The Changing Character of Warfare:
Defense of the Baltics

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Purpose

- What drives changes in character of warfare?
- What is driving change today?
- What impact will these changes have on the various domains of warfare?
- Operational and strategic implications

Underlying
NATURE OF WAR
does not change,

CHARACTER OF WARFARE
changes continually

Key Question -

Why does the character of war evolve?

Character of Warfare Reflects Societies

- Economic
- Political
- Social
- Technical

Technical is least important

Emergent Capabilities

- Pervasive Surveillance
- Precision Mass
- C4ISR that can exploit both

Tactical defense becoming dominant

Pervasive Surveillance:
Satellites and Drones

Pervasive Surveillance

All weather, all the time

- Space based – visual/IR/SAR/EW/radar
  - 100,000 small sats by 2030
- Drones – 15 min to weeks – all spectrums
- Ground – all plus sound

Coherent Change Detection

Precision Mass

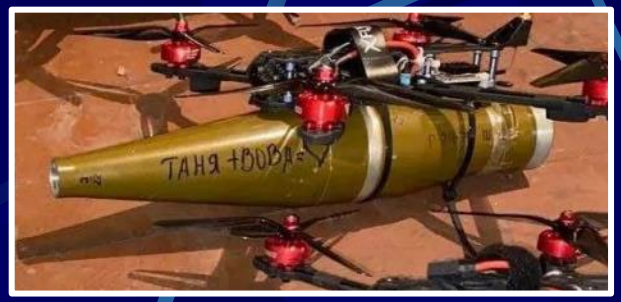
Artillery, missiles, rockets, drones

Artillery, Rockets, Missiles

- Range
  - Artillery – 50 km, self-propelled
  - Rockets – 150 km
  - Missiles – 1600 km
- Mobility – self-propelled, containerized
- Precision – CEP under 10 meters
- Cost – 50-90% less than previous precision

