

4IR Changes the Character of War

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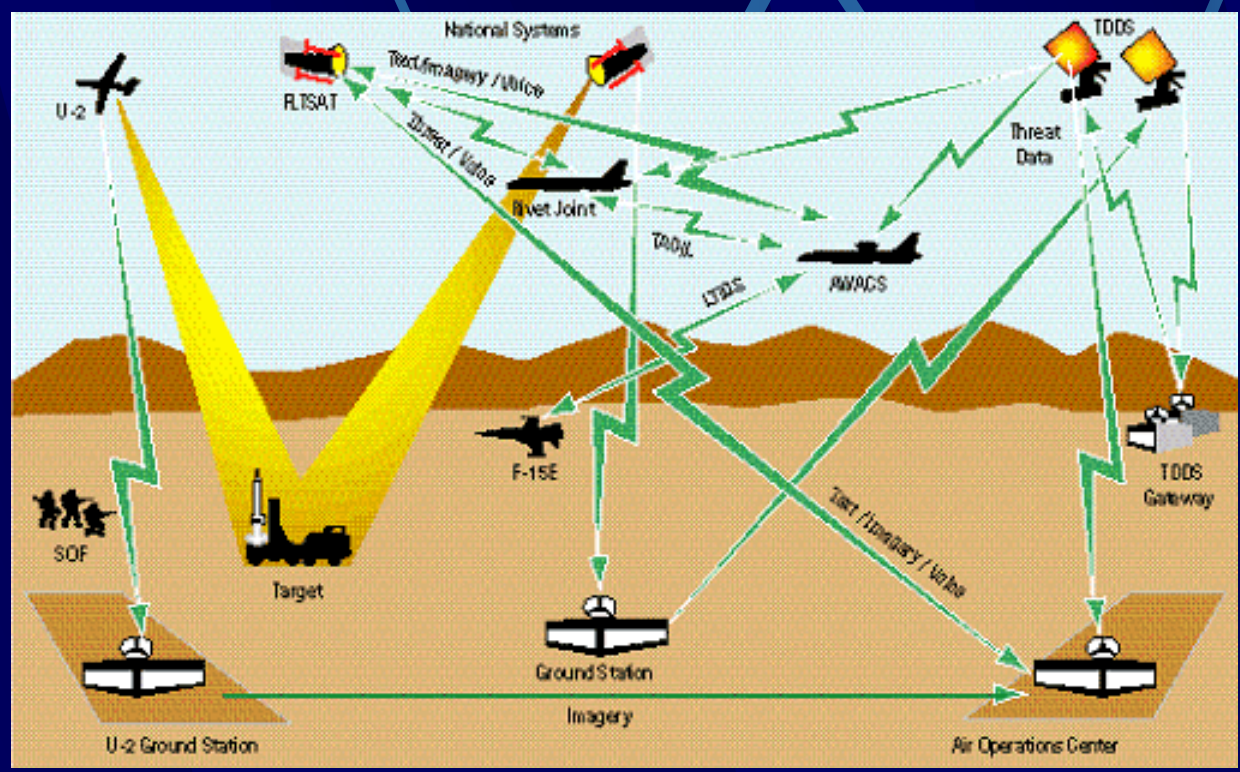


Disclaimer

Purpose

- What technologies are driving change?
- How will they impact in the various domains?
- Big questions?

What DOD envisioned: NetCentric War



What we got



Chronicle / Kim Komenich



Character of War Reflects Societies

- Economic
- Political
- Social
- Technical

“Military institutions and the manner in which they employ Violence depended on the economic, social and political conditions of their respective states.”

On War, Clausewitz, Paret translation, pg. 6.

4IR Converging Technologies

- Small warheads
- Drones
- Task-specific Artificial intelligence
- 3D Printing
- Cheap space

Small, smart, many, & lethal

Small Explosively Formed Projective



10 X Explosive
Power of TNT



IEDs that hunt you

- https://www.youtube.com/watch?feature=player_embedded&v=QRrSriR5b6s
- From 04-30 seconds

Drones + AI



DX-3 - VTOL
900 miles
Visual/IR
GPS Nav – Autonomous
\$200,000

Flexrotor
2,000 miles
Visual/IR
GPS Nav – Autonomous
\$200,000



Drones + AI



QX222

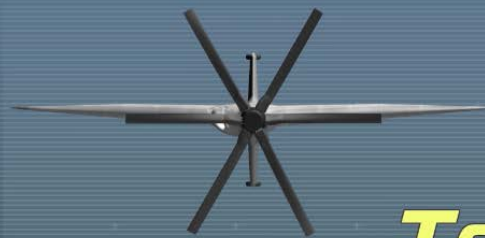
1500 miles – 500 lbs

Autonomous

VTOL

\$2M

USN Tern
900 miles
ISR, EW, Strike
500 lbs
VTOL



Tern



- Vertical Launch & Recovery
- ISR, EW and Light Strike
- All Weather, Day/Night Capable
- EW/Comms Node

