DEFENSE INNOVATION UNIT

CELEBRATING 5 YEARS

Preparing the U.S. for a Superpower Marathon with China

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Director

TECH DOMINANCE IS THE NEW GLOBAL BATTLEGROUND

> **Success no longer goes to the country that develops a new technology first, but rather to the one that better integrates it and adapts its way of fighting.**

2018 National Defense Strategy

Game Changing Technologies

- AI
- Quantum
- Hypersonics
- Cyber
- Biotechnology
- 5G
- Space
- Autonomy

Image Source: Center for a New American Security

CHINA - THE PACING THREAT

Competing with the U.S. today—economically, geopolitically, ideologically, and militarily

Transforming its economy through advanced technology

- Leading in key strategic industries (MiC 2025)
- Acquiring foreign technology and know-how
- Fostering indigenous innovation
- State-sponsored projects
- National champions
- Using tech for political & societal control
- Civil-military fusion

DIMENSIONS OF THE CHINA THREAT

ECONOMIC

- Techno-nationalism
- Industrial policies
- WTO rules abuses

GEOPOLITICAL ALIGNMENT

- Belt and Road Initiative
- Economic coercion
- Asia by Asians

MILITARY

- Increased spending
- Overmatch neutralized
- Military-civil fusion

IDEOLOGICAL

- Authoritarianism
- Opposition to Western ideas
- Propaganda | Soft Power

U.S. AND CHINA: NOT A NEW COLD WAR

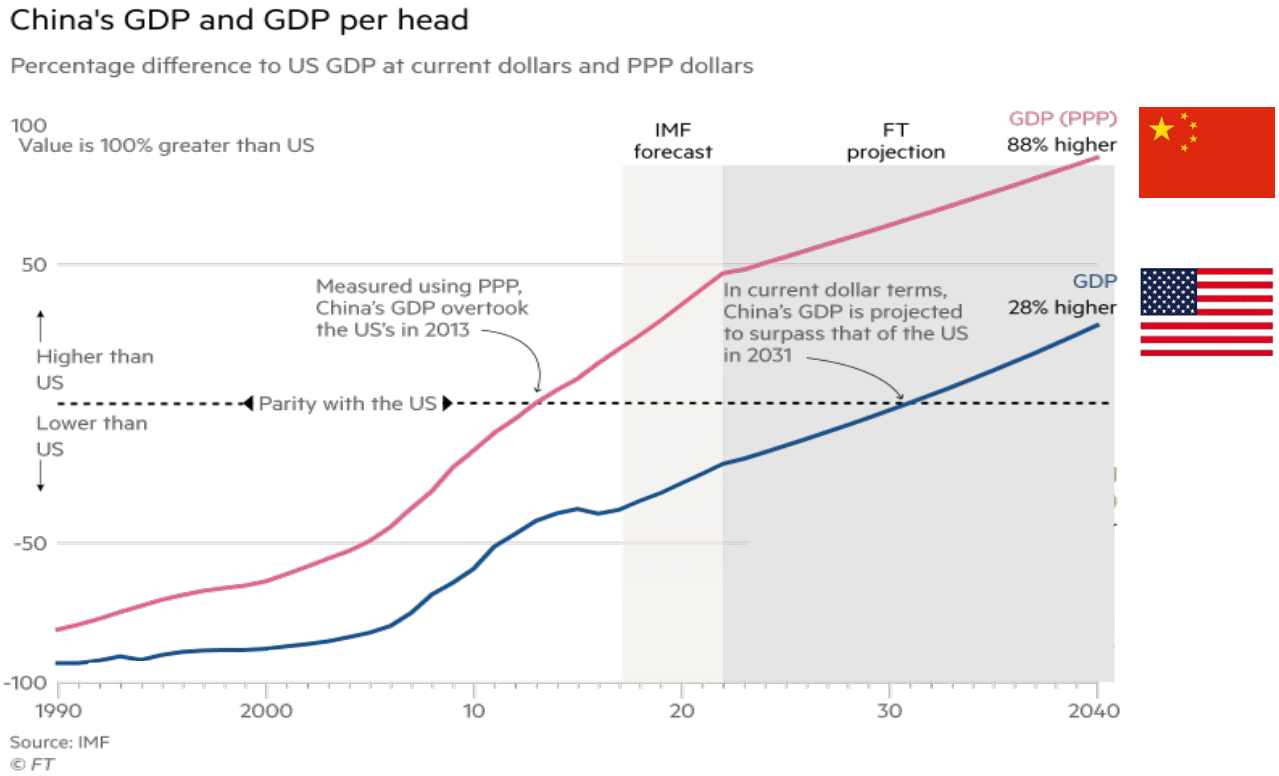
Compete where we Must, Cooperate where we Can

What is different from the Cold War?

