

Emerging Technologies for National Defense Manufacturing

Dr. Mark Lewis

Executive Director

NDIA Emerging Technologies Institute

NDIA has established the ETI

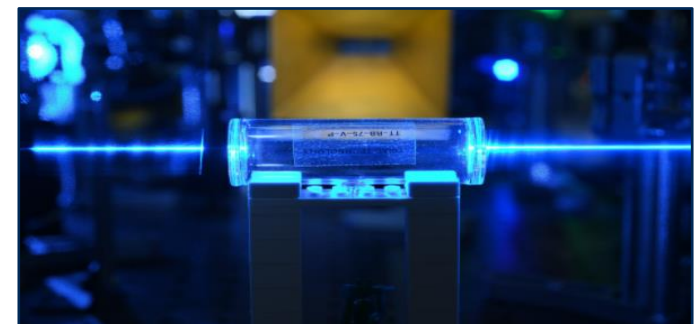
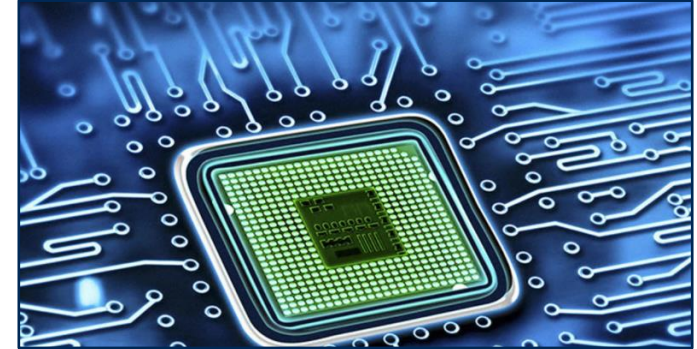


- **An in-house research team (full- and part-time) with expertise in select emerging defense technologies and related policy**
 - Building on the 2018 NDS: AI, autonomy, biotech, cyber, directed energy, FNC3, hypersonics, microelectronics, quantum, space
 - Subject to change as the 2022 NDS is developed
 - Other issues: barriers to entry, innovation, bridging the “valley of death,” etc.
- **Build teams of experts from industry and academia to tackle defense technology issues**
 - Leverage expertise of member companies and individuals in NDIA
 - But...ETI is *independent* and *objective*
- **Advised by a Board of national leaders**

– Ellen Lord	- Mac Thornberry	- Arnold Punaro
– Mitch Daniels	- Paul Madera	- Richard McConn
- **Produce high-quality reports that will meet the needs of government and industry decision makers**
- **Convene panels, workshops, and other forums for the discussion of emerging technology issues**
- **Meet directly with key stakeholders to present findings and results, as well as use latest tools (podcasts, social media) to engage the broader community**
- **Mentor early career scholars on defense technology issues**

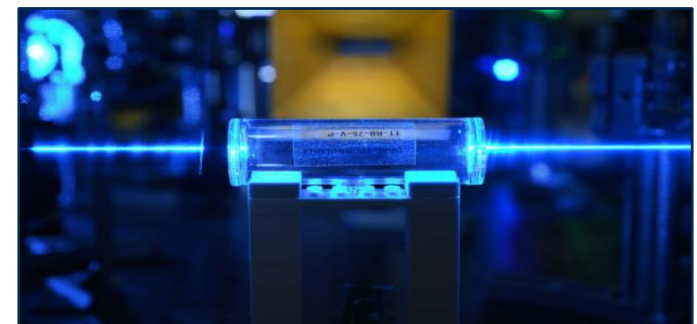
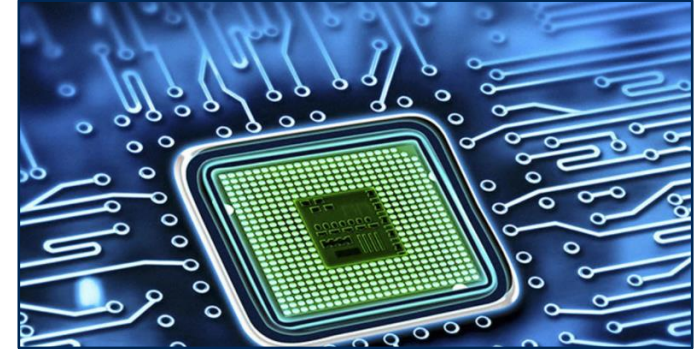
R&E Critical Technology Areas

