Issue Brief: Military Industrial Complex and Aerospace Engineering

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The military-industrial complex (MIC) is the "informal alliance between a nation's military and the defense industry which supplies it, as seen together as a vested interest which influences public policy" [1]. The driving force behind this relationship is the fact that both players benefit–the military obtains weapons and technology while the providing industry is paid for supplying it. This idea was popularized after President, and former World War II general, Dwight D. Eisenhower gave warning of its potentially detrimental effects in his 1961 farewell address.

The relationship between the aerospace industry and the military is long standing. The United States budget proposal for FY2021 requests $705.1 billion to the Department of Defense (DoD), the most spending by far in comparison to the rest of the world. For reference, the US spent $732 billion on defense in 2020 while the next 10 defense-spending countries combined spent $726 billion [2]. That said, US defense spending ranks lower than some countries as a percentage of total government spending, sitting at 9.4% (in 2019) [3]. 2021's proposed defense budget is composed of $18 billion to space, $56.9 billion to the air domain, $20.3 billion to missile defense, $21.3 billion to munitions, and $32.3 billion to the maritime domain. Of the $705.1 billion, $11.9 billion is awarded to Lockheed Martin for 79 of the F-35 Joint Strike Fighters and another $517 million for 8,150 of their Hellfire Missiles [4]. In addition to Lockheed Martin, other corporate recipients of the defense budget include Boeing, Raytheon Company, Northrop Grumman, and General Dynamics. These companies' revenues rely heavily on receiving defense contracts. In fact, 95% of the total revenue generated by Lockheed Martin in 2019 was from defense, Raytheon 94%, Northrop Grumman 85%, General Dynamics 75%, and Boeing 45% [5].

The aerospace industry's tie to the DoD does not solely reside in the air domain as there is growing investment in the space domain. One of the most publicized national security endeavors, the U.S. Space Force, has requested $15.4 billion for 2021's fiscal year. This branch of the military has been created to "maintain, protect, and expand the U.S. fleet of advanced military satellites that form the backbone of U.S. global military operations" [6]. The assets to be protected include weather-tracking, GPS, commercial, and communication satellites. Most of the assets in this branch existed prior in the Air Force, but have now been split into this new branch. Because the Space Force has fewer resources compared to other services such as the Air Force, it is likely to be more dependent on industry for technical advice and policy input [7]. The pre-existing ties between the DoD and defense companies are likely to benefit from the creation of the Space Force.

Additionally, the DoD constantly invests in the development of new technologies and the 2021 budget includes the largest allocation to research and development in history ($106.6 billion). These investments include the development of hypersonics, autonomy, and artificial

intelligence, all of which are being pursued by major defense and tech companies [4]. While the MIC is observed most directly between industry and the military, its influence reaches academia through research awards and grants. Defense research funding flows to various institutions, including university research groups. This can be seen in the CU Boulder College of Engineering and Applied Sciences' (CEAS) new Hypersonic Vehicles Interdisciplinary Research Theme and new hypersonics graduate certificate [8]. While primarily motivated by defense technology development, hypersonic research and development can contribute to space exploration—such as entry, descent, and landing on Mars—and high-speed commercial transportation.

There are argued benefits of the MIC, including the advancement of civilian technology, job creation, economic growth, and the defense industrial base. The defense industrial base refers to "a government's industrial assets that are of direct or indirect importance for the production of equipment for a country's armed forces" [9]. Many argue that this industrial base is a necessity in case the country enters wartime and must respond quickly. Additionally, some military inventions with civilian applications include GPS, radio communications, microwaves, and the internet. This brings some to believe that defense spending is necessary to progress societally beneficial technologies, while others argue this level of spending is not justified and the same progressions could still be made through other means.

Some analysts argue that the MIC is an entity that prevents peace while others argue it is a necessity to protect US citizens from malicious intent. One perspective is that without serious conflicts there is a lack of justification for continued defense funding and contracts. As a result, companies may be inclined to support the continuation of conflicts to benefit their business interests [10]. Along these lines, most defense companies have a team of political lobbyists, a group of people whose jobs are to influence legislation, regulation, or other government decisions, actions or policies on behalf of the company employing them. However, lobbying is not unique to defense companies; many companies, unions, and special interests groups all employ lobbyists. On the other hand, there are indeed groups and individuals who seek to do harm to citizens of the United States. Thus, for the protection of the general public, military operations must exist in the case that adversaries attack.

