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August 2024

# Defense Science Board Advise Implementation and Prioritization of National Security Innovation Activities



# Briefing Outline

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- Introduction
- Findings and Recommendations

# Terms of Reference

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- Tasks (USD) R&E to seek DSB feedback on the National Security Innovation Capital (NSIC)
- TOR signed October 25, 2021
- Report on and make recommendations regarding:
  - Emerging hardware and materials areas with significant potential dual-use impact; and
  - Scientific research developments ready to move from the research phase to the development phase

Task Force interpretation: Provide feedback on the National Security Innovation Capital (NSIC)

# Task Force Membership

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- Task Force Members:
  - **Co-Chair:** Dr. Katherine McGrady, CNA
  - **Co-Chair:** Dr. Robert Wisnieff, IBM
  - Mr. Michael Appelbaum, Immersive Wisdom
  - Mr. Michael Bayer, Dumbarton Strategies
  - Dr. Alison Brown, NAVSYS Corporation
  - Ms. Laetitia de Cayeux, Global Space Ventures
  - Ms. Mandy Vaughn, GXO, Inc.
- Executive Secretary/ADFO
  - Dr. Troy Techau
- Strategic Analysis, Inc. Support:
  - Ms. Elizabeth Armistead

# Defense Science Board Membership

**Chair:** Dr. Eric Evans, MIT Lincoln Laboratory

- Mr. Michael Appelbaum, Immersive Wisdom
- Dr. Jennifer Bernhard, University of Illinois at Urbana-Champaign
- Dr. Alison Brown, NAVSYS Corporation
- Dr. Kimberly Budil, Lawrence Livermore National Laboratory
- Mr. James Carlini, Leidos
- Ms. Laetitia de Cayeux, Global Space Ventures
- Dr. Tomás Diaz de la Rubia, University of Oklahoma
- Mr. Fred Dixon, Private Consultant
- ADM William Fallon, U.S. Navy RET, Private Consultant
- Dr. Johnney Green, Jr., National Renewable Energy Laboratory
- Dr. Robert Grossman, University of Chicago
- Dr. Daniel Hastings, MIT
- Dr. Ayanna Howard, The Ohio State University
- Dr. Evelyn Hu, Harvard School of Engineering and Applied Sciences
- Hon. Shirley Ann Jackson, President Emeritus Rensselaer Polytechnic Institute
- Dr. Ashanti Johnson, East Central University
- Hon. Paul Kaminski, Technovation, Inc
- Dr. Ann Karagozian, University of California, Los Angeles
- Dr. John Manferdelli, VMware
- Dr. Katherine McGrady, Center for Naval Analyses
- Dr. James Miller, Jr., Johns Hopkins University Applied Physics Laboratory
- Dr. Dhanurjay Patil, Private Consultant
- Dr. Gary Polansky, Private Consultant
- Dr. Sanjay Raman, University of Massachusetts
- Dr. David Relman, Stanford University
- GEN Paul Selva, Private Consultant
- Dr. Nashlie Sephus, Amazon Web Services
- Dr. Reshma Shetty, Ginkgo Bioworks, Inc.
- Dr. Alfred Spector, Private Consultant
- Dr. Vincent Tang, Lawrence Livermore National Laboratory
- Dr. Dorota Temple, RTI International
- VADM Jan Tighe, USN Ret., Private Consultant
- Dr. Bradford Tousley, Private Consultant
- Dr. David Van Wie, Johns Hopkins University Applied Physics Laboratory
- Ms. Amanda Vaughn, GXO, Inc.
- Dr. Dinesh Verma, Systems Engineering Research Center
- Dr. Steven Walker, Lockheed Martin Corporation
- Dr. Robert Wisnieff, IBM

