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Electromagnetic Defense Task Force Research



The Failing of Strategic Deterrence and Resilience: Contemporary Implications for US and NATO

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OVERVIEW

DISCUSSION AREAS:

1. Scope of Military Struggle to Innovate and Adapt
2. Implications of Strategic “Gray Zone” Warfare
3. Connecting Dots: Multi-domain Threats (a closer look)
 - a) Quantum
 - b) DE/HPEM
 - c) Electromagnetic Spectrum
 - d) EMP/HEMP/GMD
 - e) 5G
4. Avoiding Defeat: A Way Ahead

David Levinson: “It's like in chess: First, you strategically position your pieces and when the timing is right you strike. They're using this signal to synchronize . . . in 5 hours the countdown will be over . . . Checkmate.”





SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

TWO QUESTIONS:

- ***Has the West become characteristic of Chamberlin allowing Tyrants to become Titans out of fear of escalation and hope for moderation?***

Vladimir Putin (Russia)

Xi Jin Ping (China)

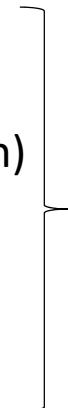
Sayyid Ali Hosseini Khamenei (Iran)

Kim Jung-un (North Korea)

Recep Tayyip Erdogan (Turkey)

Bashar al-Assad (Syria)

Other?



- ***If we encounter Tyrant or Titan – can the West survive present state?***



SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

CONSIDER THE FOLLOWING:

- **Inaction can be as powerful as action . . .**

“At the apogee of its power, the United States finds itself in an ironic position. In the face of perhaps the most profound and wide-spread upheavals the world has ever seen, it has failed to develop concepts relevant to emerging realities.”

- Henry Kissinger, 2001

- **There are no paradigms . . .**

“Really smart people with reasonable funding can do just about anything that doesn’t violate too many of Newton’s Laws!”

- Alan Kay, Computer Scientist

THE DIFFERENTIATING FACTORS ARE ALWAYS: (1) LEADERSHIP AND (2) INNOVATION



SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

Strategic Threat Climate: Past

- Root: Ideological Impasse
 - Super-Powers (Bi-polarity)
 - NATO v. WARSAW Pact
 - “Haves and Have Nots”
 - Mistrust and suspicion
 - Chief Strategies:
 - Deterrence/
 - First-Strike/Retaliation
 - Military Power



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SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

Strategic Threat Climate: Present & Future

- Root: Both ideological and religious
 - Bi-polarity fractures: awkward and restless shapes
 - Growing nuclear black market, wide proliferation of nuclear technology 40+ states (Dr. Mohamed ElBaradei, 2004, IAEA)
 - Mistrust and suspicion
 - Technology & innovation may give potency to small factions and weak states to achieve desired ends
 - Principal strategies: Gray zone warfare - novel (EMP, WMD, cyber, terrorism, proxies, propaganda, other)



SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

Strategic Threat Climate: Bottom Line

- US Special Operations Command:
 - *Trends in the strategic environment are speeding the redistribution of power across a range of actors (translation: "democratization of capability")*
 - *Rapid power shifts are creating potential energy in the international order*
 - *Power shifts happen more rapidly than the "privileges" that came with that power*
- Such are manifesting in the gray zone where costly long wars can be bypassed

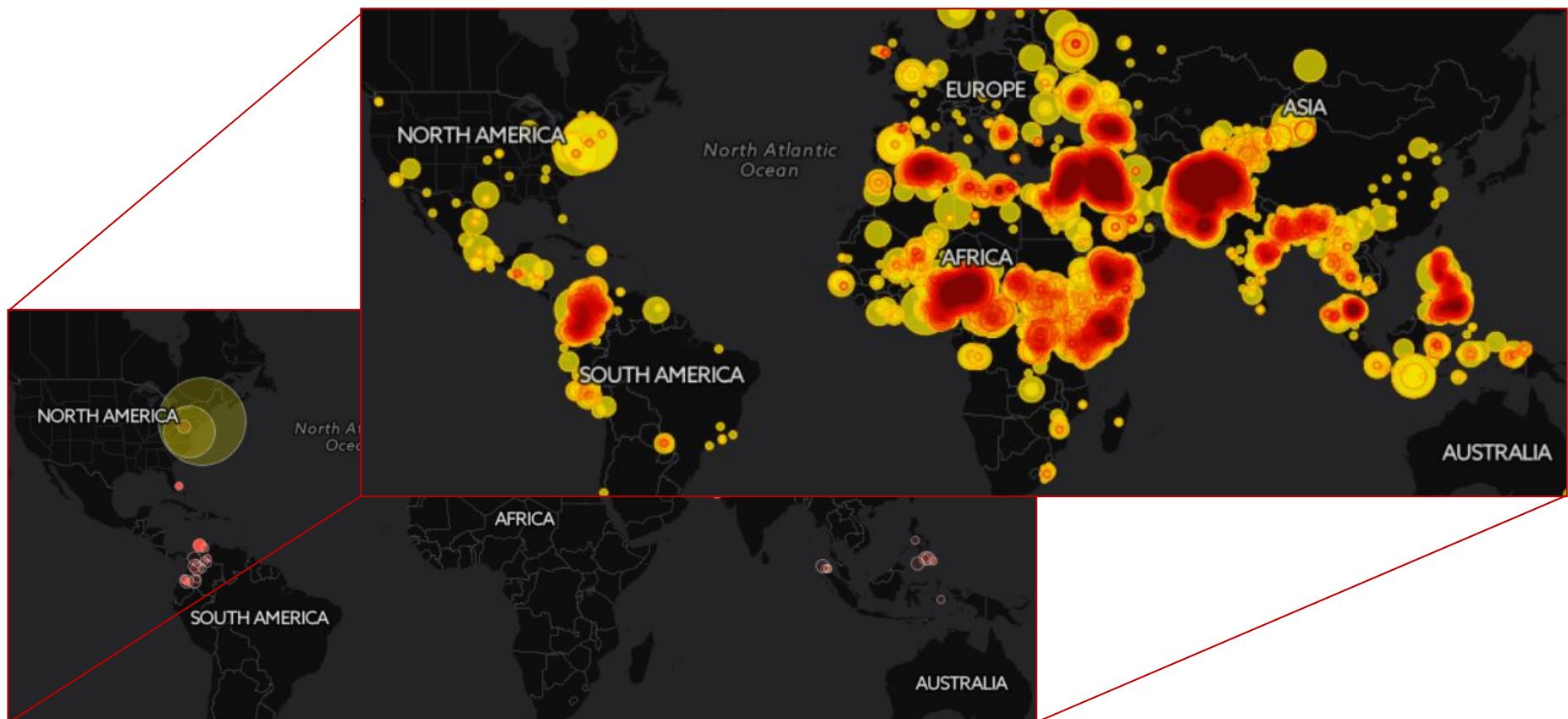


Idle Rock, Brimham Rocks - England



SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

- Deaths by terrorism since 9/11



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SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

Aggressors have always gambled on knockouts:

A first battle catching the enemy by surprise and inflicting a blow from which there could be no recovery could help avoid a long war. This was the 'allure of battle' [or strategy] that led to states gambling on aggression. Few states knowingly entered into an attritional long war.