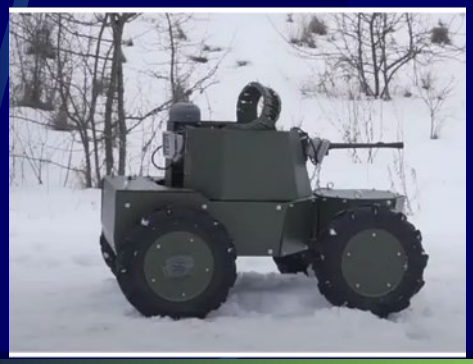
Cheap Drones

Radio, Fiber Optic, Autonomous



- Homemade
- 10-15 km
- $400

- Destinus Lord
- 2.000 km
- Mass-produced
- Low cross-section

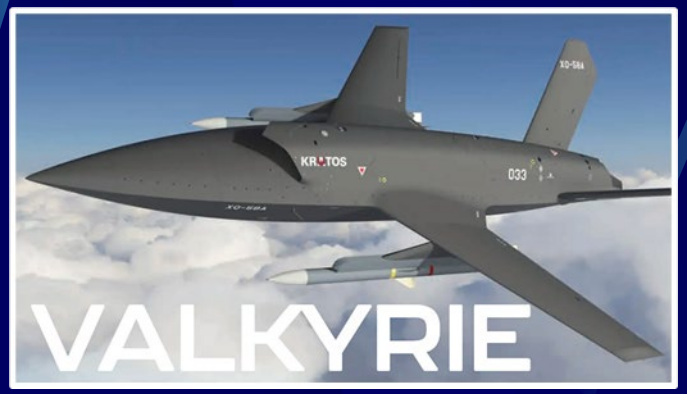


- Remote control
- Thick armor
- 12.7mm MG – 700 meters

4 million in 2025 – 12 Autonomous systems

Long-Range Drones

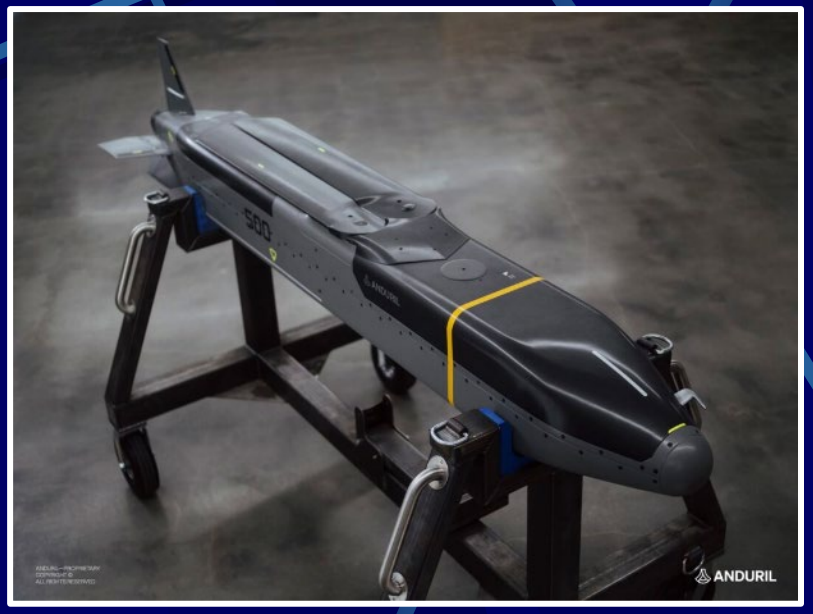
- PLA Sunflower
- 1,100 NM
- 90 lbs payload
- Autonomous
- $100,000



- XQ-58A Valkyrie
  - 3,000 miles – 600 lbs
- VTOL
- $2-5 million
- 5 variants

Cheap Precision Mass

Platform Agnostic - autonomous



Anduril Barracuda

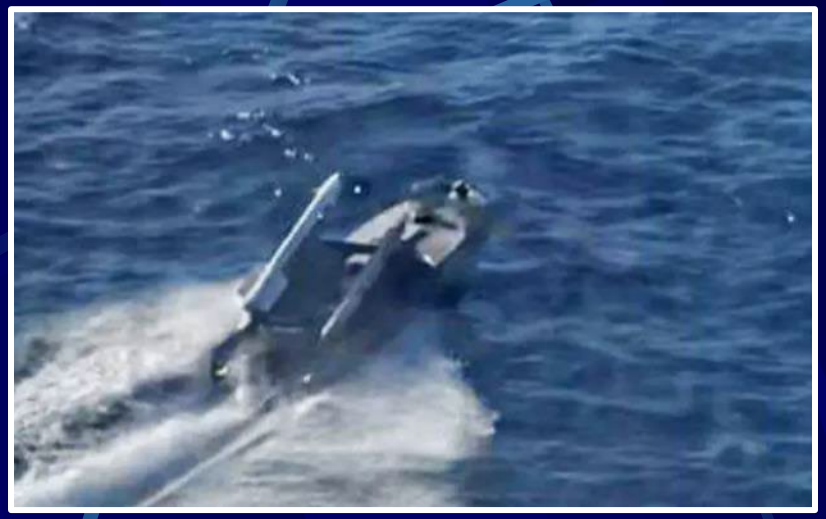
100 – 220 km, Helicopter, fighter, container

250 – 370 km, Fighter, cargo, container - $160K

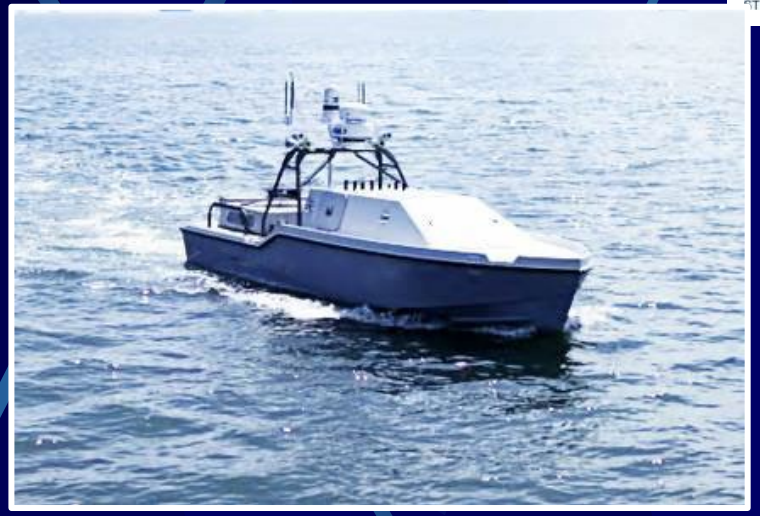
500 – 900 km, Fighter, cargo, container -$1M

