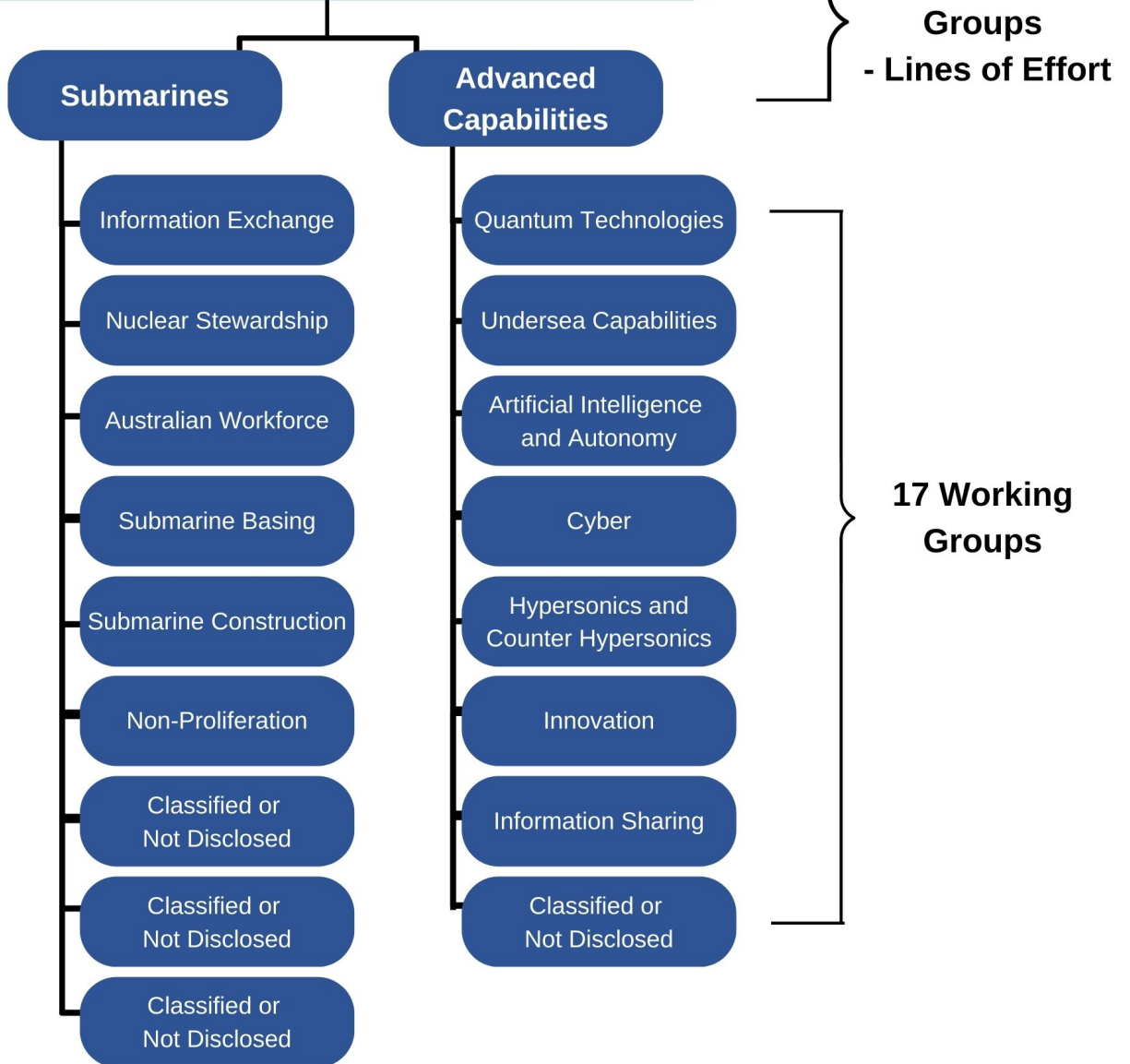


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Nuclear Submarines

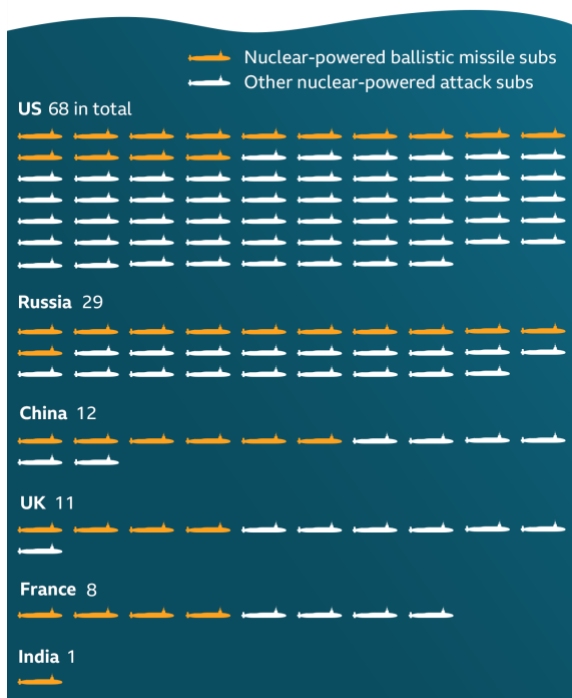
Only six countries in the world, all of them nuclear-armed, have nuclear-powered attack submarines. Australia is set to join this exclusive club as the seventh member, and the only one to not possess nuclear weapons.⁷ The nuclear-powered attack submarines (SSNs) that are a part of the AUKUS headline initiative have marked differences from diesel-powered attack submarines (SSKs). SSKs, the submarines that were a part of Australia’s original submarine deal with France’s Naval Group, have a distinct disadvantage in that they must resurface periodically to allow their batteries to

⁷ Sam Roggeveen, “How Nuclear Subs Could Transform Australia, Its Alliance and Asia,” *The Interpreter*, September 16, 2021, <https://www.lowyinstitute.org/the-interpreter/how-nuclear-subs-could-transform-australia-its-alliance-and-asia>.

recharge—an operation known as “snorting.”⁸ In comparison, SSNs nuclear-powered batteries need only be recharged about every 15 years and only need to surface as crewmembers require it, enabling them to take on longer-range missions. SSNs are also much faster than SSKs. With these advantages, SSNs can both chase and run from targets, while SSKs must wait for targets to come into range.⁹

