23rd Annual Science and Engineering Technology Conference

Arun Seraphin
Executive Director
NDIA Emerging Technologies Institute
May 23-25, 2023
San Antonio, Texas

About NDIA

NDIA is the preeminent defense industrial association connecting government and industry through strategic forums and proactive policies to align a modern, resilient, and diverse industrial base with the capabilities required to ensure the U.S. military's operational and technological competitive advantage.

NDIA BY THE NUMBERS

6 STRATEGIC PRIORITIES

- Advance Budget Stability
- Expand International Security Cooperation & Interoperability
- Gain Acquisition Agility & Regulatory Efficiency
- Promote Innovation in Technology & Process
- Foster Small Business Success
- Strengthen the DIB & Workforce

27
DIVISIONS
Provide Functional Focus

19
INTERNATIONAL PARTNERSHIPS

GOVERNMENT • ACADEMIA • INDUSTRY

1,300
Exhibitors, Sponsors, & Advertisers

100
MEETINGS & EVENTS

IN SUPPORT OF THE WARFIGHTER

6,600
of NDIA's individual members are **Military or Government**

59,000
of NDIA's individual members are **Industry**

More than half of NDIA's corporate members are **Small Businesses***

*$25 million or less in defense revenue annually

NDIA engages all 3 branches of government

AWARD WINNING
National DEFENSE
MAGAZINE
in print and online

1 MILLION
PAGE VIEWS ANNUALLY

3 AFFILIATE ORGANIZATIONS

- ETI — Emerging Technologies Institute
- NTSA — National Training and Simulation Association
- WID — Women In Defense

AT THE HEART OF THE MISSION SINCE 1919

NDIA Update

- HON. David Norquist – CEO & President
- Guy Walsh – New Chief Operating Officer
- Jen Stewart – Executive VP, Policy
- Arun Seraphin – New ETI Director

- Vital Signs (released Feb 2023)
- Hypersonics Supply Chain Report (released 5/11/23)

- Upcoming conferences:
  - CBRN Defense (7/24-7/26/23)
  - Undersea Warfare (9/18-9/20/23)
  - Future Forces/Fuze/Global Demilitarization (9/25-9/28/23)
  - NDIA ET Conference (8/28-8/30/23)

https://www.ndia.org/events

NDIA's 2023 Policy and Strategy Priorities

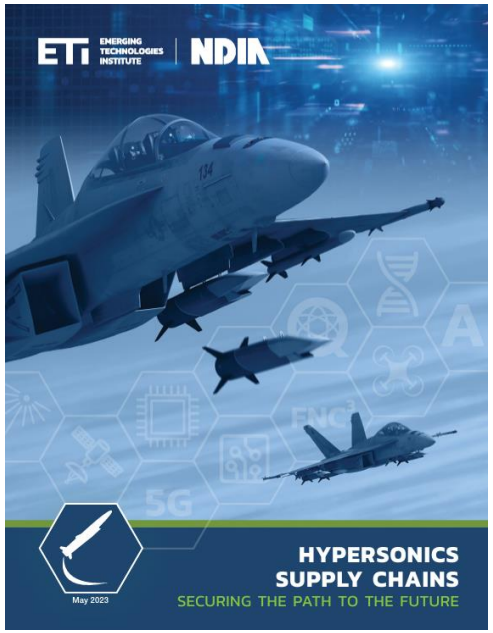
- Securing Budget Stability and Sufficiency
- Advancing DoD Digital Modernization
- Facilitating Foreign Military Sales Modernization and Technology Integration
- Restoring Industrial Readiness, Capacity, and Infrastructure
- Enabling More Resilient Supply Chains

