Conflict in the Western Pacific and the Defense Industrial Base

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A More Dangerous World

The U.S. military and defense industrial base are being stressed to deal with:

1. Assertive/nationalistic China
2. The Russo-Ukraine War; Growing aid to Russia from China, Iran, North Korea
3. Middle East wars continue in Lebanon, Syria, Iraq, Yemen, Israel, Gaza
4. Continuing threats from North Korea and global terrorism

U.S. and Allied Industrial Base Under Stress

Congress has authorized drawdown for Ukraine, Israel, and Taiwan (INDOPACOM)

U.S. industrial base surging on three levels:

1. 1-8-5, more money
2. Surge, 3 shifts, existing facilities, more people
3. Expansion, more facilities

Expanding Supply Chain

We need a shared understanding of our "pacing scenario," and what that means for the defense industrial base.

The Project

Goal:

- Inform the public discourse about a US-China conflict through an operations-research based wargaming series

Three authors:

- Mark Cancian (CSIS)
- Matthew Cancian (Naval War College)
- Eric Heginbotham (MIT)

Entirely unclassified

Ran 25+ times

Used excursions to test assumptions

Extensive Attention:

- **5,000,000** social media viewers
- **680,000** views of short video
- **113,000** views of rollout event
- **38,000** report downloads
- **33,000** podcast downloads
- Over **1,000** news citations

The Simulation

Set in 2026 using projected orders of battle

Represented: Missiles, submarines, surface ship task forces, air and ground forces, air bases, cyber, and satellite reconnaissance.

Two sides: China and U.S./Taiwan/Japan, 2-3 players per side

Air/naval operations played on a 5-foot by 6-foot map of the western Pacific.

Taiwan ground operations on 2-foot by 3-foot separate map.

Source: CSIS

The Conflict Begins

- The tyranny of range
- Effect of simultaneous conflicts
- Tension between political considerations and force deployments
- USMC MLR/Army MDTF challenge
- Vulnerability of surface ships
- No forces or shipments to Taiwan after war begins
- Key role of Japan

Source: CSIS

Situation in Week Four

- Aircraft losses on ground
- Ships starting to engage
- Submarine “Happy Time”
- Effectiveness of bomber/long range missile combination
- Anti-ship missiles are needed, but we have mostly land attack
- Tactics change as long-range munitions run out

Source: CSIS

Munitions Usage

	2028 INDOPACOM (2024 total inventory)	Ukraine/ Israel (Y/N)	Wargame usage (3 weeks)	Status at End of Operation
LRASM	440 (50)	N	440	All used in 3-7 days
JASSM (Basic)	800 (1200)	Y	0	Not preferred because of short range
JASSM-ER	500 (400)	Y	500	Run out at ~30 days
Tomahawk IV/V	4000 (4000)	N	Few	Ships mostly out of range until week 4
MST	150 (0)	N	Few	
Taiwan ASCMs	600 (200)	N	700	All used in a week

Ground Campaign

- The air campaign unfolds at the speed of a missile; the ground campaign unfolds at the speed of a man crawling in the mud
- Value of ground-based anti-ship missiles
- China's need to capture port or airfield
- Impossibility of early reinforcement of Taiwan

Source: CSIS

Ship Replacement Times

	Aircraft carriers	Large Surface Combatant	Attack Submarines	Large Amphibious ships
Current inventory	11	96	53	31
Wargame losses (total)	2	15	3	2
FYDP production rate	.2	2	1.6	.8
Surge production rate (annual)	.25	3	2	1.3
Total time to replace losses at surge (yrs)	40	15	7.5	2+

Losses include estimates for SCS and operations beyond 4 weeks
Navy could mitigate some of these effects by keeping ships in commission longer