- Sir Lawrence Freedman, Professor, King's College London, The Future of War

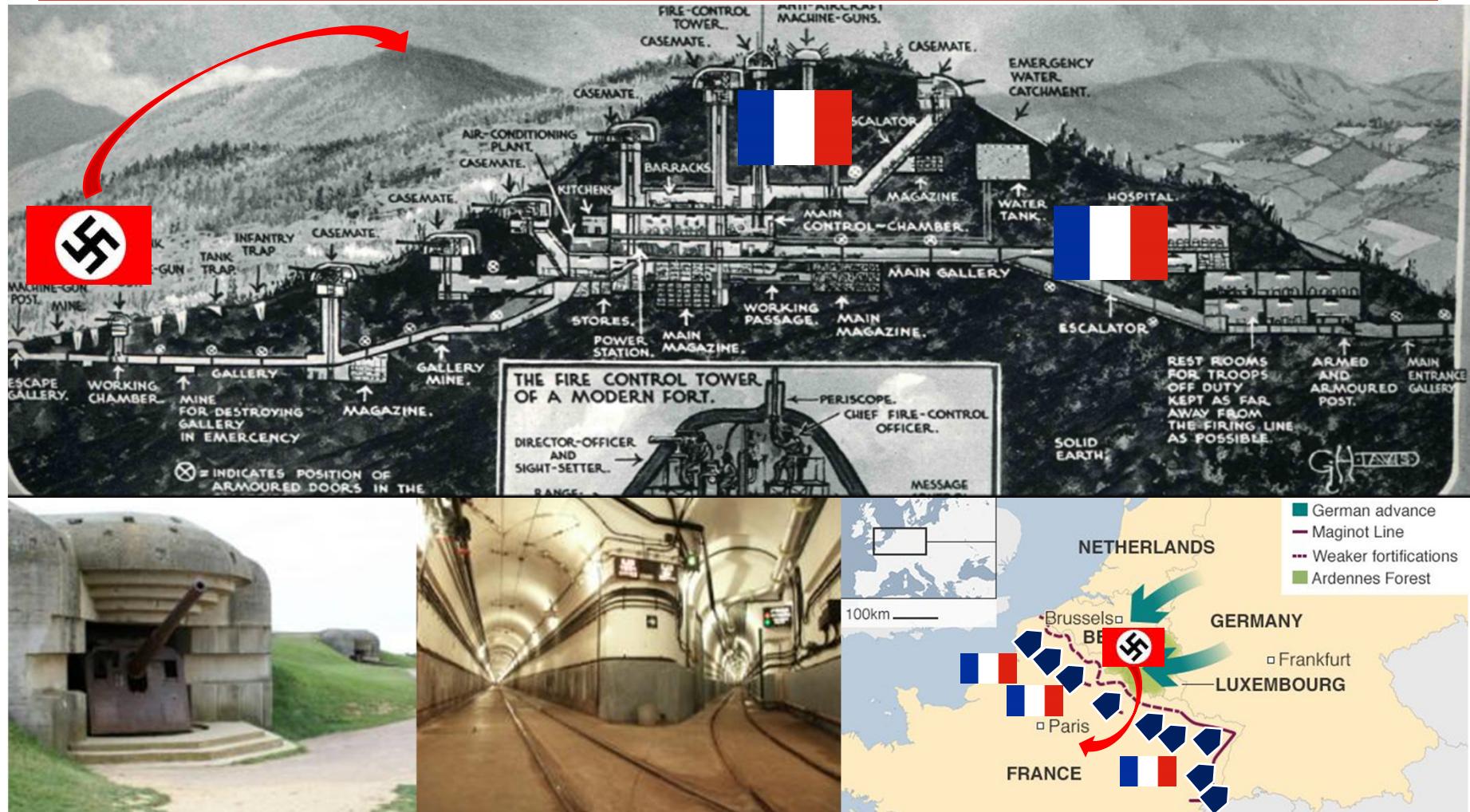


SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

Would a military or even a nation predicate its entire defense on one plan/strategy?



SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT



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SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT



German Army marching on Paris 1940

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SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT



Defeat of the British 24th Foot by Zulu, Isandlwana - January 22, 1879

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SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT



Victory of Rorke's Drift Garrison against Zulu - January 22-23, 1879

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SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

Cold War Envelope	Gray Zone Envelope
<ul style="list-style-type: none">• States safeguarded:<ul style="list-style-type: none">• Technology to create & deliver weapons• Accidents• Misjudgments• Un-authorized launch• Limited threat vectors (few states had strategic weapons)	<ul style="list-style-type: none">• States no-longer guarantee:<ul style="list-style-type: none">• Technology to create & deliver weapons• Accidents• Misjudgments• Un-authorized launch or use• Expansive threat vectors (multiple states have both nuclear weapons & tech)
SUMMARY: Accountability, control, and communications with attribution both assumed and provided by early warning	SUMMARY: No accountability, poor control, comms with some states; attribution unlikely due to novel delivery and degraded early warning & NTMs

Expanded Strategic Threat Envelope

Red = strategic defense gaps

Cold War Envelope (Symmetric & Conventional)			Gray Zone Envelope (Asymmetric & Unconventional + Symmetric & Conventional)				
<ul style="list-style-type: none"> Actors: State on state, or states on state 			<ul style="list-style-type: none"> Actors: State on state, states on state, state on non-state, state on proxy, state on pseudo-state, any combination of one or more (i.e. Syria) 				
<ul style="list-style-type: none"> Threat Types: nuclear, radiological, chemical, limited electromagnetic pulse, and limited biological 			<ul style="list-style-type: none"> Threat Types: Cold War + electromagnetic pulse, biological, space, WMD and cyberspace 				
Delivery Domains & Modes: (held by states & covered by treaties)			Delivery Domains & Modes: (held by both states and non-states not covered by treaty)				
Air: <ul style="list-style-type: none"> Bomber ICBM Missile†* 	Land: <ul style="list-style-type: none"> GLCM Mobile 	Sea: <ul style="list-style-type: none"> SLBM 	Air: <ul style="list-style-type: none"> Aircraft Balloon Dirigible Drone Airborne mines 5G 	Land: <ul style="list-style-type: none"> Moble Rail Human 5G 	Sea: <ul style="list-style-type: none"> Drone Ship Small-craft Nuclear-torpedo Submersibles 	Space: <ul style="list-style-type: none"> Lunar-weapons Satellite 5G 	Cyberspace: <ul style="list-style-type: none"> Includes denial, hacking, disruption, & destruction of systems, etc. 5G

