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DEFENCE WHITE PAPER PROJECT

DARPA 2019 Strategic Framework

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Introduction

Defense Advanced Research Projects Agency (DARPA) is the research and development agency/wing of the United States Department of Defense (DoD). DARPA is in charge of the development and research of transforming technologies that are used by the US military and its allied forces. DARPA was established in the year 1958 in response to the launch of Sputnik-1 by the Soviet Union in 1957. The formation of the first form of DARPA, which was the Advanced Research Projects Agency (ARPA) was based on the US commitment to be a future initiator of strategic technological introductions against being the victims of the same. The organization is highly responsive and adaptive with the proper demarcation of departments and areas of research. The present organisational model of DARPA includes six technical offices: Biological Technologies, Defense Science, Information Innovation, Microsystems Technology, Strategic Technology and the office of Tactical Technology.[1] ARPA regained its original name DARPA in March 1996. DARPA stands for an integrated ecosystem where academicians, corporate and government partners with the organization, join in hand in finding new opportunities and resolving the same.

The 2019 strategic framework talks about the future threats that the US, and the world face. DARPA has set plans that will provide the capability to the national security of the US by innovating and delivering transforming technology. Thus, they have used transformational changes in the area of security and management instead of gradual incremental advanced developments. This essay tries to understand the 2019 framework with a short roundup of innovative transforming technology that is proposed in the same document. It does not cover all aspects of this strategy and technologies due to the lack of technical understanding of a few models mentioned in the framework.

[1] 'About DARPA', n.d., https://www.darpa.mil/about-us/about-darpa.

Basic Framework of the Report

DARPA mentions their commitment to delivering technologies that prove a surprising advantage to the US and its allies. For this delivery of surprising advancement, DARPA has proposed a concentration through four strategic obligations. The four strategic imperatives are as follows:[2]

1. Defend the homeland
2. Deter and prevail against high-end adversaries
3. Prosecute stabilization efforts
4. Advance Foundational research in science and technology.

Defend the Homeland

This includes a new range of adding new transforming capabilities from autonomous cybersecurity, strategic cyber deterrence, sensing and defence of weapons of mass destruction to activating bio-surveillance and biothreat countermeasures. This is done in against the possibility of the development of similarly capable warheads including that from the perspective of cybersecurity by competing nations. The US Department of Defense gives importance to the security inside the terrorism in addition to the same importance in strategically important locations and regions.

Deter and Prevail Against High-End Adversaries

This involves countering competition from around the world including nearby competitors like Europe, where predominant allies can be seen, and far competitors including those emerging in Asia. It includes monitoring and realizing development on the other side of fields like those of space and the electromagnetic spectrum. Thus, new capabilities must be developed without any time-lapse to lead and stay ahead with equipped capabilities. Through this, DARPA also foresees gaining an asymmetrical advantage over competitors with the capabilities of combined dynamic, autonomous, flexible, and highly coordinated moves.

[2] 'Defense Advanced Research Projects Agency - Strategic Framework 2019', n.d., https://www.darpa.mil/attachments/DARPA-2019-framework.pdf.

Prosecute Stabilization Efforts

This proposes empowerment of the nation in an asymmetrical and diverse environment. It focuses on converting the grey areas into more capacity building that makes better understanding and terrine and moves from the competitors. DARPA considers improving the overall warfare performance of technologies that can enhance soldiers.

Advance Foundational Research in Science and Technology

This is meant to make a leap in the technology and capability that enhances the position of the nation against the competition adversaries. This includes rigorous research and development in a wide range of capabilities and future proposed areas to be covered. Thus, DARPA will be able to help the nation to stay ahead with a solution and specified blueprint for any future challenges in the wider technological area in addition to other areas. "The best way to prevent technological surprise is to create it, ensuring that U.S. warfighters and our allies have access to the most advanced technologies and capabilities first".[3] This notion of DARPA can be clearly understood considering that DARPA converts impossible to possible to keep away from future challenges. Through this framework, DARPA also claims that no other Department of Defense agency has this range of high possibility of producing highly revolutionary capabilities.

Transforming Research, Proposals and Executions

Through this session of the easy, the author tries to draw down the understanding of cut through technological and scientific innovations that DARPA has done in its last 60 years, with the updates about the project from the framework document.

Slowing Biological Time to Extend the Golden Hour for Lifesaving Treatment

This scientific development by DARPA comes under the third strategic imperative of prosecuting stabilization efforts. DARPA for enhancing this revolutionary scientific development formed a

[3] Defense Advanced Research Projects Agency - Strategic Framework 2019', n.d., https://www.darpa.mil/attachments/DARPA-2019-framework.pdf.

Biostasis[4] program to study the possible methods to extend the golden hour. Golden hour is the narrow bridge of time for giving life-saving treatment after the incident. Through the biostasis program using molecular biology control the speed at which the human system operates was attained. This helped to extend the window of time between the damaging incident and the collapse of the human body system. This enables a more extended corridor to save a life instead of making the same to an alarm condition. The development of rapid medical transport and the possibility of giving emergency care have in addition helped in successfully saving the warriors and their performance.