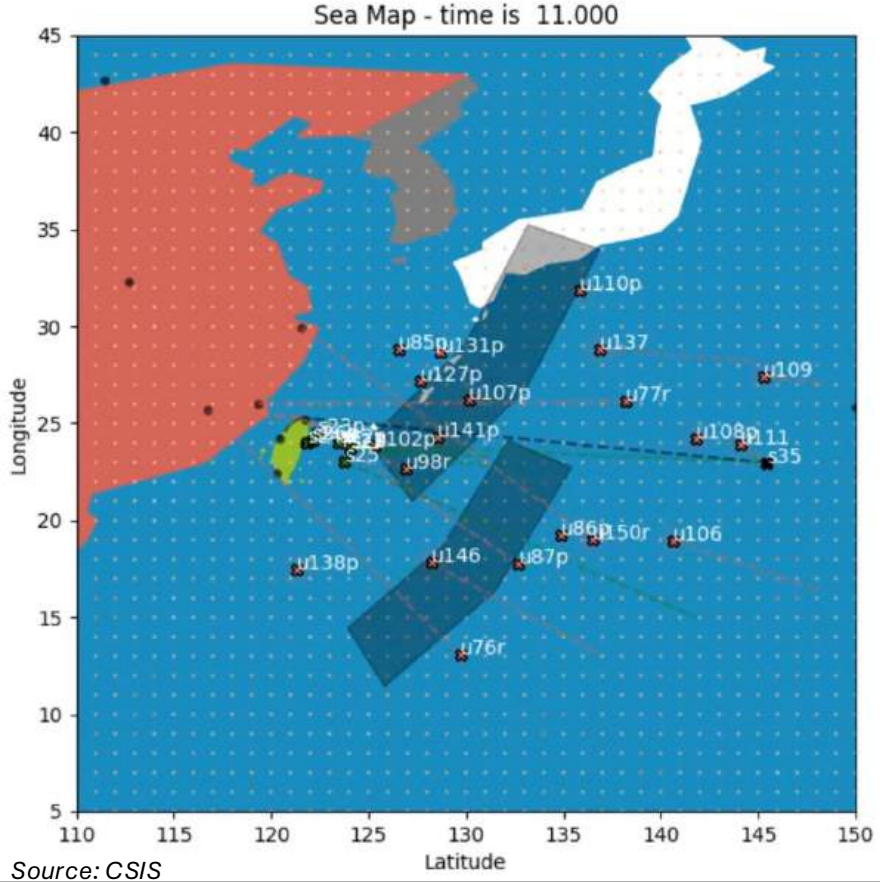
Aircraft Replacement Times

Base/ Pessimistic	Avg. losses	Production rate	Replacement time w/ retirements (yrs)	Replacement time w/o retirements (yrs)	Replacement time w/o retirements, w/ boneyard (yrs)
5th Gen	150/ 255	F-35 FYDP: 78/yr Max:120/yr	5.6 yrs/8.1 yrs	5.6 yrs/8.1 yrs	5.6 yrs/ 8.1 yrs
4th Gen	100/ 200	F-15EX,F-18 FYDP: 0 Max: 24-48/yr	4-6 yrs/ 8-10 yrs	2 yrs/4yrs	1.5 yrs?
Bombers (B-21)	20/30	FYDP: 6/yr? Max:12/yr?	10 yrs/12 yrs?	4 yrs/6 yrs?	2 yrs/3 yrs?

Replacement times include 2 years production time
Max rates from budget P-21 exhibits

CSIS Blockade Study (Ongoing)

Research and game mechanics nearly complete; wargame iterations start soon



Source: CSIS

Emerging Insights

- Keeping population alive → Not difficult, 1ship/day
- Keeping economy functioning → Difficult
- Chip production could continue under many scenarios
- Cross-strait trade is ~25% of Taiwan's total trade
  - Some substitution possible
- Energy (Coal, LNG, Oil) are 2/3s of imports
- Taiwan has some food and energy stockpiles as a hedge
- Airlift → A major effort could meet food, health, and safety needs but little else
  - Economy would collapse
- Impact on national economies and global trade?

There are Significant, Ongoing Challenges with the U.S. Defense Industrial Base (I)

Supply Chain

- Limited U.S. production of solid rocket motors, processor assemblies, castings, ball bearings, forgings, seekers for munitions, and microelectronics
- Reliance on China for advanced battery components, specific raw materials (some ferro-alloy metals, nonferrous metals, and industrial metals)

Mineral Type	China's Strengths	China's Dependencies (Country)
Iron and ferro-alloy metals	• Vanadium • Molybdenum	• Niobium (Brazil) • Cobalt (Congo) • Chromium (South Africa) • Tantalum (Congo)
Nonferrous metals	• Gallium • Germanium • Tellurium • Rare earth elements • Antimony • Arsenic	• Beryllium (United States) • Lithium (Australia)
Precious metals		• Rhodium (South Africa) • Platinum (South Africa) • Palladium (Russia and South Africa)
Industrial minerals	• Graphite • Fluorite	• Boron (Turkey and United States) • Zirconium (Australia)