1. China's economic scale
2. U.S. - China - Global economic integration
3. China's utilization of global institutions (i.e. WTO, IMF, World Bank, etc.)
4. China's pursuit of civil-military fusion

ECONOMIC CAPACITY

Primary Determinant of National Security



Disclaimer: The views, opinions, and assumptions expressed in this presentation are those of the authors and do not reflect the official policy or position of any agency of the U.S. government.

RELATIVE NATIONAL SECURITY STRENGTH

- Relative technology advantage —multiplier to economic capacity —indicates future economic growth
- Relative national security strength can change faster than economic capacity

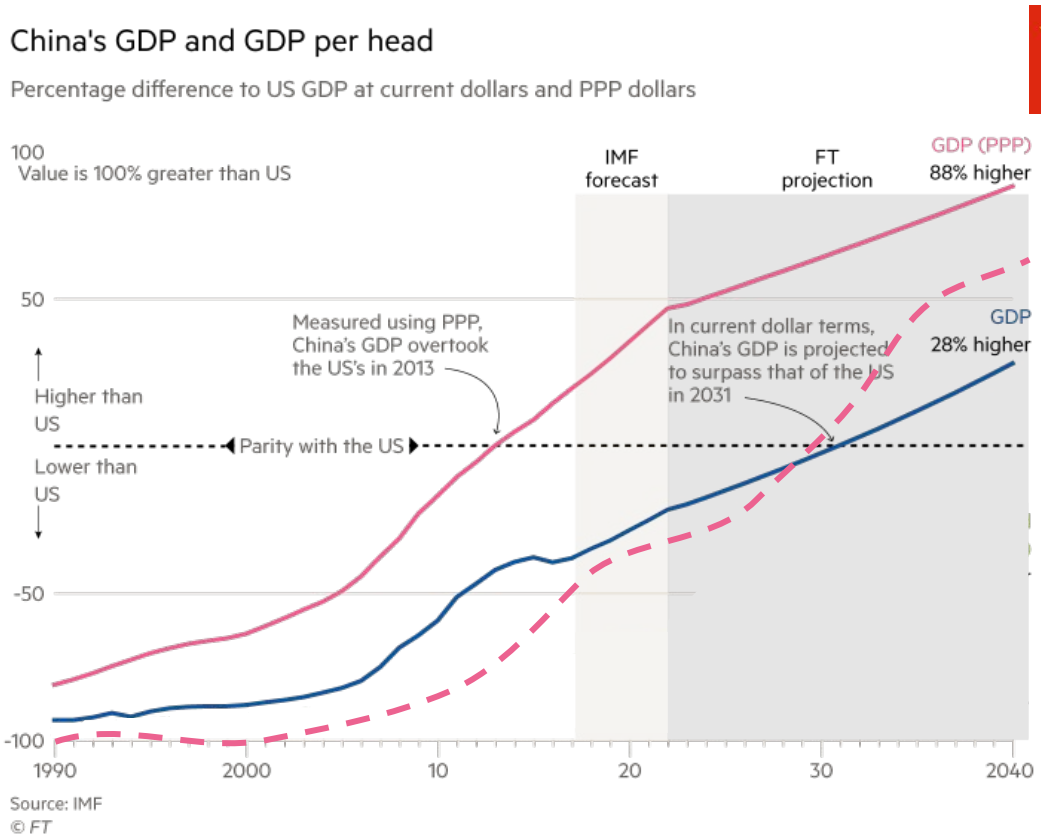
Relative National Security Strength =

Relative Economic Capacity **x** Relative Technology Advantage

↓ Relative GDP ($)

↓ $\sum_{1}^{n}$ T ratios

Technology advantages summed over all technologies (weighted by economic impact)



TECHNOLOGIES CURRENTLY AT RISK

Technologies Where China Leads the U.S. Today

Cryptocurrency
Small Drones
E-Commerce (700 million users)
Electric (Li-ion) batteries
Electric vehicles
Facial recognition software
Genetic data: genomics & medical histories
High-speed rail
Hypersonics
Mobile device manufacturing
Quantum communications (Micius)
Solar energy
Telecommunications — 5G Deployments
Ultra high-voltage electricity transmission
Wind energy

