1 November 2017
Mr. Robert Work
Former Deputy Secretary of Defense
Future Security Challenges and Potential U.S. Responses

Notes:
1. Below are informal notes of the speaker's remarks as taken by a JHU/APL staff member.
2. The speaker used very detailed slides in his presentation. Links to his presentation as well as those to the audio and video files from the Seminar can be found on Video Archives page of www.jhuapl.edu/rethinking. Files from all other previous events are also available on the site. Recent years' videos may be found on the JHU/APL YouTube Playlist.

Introduction

Mr. Work noted that he would use as his starting point the September Rethinking Seminar given by General Michael Hayden (USAF, ret) on *Future Environments and Strategic Challenges to the U.S., Her Partners and Allies.*

First message: Time for DoD and the US to "Cowboy Up"
- Work noted that:
    - General Hayden had spoken as an intelligence professional who would be briefing a President on what was happening in the world
    - Instead, Work would speak from his policy and budget perspective as DEPSECDEF for 3 different Secretaries of Defense (Hagel, Carter, and Mattis)
- Work considers his views of foreign policy and national security come from the realist school that uses a GPS approach to strategy: First we must know where we are and also how we got there
- Where we are now: We are at the end of the Post-Cold War Era
    - We need a term for this new era – Global Era?

How Might the Next 20-25 Years Resemble, or Differ from the Past 25 Years?
- Predicting future national security is always difficult but more so now with so many changes occurring
    - Using the Post-Cold War Era, which lasted about 25 years, it is possible to make some estimates about the next 25 years (which could be discussed and debated)
    - Big question: What does DoD need to compete in this new era?
- From DoD's perspective, the Cold War ended on May 12, 1989
    - President George H. W. Bush proclaimed that containment would no longer influence the development of the US defense program
    - Guidance from the Commander-in-Chief directed DoD to start to think differently
- At the end of the Cold War the US had uncontested primacy – a very advantageous position
- Then the Post-Cold War Era ended in early 2014
    - China began massive dredging operations centering on reefs in the Spratly Islands
    - Russia illegally annexed Crimea and destabilized Eastern Ukraine

1

- o Such activities are consistent with Great Powers trying to secure their borders or near-abroads
- Bottom line: 2014 marked the end of the Post-Cold War Era – a relatively coherent 25-year period
- Problem: The US was and is still bound by the National Security Strategy from January, 2012
  - o It was written before ISIS, the illegal annexation of Crimea, etc.
  - o It shows how strategically backward the US is even now
  - o The US is strategically behind partially because DoD has been so tactically and operationally focused for the last 16 years
    - ▪ The US is not thinking strategically anymore
    - ▪ As an example, General Hayden noted that the US was unable to use national technical means to identify the movement of Russian troops during the Crimea invasion
      - All the surveillance systems had been tuned to capture low power signals from cell phones, etc., in the mountains of Afghanistan and cities in Iraq

The Post-Cold War or Global Era
- Recommended reading: "America and the Geopolitics of Upheaval" by Hal Brands and Eric Edelman in The National Interest
- Primary characteristics of this relatively coherent period that are visible when looking back
  - o Uncontested US primacy as seen in 1994 when:
    - ▪ The US had 25% of world GDP and controlled 40% of global defense outlays
    - ▪ US allies had 47% of world GDP and 35% of global defense outlays
    - ▪ Bottom line: Over 70% of the world's economic output was centered on the US and its allies who also shared over 75% of military expenditures
  - o There was an absence of any serious international ideological competition
  - o There was an absence of Great Power competition since Russia was in crisis over the dissolution of the USSR and China was not yet strong enough to challenge the US
  - o There was generally good multilateral cooperation in addressing global disorder
- How will the next 25 years differ from the last 25 years?
  - o No matter what else happens, there is and will be some erosion of US / Western primacy
    - ▪ Part of it will be from dropping statistical measures
    - ▪ The US share of global GDP and defense spending is now at 22% and 34%, respectively
    - ▪ Allied shares are 39% and 25%, respectively
    - ▪ However, the US remains preeminent in what China calls comprehensive national power (CNP) which takes into account military, economic and cultural factors
  - o Great Power competition has returned with a vengeance
    - ▪ The world is divided into great powers, minor powers, and superpowers
    - ▪ Definition: A Great Power is a state that can take on the dominant state conventionally, could grievously hurt it, but not necessarily defeat it
      - It must also have a nuclear deterrent that is capable of a survivable, ensured second strike
      - Talking strictly hard power here and not global soft power or economics
    - ▪ China and Russia see selves as Great Powers and meet this realist definition
      - Both are acting as Great Powers throughout history have acted
  - o Global ideological struggles are back and shouldn't be ignored
    - ▪ The spread of democracy has stalled even though in the 1990s it seemed to be assured as the final stage of development of maturing states
      - From 1974-2000 the number of electoral democracies tripled (39 to 120)