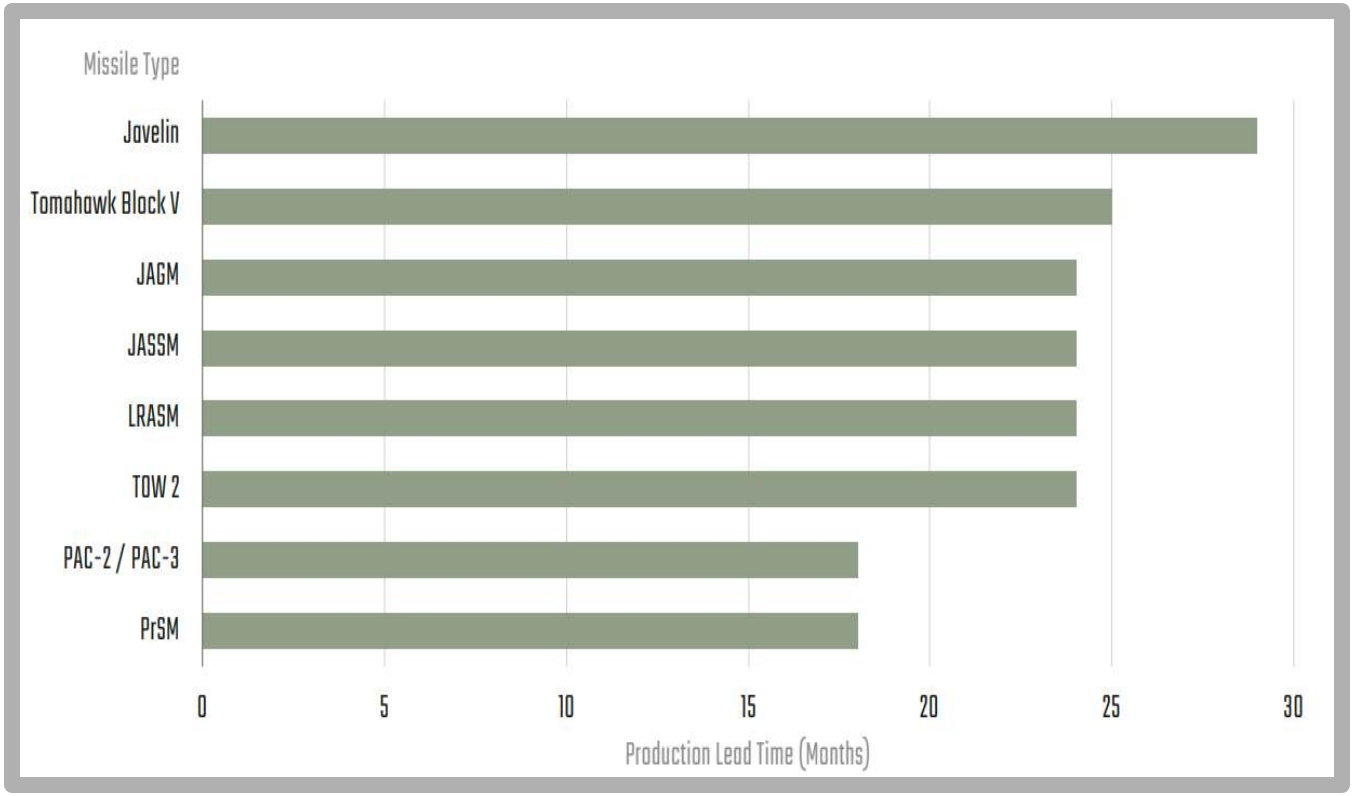
Source: Cortney Weinbaum, et al., Assessing Systemic Strengths And Vulnerabilities of China's Defense Industrial Base (RAND)

There are Significant, Ongoing Challenges with the U.S. Defense Industrial Base (II)

Timeline

- Roughly 2 years to produce key munitions, such as Tomahawk Block V, LRASM, JASSM, and others
- Additional time needed to expand factories (purchase or lease property, secure insurance, build factory, etc.)