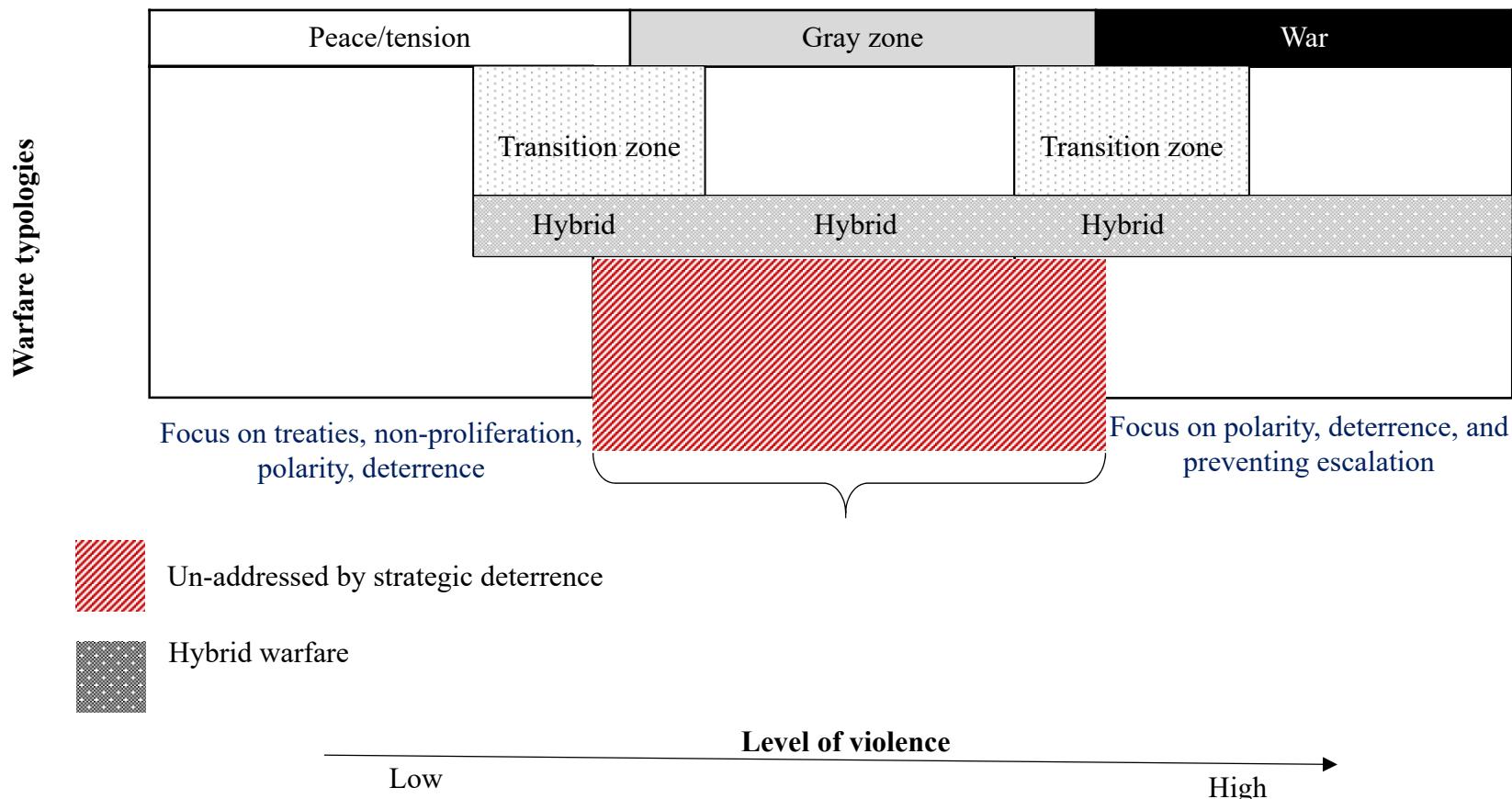
Quantum entangled technologies

†Not covered by treaty *Limited anti-satellite capabilities have existed since the 1960s. The Star Fish Prime Nuclear Tests resulted in both HEMP and disruption of LEO satellites. Militaries have also historically demonstrated limited capabilities of downing LEO satellites with air-to-air missiles.



SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

What we tend to understand:



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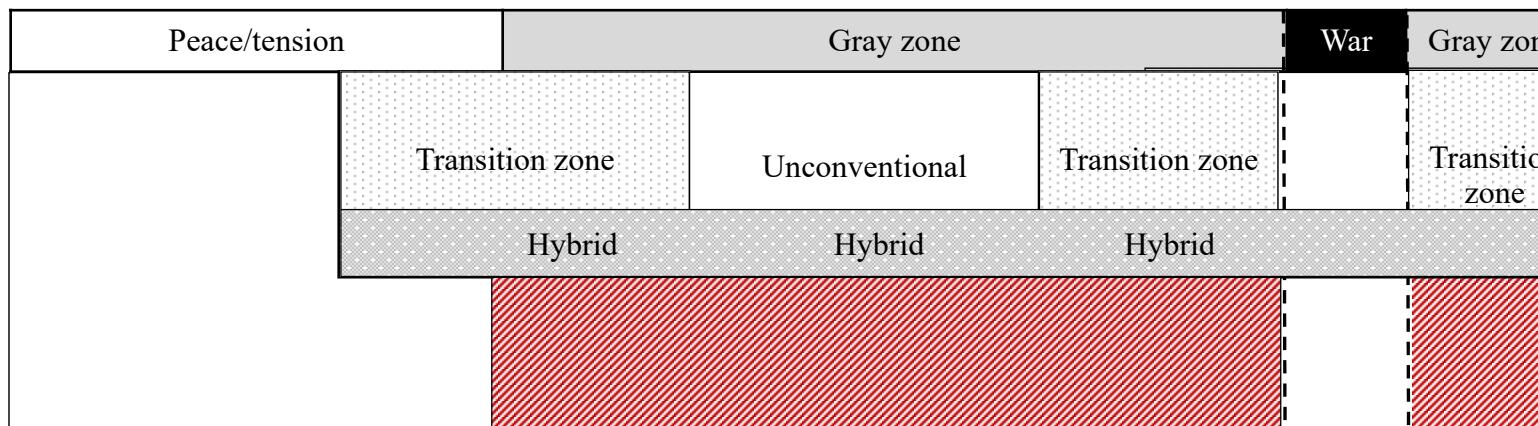


SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

What we increasingly encounter:

Stuckenberg Model

Warfare typologies



----- Trigger/threshold for War



Un-addressed by strategic deterrence



Hybrid warfare

Level of violence

Low

High

Undefined

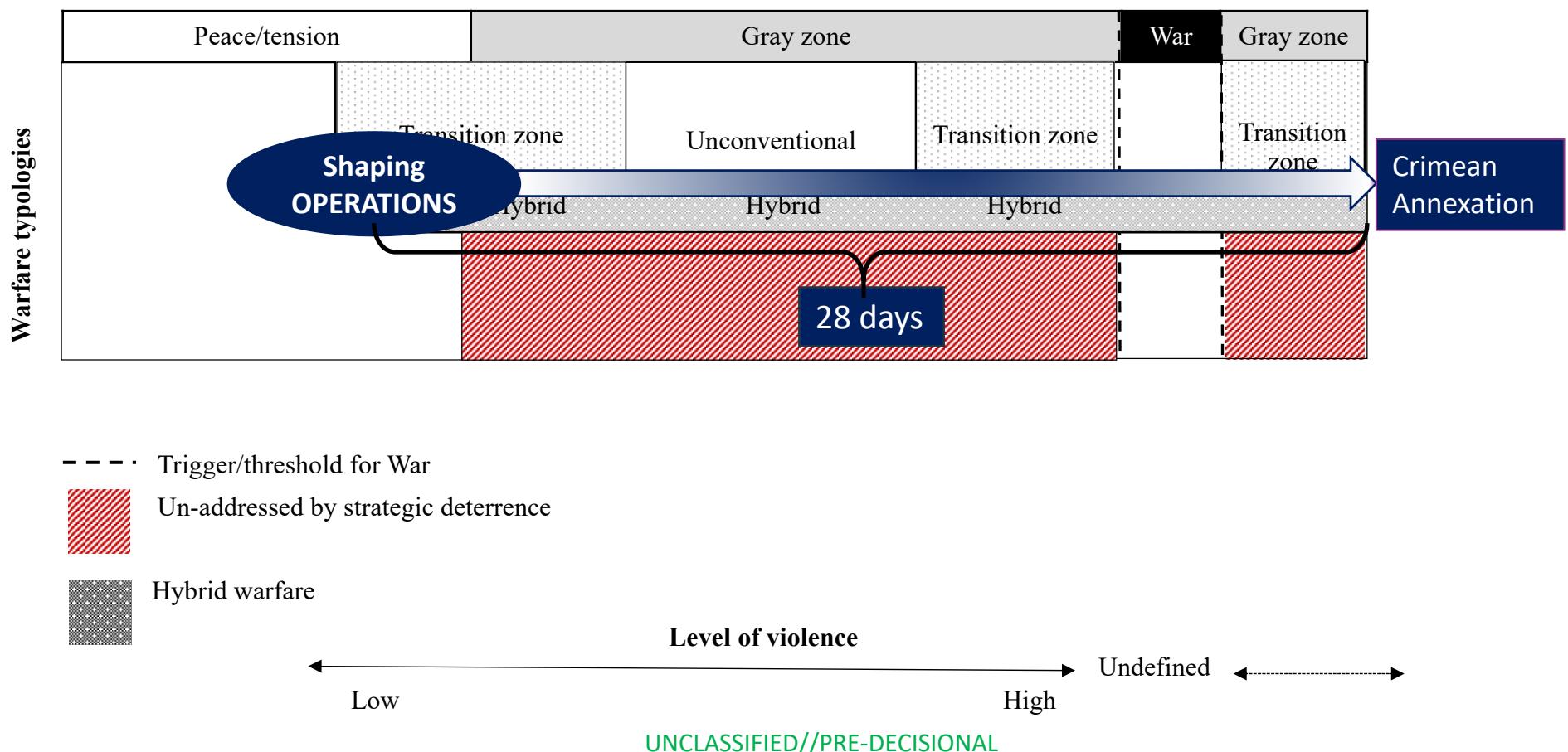
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SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

What we increasingly encounter:

Stuckenberg Model

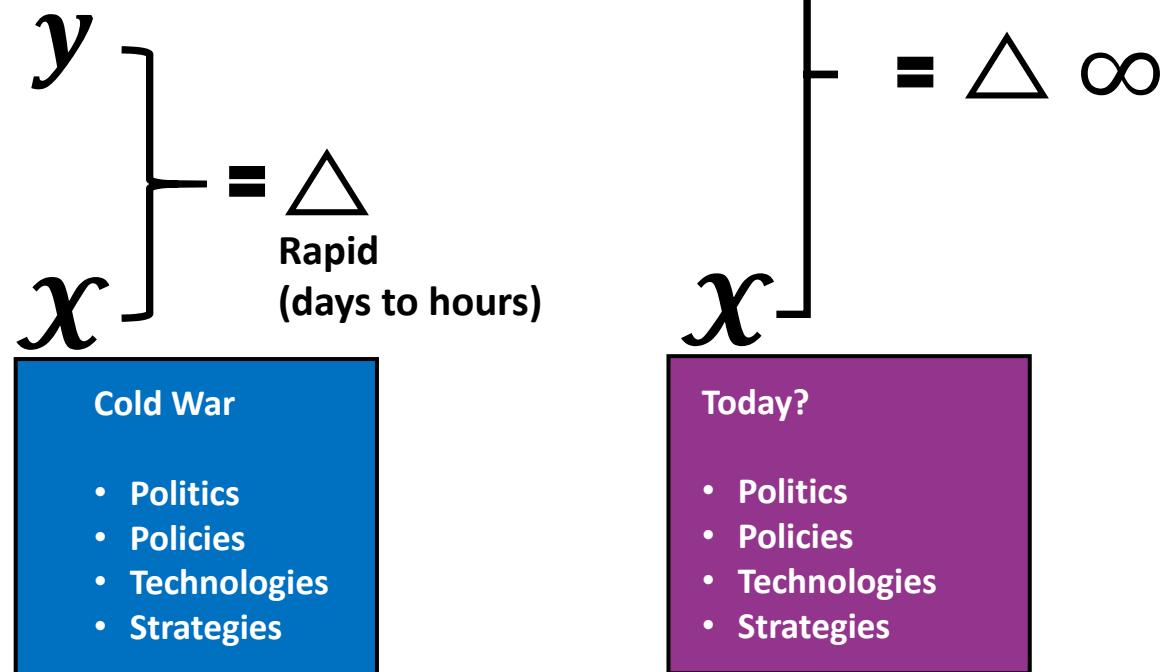


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SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

Current US/NATO Operations Picture:



χ
 Δ
 y

Adversary Action(s)

Time Delta (Time to make decision)

Alliance Response to X



SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

How can you convert potential adversary action(s) into inaction?

χ

χ Adversary Action(s)



SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

- **Dissuasion** is the ONLY WAY to remove an adversary's will to act in today's reward rich environment
 - A close cousin of deterrence, *dissuasion* focuses on influencing an adversary or potential adversary not to take certain action(s) based not upon what harm will come to the aggressor (i.e. MAD), but on an actual or perceived inability to achieve the desired ends.
 - Removes all enticements to act
 - *"The supreme art of war is to subdue the enemy without fighting"* – Sun Tzu
 - Dissuasion may be accomplished through the simultaneous application to Military Information Support Operations (MISO) and phased physical upgrades

“If you can't explain it simply, you don't understand it . . .”

- Albert Einstein





SCOPE OF MILITARY STRUGGLE TO INNOVATE AND ADAPT

Samples of Behavior (DoD):

- Trading resilience for expediency:
 - The Cloud
 - Universal iPads
 - Failure to arm air crews in combat
 - Fukushima Dai-ichi
 - “No requirement to survive”
 - Red-lines of red-tape (DTRA & FEMA)





IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

- “Most immediate and extreme danger” is nuclear terrorism (2010 Nuclear Posture Review)
 - States, their proxies, or terrorists will, at some point, permit or gain access a WMD/WME by whatever means
 - The transformative climate has not been met with adaptive defense strategy to addresses the most critical scenario:

OPTIMIZATION OF WMD/WME TO ACHIEVE STRATEGIC EFFECTS

Recognize that indications and warnings of enemy use of surface and airburst nuclear weapons may not be present for HEMP threats. [] . . . [I]ndicators, however, are unlikely to provide warning of a high altitude EMP threat.

- US Army FC-50-16 (1984)



IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

[] . . . [I]ndicators, however, are unlikely to provide warning of a high altitude EMP threat.

- US Army FC-50-16 (1984)



Terminator III Rise of the Machines: Cheyenne Mountain



IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

Why is deterrence failing?

- Diffused knowledge and technologies, afford aggressors with opportunities to levy strategic threats (those which span long periods of time, cover large geographies, and impact many people) without *attribution*.
- In the strategic gap, there may be little to no risk to an aggressor as they may act in novel ways to manoeuvre around or obscure traditional means through which they may be identified as "actor".
- An inability to attribute strategic level actions at this level of war calls into question the fundamentals of deterrence theory in the 21st century as they apply to gray zone activities.
- If NATO cannot attribute malevolent act(s), it cannot hold actor(s) accountable in the eyes of the world. If this is the case, the alliance must begin to re-think how and where deterrence is applied to maintain world order or status quo.



IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

- Present US/NATO defenses fail to holistically meet the transformative demands of expansive strategic threat climate
 - China, Iran, North Korea, Russia, AQ, ISIS, and others comprehend:

“It’s a mismatch unique in history . . . For the first time, blackout war [EMP attack] enables the least successful society on Earth, like a North Korea that cannot even feed its own people, or even atavistic non-state actors like ISIS or Al Qaeda, to destroy the most powerful societies, including the United States . . . ”

- Dr. Peter Pry, Former Executive Director, Congressional Commission to Assess the Threat to the United States from Electromagnetic Pulse Attack

BOTTOM LINE: U.S. must implement strategy to close strategic gaps or these gaps will invite strategic exploitation



IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

- Thinking of WMD/WME delivery we understand conventional



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IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

- Now must consider novel delivery + conventional + combinations



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IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

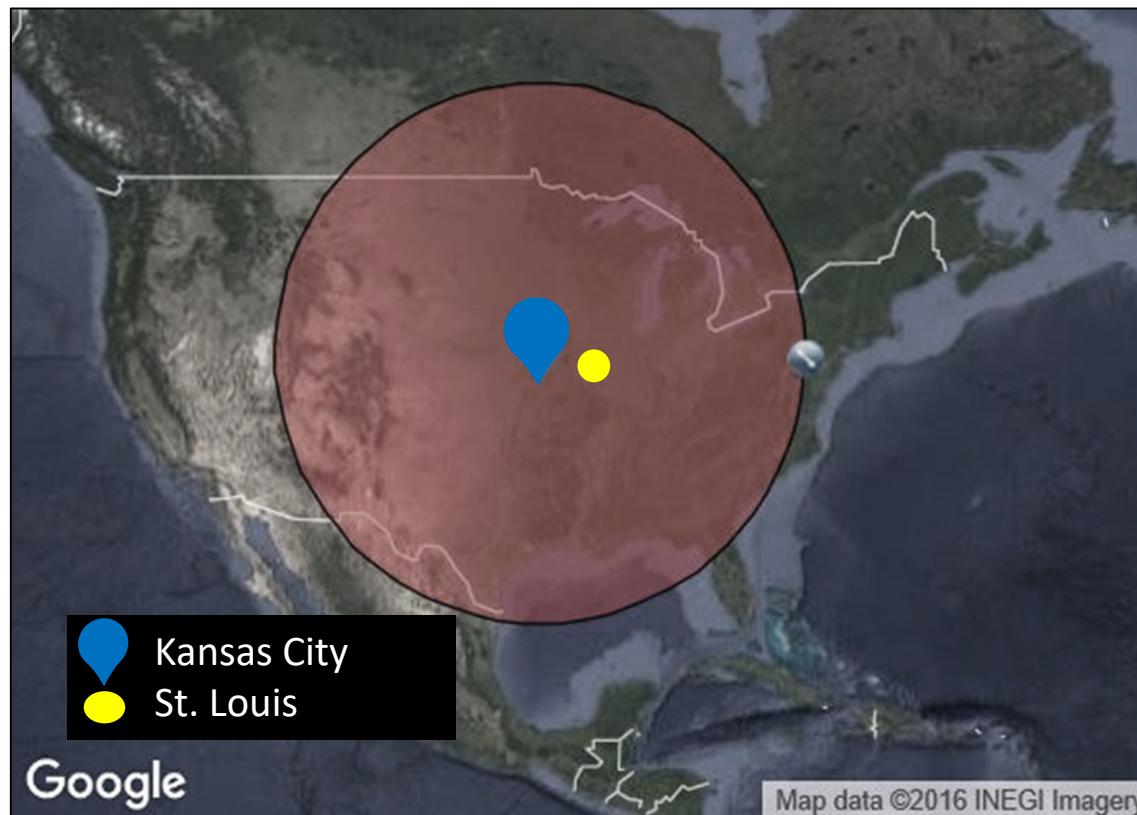
- Russian 3M54 (“Klub K”) or NATO SS-N-27 (“Sizzler”)





IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

- Russian 3M54 (“Klub”) NATO SS-N-27 (“Sizzler”)
 - Range 1,550 Mi.

