



1. Army Private First Class Harold Pukl, 36th Division, U.S. 7th Army, puts a **proximity fuze** on a 155-mm shell in France on Apr. 6, 1945 (Signal Corps photo). The fuze, developed and perfected by APL, changed the course of World War II and has been judged by historians as one of the three most important technology developments of the war, along with radar and the atomic bomb.

2. A Terrier missile roars off the aft launcher of USS *Mississippi* (BB 41) in 1953. APL's pioneering research to develop the first generation of Navy **surface-to-air missiles** laid the foundation for technologies and systems that continue to defend the fleet today and provide the backbone of US air and missile defense.

3. Illustration of the APL-developed **Transit**, the world's first satellite-based global navigation system serving the Navy's ballistic missile submarine force. The forerunner of modern GPS, Transit provided essential capability to the US Navy from 1964 until the 1990s.

4. A view of the **Advanced Multifunction Array Radar (AMFAR)** prototype with panels removed. APL designed, built, and demonstrated the Navy's prototype phased array radar to defend against multiple simultaneous aircraft and missile attacks. The prototype served as the foundation for the SPY-1 series.

5. Brooke Clayton working in APL's **towed sonar array** fabrication facility. APL developed prototypes, experiments, and ocean physics and engineering models that unlocked the potential of towed sonar arrays, enabling long-range towed arrays that revolutionized anti-submarine warfare and guided stealth designs for multiple generations of US submarines.

6. A Trident II ballistic missile is launched from the USS *West Virginia* (SSBN-736) during a 2014 missile test. APL developed the transformational instrumentation system that confidently estimates missile accuracy anywhere in the world. **SATRACK** has saved the Navy billions of dollars in flight test costs and remains essential to US nuclear deterrence strategy.

7. A **Tomahawk** Land Attack Missile (TLAM) is launched from USS *Cape St. George* in 2003 (US Navy photo). APL developed the guidance and control technology for the Tomahawk, making it the world's first long-range, precision-guided weapon and enabling it to travel hundreds of miles over varied terrain and strike heavily defended targets with great accuracy.

8. Illustration of the **Cooperative Engagement Capability (CEC)** operating at sea. Led by APL for the Navy, CEC provided the first networked air defense for US Navy ships and airborne early warning aircraft, enabling ships to engage aircraft and missiles not even seen by their own radars by using composite radar tracks created from the radars of the ships within the battle group.

9. Illustration of NASA's NEAR spacecraft. APL's revolutionary approach to **low-cost planetary exploration**, demonstrated by the NEAR mission to the asteroid Eros, inspired NASA's Discovery and New Frontiers programs and led to the highly successful MESSENGER mission to Mercury and New Horizons mission to Pluto.

10. A Standard Missile-3 Block 1B interceptor launches from USS *Lake Erie* during a 2013 test (Missile Defense Agency photo). APL led development of the transformational system needed to demonstrate **Ballistic Missile Defense (BMD) from the Sea**, proving that BMD technology could be integrated with a Navy weapon system to "hit a bullet with a bullet" in space from the sea. BMD now provides enduring defenses at sea and ashore across the globe.

11. Illustration of NASA's DART spacecraft prior to impact at the Didymos binary system. APL established the technological basis for **planetary defense**; solidified the domain as a research and development area; played key roles in defining and exercising coordination responsibilities; and successfully completed the DART mission—the first in-space demonstration of planetary defense technology.