Drones + AI



Harpy – 400 miles

Harop - 600 miles

55 lbs

Autonomous

Visual, IR, EMS

Launcher

< \$500K per drone

10 years old – operational in 6 nations

3D: Capability + Volume



Autonomous
50 KM Range
\$800

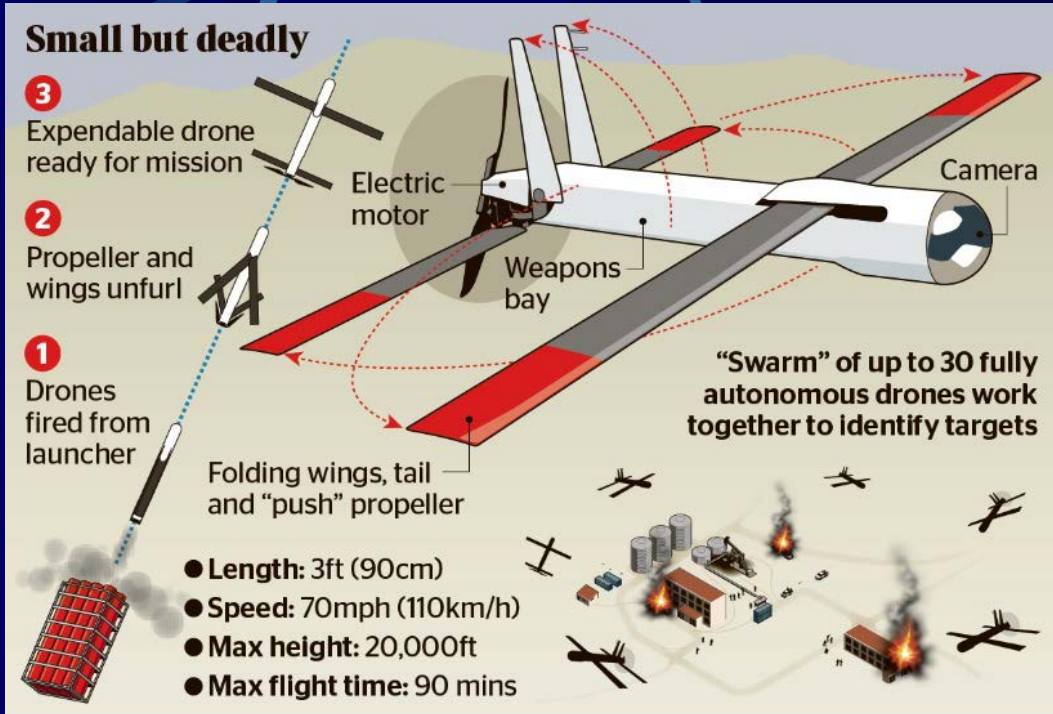
10,000 to 100,000
a day
per factory



Convergence

- 3D Printed, Autonomous
 - <http://www.wired.com/2014/09/military-grade-drone-can-printed-anywhere>
 - Show from :00 to :30 seconds.