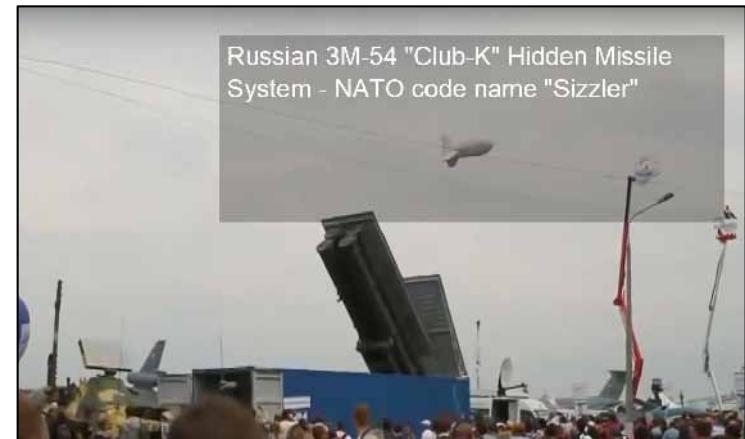


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IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

NK: Chong Chon Cang



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IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

RUS: Monk Fyodor Konyukhov



- Balloons may be resourced and built nearly without notice
- May loft nuclear or EMP device



IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

“The area disrupted by Hurricane Katrina is comparable to what can be expected from a small EMP attack.”

- EMP Commission (130)



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IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

- PROBABLE MILITARY IMPACTS:

- Electric power and emergency diesel generators (EDGs)
- C3
- Threat detection network
- Nuclear
- Logistics
- Equipment/Hardware
- Manpower

MILITARY STANDARD

26 JUNE 1990 MIL-STD-1 88-125



HIGH-ALTITUDE ELECTROMAGNETIC PULSE (HEMP)
PROTECTION FOR GROUND-BASED C4I FACILITIES
PERFORMING CRITICAL, TIME-URGENT MISSIONS
for Common Long-Haul/Tactical Communication Systems

Approved and mandatory for use by all Departments and Agencies of the
Department of Defense, in accordance with Department of Defense Directive
4640.11, 21 December 1987.

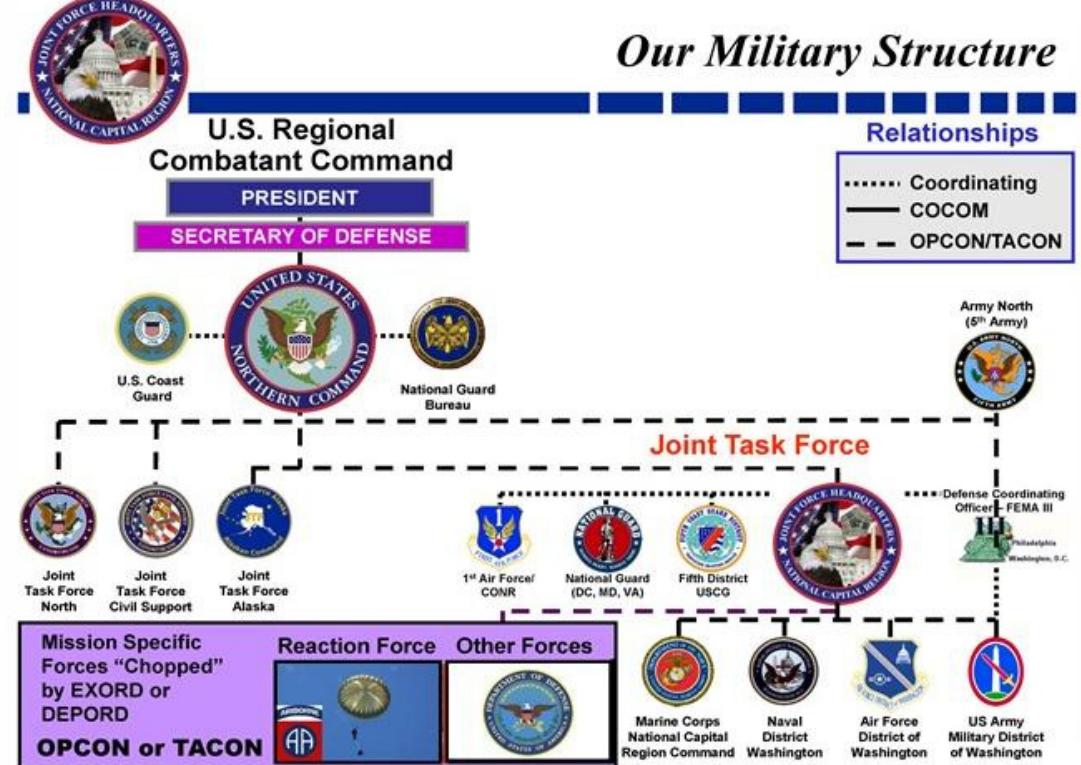
BOTTOM LINE: The ability to organize, train, equip, and defend the United States and project force will be degraded severely. NATO: same challenges



IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

“The more you sweat in peace, the less you bleed in war.” - Sun Tzu

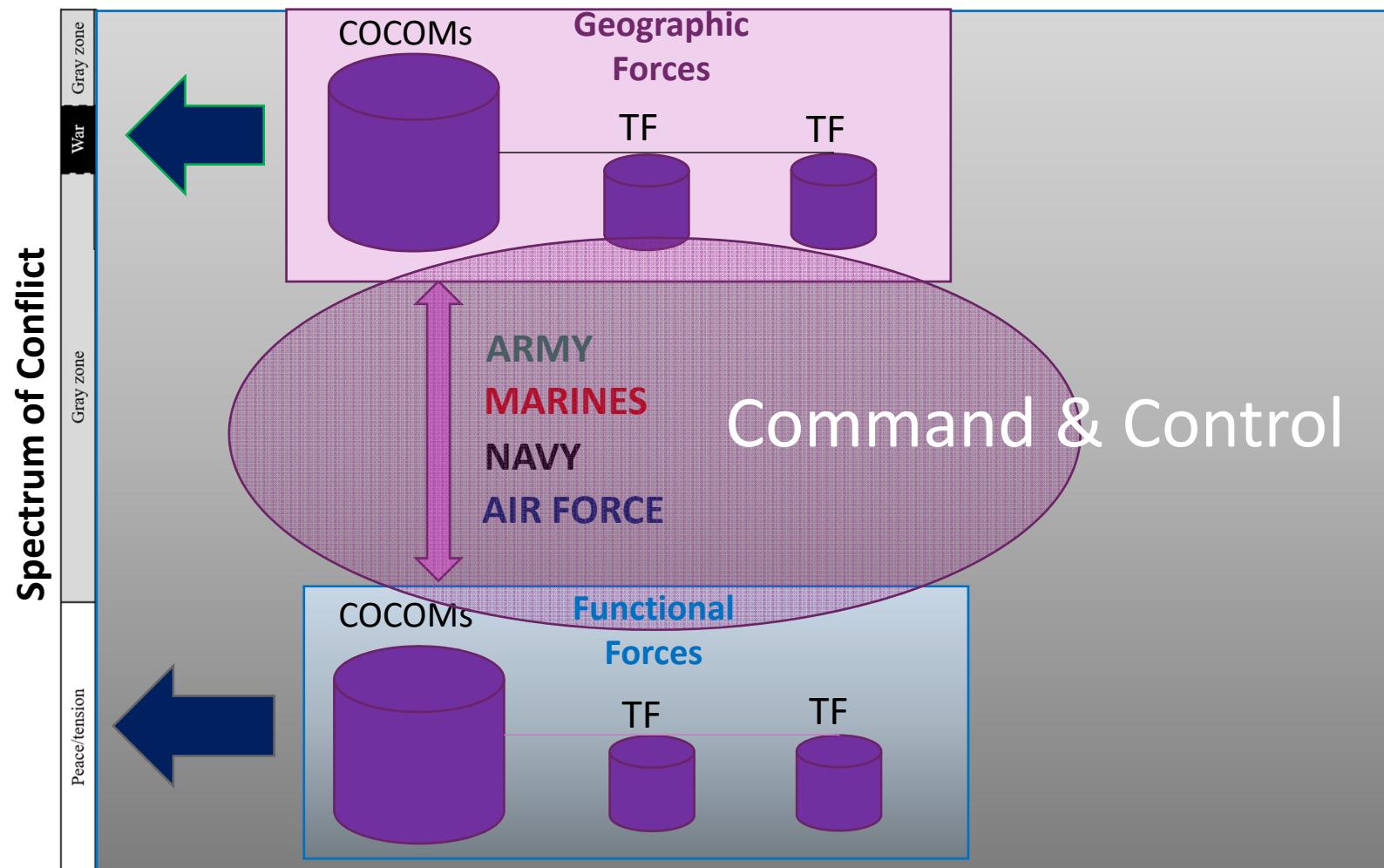
- Institutional knowledge has been lost
- Cannot fathom an attack on US Homeland: “Too big to fail”
- All defense predicated on function of early warning and C2



