212
- Brazil: Plan to build nuclear sub
- Netherlands: Replacement of Walrus-class
- Poland: Replacement of Kobben-class
- Canada: Replacement of Victoria-class
- South Korea: Building new Changbogo III-class (3500 t)
- Australia: Replacement of Collins-class with 12 new submarines
- Egypt: Plans for 4 Kilo-class

Technological development

Stirling engine

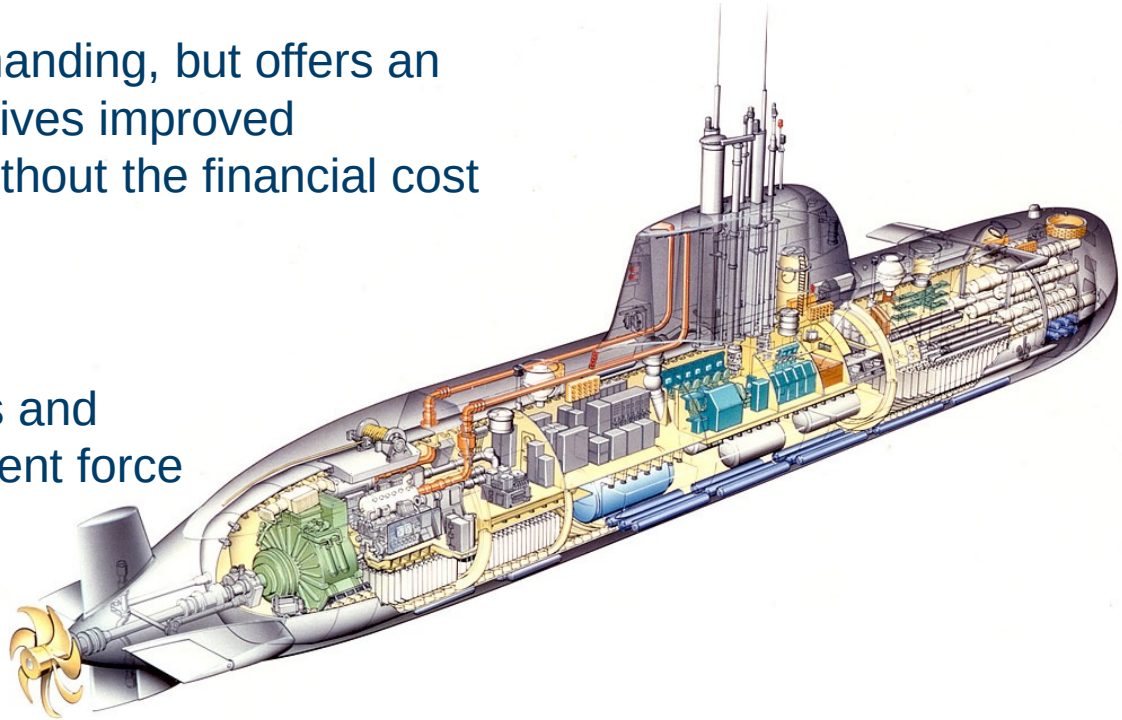
- Main focus on capability to operate covert
  - Signatures and Air Independent Propulsion (AIP) for conventional subs
- Number of nations with nuclear power increases (Brasil, India)
- Total number of submarines in the world decreases, but extensive renewals of fleets with new submarines with far better capacities
- Better sensors and effectors against other targets and with different effect than heavy weight torpedoes
- More nations with Sea Launched Cruise Missiles

Air Independent Propulsion

- Increased demand for diesel-powered submarines, due to introduction of AIP technology
  - allows non-nuclear submarines to stay submerged for 2-4 week, thereby increasing performance and survivability

- AIP is space and cost demanding, but offers an attractive alternative that gives improved submarine performance without the financial cost of nuclear propulsion

- Combination of covertness and striking power gives deterrent force



20 000 colleagues under the sea…

The Economist, 2012

Summary

- Number of submarine operating nations is increasing
  - both nuclear and conventional
- Most new conventional submarines have AIP
  - increasing performance and survivability
- Increased share of missiles launched from submarines