Areas of Interest

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1.1. Air Domain Technologies
- 1.1.1. Human Performance Optimization
- 1.1.2. Aerospace Medicine and Operational Health
- 1.1.3. Warfighter Survivability and Protection
- 1.1.4. Cognitive and Behavioral Sciences
- 1.1.5. Advanced Air Vehicles
- 1.1.6. Air Propulsion Systems
- 1.1.7. Aerodynamics and Flight Sciences
- 1.1.8. Hypersonics
- 1.1.9. Advanced Weapons Technologies
- 1.1.10. Energetics and Propellants
- 1.1.11. Guidance Navigation and Control
- 1.1.12. Munitions Survivability and Countermeasures

1.2. Space Domain Technologies
- 1.2.1. Space Access and Orbital Systems
- 1.2.2. Spacecraft and Satellite Technologies
- 1.2.3. Space Power and Propulsion
- 1.2.4. On-Orbit Operations and Autonomy
- 1.2.5. Space Situational Awareness
- 1.2.6. Resilient and Survivable Space Architecture
- 1.2.7. Space Environment and Effects
- 1.2.8. Position, Navigation, and Timing (PNT) from and for Space

1.3. Cyberspace/Electronic Warfare Domain Technologies
- 1.3.1. Cyber Operations and Cybersecurity
- 1.3.2. Communications and Networks
- 1.3.3. Electronic Warfare and Spectrum Operations
- 1.3.4. Quantum Technologies
- 1.3.5. Electro-Optical and Infrared Sensors
- 1.3.6. Radar and Radio Frequency Sensors
- 1.3.7. Multispectral and Hyperspectral Sensing
- 1.3.8. Signal Processing and Sensor Fusion
- 1.3.9. Quantum Sensing and Advanced Properties
- 1.3.10. Directed Energy Sensing and Countermeasures
- 1.3.11. High-Energy Laser Systems
- 1.3.12. Photonics
- 1.3.13. High-Power Microwave Technologies
- 1.3.14. Beam Control and Adaptive Optics
- 1.3.15. Directed Energy Effects and Countermeasures

1.3.16. Cybersecurity for Digital Environments
1.3.17. Navigation Warfare and Counter PNT

1.4. Cross-Domain Technologies
1.4.1. Human Systems Integration
1.4.2. Human-Machine Teaming and Interfaces
1.4.3. Training and Simulation Technologies
1.4.4. Rapid Multi-Domain Integration
1.4.5. Advanced Systems Engineering
1.4.6. Integrated Vehicle Health Management
1.4.7. Power and Thermal Management
1.4.8. Advanced Materials Development
1.4.9. Additive Manufacturing
1.4.10. Materials Processing and Fabrication
1.4.11. Materials Characterization and Testing
1.4.12. Environmentally Responsive and Smart Materials
1.4.13. Microelectronics
1.4.14. Model-Based Systems Engineering, Digital Engineering, and Digital Thread
1.4.15. Advanced Simulation and Virtual Prototyping
1.4.16. Data Analytics and Artificial Intelligence
1.4.17. Additive Manufacturing Digital Integration
1.4.18. Low Cost, Size, Weight, and Performance (C-SWAP) Alternative PNT Systems for Attritable Systems
1.4.19. Modular Open Architecture approaches to Resilient PNT

2. Definitions

2.1. Air Domain Technologies
2.1.1. Human Performance Optimization - Enhancing human capabilities and resilience across diverse operational environments through the application of scientific principles, advanced technologies, and personalized interventions. This includes, but is not limited to, physical conditioning, cognitive enhancement, stress management, and optimized human-machine interfaces techniques.
2.1.2. Aerospace Medicine and Operational Health - Advancing medical research, developing countermeasures, and implementing strategies to optimize the health, safety, and performance of personnel in demanding operational environments. This includes physiological monitoring, environmental protection, human performance enhancement, and medical support for air, space, and cyber operations.
2.1.3. Warfighter Survivability and Protection - Developing and integrating advanced technologies and strategies to protect personnel from a wide range of threats and hazards in operational environments. This includes

personal protective equipment, threat detection systems, casualty care, and environmental control measures applicable across various domains.