Technologies Where China is Challenging the U.S. Lead

Artificial intelligence
Biotechnology
Pharmaceuticals
Rocket launches into space
Quantum computing
Quantum sensors
Supercomputing

Commercial Implications

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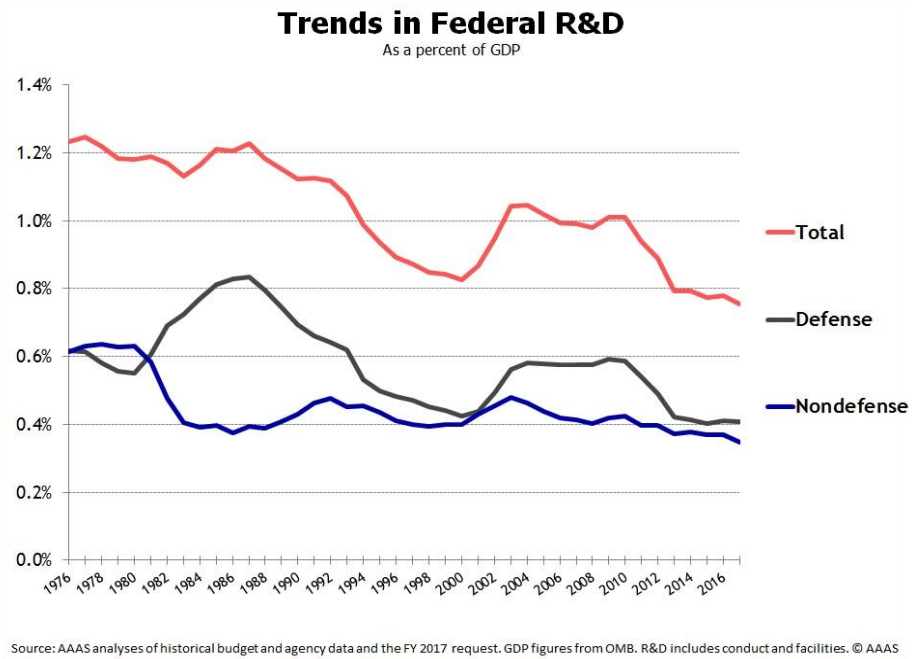
U.S. FEDERAL R&D IS DECLINING



Implying:

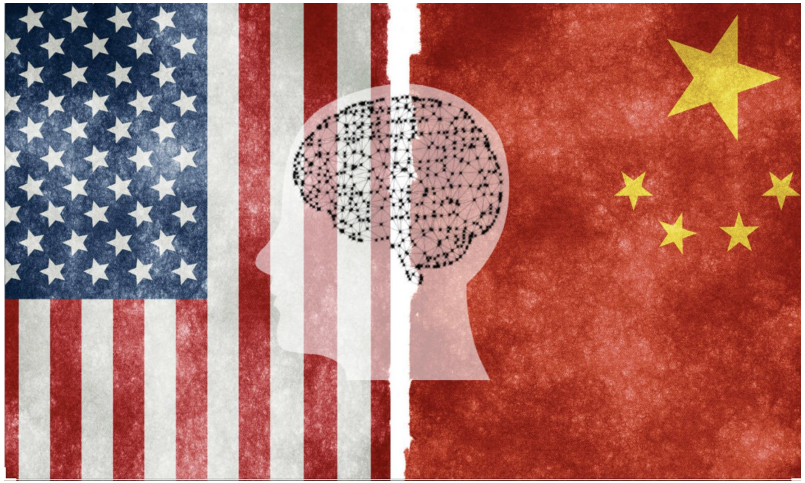
- **Fewer Breakthrough Innovations**
- **Fewer Economic Spillover Effects**

- Google Search Engine (NSF)
- GPS (DARPA, Navy, DoD)
- Supercomputing (DoD, National Labs)
- Internet (DARPA, NSF, UCLA)
- Smartphones – semiconductors, touch screens (NASA, USAF, DARPA-SEMATECH, NSF, SBIC)
- Shale Gas Hydraulic Fracturing (DOE, National Labs)
- 3D and 4D seismic imaging (DOE; MIT)
- LED Technology (DOE, USAF)
- MRI (NIH, NSF)
- Prosthetics (DARPA, VA)
- Human Genome Project (NIH, DOE)