# Briefings Received

## June 2022- August 2023

- Leslie Babich, Director, **SOFWERX**
- Michael Brown, Director, **Defense Innovation Unit**
- Thomas J. “Shotgun” Browning, Deputy Chief Technology Officer, OUSD(R&E) - **Rapid Defense Experimentation Reserve (RDER)**
- Major Clark, U.S. **Small Business Administration**
- Jay Dryer, **Strategic Capabilities Office**
- Colonel Nathan P. Diller, Director, **AFWERX**
- Brigadier General Kyle B. Ellison, Commanding General, **Marine Corps Warfighting Lab**
- Maryann Feldman, Arizona State University
- Melissa Flagg, Private Consultant
- Peter Highnam, Chief Strategy Officer, **OUSD(R&E)**
- James (Hondo) Geurts, Private Consultant
- George Ka’iliwai III, Director, Requirements & Resources (**J8**), **USINDOPACOM**
- William LaPlante, Under Secretary of Defense for Acquisition and Sustainment (**OUSD (A&S)**)
- Jeremy Leader, Deputy Director (Acting), **Commercial Space Office (COMSO)**
- Jason Rathje, Director, **Office of Strategic Capital**, Office of the Secretary of Defense
- Viji Ravendreen, **QUALCOMM**
- Tex Schenckan, Director, **National Security Innovation Activity, Defense Innovation Unit**
- Arun Seraphin, National Defense Industrial Association
- James H. Smith, **Acquisition Executive, USSOCOM**
- Lieutenant General Thomas H. Todd III, Deputy Commanding General, Acquisition and Systems Management, United States **Army Futures Command**
- John Williams, U.S. **Small Business Administration**
- Matt Williams, Technology Portfolio Manager, **OUSD(R&E)**
- David Honey, Deputy Under Secretary, **OUSD(R&E)**

Task Force used bolded innovation funders to provide context for NSIC

# Study Framework

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- Task Force examined NSIC's activities in the context of DoD's definition of innovation:
  - Deliver capability to the warfighter at speed and scale
  - Respond to the challenge created by a pacing threat that is innovating quickly
- Additional lines of inquiry included:
  - Whether the funded innovations will dissuade the adversary from considering aggression, change its calculus, provide a solution that emphasizes offensive, disruptive, and asymmetric approaches, and whether the innovation will be ready in the required timelines
- Task Force also sensitive to the need for a balance of innovations: those that deter the current pacing threat and those that are futuristic