2.1.4. Cognitive and Behavioral Sciences - Understanding and leveraging human cognitive and behavioral principles to improve decision-making, enhance performance, and optimize human-system interaction in complex and dynamic environments. This encompasses areas such as perception, attention, memory, reasoning, and social interaction.

2.1.5. Advanced Air Vehicles - Designing and developing next-generation aircraft technologies for diverse operational roles, including high-speed flight, enhanced maneuverability, stealth capabilities, and optionally manned configurations to extend operational reach and survivability.

2.1.6. Air Propulsion Systems - Innovating propulsion technologies such as turbine engines, hypersonic propulsion (scramjets, ramjets), and advanced powerplants to improve efficiency, speed, and performance of aerospace platforms

2.1.7. Aerodynamics and Flight Sciences - Conducting fundamental research in aerodynamics, flight control, stability, and aircraft performance to enable improved maneuverability, endurance, and stealth characteristics.

2.1.8. Hypersonics - Developing technologies for hypersonic flight—speeds greater than Mach 5—including materials, propulsion, guidance, and control systems to enable rapid global strike and ISR capabilities.

2.1.9. Advanced Weapons Technologies - Developing innovative kinetic and non-kinetic weapons, including smart munitions, precision-guided munitions, and novel warhead designs to increase effectiveness against evolving threats.

2.1.10. Energetics and Propellants - Researching advanced energetic materials, propellants, and explosives that provide greater performance, safety, and reduced environmental impact.

2.1.11. Guidance Navigation and Control - Developing advanced guidance and control systems for improved accuracy, maneuverability, and target discrimination in complex operational environments.

2.1.12. Munitions Survivability and Countermeasures - Enhancing munition robustness against countermeasures and hostile environments to ensure reliable performance under combat conditions.

2.2. Space Domain Technologies

2.2.1. Space Access and Orbital Systems - Supporting the development of launch vehicles, space propulsion, and space maneuvering systems to ensure reliable, responsive, and cost-effective access to space.

2.2.2. Spacecraft and Satellite Technologies - Developing advanced technologies and innovative architectures for space-based assets to enhance resilience, improve performance, and expand mission capabilities. This encompasses satellite bus design, payload development, communication systems, on-orbit servicing, and other critical technologies for space operations.

2.2.3. Space Power and Propulsion - Innovating power generation (solar arrays, energy storage) and electric propulsion systems to extend satellite life and improve maneuverability and station-keeping.

2.2.4. On-Orbit Operations and Autonomy - Advancing technologies for autonomous spacecraft operations, rendezvous and proximity operations, on-orbit servicing, and debris mitigation to maintain space asset functionality.

2.2.5. Space Situational Awareness - Enhancing sensors, data processing, and analytics to detect, track, and characterize objects and threats in the space environment, supporting space domain awareness.

2.2.6. Resilient and Survivable Space Architecture - Researching distributed satellite constellations, hardened systems, and defensive measures to ensure continuity of space operations in contested or degraded environments.

2.2.7. Space Environment and Effects - Studying space weather, radiation effects, and the orbital environment to develop mitigation strategies that protect space assets and maintain operational readiness.

2.2.8. Position, Navigation, and Timing (PNT) from and for Space - The development, deployment, and exploitation of space-based systems and technologies that enable precise geolocation, accurate time dissemination, and resilient navigation capabilities for terrestrial, airborne, maritime, and spaceborne users.

2.3. Cyberspace/Electronic Warfare Domain Technologies

2.3.1. Cyber Operations and Cybersecurity - Developing and implementing comprehensive strategies, technologies, and practices to secure cyberspace, protect critical assets, and enable effective cyber operations in support of national security objectives. This encompasses offensive and defensive cyber capabilities, threat intelligence, vulnerability management, and incident response.