At 0.7% of GDP, U.S. is behind China, Japan, Korea, Finland, Sweden, Denmark, and Germany

PREPARING THE UNITED STATES FOR THE SUPERPOWER MARATHON WITH CHINA

1. Bolster investment in basic R&D
2. Attract and develop human capital in STEM fields
3. Develop integrated U.S. economic statecraft
4. Increase long-term focus in U.S. capital markets and businesses



ACCELERATING COMMERCIAL TECHNOLOGY FOR U.S. NATIONAL SECURITY

U.S. SHARE OF GLOBAL R&D FUNDING IS DECREASING

1960s

Technologies funded or sponsored by USG and then transitioned to commercial sector:

- Microelectronics
- Touch screen
- GPS
- Space launch
- Satellite imagery

- **U.S. Defense Related (36%)**
- Other U.S. & USG (33%)
- Rest of the World (31%)

2010s-Now

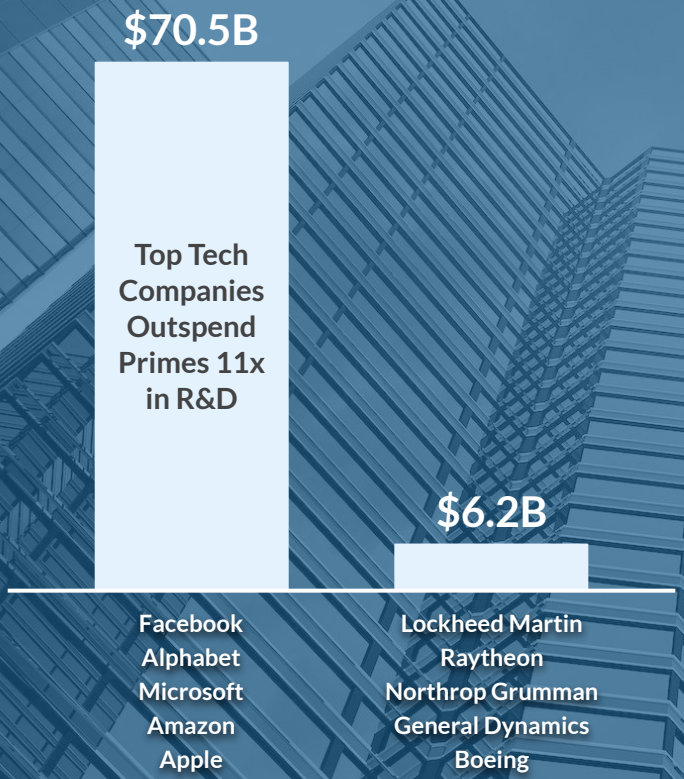
Technologies developing in the commercial sector rather than by USG:

- Biotechnology
- AI
- Mobile payments
- 5G
- Quantum computing
- Batteries & Power Systems

- **U.S. Defense Related (4%)**
- Other U.S. & USG (24%)
- Rest of the World (72%)

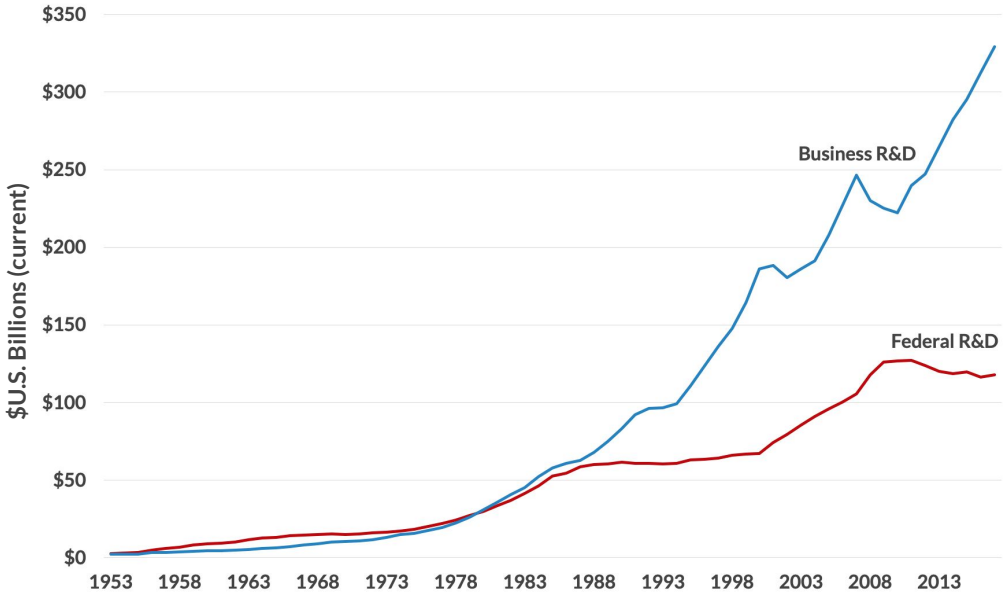
Data Source: Congressional Research Service