# NSIC Mission

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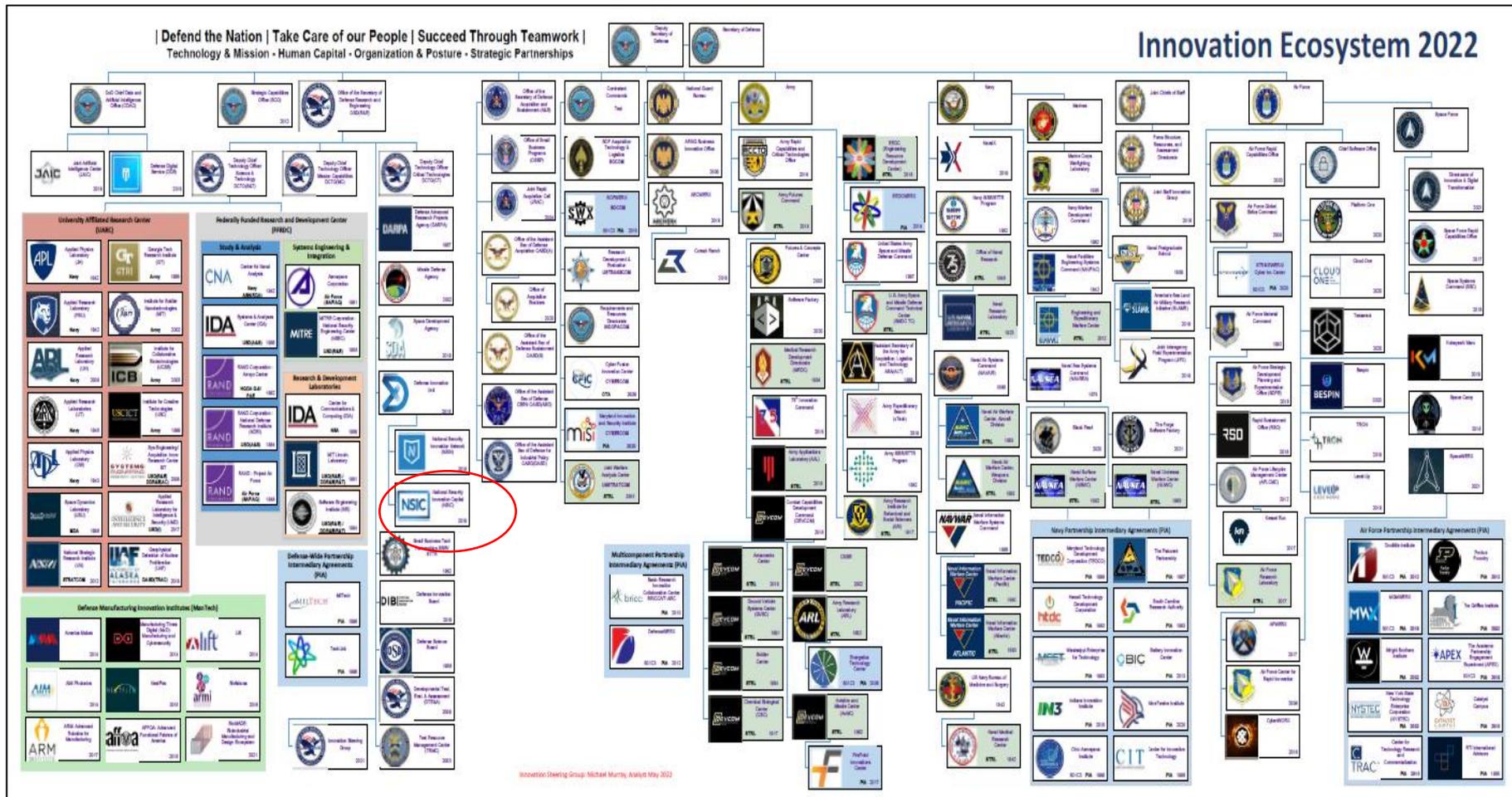
- Congressionally directed in 2018 National Defense Authorization Act (NDAA)
- Established 2019; not funded until 2021
- Designed to accelerate dual-use hardware technologies critical to national security and economic competitiveness
  - Reports to DIU
  - Engages domestic startups
  - Provides capital investment for TRL-3/4
  - Reduces risks that companies will seek adversary funding
  - Enables startups in advancing their product development by addressing funding shortfalls
  - Viewed as an experiment - has until 2026/2027 to prove itself

# NSIC Overview

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- Focused on 5 technologies
  - Autonomy & Robotics, Computing & Communications, Energy, Sensors, and Space
- To date (January 2024) NSIC has made 20 awards to 18 companies (two are supplemental awards to companies previously funded)
  - Average award size is \$1.8M (\$0.75M-\$3M)
  - Average period of performance is 20 mos (8-36 months)
  - Total funding since inception: \$35.8M
- Slightly over half of the companies have raised follow-on VC funding
  - Average of \$29.2M raised; range of \$1M to \$200M

# NSIC Resides in a Vast Array of DoD Innovation Entities



Source: Innovation Steering Group: Michael Murray

# NSIC's Funding Levels Relative to Other DoD Innovation Funders

Innovation Funder	Annual Total Awards Made (2023)
DARPA	\$4B*
USD (R&E) Critical Technology Areas (CTAs)	\$2.4B
Strategic Capabilities Office (SCO)	\$1.1B
AFWERX	\$1B
Rapid Defense Experimentation Reserve (RDER)	\$0.4B
Marine Corps Warfighting Lab (MCWL)	\$0.2B
Office of Strategic Capital (OSC)	\$0.1B
DIU	\$0.1B*
SOFWERX	\$0.06B
Joint Capability Technology Demonstrations (JCTDs)	\$0.05B
National Security Innovation Capital (NSIC)	\$0.02B

\*<https://www.linkedin.com/pulse/real-life-q-defense-innovation-labs-andrew-glenn/>