2.3.2. Communications and Networks - Innovating next-generation, resilient, and secure communications technologies, including software-defined radios, dynamic spectrum management, and high-capacity tactical networks supporting contested environments.

2.3.3. Electronic Warfare and Spectrum Operations - Researching techniques for electromagnetic spectrum dominance, including signal processing, electronic attack and protection, and spectrum sensing.

2.3.4. Quantum Technologies - Advanced systems that leverage the principles of quantum mechanics—such as superposition and entanglement—to enable next-generation computing, communication, and sensing capabilities.

2.3.5. Electro-Optical and Infrared Sensors - Developing advanced imaging and sensing systems operating across visible, infrared, and ultraviolet spectra

for target detection, tracking, and identification in all-weather and contested environments.

2.3.6. Radar and Radio Frequency Sensors - Innovating radar technologies including active electronically scanned arrays (AESAs), synthetic aperture radar (SAR), and low-probability-of-intercept/low-probability-of-detection (LPI/LPD) radars to enhance detection and tracking of air, surface, and maritime targets.

2.3.7. Multispectral and Hyperspectral Sensing - Creating sensors capable of collecting data across multiple spectral bands for improved material discrimination, camouflage detection, and environmental monitoring.

2.3.8. Signal Processing and Sensor Fusion - Advancing algorithms and architectures to integrate data from multiple sensor types for enhanced target recognition, situational awareness, and reduced false alarms.

2.3.9. Quantum Sensing and Advanced Properties - Exploring emerging quantum technologies and photonic devices to achieve breakthroughs in sensitivity, resolution, and sensor miniaturization.

2.3.10. Directed Energy Sensing and Countermeasures - Developing sensors that detect and characterize directed energy threats and support electronic warfare and self-protection systems.

2.3.11. High-Energy Laser Systems - Developing scalable, high-power laser technologies for precision engagement of air, ground, and space targets. This includes solid-state lasers, fiber lasers, and beam control systems for weaponization.

2.3.12. High-Power Microwave Technologies - Researching microwave energy sources and systems to disable, disrupt, or destroy enemy electronic systems, communications, and sensors without kinetic effects.

2.3.13. Beam Control and Adaptive Optics - Innovating advanced beam steering, adaptive optics, and atmospheric compensation techniques to maintain laser beam quality and accuracy over long distances and through turbulent environments.

2.3.14. Directed Energy Effects and Countermeasures - Studying the physical and operational effects of directed energy weapons on targets and developing defensive measures against hostile directed energy threats.

2.3.15. Cybersecurity for Digital Environments - Protecting digital assets, infrastructure, and information from cyber threats through the development and implementation of advanced security measures and resilient architectures. This encompasses threat detection, vulnerability assessment, intrusion prevention, and incident response to ensure the confidentiality, integrity, and availability of critical systems.

2.3.16. Navigation Warfare and Counter PNT - Research and development efforts focused on both disrupting adversary PNT systems and protecting friendly forces from similar attacks, ensuring mission success in GPS-denied or degraded environments. This involves developing both offensive and defensive technologies and strategies related to PNT.

2.4. Cross-Domain Technologies

2.4.1. Human Systems Integration - Integrating human capabilities, limitations, and preferences into the design, development, and evaluation of systems to optimize human-machine interaction, improve usability, and enhance overall system effectiveness. This encompasses human factors engineering, user interface design, workload assessment, and cognitive support to ensure safe, efficient, and intuitive operation.

2.4.2. Human-Machine Teaming and Interfaces - Developing technologies to improve interaction between humans and AI-enabled systems, optimizing performance across diverse operational environments and enhancing decision-making, mission planning, and situational awareness.

2.4.3. Training and Simulation Technologies - Developing and deploying innovative training methodologies and simulation tools to enhance individual and team proficiency, improve operational readiness, and facilitate effective mission rehearsal across a spectrum of operational scenarios. This includes virtual reality, augmented reality, serious gaming, and adaptive learning systems.

