The Changing Character of Warfare:

Combined Arms Defense Dominates

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The Key Rule of Military History

Leave Mountain People Alone

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
- Some questions to consider

Underlying
NATURE OF WAR
does not change,

CHARACTER OF WARFARE
changes continually

Emergent Capabilities

- Pervasive surveillance
- Precise mass
- C4ISR that can exploit both to create combined arms
- Extended range
- Emerging autonomy

Pervasive Surveillance:
All weather, all the time

Pervasive Surveillance

All weather, all the time

- Space based
  - Visual/IR – many times per day
  - SAR - Capella Space – every 15 mins by 2027
  - EW – Hawkeye 360 - w/in 3 KM - hourly
  - 100,000 small sats by 2030

Coherent Change Detection

Commercial Satellite Imagery

Fast & constantly improving

PLANET LAB
Battle Damage Assessment
1 Day post-strike

Satellite + AI
Identify ship class

Pervasive Surveillance

- Terrestrial based
  - Cyber/Social Media – Continuous
  - Advanced EW, radar, optical, acoustic
- Drones – minutes to weeks endurance
  - EO, IR, SAR, radar, EW

If you produce a signature,
You will be seen.

Precision Mass

Artillery, rockets, drones, missiles

Artillery/rockets/missiles

- Swedish Archer 155 mm
- Range: 50 km
- Emplace, 3 rounds, displace
  - 72 seconds

- HIMARS – PrSM
- 800 km

- Lumberjack
- 320 km
- $100K

- Harop – loitering munition
  - 600 Miles – 50 lbs
- VTOL
- Autonomous – Visual, IR, EMS
- Operational in over 10 nations

- C-130 w/ Rapid Dragon
  - JASSM-ER – 600 miles
  - Longer range missiles available
- Allied use too

- XQ-58A Valkyrie
  - 3,000 miles – 1200 lbs
- VTOL
- $2-5 million
- 5 variants

Naval Surface Drones

- Ukraine – Sea Baby
- 1000 km – 2000 kg
- Anti-air variant
- Land-attack variant

- Saronic Corsair
- 1000 NM – 1,000 lbs
- 24 ft long
- Autonomous/swarming
- Part of family of USVs

Autonomous Underwater Vehicles

Norwegian HUGIN

- Autonomous
- 1,000 NM
- 0.04% Nav accuracy

Anduril Copperhead

- Torpedoes
- MV-22 delivery

Anduril Ghost Shark

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

200 sharks/year; 1,000s of Copperheads

Containerized Systems

Platform Agnostic

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Missiles

ISR & Comms

Drones

Hide in Plain Sight

Iranian SAM

Estonian ASCM

Impact of Drones

- Ukraine – Russian vehicles destroyed
  - Summer of 2023
    - 42% of tanks
    - 39% of IFV
  - Early 2024 – 90% of vehicle kills
- Long-range strike – out to 2000 km
  - Russian Gasoline shortage
  - Russian AF retreated
- No go zone is 30-40 km deep
  - US Tube artillery outranged

Countering Drones

- Direct Fire
  - Advantages
    - Speed
    - Accuracy
  - Disadvantages
    - Range
    - Magazine Capacity
- Directed energy
  - Advantage to land based
    - Power
    - Concealment
    - Cheap per shot
  - Disadvantages
    - Environment, burn thru time
    - Power/distance contest

Countering Drones
Sting interceptor

- $2500
- VTOL
- Autonomous
- Thermal Sensors
- 25 km range
- RTB function

C4I:
Exploit advances

C4I - Ukraine

Demonstrated capability

- Delta – decision support/sit awareness
  - Runs on any platform
  - Routed through Starlink
  - AI assisted – Palantir
  - Inputs from sats, radars, sensors, phones
- 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

Irregular War

- Long-range precision strike; swarms
- Convergence favors non-state actors
  - Little infrastructure to protect
  - Weak drone/missile defenses
  - State infrastructure vulnerable
  - Defense of logistics – civil and military
- Powerful role for outside sponsors
- Old tech still works