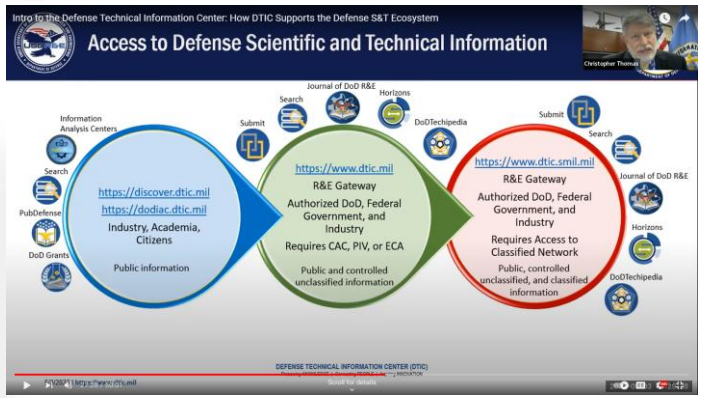
About ETI

- **Affiliate organization of the National Defense Industrial Association (NDIA)**
- **Launched in July 2021 to increase NDIA focus on emerging technologies, their impact on national security, and industry-government partnerships to win the global technology competition**
- **Deliver value to NDIA members, including traditional and non-traditional companies, on trends and opportunities in emerging technologies for national defense**
- **Staff delivers member value events, technical and policy analyses, and educational products to government and industry decision-makers**
- **Provide neutral forum for government-industry-academic exchanges on technical and technology policy matters**
- **Increase emerging technology content in other NDIA products, activities, and events**

Current ETI Activities

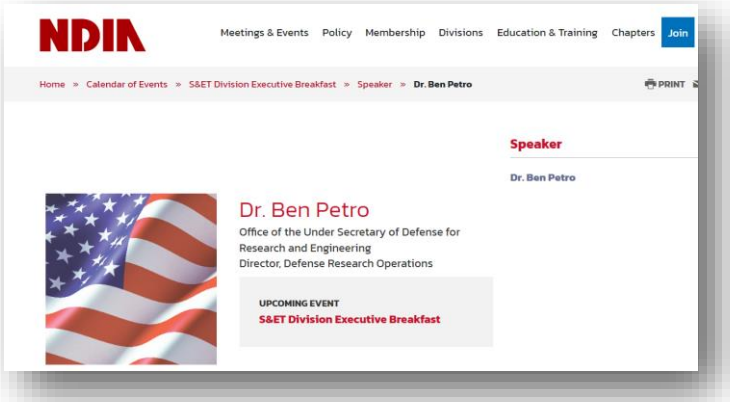
- Future Supply Chains (Hypersonics and Directed Energy)
- Budget Request and Appropriations Analysis
- Rapid Technology Capability Adoption
- Software as a Modernization Priority
- Government-Industry Data Sharing for CBM+
- Microelectronics Modernization Report
- HBCU/MSI Partnerships
- High Skills Immigration for National Security
- Policy Considerations for Artificial Intelligence
- Tech 101 Educational Series
- Emerging Tech Horizons Podcast
- Partnering within and outside NDIA





Collaboration with Divisions

- S&ET: Working with HBCUs Webinar
- S&ET: Executive Breakfast Seminar - Dr. Ben Petro (Working with DOD Labs)
- S&ET: Working with HSIs Workshop (with Air Force)
- Space: DIU State of Space Industrial Base Webinar
- Logistics: Data Sharing for CBM+ Workshop
- Support for Division Meetings and Conferences