18 Barracuda 250s for 1 LRASM

Naval Surface Drones



- Ukraine – Magura V 2023
- 350 NM - 1,850 lbs
- 18 ft long
- $273,000
- SAMs
- Bomber drones



- Saronic Corsair
- 1000 NM – 1,000 lbs
- 24 ft long
- Autonomous/swarming
- 100s in 2025

5,100 Magura V = 1 Constellation class frigate

Autonomous Underwater Vehicles

Kongsberg HUGIN

- Autonomous
- 15 days, 2200 Kilometers
- Multiple options

Anduril Ghost Shark

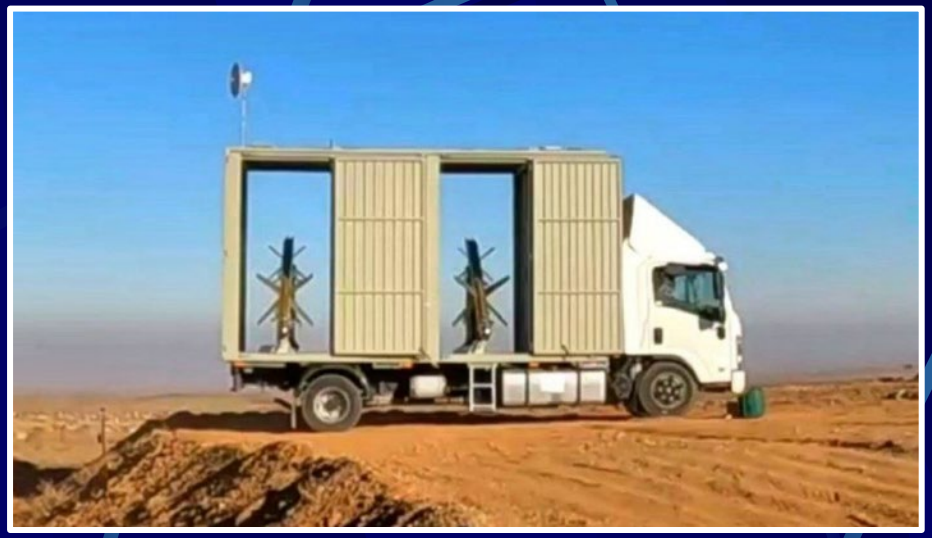
- Autonomous
- Fits in FEU
- Multiple payloads
- All electric
- 1,000 mi/2025