Conventional Warfare

- 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

Impact on US Forces

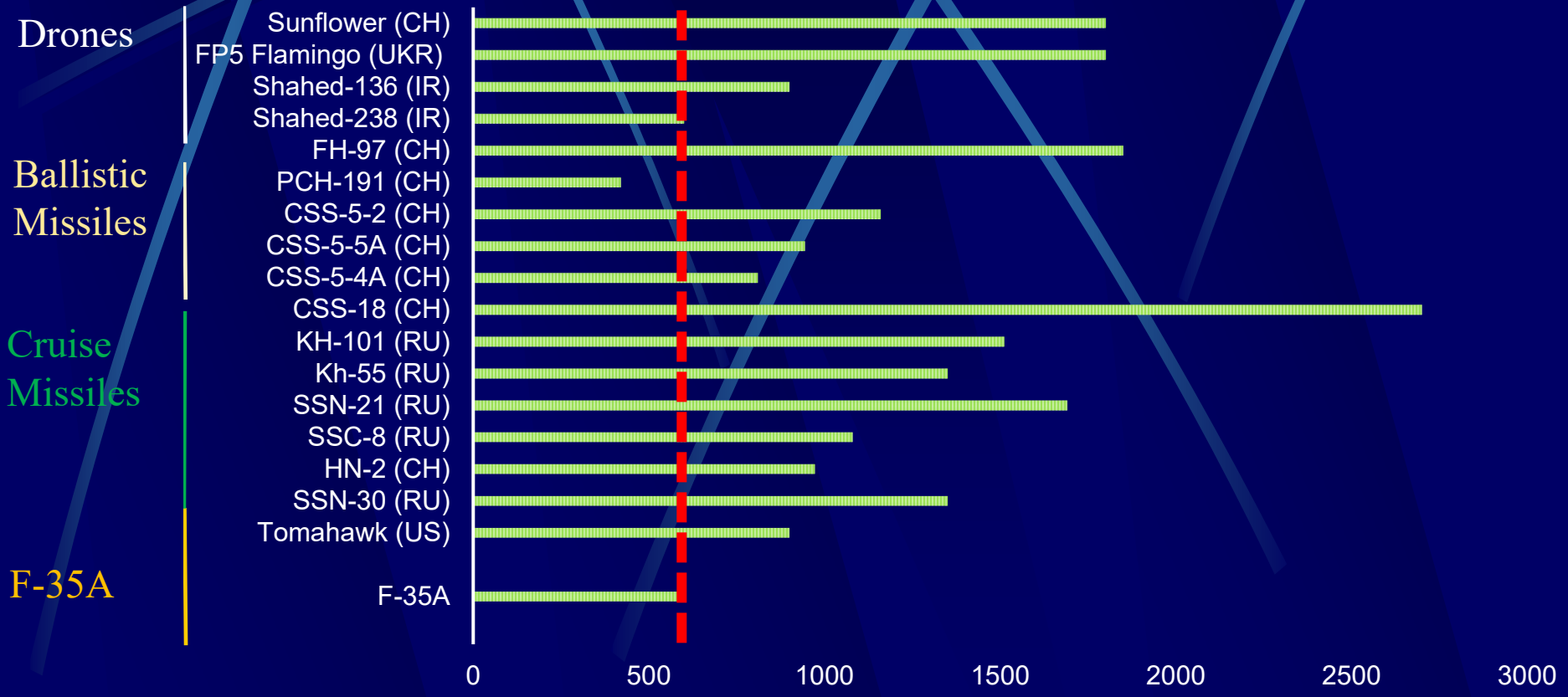
- US forces are
  - Outranged and outnumbered
  - Fragile
  - Unsupportable
  - Unaffordable
  - Unreplaceable in wartime
- Effective replacements are here or on the horizon
  - Missiles and drones
  - US very slow to adapt

Outranged
&
Outnumbered

Air Domain

F-35A vs Missiles/Drones

Operational Range in Nautical Miles



Are manned aircraft range obsolete?