Emerging Technologies Supply Chain Study

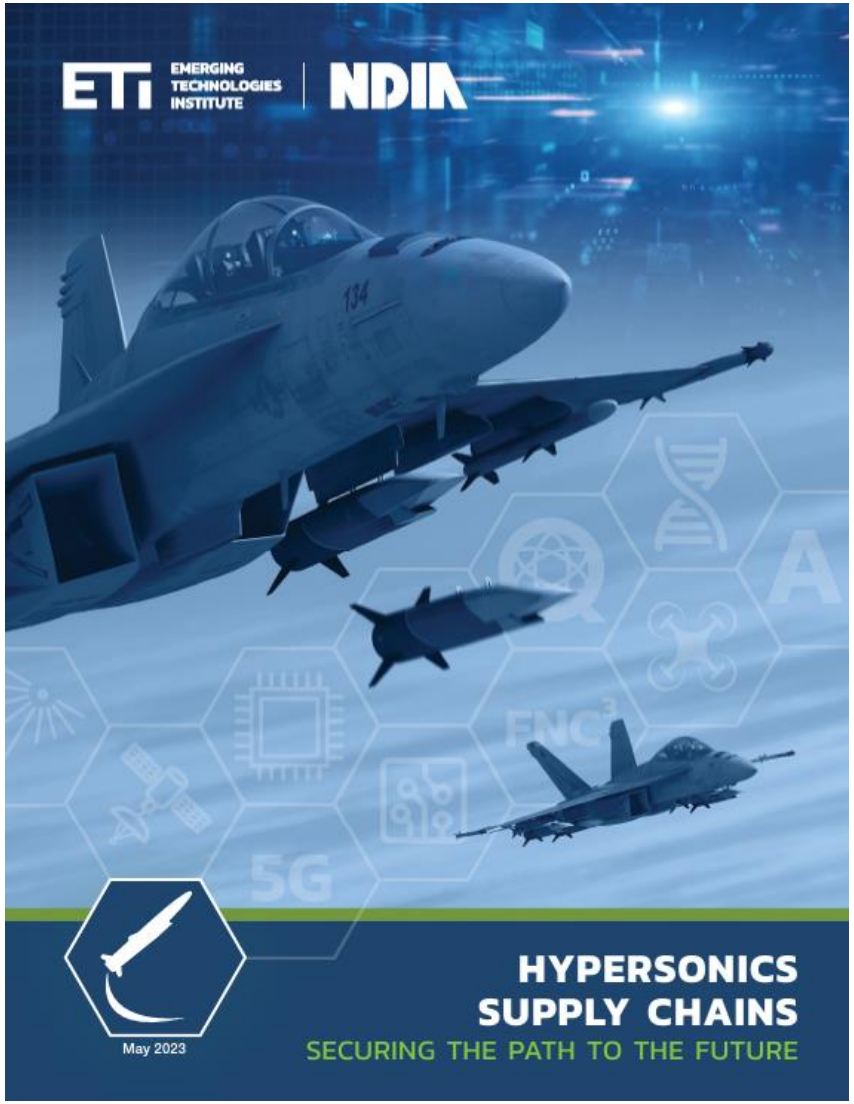
Goals: Assess the state of defense emerging technology supply chains and provide policy recommendations for their development, health, and resilience

Current Scope: Hypersonics & Directed Energy

Status: Hypersonics report published last week. Directed Energy working groups currently underway and will finish in early Summer.

Methodology (Hypersonics):

- Partnered with University of Maryland Supply Chain Management Center
- Convened 8 working groups, comprised of 22 key stakeholders from industry, government, and academia
- Conducted interviews with representatives at all levels of the hypersonics supply chains
- Compiled key findings from working groups, interviews, UMD research, and internal research into final report
- Submitted report to a distinguished peer review committee and external reviewers prior to publication



www.ndia.org/hypersonics

Hypersonics Study: Key Findings

- **Assessment:** Current supply chains, including manufacturing base, supply of critical materials, testing infrastructure, and workforce are insufficient to affordably field hypersonic weapons at scale.

- **Critical Raw Materials & Goods**
  - U.S. is reliant on China for certain critical minerals
  - Supply base of high-temperature materials is relatively small and fragile
  - Limited DOD-approved domestic suppliers for ammonium perchlorate
- **Manufacturing Base & Workforce**
  - Insufficient manufacturing base due to inconsistent demand signal
  - Insufficient testing infrastructure & personnel
  - Lack of hypersonic talent (e.g., issues with hiring & retention)
- **Supply Chain Security & Vulnerabilities**
  - Hypersonic supply chains face cybersecurity threats at all levels
  - China recruited talent from Los Alamos National Lab to work on their hypersonics programs
- **International Partnerships**
  - Existing international partnerships on hypersonics are limited but opportunities exist to strengthen supply chains by expanding international partnerships

Key Recommendations:

- DoD must provide a consistent demand signal to industry
- Further investment needed in high temperature materials such as carbon-carbon
- DoD should continue pursuing an air-breathing hypersonic vehicle system as part of its development plan to expedite manufacturing base growth and transfer critical knowledge from more senior hypersonic talent to new talent
- Academia should be leveraged for educating mid-level talent in hypersonic-adjacent fields to address workforce shortages
- OUSD A&S should ensure the acquisition workforce is adequately prepared for hypersonic procurement at scale through education and training
- U.S. government should look to Canada and Australia to diversify critical raw material supply and expand testing partnerships

www.ndia.org/hypersonics

Tech 101 series

- **Educational series to provide technical market awareness to NDIA members on a variety of emerging technologies**
- **Monthly release schedule**
- **Aimed at non-expert audience**

