



AFSPC Long-Term Science and Technology Challenges

Space and Cyberspace Innovation Summit

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Preparing for an Uncertain Future

- **Problem**
 - Reemergence of Great Power rivals
 - Transition from counter-insurgency to Anti-Access/Area Denial (A2AD)
 - Proliferation of advanced technologies/diminishment of technical advantage
 - Unsustainable acquisitions cost growth
 - Incremental approaches can no longer provide/sustain advantage
- **SECDEF approach for addressing problem**
 - Develop and refine new warfighting strategies, concepts, and tactics
 - **Drive smart and essential technological innovation**
 - Reform DoD enterprise and build force of the future





AFSPC S&T Mission

- **cutting edge technologies...** (with) potential to **drive operationally relevant** space and cyber capabilities...
 - **Technology push** – far-reaching, potentially game-changing technologies too immature or novel for warfighters to request but can inform a strategic plans
- ...that will **enhance USAF warfighting** in the air, space and cyber domains
 - **Requirements pull** – technologies focused on addressing Core Function Lead documented capability needs





S&T Needs to Be...

- **Cross-cutting across multiple domains and multiple missions**
- **Revolutionary, breakthrough, disruptive, and game-changing**
- **Create trusted and resilient combat effects through the next 30 years**
- **Extensible, manufacturable, autonomous, reconfigurable, agile, adaptable...**
- **Leverage commercial capability**

“We must pursue radical improvements in technology, that when combined with new approaches and organizational changes, expand or maintain asymmetric advantages over adversaries.”
(USAF Strategic Master Plan)





What Drives S&T Challenges?

- **AFSPC Commander's Strategic Intent, 2015**
- **Space Enterprise Vision**
- **Cyber Vision (in development)**
- **Air Superiority 2030 Capability Collaboration Team**
- **USAF Strategic Master Plan, 2015**
- **USAF Future Operating Concept, 2015**
- **US CYBERCOM Cyber Force Concept of Employment**
- **Joint Access Operating Concept, 2012**
- **DoD Cyber Strategy, 2015**
- **DoD Third Offset Strategy**
- **National Military Strategy, 2015**
- **National Security Strategy, 2015**
- **DoD Space S&T Strategy**
- **OSTP National S&T Council "21st Century Science, Technology, and Innovation Strategy for America's National Security"**





AFSPC Commander's Strategic Intent

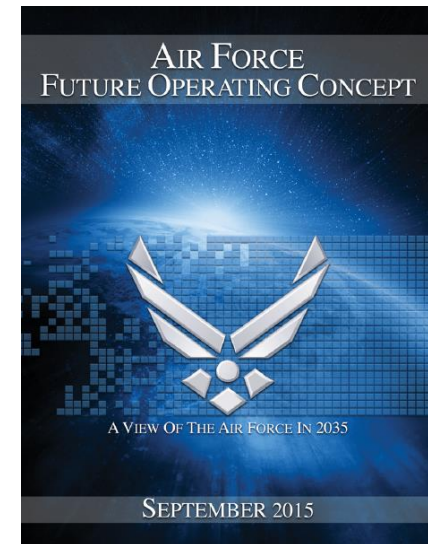
- **Reconnect as Airmen and Embrace Airmindedness**
- **Preserve the Space and Cyberspace Environments for future Generations**
- **Deliver Integrated Multi-Domain Combat Effects in, from and through Space and Cyberspace**
- **Fight through Contested, Degraded, and Operationally-Limited Environments**





AF Future Operating Concept (AFFOC)

- **Enabled across Air, Space and Cyberspace Domains**
 - Adaptive Domain Control
 - Global Integrated ISR
 - Rapid Global Mobility
 - Global Precision Strike
 - Multi-Domain Command and Control
- **Drives S&T investments**



***“...the manifestation of the Third Offset Strategy”
(DEPSECDEF Work)***





DoD Third Offset

- **Across all domains**
- **Five technological-operational components**
 - **Autonomous Deep-Learning Systems**
 - **Human-Machine Collaboration**
 - **Human-Machine Combat Teaming**
 - **Assisted Human Operations**
 - **Network-Enabled, Cyber Hardened Semi-Autonomous Weapon Systems**



Courtesy of the Center for Strategic and Budgetary Assessments (CSBA), 9 SEP 2016





Realizing the Space Enterprise Vision

- **An agile, resilient space enterprise able to deter and, if necessary, prevail in a conflict in space**
- **Delivering space effects to the warfighter via resilient ground/space systems coupled with offensive and defensive space control capabilities and tactically relevant, pervasive Battle Management Command and Control (BMC2)**
- **Revealing capabilities for deterrence, and concealing capabilities for warfighting advantage**
- **Driven by resilience capacity, reducing the time required to respond to threats while continuing to deliver space mission effects to the warfighter**





SEV Imperatives

- **Agile, responsive logistics/launch**
- **Resilient Enterprise Ground System**
- **BMC2 able to fight on tactical timelines**
- **Tightly link Space Mission Force development to warfighting construct and warfighter development**
- **Develop intelligence capacity of enable SMF warfighting construct**
- **Develop an enhance security framework and evolve protection levels**

“Most U.S. military space systems were not designed with threats in mind, and were built for long-term functionality and efficiency...This is no longer an adequate methodology to equip space forces.”

(Gen John Hyten)





Partnerships

- **Partnerships with other services, government agencies, military and national laboratories critical to ensure synergy and to leverage investments**
- **Established Interagency Space S&T Partnership Forum in 2015**
 - **Strategic forum to identify synergistic efforts/technologies**
 - **Membership: AFSPC, DARPA, NASA, NRO, NOAA, AFRL, NRL, SMDC, AF, OSD...and growing**
- **Selected 3 S&T areas for interagency collaboration**
 - **Will be presented to next Senior Leader Space Summit**
 - **Topics: small satellite technology, big data analysis, in-space assembly**





Continuum of S&T Needs and Challenges

- **AFSPC Long Term S&T Challenges**
 - “Art of the possible” crystal ball with 10-35 year goal
- **AFSPC Core Function Support Plans**
 - Linkages between prioritized capability gaps and needs, capability concepts and material solutions, and enabling technologies, typically 5-15 year focus
- **Increased wargaming, simulations, experiments and prototyping**
 - Demonstrate capabilities and highlight new focus areas





Focus of AFSPC Long-Term S&T Efforts

- **Ensure the AF and AFSPC have needed technological “know-how” to build future capabilities that preserve AF and Joint Force freedom of action**
- **Realign S&T efforts with Third Offset Strategy, AF Future Operating Concept, and Space Enterprise Vision**
- **Discover and exploit emerging, breakthrough, and disruptive game-changing technologies**
 - **Predict the future and extend the limits of the “art of the possible”**
- **Guide long-term S&T investment to reduce risk for future program and accelerate introduction of new capabilities**
 - **Including preserving “seed-corn”**





Overarching Space S&T Challenges

- **Enhanced multi-domain and multi-phenomenology Space Situational Awareness, Battlespace Awareness, and ISR**
- **New technologies applicable to space based capabilities**
- **Enhanced space access and logistics**
- **New concepts in space ground operations**
- **Dynamic new technologies applicable to all space systems**





Overarching Cyber S&T Challenges

- **Trusted autonomous systems, networks, and applications**
- **Human-machine interface design and biometrics**
- **Advanced data protection technologies**





Overarching Cross-Cutting Space/Cyber S&T Challenges

- **Artificial Intelligence/Cognitive Electronic Warfare**
- **Artificial Intelligence**
- **Advanced data analytics**





Questions?

