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3D PRINTING STRENGTHENS U.S. MILITARY SUPPLY CHAIN
Military aircraft have lifespans lasting decades, but problems surface when replacements are needed for unique parts. A very limited supply can translate to incredibly high costs, or simply an inability to repair the plane in question (see *Defense Technology Monitor* no. 49). The Defense Logistics Agency (DLA) Aviation Directorate recently made a bold move to remedy the issue by signing a contract to use additive manufacturing (3D printing) to construct a part — a process that may become the first of many.

The U.S. Air Force has high hopes for the new collaboration. According to Leonard Hayes, program manager for Technology Insertion for the Air Force's Propulsion Directorate, "it doesn't make a very good long-term business case for industry to keep using traditional processes to support our small and aging fleets of USAF weapon systems. We fly airframes and engines the commercial airlines retired decades ago. Our partnership with DLA is setting the table for the future... Once we get additive processes certified for flight, DLA sources will be able to provide parts at a reasonable cost and delivery schedule, and still turn a profit for many years." Reportedly, the additive manufacturing process is about 12 times more efficient than the current production time. (Defense Logistics Agency, April 10, 2020)

SPACE FORCE INVESTS IN JAMMING
In a showcase of its growing counter-space weapons capabilities, Russia recently conducted a test of a satellite killing missile. Russia, however, isn't the only nation making big moves relating to space. The new U.S. Space Force is hard at work increasing the range of tools it has at its disposal to disrupt enemy space assets. The latest such technology is the Counter Communications System Block 10.2, which is described as a "transportable space electronic warfare system that reversibly denies adversary satellite communications." The ground-based jamming array is meant to disrupt adversary access to satellite networks in the event of a conflict. The Block 10.2 has been already undergone testing for a year and reached operational maturity, and the U.S. military now has 16 units of the system operational, with four newer models expected in two years' time. (*Newsweek*, April 17, 2020)

HOW AI IS EVOLVING
Building an artificial intelligence is complicated. In recent years, researchers have demonstrated impressive AIs by creating neural networks resembling the structure of the human brain, but these systems must be trained with very large data sets and rely on researchers to help integrate certain basic functions - and they invariably inject human bias in the process. Google researcher Quoc Le and his colleagues have adopted an alternative Darwinian approach to such coding. The software, known as AutoML-Zero, starts with basic mathematical concepts that are known to a high school student. The program creates 100 algorithms, which compete against each other to complete a basic imagery test. The best algorithms remain, while the others are destroyed. The process occurs repeatedly, and each successive generation of "winning" algorithms is slightly mutated and more advanced. At this time, the system is only attempting simple concepts, but researchers believe it will eventually be capable of scaling up to more complicated problems. (*Science Mag*, April 13, 2020)

U.S., NORWAY TEAM ON HYPERSONICS
Russia and China are not the only nations making progress on the hypersonic weapons front. The U.S. Department of Defense and Norway's Ministry of Defense are now working together under the Allied Prototyping Initiative (API) to push forward ramjet technology, which can be incorporated into hypersonic missiles, as part of the Tactical High-speed Offensive Ramjet for Extended Range, or THOR-ER, program. According to the Pentagon, the program "aims to cooperatively develop and integrate advancements in solid fuel ramjet technologies into full-size prototypes that are affordable, attain high-speeds, and achieve extended range, culminating in flight demonstrations in operationally relevant conditions." The intended goal of the joint initiative is to leverage the strengths of each country's industrial base to foster innovative solutions and leap ahead of potential adversaries. The U.S. military has not yet specified which of its active hypersonic offensive weapons programs will incorporate the ramjet technology. (*Breaking Defense*, April 20, 2020)

BACK TO THE DRAWING BOARD FOR A NEW INTERCEPTOR
The Pentagon has spent significant sums attempting to salvage the redesigned kill vehicle (RKV) program, which was planned for use with the ground-based midcourse defense (GMD) system interceptors that destroy incoming intercontinental ballistic missiles. The RKV design has been plagued by technical difficulties and an ever-lengthening timeline for delivery. To address kill vehicle inadequacies, the Pentagon has decided to stop building GMD interceptors and instead issue a request for proposal to design the Next-Generation Interceptor (NGI), intended for the defense of the U.S. homeland against long-range missile threats. To hasten the delivery timeline of the NGI, the Pentagon's Missile Defense Agency plans to issue two contracts for the "simultaneous development" of the technology. (*Defense News*, April 24, 2020)