- **Topics include:**
  - Hypersonics 101
  - Quantum Science 101
  - Microelectronics 101
  - Blockchain 101
  - Directed Energy 101
  - Additive Manufacturing 101
  - Cloud Computing 101
  - Digital Engineering 101
  - Quantum Computing 101
  - 5G 101

Each averages 200 registrants, 125 attendees live, and 400 YouTube views

Emerging Tech Horizons Podcast

- **Podcasts on Technical and Policy Issues**
  - China and Emerging Technologies
  - Quantum Computing
  - Blended Wing Body Configurations
  - Operational Energy
  - Working with HBCUs
  - Understanding the CHIPS and Science Act

  …and many more
- **Released biweekly on YouTube, Spotify, and Apple Podcasts**
- **Sponsorship opportunities**
- **Viewership:**
  - 2023 to date - 25000+ views – 10 podcasts released so far
  - 2022 – 25 podcasts
  - 2021 – 9 podcasts
- **Using podcast to promote NDIA and ETI events and products**

Emerging Tech Horizons Podcast Episode with Al Shaffer

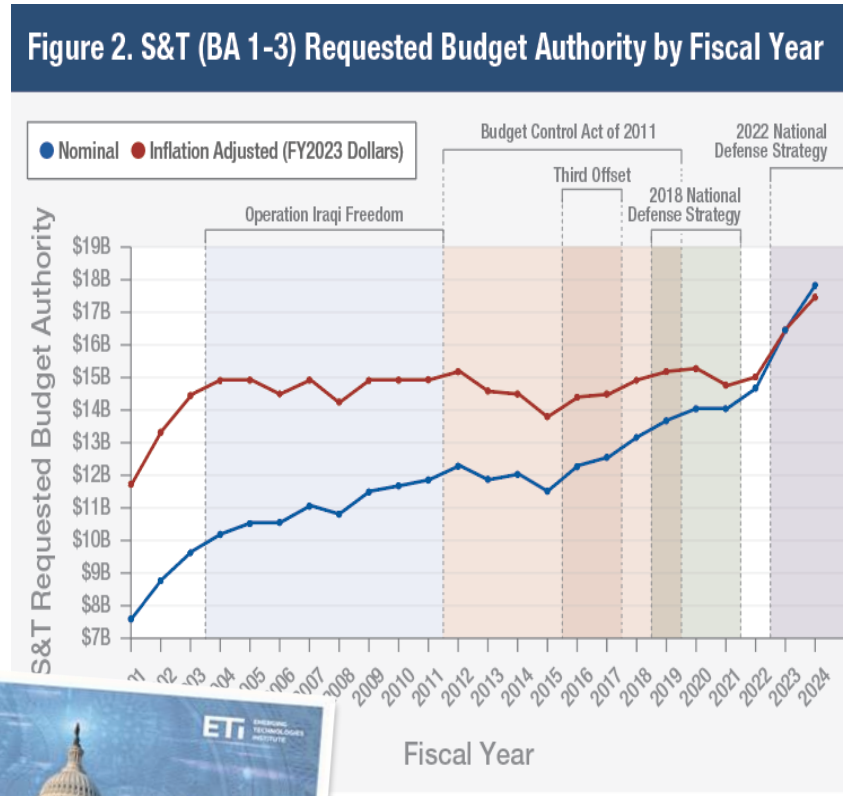
Emerging Tech Horizons Podcast Episode On the Road at SOFIC

Budget Request and Appropriations Analysis (S&T Funding Data)

How: Analyzing multiple budget justification and appropriations data sources; Developing software tools to process more data

Findings:

- **Doubling down on emerging technologies:** S&T budget requests were flat from FY2003 to FY2015. Since FY2016, requests have grown substantially
- **When defense topline grows, S&T grows slowly.** Money goes towards near-term threats
- **When defense topline shrinks, S&T is protected.** Long-term investments are protected
- **Congress pays attention:** Congress always appropriates more for S&T than what DoD requests
- **DoD is not reaching stated internal target:** DoD's S&T requests do not reach 3% of the DoD topline



