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“EMERGING” TECHNOLOGIES AND DETERRENCE STABILITY IN THE 21ST CENTURY

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TOWARDS A MORE DANGEROUS NUCLEAR WORLD?

WE ARE ENTERING – PERHAPS EVEN SLEEP-WALKING INTO - A NEW AND MORE COMPLEX GLOBAL NUCLEAR ORDER

- Different potentially disruptive technologies reaching fruition at the same time, many of which are dual use and interlinked with each other.
- They are creating deterrence challenges, escalation challenges, proliferation challenges, stability challenges, crisis challenges and arms control challenges.
- Terminology, understanding and clarity is often clouded, leading to hype.



BUT WHAT'S NEW AND HOW, WHAT MATTERS, WHY AND TO WHOM, AND HOW WE CAN CONSTRUCT THE WAY AHEAD?

- Impact of some tech more marginal
- Impact is not equal
- Impact perceptual as much as actual
- Impact will be both deliberate and inadvertent

THIS WILL – AND IN SOME CASES ALREADY IS – IMPACTING THE WAYS, MEANS AND ENDS OF DETERRENCE...

DETERRENCE AND NUCLEAR AGES

FIRST NUCLEAR AGE

1945-1990

SECOND NUCLEAR AGE

1990-2020

THIRD NUCLEAR AGE

2020?-

FOCUS/ THREAT

Major nuclear war between the superpowers

Nuclear proliferation to irrational “rogue” actors and regions

Vulnerabilities and uncertainties created by new technologies lead to deliberate or inadvertent nuclear use

CONCEPT OF DETERRENCE

MAD and mutual vulnerability through secure second strike forces

MAD plus deterrence by denial, coercion and compellance.

Mixture of nuclear and non-deterrence through both denial and punishment?

ROLE OF NUCLEAR WEAPONS

Essential for deterrence

Deter major powers

Role augmented and even replaced by other non-nuclear capabilities for deterrence?

1. SENSORS AND SECOND STRIKE FORCES

THE NOTION THAT ADVANCES IN SENSING, TRACKING, PROCESSING AND PRECISION STRIKE ARE MAKING IT POTENTIALLY EASIER TO TARGET SUBS AND MOBILE MISSILES.

- There probably is some truth to this!
- Undersea acoustics and other sensors, UUVs, choke points.
- ISR and imaging satellites, UAVS, hacked comms, precision strike (non-nuclear).
- But some of this isn't really new!

DEPENDS WHOSE SUBS OR MISSILES, WHERE, AND WHO IS DOING THE FINDING.

- US and UK subs very quiet and benefit from good access to deep water. Russia and China don't.
- Once accessed, the world's oceans are huge places to hide!
- Russia and China mobile missiles could be hidden in vast areas, decoys used. North Korean missiles might be easier to locate and attack.

SYSTEMS FOR TRACKING AND COMPROMISE MIGHT BE VULNERABLE TO ATTACK, WOULD NEED GOOD ENDURANCE AND TO BE IN THE RIGHT PLACE AT THE RIGHT TIME.

- Non-nuclear precision strike would have to be very accurate. Wouldn't work against a large nuclear arsenal.
- The more subs you have the more difficult it becomes to undermine them – this could be a problem for the UK
- Other than the UK, all major powers have other means of nuclear delivery, making the risk of attack outweigh any benefits.

ALL OTHER NUCLEAR SYSTEMS ARE THEORETICALLY VULNERABLE, BUT THIS DOESN'T CHANGE. THE POLITICAL CALCULATION THAT ATTACKS WOULD BE POTENTIALLY SUICIDAL.



“The hunt for mobile missiles is getting faster, cheaper, and better. Long recognized problems with mobile systems have combined with cyber technology breakthroughs to make these missiles vulnerable.”

Paul Bracken, 2016.

2. HYPERSONIC MISSILES

HYPERSONIC GLIDE VEHICLES (HGVS) AND HYPERSONIC CRUISE MISSILES (HCMS)

- Speed, maneuverability, trajectory, surprise, and ability to defeat midcourse defenses.
- Mixture of strategic and tactical, nuclear and non-nuclear applications
- Concerns about surprise attacks, counter-force, “ambiguities” (target, destination, warhead).

BUT WHAT THEY OFFER ISN'T REALLY THAT “NEW”

- Hypersonic moniker is misleading – similar speeds to current missiles.
- Similar in many ways to BMs and CMs; speed, ability to evade defences, maneuverer.
- Marv technology traced back to the 1980s – wasn't pursued.