Anduril Copperhead

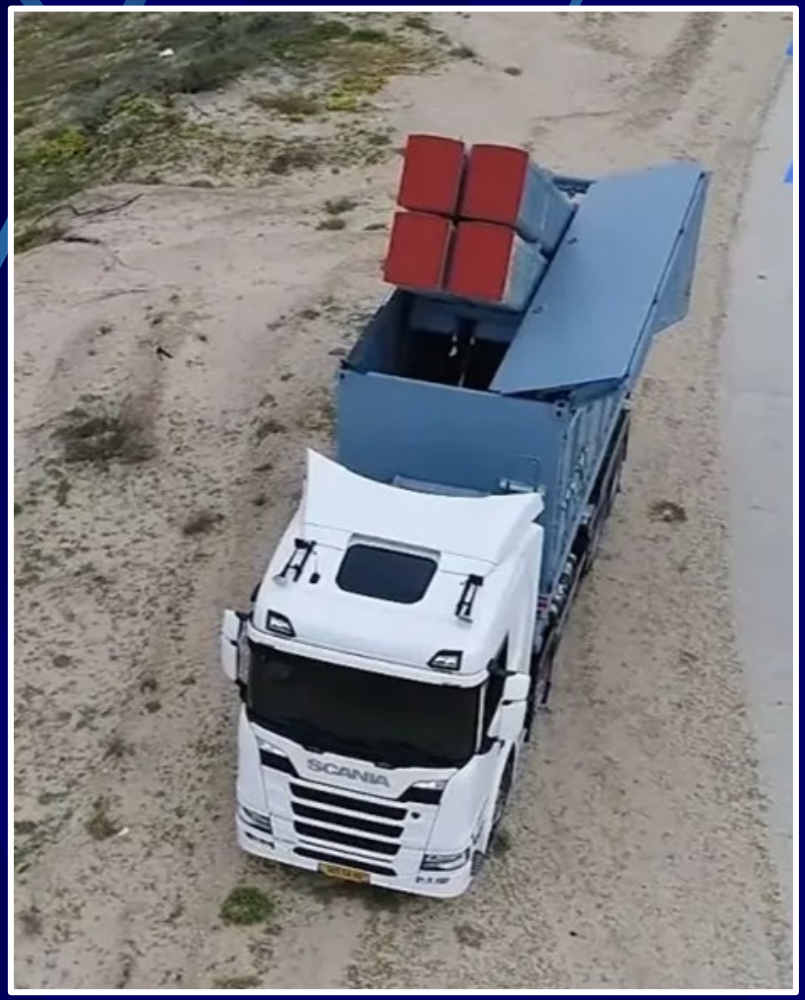
- Torpedoes
- MV-22 delivery

200 sharks/year; 1,000s of Copperheads

Hide in Plain Sight



Iranian SAM



Estonian ASCM

Countering Mass?

Direct Fire and Directed Energy

Directed Energy: Lasers and Microwave

- Advantage to land-based defense
  - Massive power generation advantage
  - Concealment
- Weakness
  - Lasers - smoke, haze, reflective coatings
  - Microwave – Faraday cages; hardened electronics

C4I:
Exploit advances

C4I - Ukraine

Demonstrated capability

- Delta – decision support/sit awareness
  - Based on Diya
  - Runs on any platform
  - Routed through Starlink
  - AI assisted – Palantir
  - Inputs from sats, radars, sensors, phones
- Much more than “Uber for fires”
  - Unit to national communications package

