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What The Ultimate Submarine Could Look Like In 20 Years

The U.S. Navy's Virginia Class fast attack submarines are ruthlessly efficient war machines, the apex predators of the deep. Yet their general appearance and many aspects of their design have a direct lineage back to the 1950s. The same can be said of British and Russian subs. However, a range of new technologies could allow radically different submarines in the future.

The U.S. Navy wants its next submarine to be bigger and faster than the current Virginia Class boats. The Royal Navy and Chinese Navy will likely follow generally similar thinking. So what are the trends and technologies which could revolutionize the next generation of submarine?

A driving force will be to increase the number of weapons a future submarine can carry, as well as autonomous underwater vehicles (Unmanned Underwater Vehicles, aka UUVs or simply 'drones'). So the torpedo room, and it is likely to remain called that despite everything I am about to say, will be more of a 'generic ocean interface.' It will have to be larger and almost certainly fully automated.

Another way that it will carry more weapons is because some of them will be smaller, like the Swedish lightweight torpedoes which are loaded two to a tube. These can be used against lower-value targets, which are currently a problem for submarines armed only with very expensive torpedoes. And they can be used to intercept incoming enemy torpedoes.

How the submarines of the future will be powered is harder to speculate about. Lithium-ion batteries and the latest Air Independent Power (AIP) are making larger non-nuclear submarines more capable. These will transform non-nuclear countries' navies. But the power potential of nuclear propulsion will remain attractive to those countries which have it.

With new secure, underwater communications technologies, drones and submarines will operate together as part of a network. Today submarines are generally lone wolves because of the difficulty of identifying whether a target is friend or foe. This is even more of a challenge for armed drones, which lack human judgement. But next-generation underwater communications could change the equation.