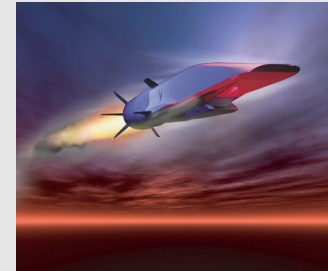
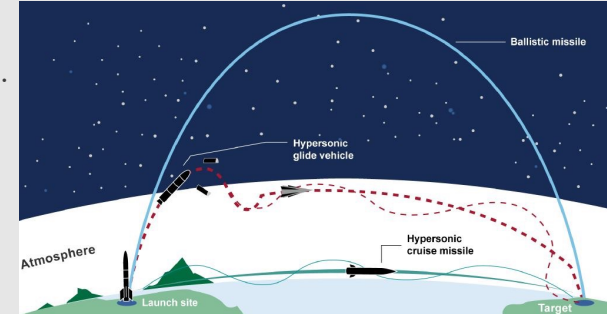
...AND THEY HAVE LIMITATIONS

- Don't appear to offer much advantage to BMs for the moment.
- Slow when maneuvering, susceptible to terminal BMD, problem of how to deal with heat, easier to track with infrared.
- Use of GPS for terminal precision/guidance – only once missile is travelling slow enough inside atmosphere.
- HGV probably easier than HCM.

WHAT MATTERS IS THAT THEY ARE POTENTIALLY MORE DESTABILIZING

- Increase changes of misperception and inadvertent escalation rather than counter-force game changer

COULD BE BROUGHT INTO EXISTING ARMS CONTROL AGREEMENTS? I.E. ON LAUNCHERS?



3. TOWARDS FULL SPECTRUM BMD?

BMD ISN'T A NEW CONCEPT, BUT IT IS POTENTIALLY BECOMING MORE PROBLEMATIC FOR DETERRENCE:

- Improvements and spread of **right of launch** non-nuclear capabilities
- Emergence of **left of launch** and full spectrum rationale

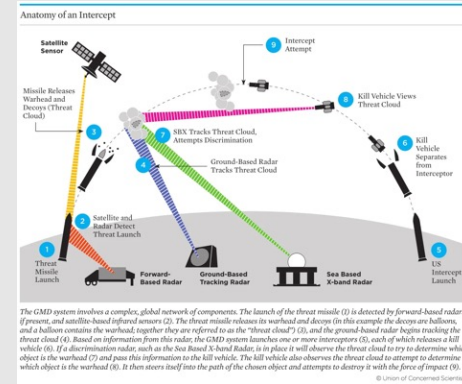
THE NEGATIVE IMPACT OF BMD ISN'T NEW EITHER...

- Driven interest in modernization and hypersonic weapons, especially Russia
 - Though some of this is tempered by lack of confidence in the technology/mission and how these systems can be overwhelmed.
- Left of launch is effectively a new incarnation of counterforce with kinetic weapons.
- Right of launch impact is probably limited, left of launch won't be.

BUT IT DOES PRESENT NEW CHALLENGES AND EXACERBATES THE PROBLEM

- Less tangible, harder to quantify, increased suspicion.
- Pre-emption rather than defence?
- Non-kinetic left of launch might have lower barriers to entry

ONLY US CURRENTLY DOING THIS, AS FAR AS WE KNOW, BUT RISK OF SETTING A PRECEDENT THAN OTHERS WILL FOLLOW.



“... [global strike] is probably [the ability to be] any place on the face of the earth in an hour” while the “high end is any place on the face of the earth in about 300 milli-seconds - that’s cyber.”

US Gen. James Cartwright

4. COMPLEXITY ACROSS “NEW” DOMAINS

A NEW TYPE OF NUCLEAR ENVIRONMENT OR ECOSYSTEM SHAPED BY BOTH *HARD, TANGIBLE, OBSERVABLE* AND *SOFT, INTANGIBLE AND SECRETIVE DEVELOPMENTS*

- Interaction of physical and information domains in a way not seen before.
- Involves a commingling of nuclear and non-nuclear systems
- Compressed decision-making time and new types of escalatory pathways.
- Blurring of fire-breaks and less commonality of understandings.

