



Modifications to U.S. Space Strategy

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The Trump administration has modified U.S. space strategy to more widely include the private sector in government-run space programmes, which could result in an acceleration of technological development and revival of the industry. If successful, the U.S. would strengthen its position as the leader of space services, especially in the face of China's similar ambitions.

Donald Trump's campaign promise to change U.S. space strategy and later enumerated by his supporters assumed strengthening the U.S. position as the leader in space. Based on a recommendation presented by Vice President Mike Pence, Trump on 30 June 2017 revived the National Space Council, which had been inoperative for 24 years and put the leadership of it under the vice president with the goal to supervise the entire space programme. In a memorandum signed on 11 December 2017, Trump changed some of the premises of the National Space Policy (NSP) from 2010. The priority now will be on new manned missions to the Moon and operating in cislunar space (between the Earth and the Moon). Based on this activity and infrastructure that is created, manned flights to Mars will be planned.

U.S. Partners. The administration's revised strategy stipulates that activities geared toward new flights to the Moon and manned missions to Mars should involve private and international entities. Regarding the latter, the document does not specify whether they should be organisations, countries, companies or a combination of all of them. The goal of the administration is to include private enterprises involved in the development and use of space technologies ("NewSpace") in joint projects with NASA. This reflects existing public-private partnership programmes: Commercial Orbital Transportation Services (COTS), orbital supply flights, and NextSTEP—developing interplanetary travel technology.

The NewSpace industry, which has developed mostly since the announcement of President Obama's NPS in 2010, serves as the lifeblood of U.S. space activities. Such companies as SpaceX and United Launch Alliance (ULA, a joint venture of Boeing and Lockheed Martin) execute contracts for the Air Force, including placing military satellites into orbit. The total value of these contracts is expected to be about \$70 billion by 2030. SpaceX also carries out tasks for NASA under two contracts worth \$4.2 billion to re-supply and carry crew to the International Space Station (ISS). Also, Boeing has signed a contract for manned flights worth \$4.2 billion. Splitting contracts between companies is intended to avoid a monopoly and give the opportunity to use an alternative service provider in a crisis. By investing funds in private subcontractors, the U.S. wants to accelerate development of the new technologies sector, which in effect will find application in the automotive, telecommunications, and medical industries.

After the U.S. shuttle programme ended in 2011, the only way for American crews to reach space was aboard Russian Soyuz rockets. Each flight to low Earth orbit costs NASA about \$80 million, paid to Roskosmos, the Russian space agency. Also, ULA Atlas rockets use Russian RD-180 engines, but with deliveries expected to end in 2022, meaning that ULA has until then to develop its own propulsion system. Boeing and SpaceX contracted crew missions were supposed to carry U.S. astronauts to the ISS by spring 2019 but delays in the development of sufficiently safe technology pushed flight dates to autumn of 2019 for SpaceX, and even to 2020 for the Boeing vehicles.

Domestic Policy and Financing Issues. Subsidies for civilian space operations in 2017 was set in the NASA Transition Act, supported by both Democrats and Republicans. Under it, the NASA budget was increased by \$200 million compared to 2016 to \$19.5 billion. The act provided for covering the costs of all the agency's programmes, including those examining climate change, at an almost unchanged level. It also obliges NASA to continue planning manned missions to Mars, possibly at the expense of a reduction of ISS funding after 2024. After signing the bill into law, Trump presented a draft budget for 2018 that assumed cutting the agency's funding to \$19.1 billion. The cuts were focused mostly on climate research. The proposed cuts to NASA's budget contradict the ambitious plans for interplanetary missions, which, if they were to happen, would come later than the president's potential time in office. The cuts are associated with Trump and his associates' scepticism of the science behind climate change and criticism that the Obama administration spent too much money on research into it. At the same time, the president nominated Congressman Jim Bridenstine to be the next NASA director, but his space-related experience has been limited to legislative activity. Until now, the agency's top administrator has always been a space expert. Trump's behaviour undermines the traditional bi-partisan custom of not engaging NASA in politics and seeking compromise on issues to focus primarily on the development of science and strengthening the position of the U.S. as the leader in space research.

U.S. Facing Competition. In recent years, America's position as the leader in space has weakened. Several factors have played a role in this decline. Work on a heavy-launch rocket (SLS), capable of re-supply and crew flights to Earth orbit and cislunar space began only after the completion of the shuttle program in 2011. The U.S. then depended on Russia and private companies to fill the gap. Meanwhile, China's fast-growing space programme struck another blow to the U.S. position. In 2003, China became on only the third country in history after the U.S. and USSR to independently put an astronaut in space. In 2013, a Chinese rover landed on the Moon's surface, and between 2020 and 2022, it plans to establish a permanent orbital station. China also has declared an interest in manned missions to both the Moon and Mars.

Concerns about China's growing ambitions and capabilities in space are reflected in the latest U.S. strategy documents. A ban on space-based technological cooperation with China, in force since 2011, was kept in place by the new administration. The U.S. anxiety is triggered by the prospect that China could use space as an area of military rivalry, stemming in part from Chinese research on anti-satellite technologies. The U.S. also points to China as one of the biggest benefactors of American technological achievements, some acquired illegally.

Conclusions. The changes in U.S. space strategy only partly diverge from the assumptions delineated by the Obama administration. In addition to strengthening cooperation with the NewSpace sector, making the Moon a stopover on the way to Mars, and reducing the importance of research on climate change, the U.S. under Trump wants to maintain its lead in the space sector. The U.S. will compete with China and its growing capabilities but also indirectly support the American economy and the NewSpace industry. To achieve this, the U.S. must use the competing NewSpace companies and foreign partners in cooperation. NASA should develop a strategy to persuade commercial and international partners to achieve common goals in exchange for technological and financial benefits, as well as prestige. However, this will not be possible without constant increases in NASA's budget and returning to the idea of cross-party consensus on space research.

The assumptions of the Polish Space Strategy published in 2017 are in harmony with the U.S. goals on space policy. Polish companies and research institutions may look for opportunities to participate in NewSpace projects as subcontractors, supported financially and substantively by the Polish Space Agency. In 2017, the European Space Agency's tender website had more than 360 entities from Poland that carry out commissioned orders in such areas as automation, material engineering, and optoelectronics. The growth of this industry may affect the implementation of the Poland's Strategy for Responsible Development (Morawiecki Plan), which is the creation of a knowledge, innovation and technological process-based model of the economy.