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IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

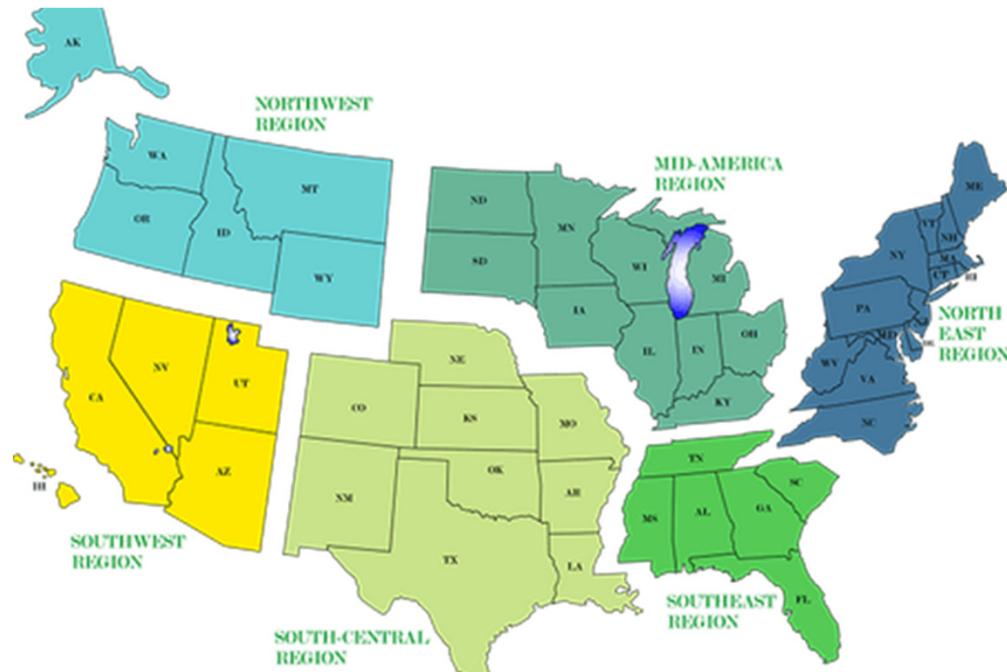


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IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

- Certain circumstances can remove ability to use US/NATO forces in the absence of “Commander’s Intent.”
- If even a non-state actor acts strategically in the right way, **DEFEAT OF THE UNITED STATES WILL TAKE JUST SECONDS.**
- Adversaries understand the “right way”.



ISLANDED DEFENSE:

Commanders in unaffected regions (Northwest, Southwest) by predetermined succession would assume pre-planned postures until national leadership/defense can be restored.



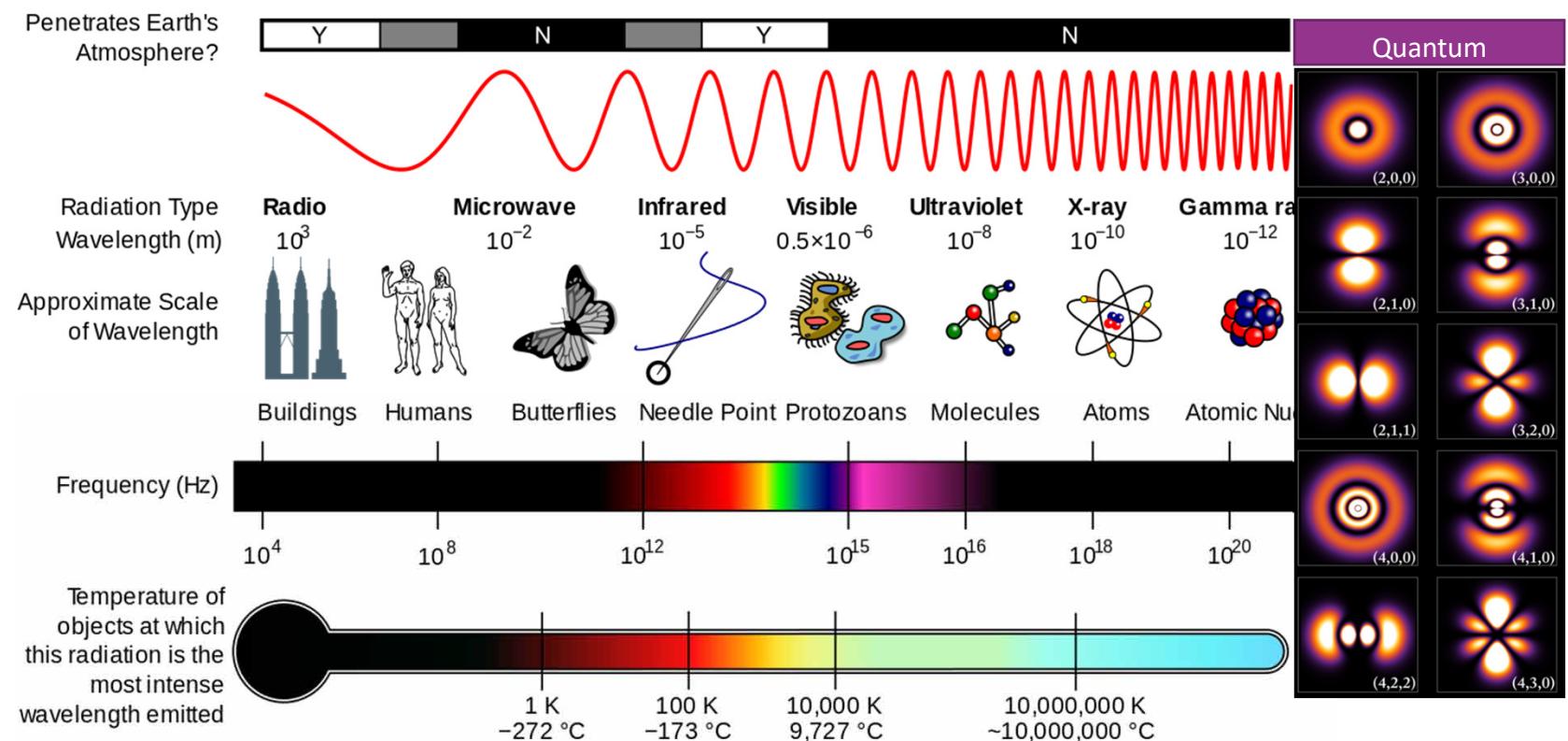
IMPLICATIONS OF STRATEGIC “GRAY ZONE” WARFARE