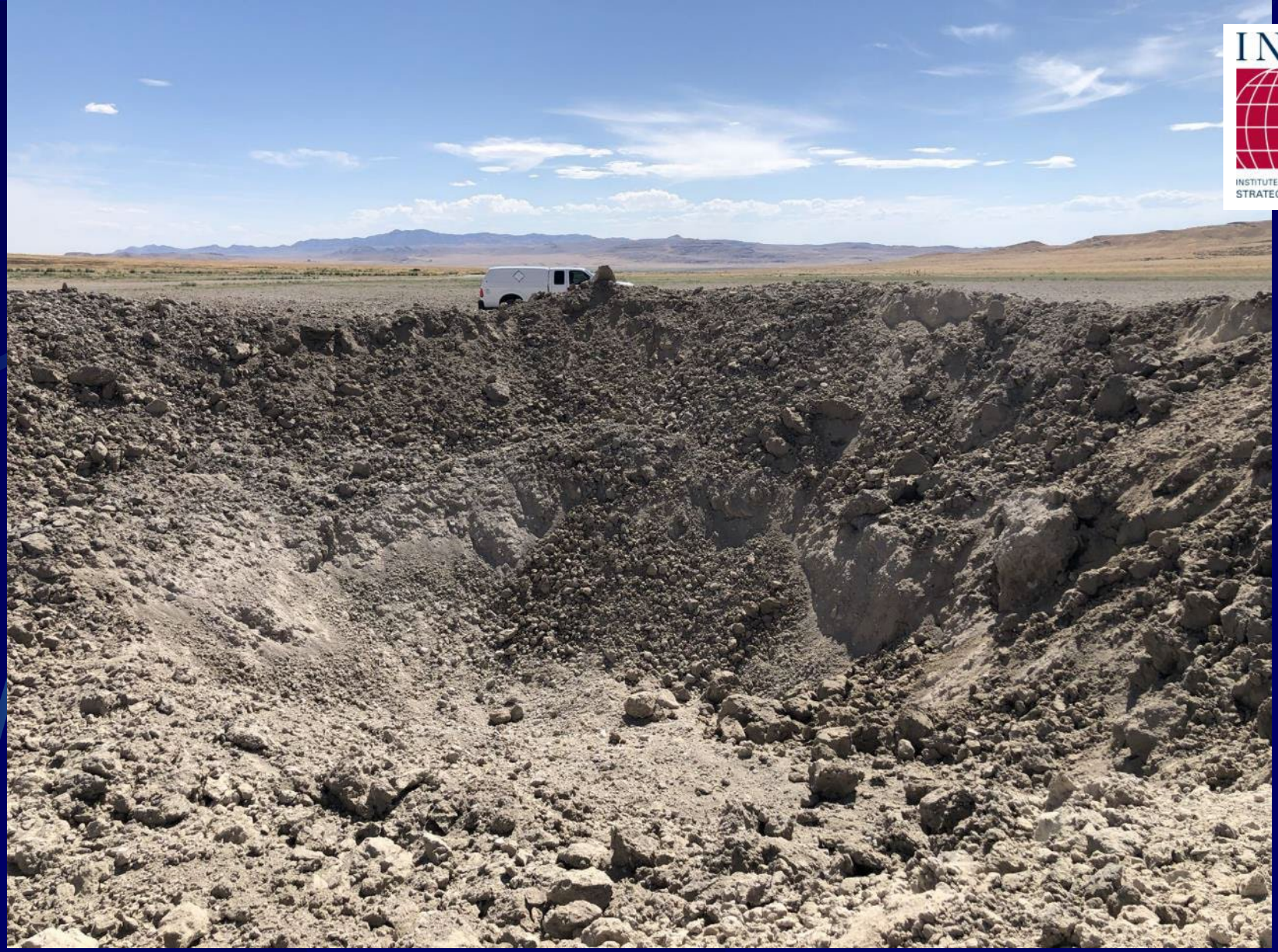
C4I

- Israel
  - Lavender – 37,000 people
  - The Gospel – 20,000 buildings
  - Where's daddy – active tracking
- United States
  - Army – Project Convergence
  - Navy – Project Overmatch
  - Air Force – Advanced Battle Management System
  - Joint Fires Network – deep strike weapons

Tactical Impacts:
C4I, Pervasive Surveillance, and Mass w/ Precision

Ground Domain

- 15 – 30 Km Dead Zone
- Defense becomes dominant
  - Defenders stationary
    - Passive ISR
    - Dispersed weapons – massed combined arms
      - Artillery, rockets, drones, EW, direct fire, aircraft
  - Attackers move
    - Often must converge
- Numbers are essential
  - Sustained over time



