



U.S. Air Force
Scientific Advisory Board

**DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE
WASHINGTON DC**

October 2, 2017

Dr. James S. Chow
Chair, Air Force Scientific Advisory Board
HQ USAF SAB
1060 Air Force Pentagon (RM. 5E815)
Washington, DC 20330-1180

MEMORANDUM FOR AIRSTAFF AND ALL MAJCOM-FOA-DRU

SUBJECT: Scientific Advisory Board, FY18 Studies

The Secretary of the Air Force has directed the Air Force Scientific Advisory Board (SAB) to conduct studies of topics that are technologically critical to the future of the Air Force:

Studies:

- (1) Maintaining Technology Superiority for the USAF (MTS)
- (2) Technologies for Enabling Resilient Command and Control (TRC)

To accomplish these studies, SAB members will gather relevant data by visiting Air Force units from October 2017 to October 2018. As the Chair of the SAB, I would like to ask in advance for your support if the SAB should visit your location. If you believe your units have information that would support any of the FY18 studies and would like to request a visit, please contact the SAB Executive Director, Lt Col Domenic Smeraglia, 703-697-1109 or domenic.smeraglia.mil@mail.mil.

Sincerely,

A handwritten signature in cursive script, appearing to read "James S. Chow".

Dr. James S. Chow
Chair, Air Force Scientific Advisory Board

Attachment:
SAB FY18 Studies Terms of Reference

SAF/PA Release: 2017-0401

(1) Maintaining Technology Superiority for the USAF (MTS)

Background

The USAF has always been critically dependent on developing, fielding, and maintaining superior warfighting capabilities derived from science and technology (S&T) advances, including basic research, applied research, and advanced technology development. However today, federal budget pressures, rapidly evolving global technological capabilities and threats, and our adversaries' less fettered processes for developing technologies into warfighting capabilities make it difficult for the current Air Force S&T and acquisition enterprise to maintain technological superiority. Even parity is at risk in some key areas. In part, this calls for a clear identification of S&T efforts that can support critical capabilities for the 2030+ warfighting environment, highlighting those that can potentially provide lasting advantages for the USAF. But in addition, there can be obstacles in the acquisition process itself that impede timely development and transition of technology-enabled capabilities to meet changing warfighter needs. The Air Force will benefit from a study that not only provides an independent, external, expert perspective on critical technology development efforts needed for the 2030+ environment, but that also proposes mechanisms to enable more rapid, affordable, and effective transitions from the S&T enterprise to help maintain technological superiority for our warfighters.

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The study will:

- Assess critical air, space, and cyber/information warfighting capabilities needed in the near, mid, and far-term, including their resilience to adversary CONOPS and countermeasures; include inputs from appropriate MAJCOMs and the intelligence community.
- Identify and prioritize the key underlying concepts and supporting technologies needed to enable these critical capabilities, including perspectives from across the Air Force, DoD, intelligence community, DoE, FFRDCs and relevant commercial technology organizations.
- Assess the resilience of identified concepts and technologies to counter threats and proliferation. Identify those that are likely to result in asymmetric and/or lasting advantages for the USAF against potential foes.
- Determine the impact of alternative acquisition and funding approaches on the speed and cost of effective development of technologies and their transition to provide superior warfighting capabilities; leverage insights from existing acquisition-policy related research.
- Recommend changes to internal policies and processes in the Air Force S&T and acquisition enterprise that would enhance rapid innovation and speed associated technology transition.
- For the identified critical technologies, propose roadmaps employing these recommended changes in the S&T and acquisition enterprise to rapidly mature and transition them; include needed MS&A, experiments, and demonstrations to validate utility and CONOPS, funding strategies and rapid acquisition approaches.

Study Products

Briefing to SAF/OS and AF/CC in July 2018. Publish report in December 2018.

(2) Technologies for Enabling Resilient Command and Control (TRC)

Background

The Air Force's Future Operating Concept identifies resilient command and control (C2) as one of five future Air Force core missions. It envisions resilient Operations Centers that provide Air Force component commanders with abilities to plan, direct, and assess the activities of air, space and cyberspace forces in an integrated cross-domain manner. An on-going Enterprise Capability Collaboration Team (ECCT) is considering how this can be achieved. Key attributes of resilient C2 identified in past SAB studies include (1) integrated multi-domain planning and execution, trained in the full range of air, space, and cyberspace capabilities, effects, and limitations, (2) dynamic sourcing, direction, and execution that operates inside adversary decision cycles, (3) ability to gather and create information to enable global situational awareness through use of automated decision support tools and tailorable user defined operating pictures, (4) flexibility to employ across varying conflicts under dynamic conditions, differing levels of delegated authority, between supported or supporting roles, and between centralized control and distributed coordination, and (5) reduced forward-deployed footprints with an ability to be quickly repositioned, reconfigured, and augmented. However, there are many technical and non-technical challenges to realizing resilient C2. In implementing the ECCT results, the Air Force will benefit from an assessment of viable architectures and technologies that enable resilient operations centers, including technical maturity and integration readiness of existing and emergent technologies that can support resilient C2.

Charter

The study will:

- Review existing Joint and Air Force C2 CONOPS, architectures, procedures and technologies, determine their capabilities and limitations in providing multi-domain planning, direction, and assessment, and determine key characteristics that can enhance Air Force C2 effectiveness.
- Engage with the ECCT to identify alternative future Air Force C2 architectures and assess their ability to meet desired needs across Joint and coalition operations that stress varying levels of conflict, differing levels of delegated authority, and supported or supporting roles.
- Assess technologies that can enhance C2 effectiveness including multi-domain integration, planning responsiveness, assessment, situational awareness, flexibility, re-configurability, communications and network resiliency, survivability, multi-level security and information assurance; assess technology readiness, timelines, and investments needed to reach maturity.
- Consider potentially relevant commercial-world approaches, such as in augmented reality and gaming, to address analytics, decision aids, visualization tools and human-machine interfaces.
- Recommend key areas for science and technology investments to evolve current C2-relevant technologies and their integration into a future resilient Air Force C2 system.
- Provide a roadmap outlining essential new and emerging technologies (e.g., machine learning) and maturation timelines to support development/fielding of resilient C2 capabilities.

Study Products

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