Mass Launch Drones



Slocum Glider



Cheap Space



Thinking differently

Club-K Container Missile System



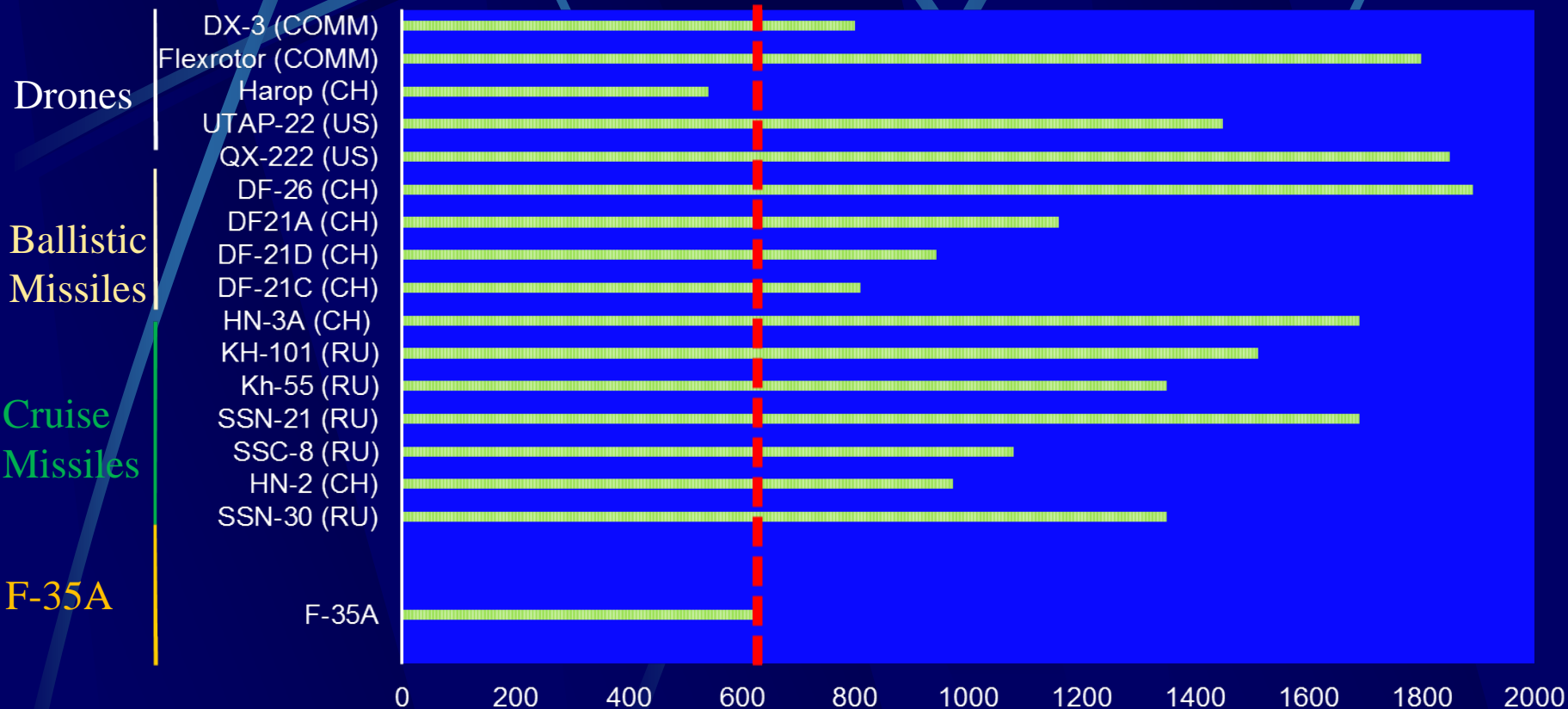
6 models, stowed and deployed,
including missiles

Surprise employment



F-35A vs Missiles/Drones

Range in Nautical Miles



Directed Energy: Lasers and Microwave

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

Implications

- Irregular war
- Conventional war
 - Examine each domain

Irregular War

- Convergence favors non-state actors
 - Less bureaucracy; less target discrimination
 - Little infrastructure to protect
- No more immunity for the west
 - No more secure bases or LOCs
 - Potential use to isolate theater via threat
 - HS leaders and gatherings vulnerable
- Powerful role for outside sponsors

Conventional – Ground Domain

- Autonomous drones
 - Cost less than ATGMs – mass precision
 - Ground systems will evolve
- Mass reappears
 - 10,000 dumb swarm is doable today
 - Dispersed 20 foot containers/pods that can operate independently or as networks
- Is this 1863?

Conventional – Sea Domain

- Drones vs. ships for mission kills
- Underwater weapons – sink ships
 - Smart mines
 - Dumb mines defeat U.S. today
 - Self-deploying mines
 - Rising
 - Rocket propelled
 - Trans-oceanic range

Conventional – Air Domain

- Attack 4th/5th generation aircraft and key enablers (AWAC, tankers) on ground
- Strike logistics & C2 nodes
- Evolved cruise missiles and drones take over many (all) missions?

Is entire manned fighter fleet range obsolete?

Tradeoffs

- F-35: \$140M, \$65K per operating hour
- Loitering TLAM: \$1.1M; w/ AM : \$600K

1 F-35 or 70 QX-222 or 233 TLAMs
Plus 2 more TLAM per month
Or 1 more QX every 45 days

Conventional – Space Domain

- Everyone has space assets
 - Surveillance – no hiding at sea!!
 - Communications
 - Attack?
 - Maneuvering Cube –sats have been launched

Conventional – Cyber Domain

- Strike exposed nodes
 - Underwater cables
 - Key nodes inland
- EMP cruise missile
- Quantum computing

US underfunds EM warfare

Deglobalization

- Trade as % of GDP – 5 years decline
- FDI into US – record highs for 2 years
 - 70% into manufacturing – 2% of GDP
- US Manufacturing jobs – increase for 6 years
 - Added 1 million jobs
 - Short 400,000 workers
- Container freight way down
- Energy becoming regional
- Environmental and social movements

Strategic Implications

- Mass and mobilization return
- Wars will be long
- Decreased American interest in international affairs
- Increased cost of intervention
- How to sustain alliances?

Operational Implications

- Does tactical defense become dominant?
- Power projection much more difficult
- Dominance in any domain much more difficult
- Cross domain attacks easier

Implications for Great Power Competition

- Geography favors the defense
- US alliances are fundamentally defensive = major advantage
 - Allies can buy if US leads
- Smaller states can deny major powers
- Lower cost; greater allied contribution

Big Questions

- Does small, smart, many dominate the few and exquisite – buying wrong stuff?
- Will land power come to dominate all domains?
- Will the Fourth Industrial Revolution lead to deglobalization – and U.S. regionalism?

Contact Information

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