Land Domain

- Defense becomes dominant
  - 30-40 km dead zone
  - Drones range – 30 – 100 km
- US armor and tube artillery outranged
  - Attackers moving and converging
- Numbers are essential – 10 M in Ukraine
  - Sustained over time

Fragile

Air and Ground

- Airfields
  - Stimson paper 7-30 days – just PLARF
  - CONUS bombers/tankers
- Russian ground forces losses
  - Tanks – 11,000; APCs – 23,000; Arty – 33,000
  - Personnel – 1.2 million
- Massive signatures of C2 and logistics

Sea

- Any ship can kill any other ship
- Think weapons not platforms
  - Missiles, drones, mines, torpedoes
  - Tens of thousands not dozens
- Land based defense dominates sea to increasing ranges
  - Comms, cover, & magazine advantages
  - Choke points closed – land-based blockade
- Small states/insurgents challenge navies

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Fragility - US carriers

USS Oriskany – 1966
5 months

USS Enterprise -1966
51 days

USS Forrestal – 1967
9 months

Fragility – Surface Line

Average 1.2 Cruise missiles to sink or disable

HMS Coventry

USS Stark

Unsupportable

- Very low readiness rates < 50% for many
- Complexity of weapons
- Limited suppliers
- Massive logistics backlog
- Forward logistics facilities in range

Peacetime with large US bases

Unaffordable

- F-35A = $855M each lifetime
  - $2.1B to insure one works
    - Lockheed was delivering w/out TR-3 or Block 4
    - Next gen will cost 3 times as much
- CV = Purchase > $20 B with airwing
- = Lifetime – approaching $100B
- Missiles = LRASM/JASSM-ER - $3.3M; PAC-3 Interceptor - $3.4M

Unreplaceable

- F-35: 13 per month (20 users)
- B-21: 7 per year
- CV: 9 years each (JFK delayed)
- DDGs: 2/year; FFG: ??
- SSNs: 1.5/year
- Munitions: a fraction of usage

- Munitions:
  - TLAM – 57
  - MST – 837 (3 yrs)
  - JASSMs (AF inc) -389
  - AMRAAM – 51
  - LRASM – 120
  - RAM – 123
  - SM6-139
  - NSU - 106

Money won't fix it –
DIB can't produce mass

The Good News

- New weapons
  - Range
  - Mass producible in wartime
  - Affordable
  - Supportable

Collaborative Combat Aircraft

- XQ-58A *Valkyrie*
- 5,000 KM – 270 KG
- 4.000 KM – 540 KG
- Autonomous/VTOL
- $3M
- Mass produced

- YQF-42A and 44A
- 1,200 KM
- Semi-autonomous
- $25-30M

700 Valkyrie = 1 F-35A Lifetime cost

FML-136 LUCAS
Low-cost Unmanned System

- Linked, swarming
- Autonomous
- NLOS control if needed
- 700 km, 18 kg warhead
- $35,000
- 3 months to reverse engineer Shahed
- TF Scorpion Strike in CENTCOM

Autonomous Attack Drones

- Over 100,000 delivered in 2025
- Bumblebee – 15-30 km range
  - Lock on from 1.6 km
  - 70% hit rate – 1,000 live missions
- Hornet – 120 km range
  - 5 kg payload
  - 6,000 per month initial plan
- Vermeer – 90 km
  - Guidance – .5 kg

Cheap Long-range Precision

Platform Agnostic - autonomous

- VTOL
- Containerized
- Autonomous
- Swarming
- Varied payloads
- 10 tools
- Commercial parts
- 2026 – 100/month

Anduril Barracuda

100 – 220 km, Helicopter, fighter, container
250 – 370 km, Fighter, cargo, container - $160K
500 – 900 km, Fighter, cargo, container -$200K