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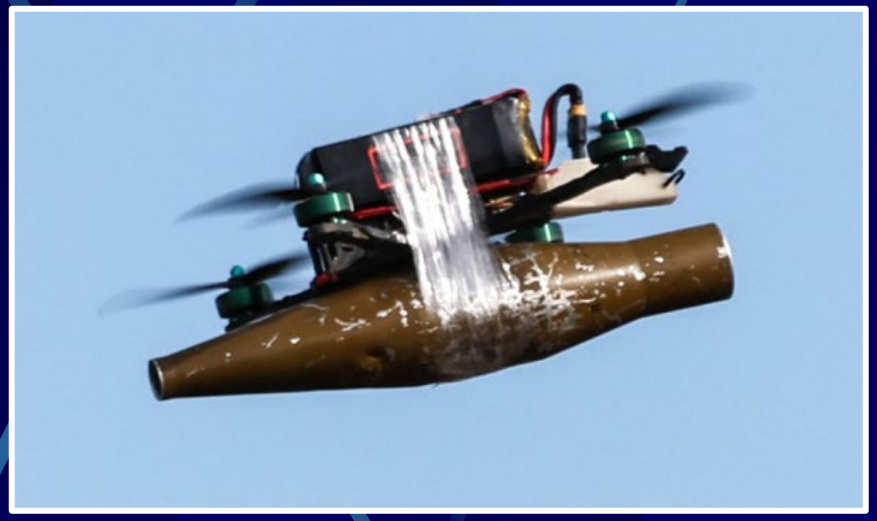
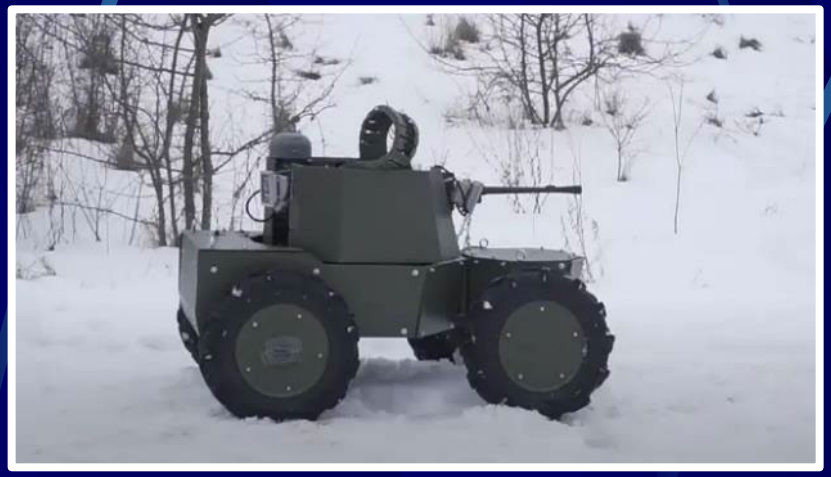
40,000 lbs = 1 Tractor Trailer load of Ammonium Nitrate

UGV + UAV

$400 each
15km
Increasing autonomy





Remote control
Thick armor
700 M accuracy

Can you maneuver with 1,000 hunters overhead and underfoot?

Sea Domain

- Land power dominates sea to increasing ranges – concealment/magazine depth
  - Confined seas mutual denied areas
  - Choke points closed – mines, missiles, drones
- Small states/insurgents challenge navies
- Weapons not platforms
  - Any ship can kill any other ship
  - # ship killers = # ships with containers

Air Domain

- Weapons not platforms
- Fixed bases become untenable
- Evolved cruise missiles and drones take over many missions
- With right weapons, mobile air defense denies airspace

Are manned aircraft range obsolete?

Air Domain

Cost/Benefit Analysis

- Sunflower Autonomous = $100,000
- Barracuda 500 = $450,000
- XQ-58A Valkyrie = $3,000,000
- F-35A costs per aircraft per F-35 office
  - Lifetime cost = $855,000,000
  - 1 F35A = 285 Valkyries or 1,900 Barracudas or 8,550 Sunflowers
  - FMC – 855 Valkyries or 5,700 Barracudas or 25,650 Sunflowers
- Little or no maintenance for drones

Space Domain

- Heavily congested and contested
- Everyone has access to space
  - Surveillance, Communications, Attack
- Rapid space replacement evolving
  - Commercial space, drones, balloons
- Key issue = PNT for civilians

Cyber Domain

- Combined arms fight
- Conventional wisdom – offense dominated
- Ukraine shows
  - Contested
  - Continuous
  - Global

Electromagnetic

- The critical domain??
- Contested by combined arms
- Russia claimed 90% of drone kills were EW
  - Down to individual soldier
- China – Learning from Russia
- Driving long-range precision to GPS independent autonomy

Operational Implications

- Connected C2 critical
  - Must prepare to fight disconnected
- Defense dominates air, land domains
- Sea domain is mixed
- Space and electromagnetic contested
- Cyber uncertain
- Power projection much more costly

Strategic Implications

- Major Allied advantage in Europe/Asia
  - Geography favors the defense
- Smaller states/non-states deny major powers
- Greater allied contributions
- Mass production returns
- National mobilization required

Contact Information

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