WHY COMMERCIAL



Data Sources: National Science Foundation, Defense News, Strategy&

U.S. R&D Expenditures by Source: 1953 - 2017



Source: National Science Foundation, National Patterns of R&D Resources: 2016–17 Data Update.

ALIGNED DEFENSE INNOVATION EFFORTS: Core DIU, NSIN, and NSIC

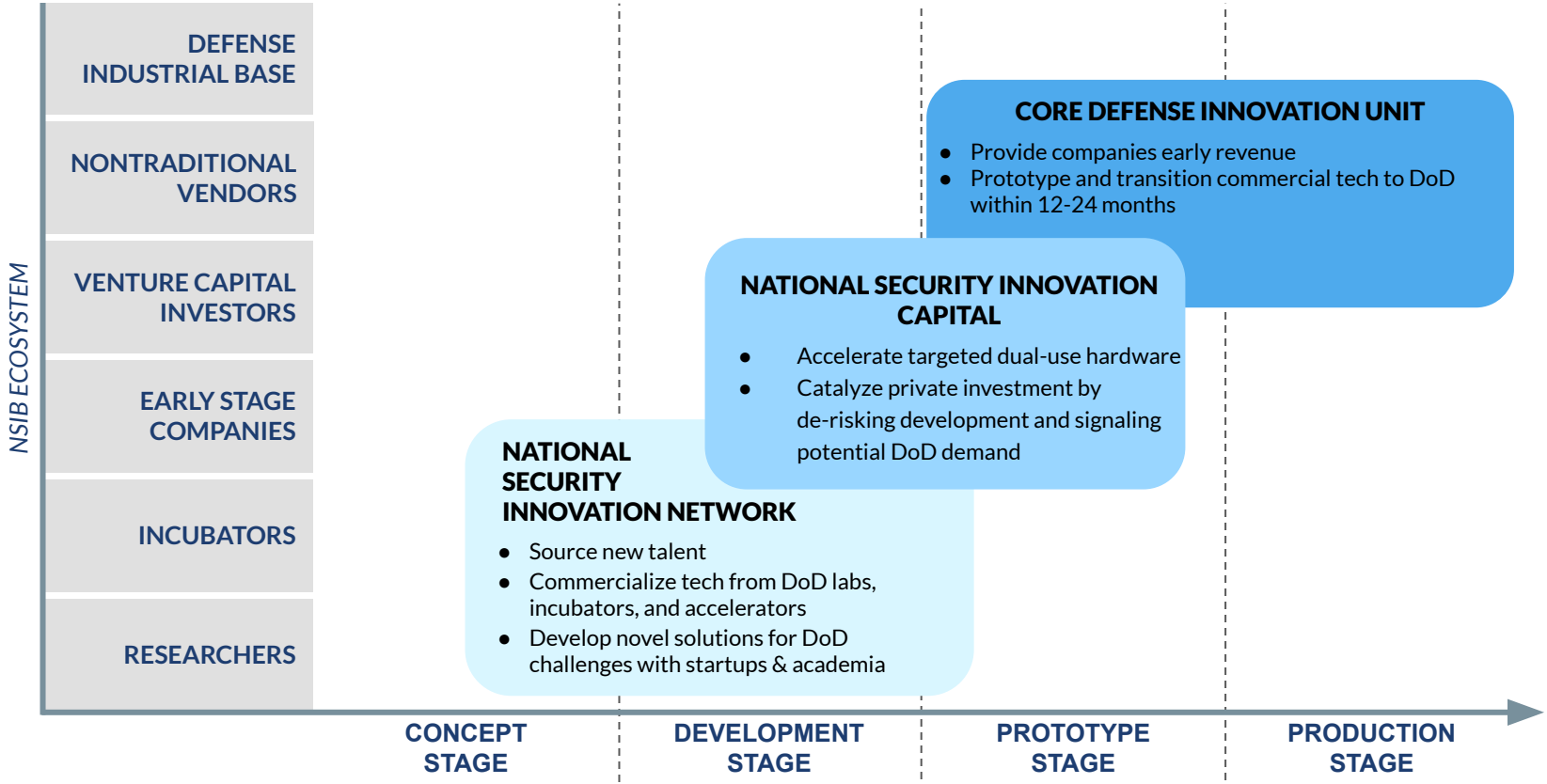
DIU is a fast-moving, cross-DoD organization focused exclusively on commercial companies to solve national security problems.