SPACE/COUNTERSPACE

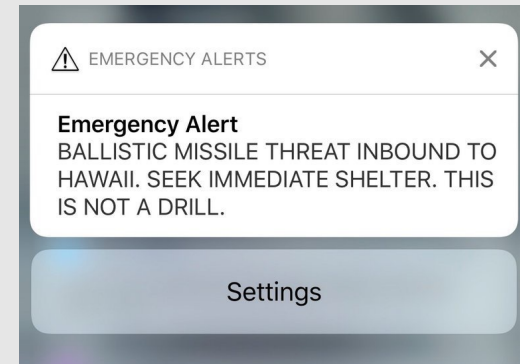
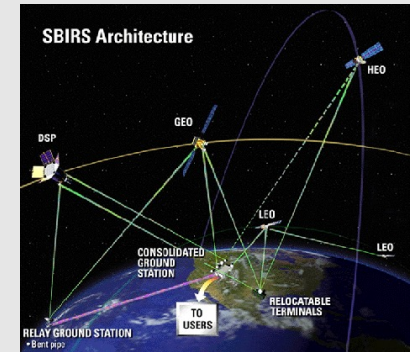
- Dual use satellites; ASAT developments, importance of space to certain operations, escalatory potential. But there are also limits on “perfect strike”.
- Possibility of actions being misinterpreted, “entanglement”....

INFORMATION ENVIRONMENT

- A more diffuse domain with more actors and more potential for mis- and dis-information
 - Twitter, signaling, fake news and deep fakes, patterns of behavior, cyber attacks. Wormhole escalation.

A GENERALLY MORE COMPLEX ENVIRONMENT IN WHICH TO OPERATE, WITH AN INCREASED LIKELIHOOD OF THINGS GOING WRONG?

- Or is complexity and escalation risk being used as a deterrent policy?



5. AI, AUTOMATION AND DETERRENCE

THIS ISN'T AS NEW AS SOME MIGHT THINK...

- Dead hand but also early warning and cruise missiles (and use in conventional weapons).
- But it is important to be clear what AI and autonomy are and how they might be used in the future...
- Both AI and automation could have a role to play in deterrence

MANY POTENTIAL APPLICATIONS, SOME MORE MARGINAL AND SOME MORE WORRYING THAN OTHERS:

1. Decision making support; data collection and analysis, targeting, war plans.
2. Finding and tracking targets
3. Accuracy and guidance of weapons (smarter)
4. Autonomous platforms for sensors and weapons (Status 6)
5. Left of launch operations

BUT ALSO CONCERNS AND LIMITATIONS

- Slow descent towards “killer nuclear robots” and *The Terminator!*
- Keeping a human in the loop... (confirmation bias versus mistrust)
- Vulnerabilities: data poisoning, hacking and jamming, limits of computer power and data sets, unpredictability.

THERE ARE GOOD REASONS WHY AI AND AUTOMATION CAN BE LIMITED... BUT THIS WILL REQUIRE CONTINUED MONITORING AND OVERSIGHT.

- Controlling AI applications rather than “AI arms control”

AI is: “the theory and development of computer systems able to perform tasks normally requiring human intelligence.”

“Machine learning is a type of AI that specializes in parsing and analyzing given data in order to adapt from it and make adequately intelligent decisions.”

1. EDT AND NUCLEAR PROLIFERATION leads to strategic instability and arms racing (*most likely?*)

2. EDT Produce a (Temporary) Strategic Advantage creating the possibility of coercion and a non-nuclear first strike capability (*most destabilizing?*)

Four Possible Scenarios?

3. EDT Restraint through arms control, risk reduction and normative mechanisms. Nukes remain central. (*most appealing?*)

4. EDT Stability undermines the value of nuclear weapons but creates the space for conflict (*most transformative?*)

TECHNOLOGY AND THE PRIMACY OF POLITICS?

THERE IS A CURRENT FEELING OF TECHNOLOGICAL DETERMINISM AND A NUCLEAR WORLD IN FLUX... AND PERHAPS ONE THAT IS MORE DANGEROUS THAN BEFORE.

- When the various different technological (and political) challenges are together there is a feeling that we might be entering into a new **“third” nuclear age** where the rules of the nuclear game will change, and new mechanisms and thinking for deterrence, arms control, and stability will be required.

THIS NEW ERA IS LIKELY TO SEE:

1. Blurring (rather than replacement) of nuclear and non-nuclear distinction;
2. Increased lack of understanding of this tech and its implications by policymakers
3. New pathways for (inadvertent) escalation through entanglement and indistinguishability
4. Greater uncertainty and less tangible threats
5. The possible rise of non-nuclear first-strike capabilities
6. The shifting balance between humans and machines
7. The increasing speed of operations and the reduction in decision-making time

BUT SOME OF THESE TECHNOLOGIES ARE MORE ESTABLISHED THAN SOMETIMES ACKNOWLEDGED, AND SOME REFLECT NEW VERSIONS OF OLD PROBLEMS RATHER THAN SOMETHING ENTIRELY TRANSFORMATIVE FOR DETERRENCE

- We have dealt with periods of technological change in the past, but this does not mean we can stand idly by while a new nuclear environment with new nuclear risks unfolds...
 - Political will, informed decision makers, and a vibrant climate of ideas are essential.