18 Barracuda 500s for 1 LRASM

Autonomous Surface Vessels

- USN MUSV
- 8 containers
- 20-66 Barracuda each
- Autonomous/swarming

- Blue Water Autonomy
- 5 shipyards
- Container capable

- Sea Baby
- 1000 km
- 2000 kg

Missile Merchants

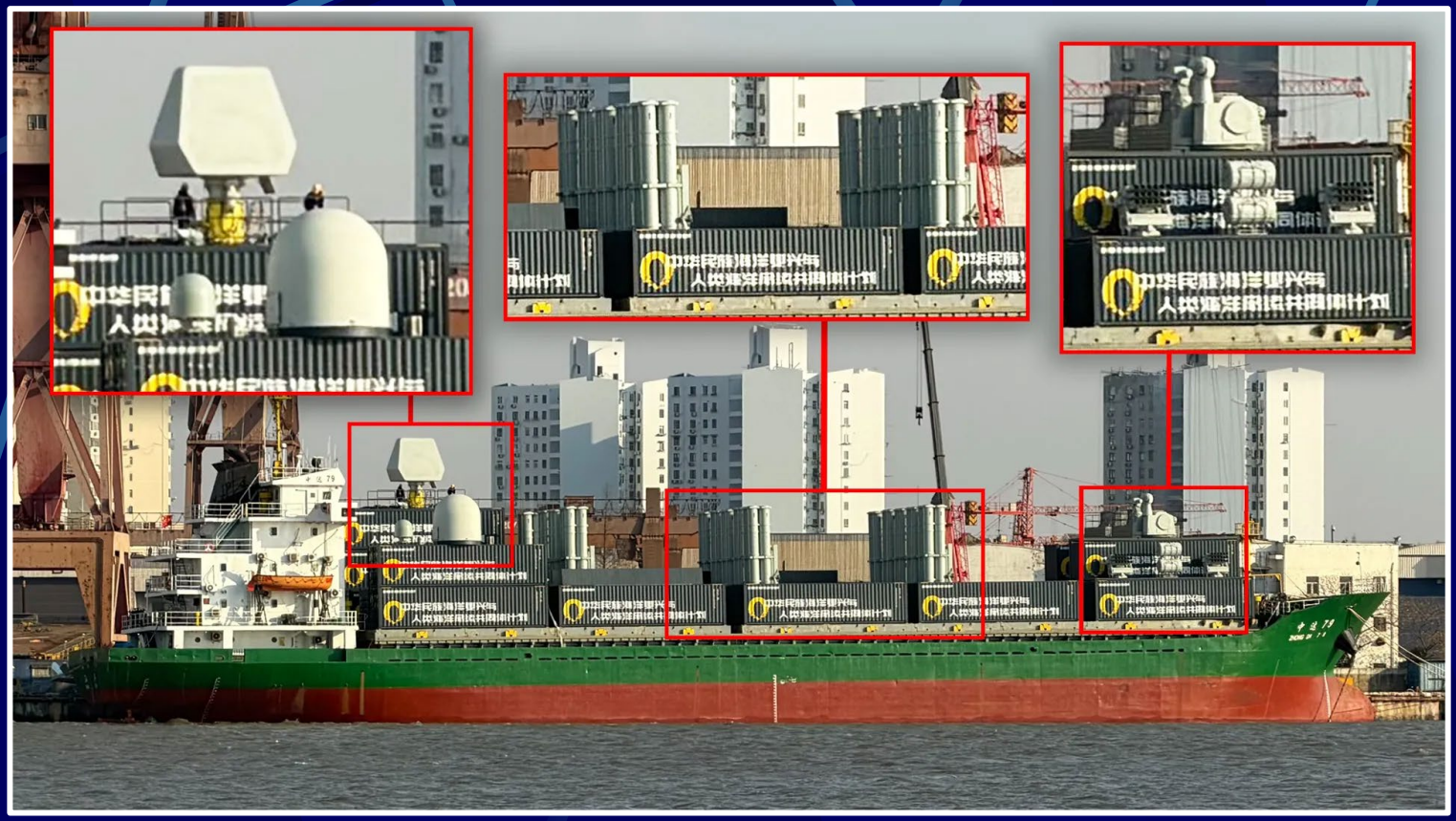
- $25 million for ship
- Total - $125M
  - 40-250 missiles
  - VTOL Drones
- Small crew
- Well-armored

- $2-5 million for ship
- 4 – 20 LR missiles per TEU
- 66 SR missiles per TEU
- VTOL Drones

8 Large MM w/320 to 2000 missiles = 1 *Constellation* class

PLAN

25 Dec 2025



- Phased array radar
- 60 VLS cells
- 2 CIWS
- 2 Decoy launchers

Initial analysis

- Current platforms
  - Reduce/slow/stop buys
  - Invest in readiness for current systems
- Current weapons
  - Continue buys but examine replacements
- Accelerate new generations of weapons/systems

Some Questions

- Should operating concepts focus on defense?
- Payloads not platforms?
- Containerize everything?
- Production for long wars?
- Battlespace management?

The entire history the Marine Corps summed up

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