There is no correct path forward regarding the relationship between the military and the defense industry; however, it is crucial to consider those who are impacted directly and indirectly. As the majority of funding in the aerospace industry as it lays now comes from defense contracts, these are topics that must be recognized. That being said, the realm of the aerospace industry is expanding rapidly to include more commercial companies, government contracts for Earth-observing satellites, space exploration missions, and much more. Given that the industry is in flux, it is important that the next generation of aerospace engineers are informed and act intentionally to ensure that the industry's values align with their own.

Bibliography

[1] Military Industrial Complex
https://en.wikipedia.org/wiki/Military%E2%80%93industrial_complex

[2] U.S. Defense Spending Compared to Other Countries
Peter G. Peterson Foundation, May, 2020
https://www.pgpf.org/chart-archive/0053_defense-comparison

[3] Stockholm International Peace Research Institute (SIPRI) Military Expenditure Database
https://www.sipri.org/databases/milex

[4] DOD Releases Fiscal Year 2021 Budget Proposal
U.S. Department of Defense, February, 2020
https://www.defense.gov/Newsroom/Releases/Release/Article/2079489/dod-releases-fiscal-year-2021-budget-proposal/

[5] Defense News Top 100 for 2020
Defense News, 2020
https://people.defensenews.com/top-100/

[6] The Purpose and Mission of the Space Force
Reid Barbier, American University, July, 2020
https://www.american.edu/sis/centers/security-technology/the-purpose-and-mission-of-the-space-force.cfm#:~:text=The%20primary%20mission%20of%20the,military%20can%20hardly%20be%20overstated.

[7] Here are the companies that could profit from Trump's Space Force
Aaron Gregg, The Washington Post, August, 2018
https://www.washingtonpost.com/business/2018/08/14/here-are-companies-that-could-profit-trumps-space-force/

[8] Hypersonics research paving way for Mars exploration, space tourism
Daniel Strain, CU Boulder Today, February, 2021
https://www.colorado.edu/today/2021/02/02/hypersonics-research-paving-way-mars-exploration-space-tourism

[9] Defense Industrial Complex

https://en.wikipedia.org/wiki/Defense_industrial_base#:~:text=The%20term%20defense%20industrial%20base,for%20a%20country's%20armed%20forces.

[10] United States defence contractors and the future of military operations
Charles W. Mahoney, Defense & Security Analysis, April 2020
https://www-tandfonline-com.colorado.idm.oclc.org/doi/full/10.1080/14751798.2020.1750182

Stakeholders:
Defense contractors (Lockheed, Raytheon, Northrop, Boeing, etc.), defense contract employees, Pentagon, politicians, economy/job market, military personnel, climate (US military is one of world's top polluters), taxpayers, civilians in conflict regions, governments purchasing arms & weaponry, other programs not getting government funding (health care system, pandemic preparedness, foreign aide, education, unemployment and jobs programs, housing and community programs, climate change programs)

Note: Large portion of defense budget is personnel compensation and support for those who serve (and their families)

Questions

1. If Climate Change is identified as a national security threat, yet the DoD runs highly on fossil fuels - which have been identified as large contributors to climate change - what does expanding the defense program imply? How can expanding the defense program also benefit the fight against Climate Change?
2. If one engineer decides that they are ethically opposed to militarization of the aerospace industry, what are the pros and cons of them remaining in their respective position of the industry? In other words, what happens if they leave the job they are ethically opposed to? What happens if they stay?
3. The Russian and Chinese Governments are identified as competitors in Trade Wars as well as in the Maritime, Cyber, and Space Domains; if the United States is a leader in these domains as well - both economically and in terms of military - can the United States and other leading countries abstain from militarizing space as a peace-keeping initiative? Or *must* they keep up with or stay ahead of these other militarizing nations?
4. A perspective to consider is that the Department of Defense asserts that the United States is not an "aggressor nation" but instead we are a "response nation." Our nuclear weapons are very explicitly noted as "strategic deterrence" and that same label is applied to platforms that carry them (i.e. Ohio and Columbia Class Ballistic Missile Submarines). What this means is that, on paper, we will never launch the first attack but will instead only use our nuclear arsenal in response to an act of aggression. Certain Political Scientists and Theorists (linked here: The Spread of Nuclear Weapons) assert that giving everyone nuclear weapons will bring balance of power. Of course, individuals can spend hours finding loopholes in this policy and nitpick the Department of Defense on potential hypocrisies of this policy but what students also need to remember is that the military is a tool of the people, the government, and unfortunately the Military Industrial Complex. Yet the DOD itself maintains apolitical stances and pledges to challenge unlawful orders.