Although details are still being developed to guide the optimal path forward, the Australian SSNs are likely to run on highly enriched uranium (HEU). Both the U.S. and UK submarine fleets use HEU to power their SSNs. HEU, compared to low enriched uranium (LEU), does not require as big a reactor, and the fuel has a much longer life span. For instance, the Virginia-class HEU lasts for 33 years—the life of the submarine—while submarines using LEU must be refueled every one to three years.¹⁰ The use of HEU for the AUKUS SSNs carries with it additional proliferation concerns—as it can be used to make nuclear weapons—which will be discussed in greater detail below.

Who has nuclear submarines?



Source: International Institute for Strategic Studies



⁸ Sylvia Pfeifer, Demitri Sevastopulo, and Anna Gross, “The nuclear technology behind Australia’s Aukus submarine deal,” *The Financial Times*, September 19, 2021, <https://www.ft.com/content/aa5c9fd5-891b-4680-b3c7-5a55d03f673c>.

⁹ Hugh White, “SSN vs SSK,” *The Interpreter*, September 29, 2021, <https://www.lowyinstitute.org/the-interpreter/ssn-vs-ssk>.

¹⁰ Anastasia Kapetas, “Limiting the Nuclear-Proliferation Blowback from the AUKUS Submarine Deal,” *The Strategist*, September 21, 2021, <https://www.aspistrategist.org.au/limiting-the-nuclear-proliferation-blowback-from-the-aukus-submarine-deal/>.