- **ACCELERATE**
  DoD adoption of commercial technology
- **TRANSFORM**
  Military capacity and capabilities
- **STRENGTHEN**
  The national security innovation base

National Security Innovation Network: Builds networks of innovators that generate new solutions to national security problems

National Security Innovation Capital: Accelerates development of dual-use tech and stimulates private investment

THREE ORGANIZATIONS COMPRISE DIU: ALL GROWING THE NATIONAL SECURITY INNOVATION BASE



WE FOCUS ON CRITICAL TECHNOLOGY AREAS

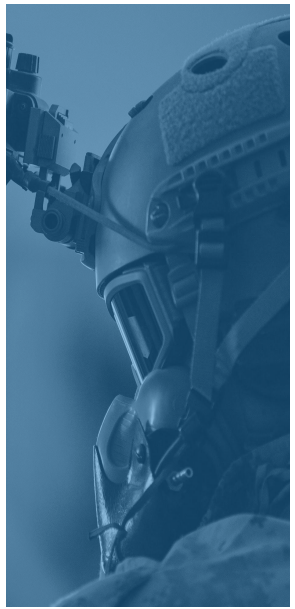
Where the Commercial Sector is in the Lead

Advanced Energy & Materials

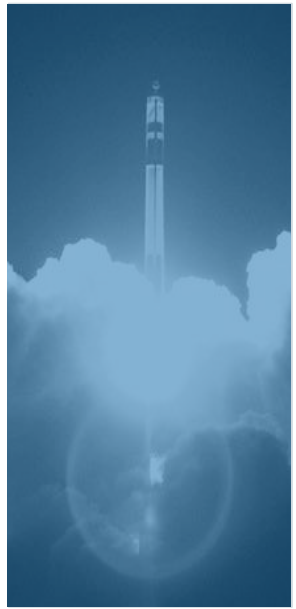
AI/ML

Autonomy

Cyber



Human Systems



Space

BEST COMMERCIAL TECH TO DOD

DIU, with DoD partners, competitively selects the best technology to prototype, transition, and scale solutions.

Department of Defense

- Knowledge of and access to leading technologies
- Competitive prototype process-->proven solutions
- Delivery of capabilities in 12-24 months
- Solutions at commercial cost to save taxpayer $

Commercial Technology

- Simple process and fast time to award
- Access to large volume defense contracts
- Opportunity to solve high-impact national security problems

STRENGTHEN THE NSIB

Broad & Deep Integration Into Tech Ecosystems

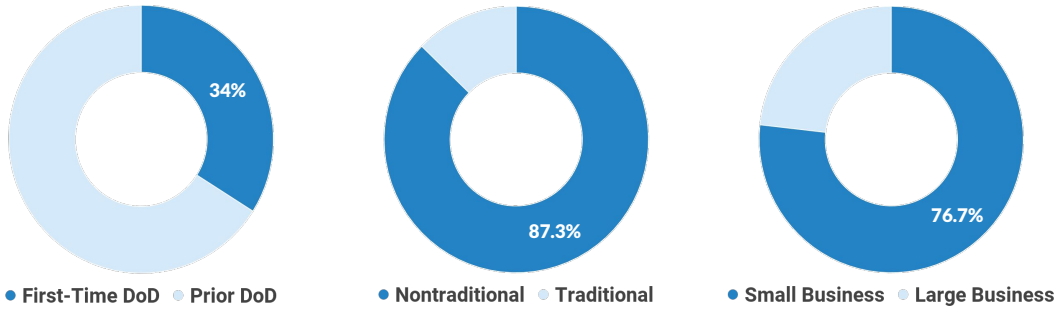
2,300+ Companies Have Responded to DIU Solicitations