- Since 2006 more countries have seen decreases in their democratic values than have seen increases
    - Authoritarianism is making a comeback eroding the democratic balance
        - 1940-1989: Over 50% of dictators came to power through coup d'états
        - Since 2010: 40% of takeovers were by authoritarianization, equal in number to coup d'états
    - Authoritarianization starts with a subtle but steady erosion of democratic values and practices
        - It has already happened in Turkey and Hungary
        - It may be occurring in Poland
        - Xi in China and Putin in Russia are leading and encouraging this behavior around the world
    - There are also all sorts of religious ideological struggles going on all over the world
    - The result is a general intensification of global disorder
- Result: A pronounced uncertainty about the willingness and staying power of the US and the other main defenders of the post-Cold War system
    - Uncertainty makes struggles between democracies and authoritarians more concerning
    - This is consistent with General Hayden's views presented at the last Rethinking Seminar

Fashionable: "We are in the most dangerous international security environment" in 70 years
- But compare the dangers
    - In 1986 there were 39,000 nuclear weapons aimed at the US
    - By comparison, 35-40,000 ISIS fighters in Iraq and Syria do not constitute the same level of threat
    - From 1965-1972 the US: fought in Vietnam, lost Egypt and Syria to the USSR, saw the PLO turn to terrorism, and dealt with N. Korea shooting down planes and killing soldiers with axes
    - In response to the ax murders, the US flew B-52s with nuclear weapons near N. Korea
    - It was a much different feeling than we have now
- Henry Kissinger said in 1969: "The current international environment is in turmoil because its essential elements are all in flux simultaneously."
    - Prime elements of the Post-Cold War period are again all in flux
    - Consequently, the next 25 years will be far more strategically challenging than the last
    - Grand strategy should be more important to the US now and we should *Cowboy Up!*
        - The US for the last 2 decades has been too focused on tactics and operations

National Security Challenges of the Next 25 Years
- Competing with Great Powers in peace while avoiding Great Power war
- Deterring and responding to both old and new means of strategic attack
- Managing the continued destabilization, disintegration and possible reintegration of the Greater Middle East…albeit at a lower, sustainable strategic cost
- Contending with nuclear-armed minor powers
- Dealing with the culmination of the Guided Munitions-Battle Network Revolution
- Operating in newly or more hotly contested operational domains
- Preparing for and withstanding a looming technological tsunami

The following provides details on each of the above challenges:
Competing with Great Powers in peace while avoiding Great Power war
- Haven't had a Great Power war in 70 years and a good goal for the next 70
- China now sees itself as one of or the key rule maker by 2050

- Russia contests key aspects of the Post-Cold War era as it increases control over its near-abroad
- China and Russia are both questioning and contesting the US-led international order
  - Cooperating with each other in a wide variety of ways (technologically, militarily, and sometimes in foreign policy)
- Whenever we have Great Power competition, it will put constraints on our freedom of action
  - With every strategic move, the US must consider how its actions may impact the other Great Powers
  - Only had one peer competitor to worry about in the Cold War
    - Russia was a peer competitor in the Cold War, but now is a Great Power
  - The US needs to avoid actions that could force China and Russia into a formal counter-coalition
- The US needs to:
  - Compete with the other Great Powers daily
  - Confront them when they are acting in ways against US or allies' interests
  - Contest their long-term, broad visions of how the world should evolve
  - Do all of this while avoiding a Great Power war
- The US must consider Russia and China as our geo-political rivals, not adversaries
  - They are acting like Great Powers who will vigorously defend what they consider to be in their vital interests
  - There is no reason for the US to get into a Great Power war unless it happens through miscalculation or misunderstanding
- The US must maintain strategic parity since that is the basis of strategic deterrence
  - It must strengthen conventional deterrence to avoid a situation where Russia attacks it because Russia believed it could achieve its gains with conventional weapons
  - The US needs to prepare for ambiguous *Gray Zone* challenges
  - As in the Cold War, the US must prepare for proxy wars involving client states
    - This is probably much more likely than a direct confrontation with a Great Power