Selected Munitions Production Timelines



Source: CSIS

There are Significant, Ongoing Challenges with the U.S. Defense Industrial Base (III)

Munitions Stockpiles

- Insufficient stockpiles of critical munitions for protracted war, including in or near key theaters
- LRASM, PAC-3, SM-6, TLAM, AMRAAM, NSM

Workforce

- Insufficient supply of engineers, electricians, pipefitters, shipfitters, metalworkers, and others
- These challenges have caused notable delays with frigates, submarines, destroyers, and other ships

Contracting and Acquisitions

- Insufficient number of appropriated multi-year contracts
- Little urgency in acquisitions and contracting, which are currently operating in a peacetime environment

China's Defense Industrial Base is on a Wartime Footing and the U.S. is Losing Deterrence

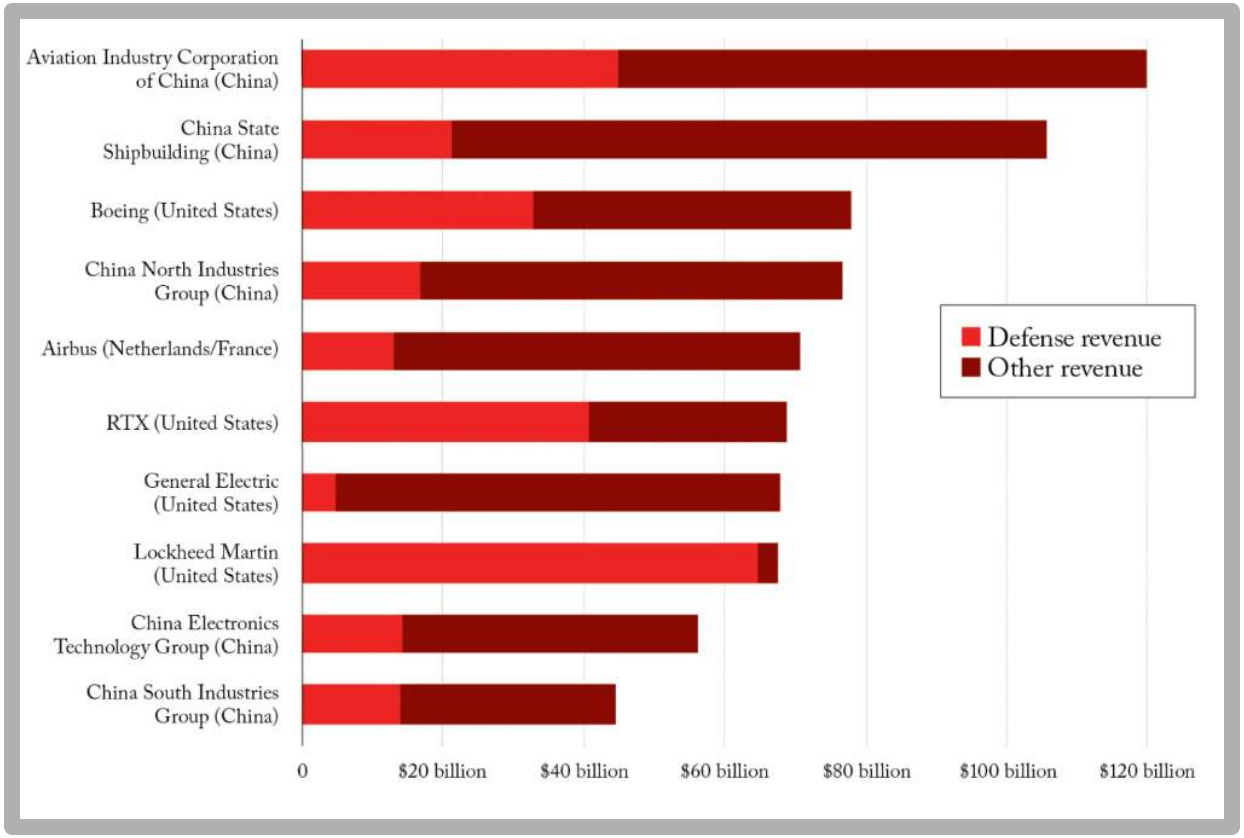
Key Areas of China's Defense Production

- Naval
- Land
- Air and air defense
- Space and counterspace
- Cyber
- Nuclear
- Multi-domain precision warfare

China Has a Major Shipbuilding Advantage

- China's shipbuilding capacity is 230 times larger than the U.S.