Tapping the Neuroscience of Touch to Improve Prosthetics

This development of technology with the help of neuroscience was related to enhancing the support for personnel who have lost limbic function. DARPA's Hand Proprioception and Touch Interfaces (HAPTIX) program is a revolution that made a change into sensor-equipped upper limb artificial body parts that enable the personals to return to the military service. "HAPTIX technologies tap into the motor and sensory signals of the arm to allow users to control and sense the prosthesis via the same neural signalling pathways used for intact limbs".[5]

Rapid Diagnosis of Infectious Diseases

This particular program comes under the imperative of advanced fundamental research in science and technology. The autonomous Diagnostics to Enable Prevention and Therapeutics (ADEPT) program support individual and total force health protection through the development of rapidly identifiable technology that responds to threats posed by natural and engineered toxins and diseases.[6] The technique found through this program gives genetic instruction to the body by leading to the production of antibodies against a specific threat.

Development of Hypersonic

[4] Ibid.
[5] Defense Advanced Research Projects Agency - Statergic Framework 2019', n.d., https://www.darpa.mil/attachments/DARPA-2019-framework.pdf.
[6] Ibid.

DARPA mainly provide its research and development in the field of hypersonic to adjust to the present need of the Department of Defense. Hypersonic missile development gives an upper hand to the nation in creating asymmetry. These hypersonic warheads are created in a way that crosses and surpasses the competitive radars.

Autonomous Unmanned Ship

DARPA has produced unmanned ships that can operate through the open sea with supervisory oversight. These autonomous ships build up the potential of unmanned patrol in large areas, cutting down the cost of a crew of ships.

Network Undersea Platforms

This program was initiated to manage the challenge of the vast area of surveillance for the USA. DARPA initiated the Hydra program was made to suppress this challenge where it made an undersea network of unmanned payloads and platforms to supplement the huge amount of manned underwater vessels. This enabled remote control management of a larger area.

Communications Through Jamming

The ability of adversaries to jam the communication and challenge the US led to the formation of the Communications Under Extreme RF Spectrum Conditions (CommEx) program. This program led to the innovation of air-to-air communication in challenging circumstances including the possibility of jamming or tapping out the communication. Moreover, the same program has also developed new ways of protecting US military signals in the case of increasing threats.

Safe Genes

The Safe Gene program of DARPA was made to have a basic understanding of challenges that may occur due to gene editing. This enabled them to understand the health and security concerns related to the accidental or intentional misuse of the same.

Plan X – Cyberspace

Hardness in understanding the cyber domain made DARPA initiate this plan. Plan X enabled the military of the nation to work swiftly in cyberspace similar to that of traditional floors of attacks. Plan X enabled the Department of Defense to better identify, plan and assessment of cyberwarfare and cyberspace.

Automating Tools to Detect and Resist Cyber Attacks

DARPA's Cyber-Hunting at Scale (CHASE) Program seeks to counter the problem of cyber-attacks through automated tools to detect, characterize and distribute protective measures. CHASE aims in providing automated machine-learned vulnerability of patching them.

Analysis and Conclusion

Through this overall analysis of the Strategic Framework of 2019 of the Defense Advanced Research Projects Agency, we have understood the limitless research that is happening in the area of research and development in the field of the armed and military power of the nations. The primary understanding that the writer derived through this is about the wide range of state-funded research by the USA, particularly by defining and upturning each pocket of knowledge and possibilities. In my opinion, these developments aid in moving competition more into an asymmetrical field. Several moves by the adversaries may have only led to the possibility of more thoughts and innovation to resolve the risk.

The functioning of DARPA can be seen as the biggest risk-solving agency for the nation. The proposal for the transition of technology and technical knowledge to its allied nations will gear up for a wider market for the technology. This wider market may result in the spoiling of the technology or the misuse of the same. This misuse will only again affect the parent nation of the technologies, which have made the USA monitor and manage the revolutionary technology and wide research-based technical order. These will be only meaningful when they reach the right hands that are ensured by the US government to policy implementation.

These dynamic cut-through technologies and continued research related to the same reaffirm the position of the nation with an outlook of making it a leading technological giant. Various

partnerships of DARPA with agencies and tech-producing companies may have only led to positive notes in developing the outcome. Through this framework, DARPA also clearly states the failure of many of its innovative ideas.

The second part of this essay focused on understanding the technologies, innovations and results of sub-projects in DARPA that have given fascinating concepts and ideas about the level of present development and the rate of its usefulness and success. The areas of specific projects can be seen to have a wide scope with a wide range of subjects from complex machine learning and AI to the human system and neuroscience. The lack of technical know-how about many of the proposed ideas in the framework left a few areas untouched. These untouched areas were seen as the parts that need a more constructive understanding.

The essay compares the framework proposed with the present military capabilities of the USA. Though the nation lost many missions outside its territory, its capability of cutting-edge technology still keeps it relevant. This type of strategic framework also enables other nations to future investment in research and development (like that of Indian DRDO).

There were two major challenges during the writing of this essay: a lack of analytical literature and a lack of understanding of many of the technical terms that were used in the framework. But there was an overall understanding of the framework and topics for further reading.

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