# NSIC's Pursuit of Emerging Hardware with Significant Dual-use Potential

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- Inconclusive
  - Limited funding
  - Investments aren't unique in all cases
  - Still evolving as an organization
    - Has taken positive steps to improve its processes for identifying potential companies
    - Technical expertise and business experience within its structure has grown
    - Closer ties to DIU help with technical and business expertise
    - Beginning to engage military when considering proposals
      - Early engagement helps ensure eventual military utility
  - Extent to which innovations have been adopted by the warfighter is unclear
    - However, there is evidence of engagement with DoD labs, government-based innovation organizations, and DIB
  - Relationship to USD (R&E) priorities is at the broad Critical Technology Area level
    - Unclear to what degree NSIC activities enhance USD(R&E)'s critical technology portfolios

# Briefing Outline

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- Introduction
- Findings and Recommendations

# NSIC Assessment: Findings and Recommendations:

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## NSIC Realignment

- **Finding 1:** In the context of innovation funding accounts across the DoD, NSIC has a similar mission to other better-resourced innovations funders
  - NSIC has started to talk about serving as informal “incubator” to DIU
- **Recommendation 1:**
  - Absorb NSIC into one of the larger innovation funding accounts versus a separate innovation funder. [near-term; DEPSECDEF]
    - Absorb funding and mission
    - Proliferation of additional, small innovation organizations throughout DoD doesn't offer significant advantages
    - DIU is the obvious candidate
      - Office of Strategic Capital could also be a candidate for scaling prototypes NSIC pursues

# NSIC Assessment: Findings and Recommendations:

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## Alignment of NSIC Programs to Priorities

- **Finding 2:** NSIC has the opportunity to be better aligned to the NDS and USD(R&E)'s strategy and priorities
  - Unclear how NSIC supports DoD's overall technology strategy
- **Recommendation 2:** Better align future NSIC programs – regardless of where NSIC gets integrated - to NDS and USD(R&E)'s strategy and priorities. [near-term; DIU]

# NSIC Assessment: Findings and Recommendations:

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## Emerging hardware with significant dual-use potential

- **Finding 3:** NSIC's purpose is to fund small companies to get them over the hurdle of insufficient initial investment
- However, the probability of NSIC's efforts yielding a significant dual-use capability is limited
  - Helping companies over initial obstacles in and of itself is not a sure way to such capabilities
  - Additional challenges exist around funding start-ups that private investment has already chosen not to fund
- **Recommendation 3a:** If NSIC stays as a single entity, ensure alignment between NSIC and the NDS and USD(R&E)'s strategy, thereby increasing the probability of bringing in more private capital to support R&E's mission [near-term]
- **Recommendation 3b:** If NSIC stays as a single entity, increase the probability of the emergence of a significant dual-use capability by connecting its funded efforts to larger entities capable of taking next steps to scale. [near-term; DIU]

# NSIC Assessment: Findings and Recommendations:

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## DoD's Innovation Ecosystem

- **Finding 4:** NSIC is just one organization in DoD's broader innovation ecosystem
  - Conducting the NSIC assessment exposed the Task Force to multiple entities within the ecosystem
  - Shortfalls in the ecosystem in terms of addressing the pacing threat were evident, e.g., absence of relevant KPIs
- **Recommendation 4:** A broader, deeper, fully-informed assessment of the ability of DoD's innovation ecosystem to address the pacing threat is in order [near-term; USD (R&E)]
  - Sample questions include:
    - What is the DoD Innovation Strategy, and does it account for the adversary's innovation ecosystem?
    - Given an adversary that is innovating quickly, will the innovations meet the required timelines?
    - Do innovation funders ensure military utility through engagement of unit-level operators?
    - Are efforts to create databases that capture the innovation ecosystem sufficiently resourced to help with decisions about investment?
    - Are there changes to the acquisition system that could be made in the near-term to gain quick wins given the pacing threat?
    - Can best practices that have led to innovations of military utility be deployed more broadly?
    - What near-term steps can be taken to expand DoD's technology expertise?