- **Seed Areas of Emerging Opportunity**
 - Biotechnology
 - Quantum Science
 - FutureG
 - Advanced Materials
- **Effective Adoption Areas**
 - Trusted AI and Autonomy
 - Integrated Network System of Systems
 - Microelectronics
 - Space Technology
 - Renewable Energy Generation and Storage
 - Advanced Computing and Software
 - Human Machine Interfaces
- **Defense-Specific Areas**
 - Directed Energy
 - Hypersonics
 - Integrated Sensing and Cyber



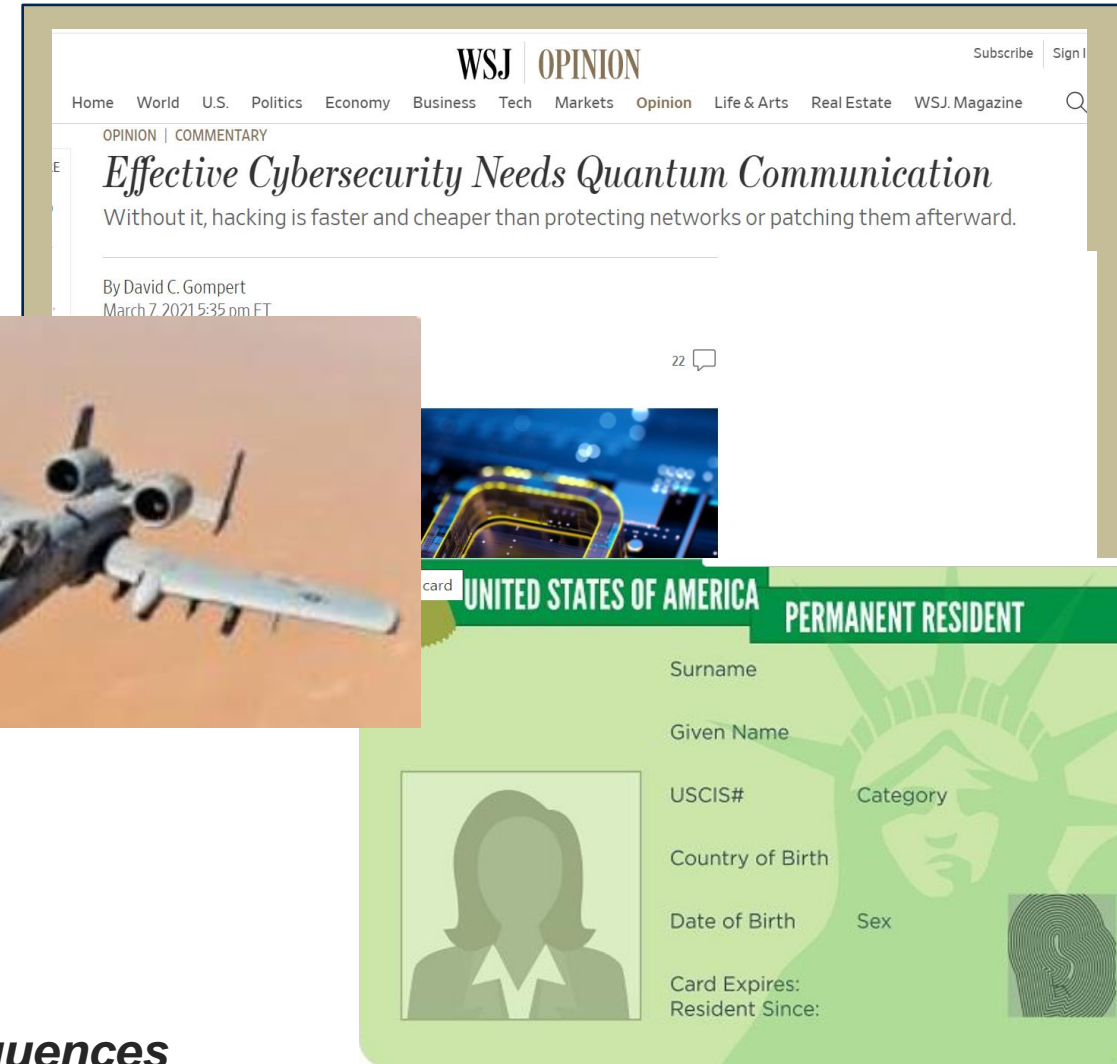
Current Areas of ETI Activity

- **Seed Areas of Emerging Opportunity**
 - Biotechnology
 - Quantum Science
- **Effective Adoption Areas**
 - Microelectronics
- **Defense-Specific Areas**
 - Hypersonics
- **Supporting Efforts**
 - Supply Chain
 - Technology Policy
 - Energetic Materials