The Top 10 Largest Defense Companies Globally by Total Revenue, 2023



Source: Seth G. Jones, Foreign Affairs

How to Ramp Up Production if Deterrence Fails?

The Challenge of Surge

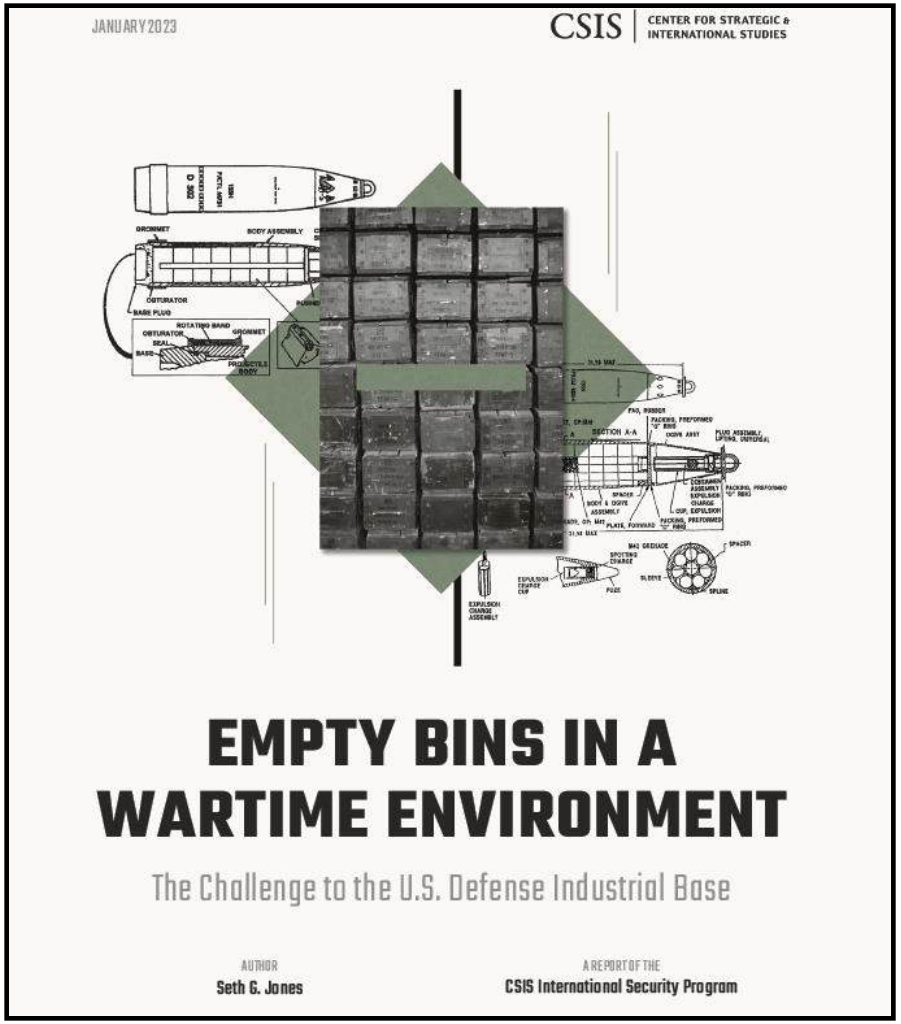
- Limitations on factory capacity, including facility space, machine tools, test & evaluation equipment, workforce, and others will create delays in building up capabilities
- There are pervasive challenges throughout the supply chain

Specific Supply Chain Limitations

- Solid rocket motors, advanced battery components, raw materials (e.g. some ferro-alloy metals, nonferrous metals, and industrial metals)
- More generally, DoD's 2022 supply chain report highlights: kinetic capabilities, microelectronics, casting and forging, battery and energy storage, critical and strategic materials

Questions?

Source: WSJ




Backup

The Wargame

- A 125 page “Rules for Umpires” lays out game rules.
- Die rolls, combat results tables, and computer programs calculate combat results.
- The white cell restricted to adjudication of unforeseen circumstances.
- Ground operations played on a separate map that covers Taiwan.
- Mobilization: China 30d; US 15d.