- GREATEST CHALLENGES FOR WEST (US/NATO):
 1. Breaking the Illusion of invulnerability
 2. Creating survivable multi-national military C2
 3. Educating the force to achieve COP – Gray Zone
 4. Developing defense strategy for the gray zone
 5. Defending against strategic cascades
 6. Technologically primed for total defeat (due to stripping of resilience)
 7. Not ready for changes in warfare (i.e. France before WWII - “Maginot Moment”)
 8. Continued technological fusions that enable recipients of diffused power to convert potential energy into kinetic energy (at all levels of conflict)



CONNECTING DOTS: MULTI-DOMAIN THREATS

- ELECTROMAGNETIC SPECTRUM



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CONNECTING DOTS: MULTI-DOMAIN THREATS

ELECTROMAGNETIC SPECTRUM:

- Electromagnetic Defense Task Force
 - Quantum
 - DE/HPEM
 - Electromagnetic Spectrum Management
 - EMP/HEMP/GMD
 - 5G



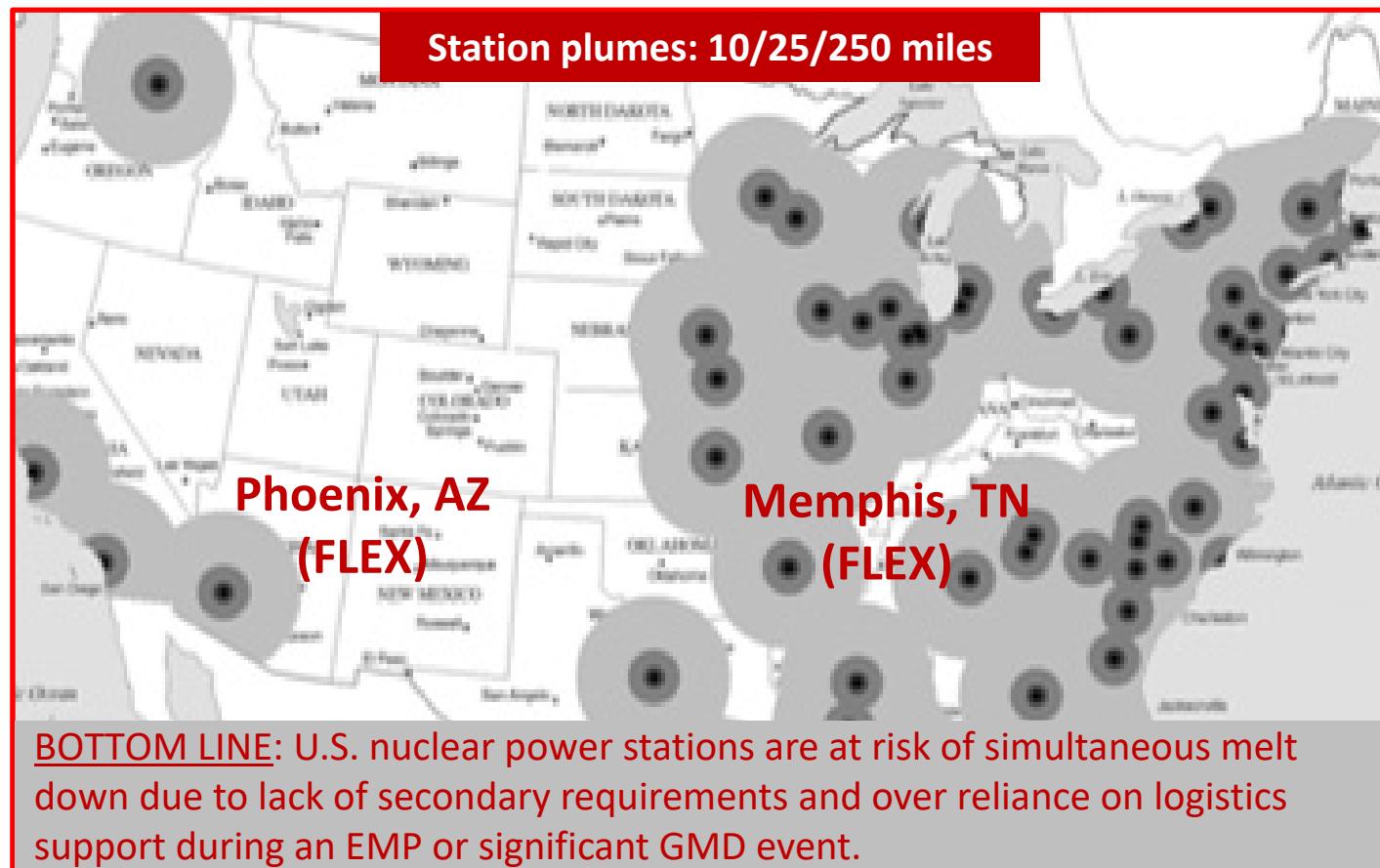
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CONNECTING DOTS: MULTI-DOMAIN THREATS

EMP/HEMP:

- Nuclear Power Stations and Spent Fuel Pools

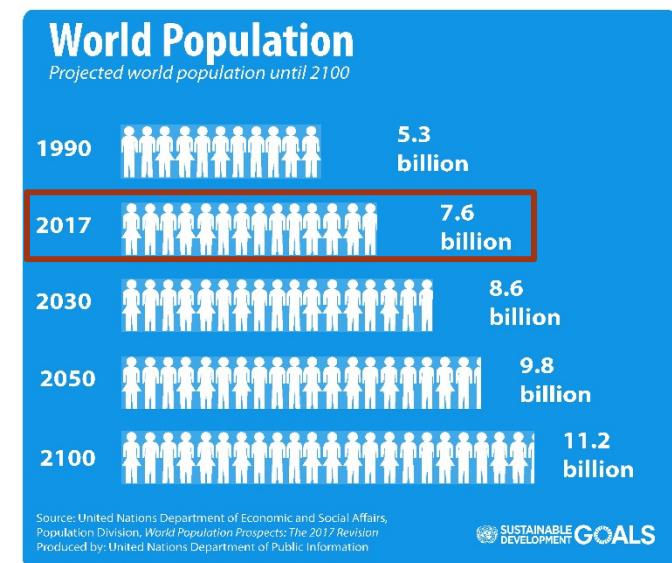
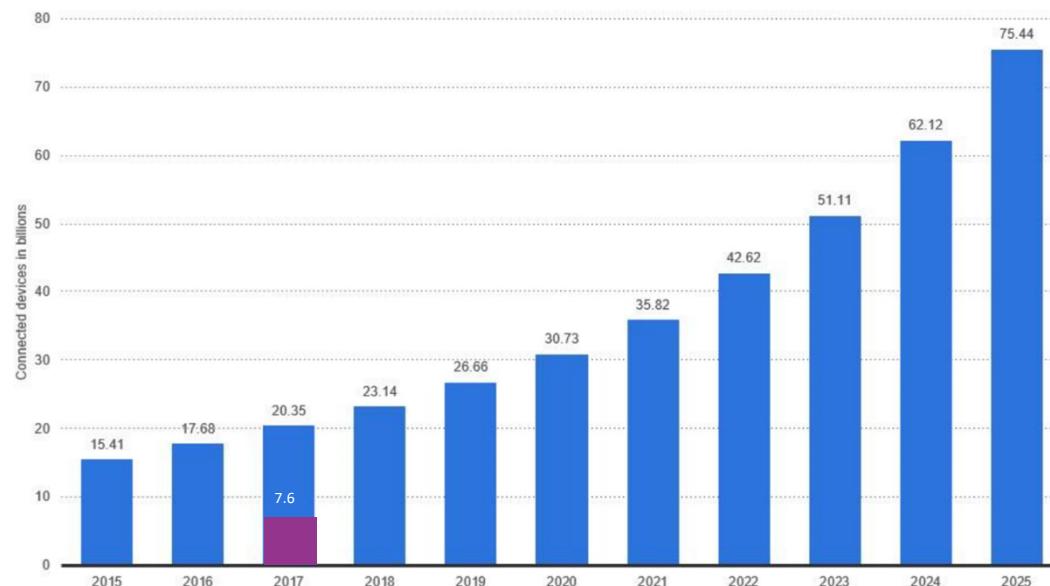




CONNECTING DOTS: MULTI-DOMAIN THREATS

5G:

Internet of Things (IoT) connected devices installed base worldwide from 2015 to 2025 (in billions)



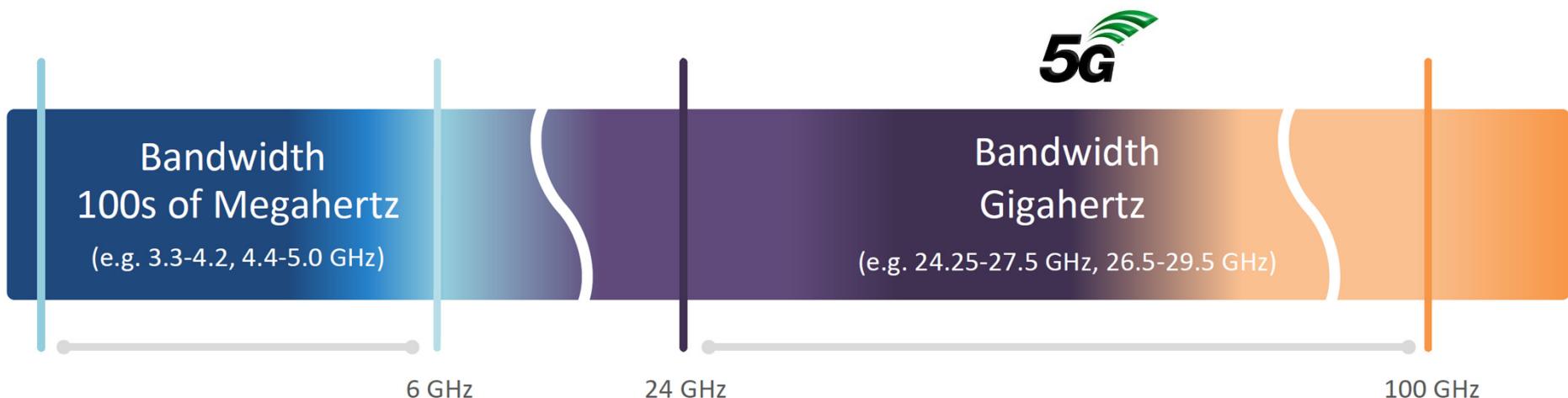
Source: Forbes: Available at <https://www.forbes.com/sites/louis columbus/2017/12/10/2017-roundup-of-internet-of-things-forecasts/#265f3bc81480>

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CONNECTING DOTS: MULTI-DOMAIN THREATS

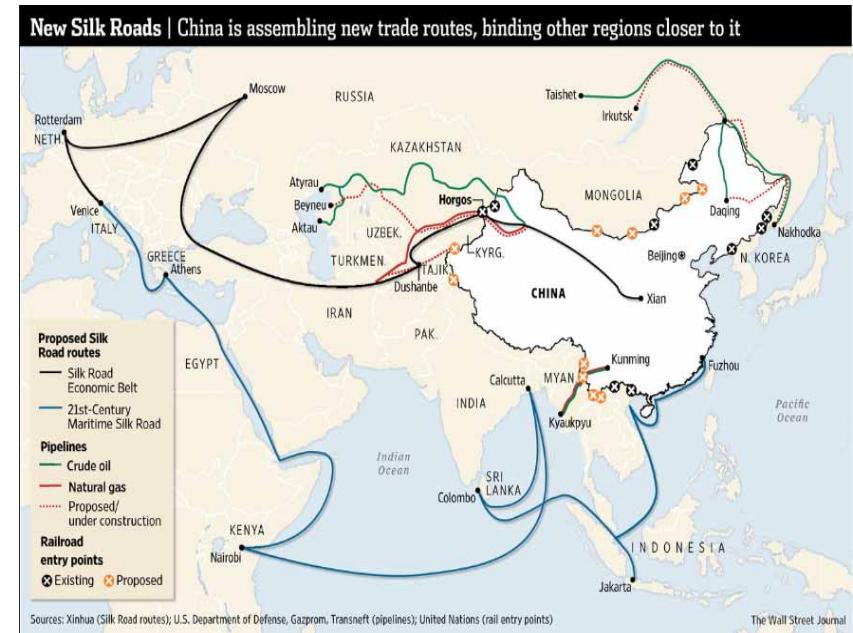
- **Every 5 years mobile technologies undergo generational update**
 - Proceeding generations were 4G, 3G, 2G (the first digital network) and 1G (analog network)
- **5G is a boundary-crossing secure communications advancement with nearly unlimited bandwidth & almost no latency;** in comparison to 4G, 5G may offer 10x faster downloads, 100x higher wireless transfer rates, and 100x lower latency





ECONOMIC AND SECURITY INTERESTS

- **5G applications are forecast to exceed \$400B by 2022**, with the construction and maintenance of a prospective US network resulting in 3 million jobs and a \$500B increase in domestic GDP
- **Rapid creation of a global 5G network is a cornerstone in China's industrial plan to compete with western interests**; the plan is currently underwritten with a half-billion dollars in investment with a first to market goal to deploy 5G commercially by 2020
- **By 2035, 5G is expected to enable \$12.3T in global economic output**; states and non-states that control the 5G network may dictate or control all digital transactions including the ability to share and receive information





ECONOMIC AND SECURITY INTERESTS

- China controls the majority of hardware manufacturing needed to create 5G components and antennas (41% of the market and rising)
 - Part of Beijing's "*Electronic Belt-road*" plan is to deploy a network favorable to Chinese economic and security interests
- Control of 5G is roughly equivalent to control of the internet; open 5G is critical to freedom & free market economics (the network builder will own the highways and control who drives on them)
- Access to 5G will be critical to operations in every warfighting domain, in particular, space command & control
- Defense experts assess 5G market share will be "locked-up" by China in months with no second chance in 5G race; EO intervention stopped recent corporate mergers; immediate action needed to secure US first mover advantage



AVOIDING DEFEAT: A WAY AHEAD

- STRATEGIES:

- Close the deterrence gap with *dissuasion* campaign

- Zero risk Classified Presidential Directive:

- “Manhattan Project” to protect nuclear power facilities (critical infrastructure)
 - Move spent fuel to dry casks (reduce risk to US by 75 percent)
 - Implement 5G while hardening

- Create US gray zone strategy

- Commander's Intent
 - Educate US Military – restore institutional knowledge
 - Educate NATO – create institutional knowledge
 - Create retaliation policy

- New top-to-bottom EMS construct?

- Re-orient all electromagnetic activities



EDTF



AVOIDING DEFEAT: A WAY AHEAD

RECOMMENDATIONS:

- **Provide robust USG support to develop global redundant terrestrial and space-based 5G networks by forming partnerships with industry leaders owning component manufacturing capabilities, space lift capabilities, and technical expertise**
- **Reduce FCC and FAA impediments to rapid rollout and development of key enabling technologies in the US while incentivizing domestic manufacturing to help underpin component security**
- **Invite US allies to partner in the creation of global networks (like GPS) controlled and maintained by western interests**



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AVOIDING DEFEAT: A WAY AHEAD

- **SpaceX has plans to deploy a space-based internet;** a 5G network (“Starlink”) would consist of 12,000 satellites in Low-Earth Orbit. Two prototype satellites are being tested in orbit and DARPA’s BLACKJACK program is exploring national security uses. The USG can not afford this system on its own but it has major implications for military C2
- **The system will require weekly access to space by re-usable launch vehicles** generating significant strategic advantage in launch and space access and creating a “virtuous cycle.” SpaceX Big Falcon Rocket (BFR) would be a strategic national asset with significant military utility
- **BOTTOM LINE: A Presidential Finding under *Defense Production Act Title III* would allow subsidization of manufacturing infrastructure or advance purchase of bandwidth in the event of fielding... in both cases help close the business case to ensure US leadership in space-based 5G**



SpaceX Big Falcon Rocket (BFR) shown deploying a satellite. The BFR is able to re-fuel in orbit Source: SpaceX



SUMMARY

- **5G is a strategic-level communications capability that will be governed according to either western or competitor interests.** In the months ahead, the US has an opportunity to move into first place position by capturing market share. Robust US government support can help ensure the democratization of information and data in the information age for all mankind.



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