

4IR Changes the Character of War

Dr. T. X. Hammes Institute for National Strategic Studies National Defense University

Disclaimer

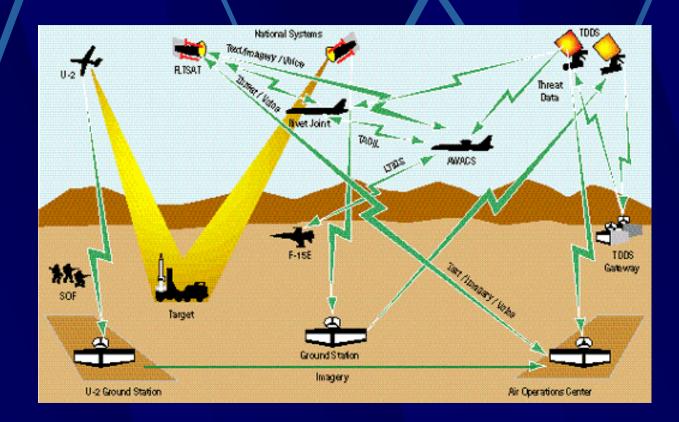


Purpose

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

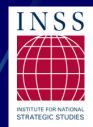


What DOD envisioned: NetCentric War



4

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 + Al





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

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



Drones + Al





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



- ISR, EW and Light Strike
- All Weather, Day/Night Capable
- EW/Comms Node

NAVY

Drones + Al





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

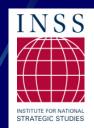




Autonomous 50 KM Range \$800

10,000 to 100,000 a day per factory



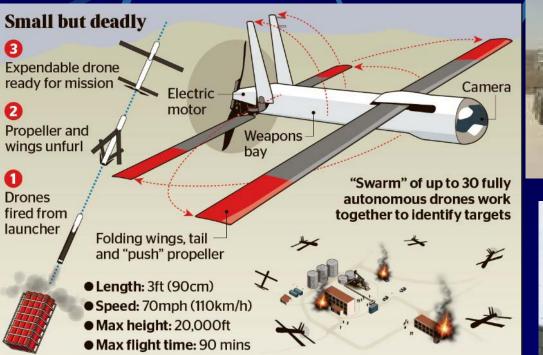


Convergence

<u>3D Printed, Autonomous</u>
 <u>http://www.wired.com/2014/09/military-grade-drone-can-printed-anywhere</u>

Show from :00 to :30 seconds.

Mass Launch Drones

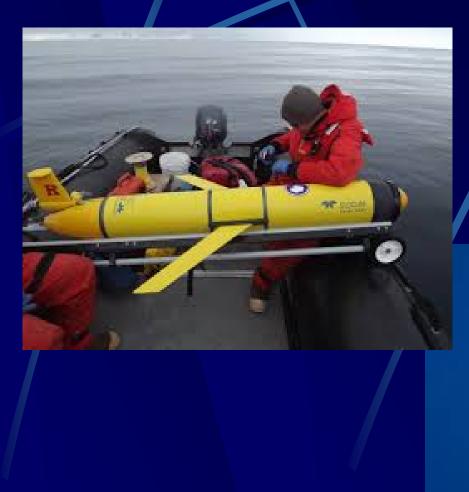






Slocum Glider









Cheap Space









Thinking differently



Club-K Container Missile System



6 models, stowed and deployed, including missiles

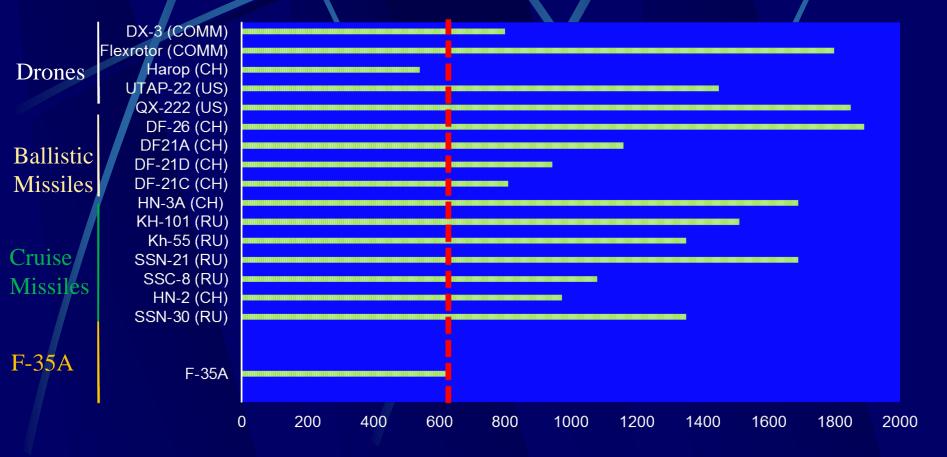
Surprise employment







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

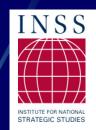
Irregular War



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

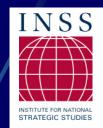
Drones vs. ships for mission kills Underwater weapons – sink ships Smart mines Dumb mines defeat U.S. today Self-deploying mines Rising Rocket propelled • Trans-oceanic range



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?

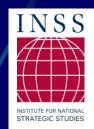
Is entire manned fighter fleet range obsolete?



Tradeoffs

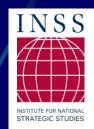
F-35: \$140M, \$65K per operating hour
Loitering TLAM: \$1.1M; w/ AM : \$600K

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?

INSS INSTUTE FOR NATIONAL STRATEGIC STUDIES

Operational Implications

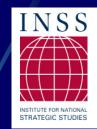
Does tactical defense become dominant?
Power projection much more difficult
Dominance in any domain much more difficult

Cross domain attacks easier

Implications for Great Power Competition

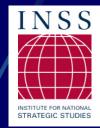


Geography favors the defense
 US alliances are fundamentally defensive = major advantage
 Allies can buy if US leads
 Smaller states can deny major powers
 Lower cost; greater allied contribution



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

txhammes1@gmail.com