Source: CSIS

Example Model: Anti-ship Cruise Missiles

Step	Data Sources
1. Failures to launch, travel to target area	• GAO report on Tomahawks in Desert Storm • International Journal of Geophysics on civilian rockets • Air Force Magazine on CALCMs
2. Interception with missiles, CIWS, electronic warfare	• MDA on Standard Missile testing • RAND study on interception • Historical rates of ASCM interception
3. Terminal Guidance	• Historic rates of success for TOWs, AIM-9s • Rates of ASCM hits on civilian ships
4. Damage	• Plotting transferred energy of missiles vs. displacements of ships sunk by various munitions

The Wargame: Players

- Two sides: China and U.S./Taiwan/Japan, 2-3 players per side.
- Players from a variety of senior governmental, think tank, and military backgrounds.
    - Plus, some junior staff
- Players told to execute their best strategy, not to forecast what the countries involved would do.

Source: CSIS

Changes to Force Flow for Western Pacific Conflict

Force Flow w/o Diversions to Other Theaters

Week	0	1	2	3	4	5	Total
CSGs	2	+1		+2	+1	+1	6
SAGs	3		+2	+3	+4	+3 +2	17
ARGs	3				+2	+1 +1	7
SUBRONS	1	+1	+1	+2	+1	+1	7

Force Flow w/ Diversions to Europe and Mid-east

Ships: 136

Week	0	1	2	3	4	5	Total
CSGs	2	+1		+2	[ ]	+1	5
SAGs	3		+2	+3	[+2]	[+2] +2	14
ARGs	3				+2	+1	6
SUBRONS	1	1	1	[GIUK] +1	+1		5

Ships: 110

National Defense Industrial Strategy Implementation Plan Lays out the "Risks of Inaction" for the Indo-Pacific Deterrence Line of Effort

Risks of inaction (so status quo)

- Inability to compete globally results in a decrease in DIB exports and market share
- Supply and material shortfalls result in the inability to meet the pacing challenge and production requirements Fragile supply lines result in the inability to meet production requirements

Mitigation in key areas will take 5+ years

NDIS Implementation Plan Highlights Time Challenge

1: Indo-Pacific Deterrence		
LOE 1.1	Supplementing Key Munitions and Missiles	Long-Term (5+ years)
LOE 1.2	Submarine Industrial Base	Long-Term (5+ years)
2: Production and Supply Chains		
LOE 2.1	Assessing Supply Chain Risk Vulnerabilities	Immediate (0-2 years)
LOE 2.2	Onshoring Critical Production Capacity	Long-Term (5+ years)
LOE 2.3	Industrial Cybersecurity	Immediate (0-2 years)
LOE 2.4	Adversarial Capital	Medium-Term (3-4 years)
LOE 2.5	Stockpiling	Long-Term (5+ years)
LOE 2.6	Maritime Economic Deterrence	Medium-Term (3-4 years)

Source: National Defense Industrial Strategy Implementation Plan for FY2025, Department of Defense

NDIS Implementation Plan Highlights Time Challenge

3: Allied and Partner Industrial Collaboration		
LOE 3.1	Strengthening AUKUS Trilateral Security Partnership	Medium-Term (3-4 years)
LOE 3.2	Co-development and Co-production of Priority Defense Systems	Medium-Term (3-4 years)
LOE 3.3	Facilitating International Industrial Collaboration	Medium-Term (3-4 years)
4: Capabilities and Infrastructure Modernization		
LOE 4.1	Nuclear Modernization	Long-Term (5+ years)
LOE 4.2	Organic Industrial Base	Long-Term (5+ years)
LOE 4.3	Improving Maintenance, Repair, Overhaul, and Upgrade (MRO&U)	Medium-Term (3-4 years)

Source: National Defense Industrial Strategy Implementation Plan for FY2025, Department of Defense

NDIS Implementation Plan Highlights Time Challenge

5: New Capabilities Using Flexible Pathways		
LOE 5.1	Replicator Initiative	Immediate (0-2 years)
LOE 5.2	Rapid Defense Experimentation Reserve	Immediate (0-2 years)
LOE 5.3	Flexible Acquisition Pathways	Immediate (0-2 years)
6: Intellectual Property and Data Analysis		
LOE 6.1	Intellectual Property Coordination	Long-Term (5+ years)
LOE 6.2	Deliver Capabilities for Enterprise Business and Joint Warfighting Impact	Long-Term (5+ years)
LOE 6.3	Advance the Data, Analytics, and AI Ecosystem	Medium-Term (3-4 years)

Source: National Defense Industrial Strategy Implementation Plan for FY2025, Department of Defense