2.4.4. Rapid Multi-Domain Integration - Combining air, space, cyber, and ground technologies to develop interoperable, networked capabilities that enhance joint and coalition operational effectiveness.

2.4.5. Advanced Systems Engineering - Applying holistic and innovative systems engineering approaches to design, develop, integrate, and test complex systems and architectures, ensuring seamless interoperability, optimal performance, and cost-effective solutions across the entire lifecycle. This encompasses requirements engineering, architecture development, modeling and simulation, and verification and validation.

2.4.6. Integrated Vehicle Health Management - Creating systems for real-time monitoring and diagnostics of aerospace platforms to enhance safety, readiness, and maintainability.

2.4.7. Power and Thermal Management - Advancing technologies for efficient power generation, storage, distribution, and thermal dissipation across multiple platforms and operational scenarios. This encompasses innovations in energy harvesting, power electronics, battery technology, advanced cooling systems, and thermal interface materials to enable high-performance systems in demanding environments.

2.4.8. Advanced Materials Development - Creating novel materials with enhanced properties tailored for diverse applications, including but not limited to aerospace structures, electronic components, and protective coatings. These materials may include high-temperature ceramics, lightweight composites, metamaterials, multifunctional materials, and bio-inspired materials. Focus is on improving performance characteristics, durability, and resilience in extreme and contested environments.

2.4.9. Additive Manufacturing - Innovating and maturing additive manufacturing techniques for on-demand production of complex geometries, customized parts, and multi-material components. This encompasses advancements in materials, processes, modeling, and quality control to enable rapid prototyping, distributed manufacturing, and agile sustainment solutions across various domains.

2.4.10. Materials Processing and Fabrication - Developing and optimizing advanced processing and fabrication techniques for creating materials and components with tailored properties and microstructures. This includes methods such as nanomanufacturing, advanced joining, surface engineering, and coatings to enhance performance, reliability, and longevity in a wide range of applications.

2.4.11. Materials Characterization and Testing - Using experimental and computational techniques to understand the structure, properties, and performance of materials under relevant operational conditions, enabling the development of advanced aerospace systems.

2.4.12. Environmentally Responsive and Smart Materials - Developing materials that adapt to their environment or provide sensing and self-healing capabilities to enhance system resilience and functionality.

2.4.13. Model-Based Systems Engineering, Digital Engineering and Digital Thread, Advanced Simulation and Virtual Prototyping - Creating and utilizing comprehensive digital representations of systems and their lifecycles to enable improved design, analysis, verification, and validation. This encompasses digital twins, virtual prototypes, and simulation environments to optimize performance, reduce costs, and accelerate development timelines.

2.4.14. Data Analytics and Artificial Intelligence - Developing and applying advanced algorithms, machine learning techniques, and data-driven approaches to extract actionable insights from complex datasets and enable intelligent decision-making. This encompasses predictive analytics, pattern recognition, anomaly detection, and automated reasoning to improve situational awareness, optimize operations, and enhance system performance.

2.4.15. Additive Manufacturing Digital Integration - Integrating additive manufacturing processes with digital design, simulation, and analysis tools to enable closed-loop optimization, enhanced design freedom, and improved part quality. This encompasses generative design, topology optimization, process simulation, and in-situ monitoring to maximize the benefits of additive manufacturing.

2.4.16. Low C-SWAP Alternative PNT Systems for Attritable Systems – Developing affordable and expendable PNT solutions to ensure resilient navigation and timing capabilities for unmanned, potentially disposable aircraft in GPS-denied environments prioritizing C-SWAP requirements

2.4.17. Modular Open Architecture approaches to Resilient PNT - Developing flexible and adaptable PNT systems that use standardized interfaces, enabling rapid integration of new technologies and algorithms to maintain reliable navigation and timing in contested environments. This modularity facilitates quicker upgrades and responses to emerging threats against GPS.