41 COMPANY PROPOSALS RECEIVED PER SOLICITATION IN 2020

- 50% increase compared to 2019
- 60-90 days-to-award goal

35% INCREASE IN NEW PROJECTS STARTED COMPARED TO 2019

189 Unique Companies Have Received DIU Awards



Predictive Maintenance

E-3 Sentry

Joint Light Tactical Vehicle

Data shown here represents DIU awards from June 2016 - December 2020

DIU TRANSFORMATIVE PROJECT: BLUE sUAS INITIATIVE

Creating Viable Alternatives to Chinese Drones

Solution

- Standardize product: Enables units throughout the joint force to field large numbers of sUAS (refreshing tech frequently).
- Aggregate USG buying power: Create viable U.S. and friendly-nation industrial base to produce best in class capabilities and achieve scale economies for vendors.

DoD Partners

- Army PEO Aviation
- Navy/USMC PMA-263
- USAF SAF/CN
- GSA
- DHS/CBP

Commercial Vendors

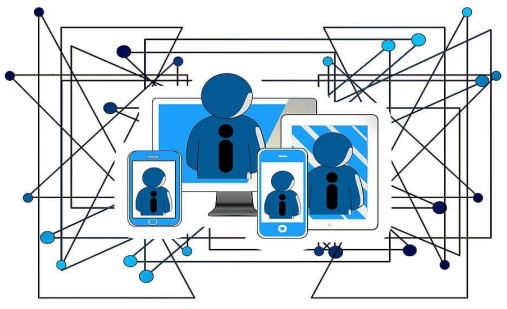
- Altavian
- Parrot
- Skydio
- Teal
- Vintage Robotics

Blue sUAS leverages the Army's Short Range Reconnaissance (SRR) Program of Record

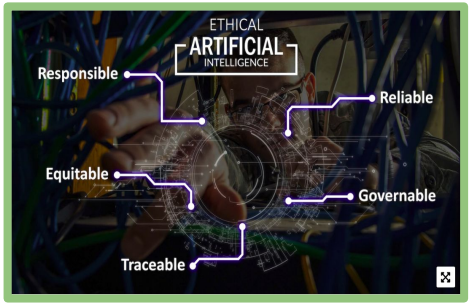
- Use the same drones, but integrate open architecture with a ground control system that fits the needs for each particular user base while ensuring iterative upgrades.
- Align requirements, resources, development, testing, and user experimentation across DoD from the start.
  - NDAA/TAA compliant with DoD cyber validation
  - Configurations available in ISM/DoD frequency bands
- Make systems available through production OTs and on the GSA schedule for DoD and other federal agencies to purchase, sending a strong demand signal to the U.S. industrial base.

DIU AND AI: SUPPORTING DOD EFFORTS

Providing access to new capabilities



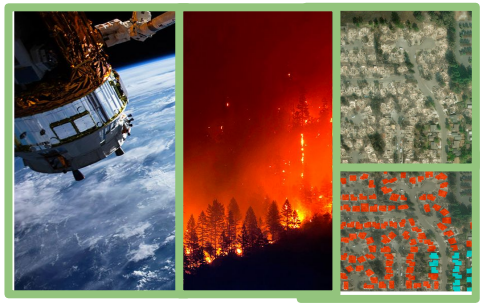
Cutting-Edge Commercial Capabilities
(e.g. Knowledge Graphs)



DoD's AI Ethical Principles

DIU NDIA Panel #1

Using AI to Understand Relationships Between People, Places, and Things



World-wide AI Prize Competitions
(e.g. xView)

Coordination With DoD Partners

DIU NDIA Panel #2

From Prize Challenges to Operations: Lessons from the xView Challenge

DIU MISSION AND KEY AREAS OF EFFORT

BE A FAST FOLLOWER

- Utilize commercial solutions to address DoD challenges today in key technology areas:
  - AI & Autonomy
  - Human Systems & Advanced Energy and Materials
  - Space & Cyber

DoD STRATEGIC EFFORTS

- Climate
- Supply Chain
- COVID-19
- Whole-of-Government AI

ATTRACT BEST TALENT

- Lower barriers of entry to DoD as a solution provider, civilian or SME
  - Cyber Information Technology Exchange Program/Challenges
- Leverage Reserve and National Guard personnel
- Outreach to universities/graduate programs for new National Security talent

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