Rapid Technology Capability Adoption

(Schmidt Futures)

What We Are Exploring:

- Provide recommendations and guidance to decision makers focused on developing the means for rapidly delivering commercial capabilities to the DoD

How:

- Identify areas in which the DoD can execute rapid acquisition activities, especially to take advantage of emerging technologies
  - Generate advocacy strategies to support implementation of recommendations by Congress and the DoD
    - Advise policy or legislative changes
    - Advise budgetary or resource changes, or financial management policy changes

Early Insights:

- Department of Defense struggles to deliver new technology to the warfighter in a timely manner, even when solutions are already available in the commercial sector
- There are several barriers and challenges to adopting new capabilities in a rapid manner
  - Policy and Requirements
  - Behavior
  - Meeting the needs of the oversight community (testing, auditing, Congress, …)
- There are several examples of successful rapid deployment of capabilities to include Operation Warp Speed

Next Steps:

- Initiate research/conduct interviews on OWS and other rapid deployment efforts
- Identify barriers/challenges and recommend mitigations
- Make policy change recommendations
- Develop a Rapid Technology Capability Adoption Playbook

Policy Considerations for Artificial Intelligence

What We Are Exploring:

- Exploring how the development of a regulatory framework can be best supported by the technical, military, and policymaking communities

How:

- Interviews with autonomy experts from NDIA membership with commercial, academic, and government backgrounds
- Policy analysis (e.g., DODD 3000.09, Responsible AI Strategy, and 5 Principles of AI)
- Publications in Carnegie Council on Ethics in International Affairs, National Defense Magazine, and stand-alone paper
- Engagement with Congress

Early Insights:

- The technical community is eager for policymakers and end-users to have a deeper understanding of technical aspects of autonomy and their policy implications
- Previous technology policy regimes were helped by an open dialogue between communities
- Few opportunities for sustained dialogue and collaboration between technical, military, and policymaking communities
- Need to have a dialogue and policy formulation around real world likely scenarios/continuously learning systems
- Practitioners must understand data sources and biases

EMERGING TECHNOLOGY HORIZONS BY WILSON MILES

Autonomous Weapon Policy Receives Much Needed Update

Software as a Modernization Priority

What We are Exploring: Provide NDIA member feedback on how DOD should structure its Software Modernization priority area

Products:

- November 2022 Workshop co-hosted with Carnegie Mellon University (CMU) Software Engineering Institute (SEI) for NDIA industry & academic members, along with R&E and Service technical staff
- 25 attendees representing the defense industrial base, academia, U.S. government, and allies, including Google, Palantir, Rebellion Defense, Northrop Grumman, Singapore, and Australia
- Workshop summary report co-written with CMU SEI
- Workshop summary report foreword written by Thomas W. Simms, Acting Principal Deputy Director, Systems Engineering and Architecture, Office of the Under Secretary of Defense for Research and Engineering

Example Recommendations:

- DoD should create a process for surfacing and prioritizing long-term software-specific needs, both content (i.e., mission-supporting) and enabling, as a foundation for software S&T investments;
- DoD should prioritize the development of capabilities that will enable the maximum possible use of commercially-driven AI-enabled tools.
- DoD should focus on tools that use automation to minimize the technical debt associated with legacy code.
- DoD software workforce plans should deliberately seek to promote both retention of internal expertise and “leavening” with rotational positions for commercial practitioners.
- DoD should explore standardization of requirements for evidence about software systems.

Status: Report to be published in later Spring, Podcast to be used to highlight report rollout

Emerging Technologies Defense & Exhibition Conference

August 28 – 30, 2023, JW Marriott, Washington, D.C.

Focus Areas: Game Changing Technologies, Counter UAS, Contested Logistics, Operational Energy

- Business Opportunities Panels from PMs and PEOs
- Operational Challenges
- Technology Briefs
- Keynote Speakers from DOD and Industry

Abstract Portal for NDIA Member Technology Presentations open until June 16

Registration is open now

Display and Sponsorship Opportunities

Work with us!

- People
- Joint workshops
- Webinars, Podcasts, Tech 101 Events
- Future Study Ideas
- 2024 conference collaboration