Other Topics of Interest to ETI

- *Defense Industrial Base/Supply Chain*
- *Acquisition timelines, transition, budget constraints*
- *Legislative context*
- *Technical credibility*
- *Legacy vs. new*
- *Industrial Base vulnerabilities*
- *Test and Evaluation*
- *Digital Engineering*
- *Workforce*
- *Responding to adversaries without unintended consequences*



Progress so far...

- **Launched Emerging Tech Horizons podcast**
- **Leading a study on the Emerging Technologies Supply Chain**
- **Released 2 reports (The Modernization Quandary, Digital Engineering)**
- **Held 3 workshops, with more in the works**
- **Meeting with member companies, Divisions, and Chapters**

Emerging Technologies Supply Chain Research Study – Overview

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

How: Bring together key stakeholders from industry, government and academia to deliver public reports on key findings, detailed assessments of current emerging technology supply chains and policy recommendations to government and the private sector.

Technologies:

- Hypersonics
- Directed Energy
- Biotechnology (biologically-derived manufacturing)
- Quantum Sensing

Focus Areas:

- Critical Raw Materials & Goods
- Manufacturing Base & Workforce
- Supply Chain Security, Redundancies & Vulnerabilities
- International Partnerships, Allied Near-shoring & Domestic On-shoring

Emerging Technologies Supply Chain Research Study – Status

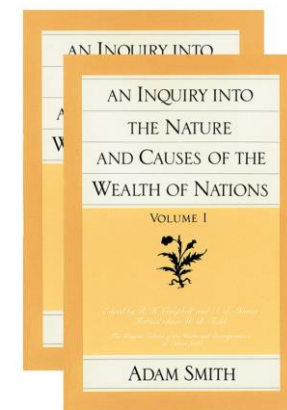


- Partnering with Supply Chain Management Center at University of Maryland to map the supply chains of each of the 4 technologies
- Working groups of key stakeholders kicking off to dive deep into the issues
- Peer Review Committee formed of an esteemed group of former government officials and current and former senior leaders from industry and academia to serve in an advisory capacity. Names will be announced in *National Defense* magazine next month

Want to get involved? Contact Rebecca Wostenberg (rwostenberg@ndia.org), Chair of the Supply Chain Study

“If any particular manufacture was necessary, indeed, for the defence of the society, it might not always be prudent to depend upon our neighbours for the supply...”

- Adam Smith, The Wealth of Nations



Importance of manufacturing technologies in transitioning Emerging Technologies

- Innovation and invention in Emerging Technologies is not enough – we need to be capable and ready to produce
- R&E, A&S, and Service Leadership need to think about both innovation and manufacturing ecosystems
 - R&D
 - ManTech, Manufacturing Institutes
 - Industrial scale-up
 - Early procurement
 - Workforce (innovation and production)
- Failure to invest in both innovation and production capacity will lead to negative outcomes for both national security and the economy. Examples:
 - Microelectronics
 - Rare earth materials
 - PPE



- **Each emerging technology area has unique challenges where new manufacturing processes can lead to performance improvements and cost reductions**
 - Hypersonics
 - Quantum
 - Biotechnology
 - Microelectronics

Hypersonics manufacturing case studies

- **Good news:**
 - Additive Manufacturing
 - New Labs – high materials lab, center of excellence
- **Bad news:**
 - Cost of manufacturing is #1 barrier to transition
 - Design failures and flight test failures



- **Need to build manufacturing workforce of the future**

- This is not the same as the R&D workforce
- Different education
- Different training
- Different skill requirements
- Different experience requirements



- **Who is responsible for creating this for DOD and DIB?**

ETI opportunities and asking help

- Continue and expand supply chain studies
- Explore how to better connect DOD and DIB manufacturing innovation communities with R&D enterprise, with programs, primes, customer
- Technical manufacturing roadmaps for each modernization priority - do we need them?
- Identify economic, policy, and cultural barriers to developing robust manufacturing bases of the future

NDIA Products

- Webinars
- Workshops
- Conference panel
- Policy papers
- Recommendations to Congress and Executive Branch