Deterring and responding to both old and new means of strategic attack
- Nuclear weapons will be around for some time so the US must maintain a strong nuclear deterrent
- Both Russia and China consider strategic cyberattacks as counter value warfare, which would involve strikes against industry, power grids, and the economy
- The US is at a disadvantage since its thinking has moved away from counter value targeting in the nuclear realm
  - Definitions: *Counter value* involves targeting an adversary's cities and society while *counter force* involves targeting nuclear and conventional military forces
  - The US needs to rethink these concepts
- We are already seeing the first sophisticated cyberattacks against societal and governance cohesion
  - Russia's actions in the US over the last year are a clear example
  - These types of attacks will become increasingly more sophisticated using AI
  - This is a subject that democracies don't want to talk about
- We may need to deter and respond to genomic attacks against populations
  - Some are working on weaponizing genomics to be able to attack certain cohorts within a population
- Bottom line: We need to think about a new theory of deterrence
- Lattice Deterrence
  - Requires considering different escalatory ladders for all the various types of warfare including cyber, nuclear, genomic, societal and governance cohesion attacks

- o Together these attacks form a lattice so we need to think about new theories of escalation control and ways to de-escalate a situation
  - o Bottom line: It makes for a very challenging strategic environment
- At the same time we need to rethink the traditional fighting at home vs. away construct
  - o DoD has generally planned to fight overseas to keep adversaries off our shores
  - o The home vs. away construct is likely no longer valid
  - o The US will be under attack at home as soon as its forces start to move if not before
- Expect more attention to be paid to homeland defense
  - o DoD will be drawn more and more into homeland defense
  - o Result: DoD will need to divert resources away from its overseas missions

Managing the destabilization, disintegration and possible reintegration of the Greater Middle East
- The Middle East is a strategic cul-de-sac that the US has been stuck in for a long time
- Now there is competition for regional hegemony going on between Iran and Saudi Arabia
  - o The US apparently threw in with Saudi Arabia – a decision that did not appear to have been debated but should have been
- States from West Africa to Afghanistan are also suffering from a breakdown in governance
  - o Plus, there is sectarian violence from Sunni / Shia disputes, ISIS, al Qaeda, and others
- Expect more Great Power competition in these areas
- The US must find ways to accomplish its goals there more economically in terms of both resources and forces as part of a strategic plan
  - o Extraordinary amounts of resources have already been spent there

Contending with nuclear-armed minor powers
- The issue is primarily N. Korea at the moment but there are also hostile minor powers which aspire to be nuclear-armed (Iran) as well as unstable already nuclear-armed powers (Pakistan)
- Depending on how Great Power conflict goes, even friendly countries may be pushed toward pursuing an independent nuclear capability
  - o What would this mean for US extended nuclear deterrence?
- Regional nuclear deterrence will remain a critical issue along with rethinking strategic nuclear deterrence

Dealing with the culmination of the Guided Munitions-Battle Network Revolution
- To determine if it was a revolution one must consider whether or not it supplanted the previous dominant form of warfare
  - o If a state lacked guided munitions when in conflict with a state that had theater-wide capabilities, that first state would become nothing but a list of targets
  - o This was true with the two wars fought between the US and Iraq in the 1990s and 2000s
  - o And it was all done using conventional (not nuclear) warfare
- Maturation of a warfare regime occurs when all of the competitors have the same tools/weaponry
  - o A lot depends on how fast this new regime can be duplicated by others
- As history has revealed, regime maturation happened during WWII
  - o Both sides had radios, mechanization, etc. but Germany was the first to pull all the elements together into a new operational concept called the blitzkrieg
    - ▪ It gave them enormous operational and tactical advantages for about 4 years
    - ▪ Then the US and USSR saw what they were doing and came up with their own slightly improved versions
  - o The aircraft carrier revolution was a little different
    - ▪ Japan and the US were the prime competitors
    - ▪ By the time Japan was out of the competition, the US had 100 carriers

- Others thought that they too could build capable carriers but are nowhere near the US in terms of numbers or capability
- Instead, other competitors chose to develop anti-ship cruise missiles and submarines
- The maturation of the Guided Munitions-Battle Network
  - In Iraq the US was able to coordinate all the elements and deliver theater-wide 24-hour, all weather, guided munitions bombardment
    - We held on to this lead for 25 years
  - Now both China and Russia are near parity with the US
    - The technologies involved are now largely proliferated
- Bottom line: The US conventional overmatch is receding so that anytime the US projects power in the future, it will be costlier and more difficult
  - The US will be operating in more highly contested domains
  - Because of the Guided Munitions-Battle Network Revolution, air/land/sea operations will be more contested than in the Post-Cold War Era

Operating in newly or more hotly contested operational domains
- Domains that will be hotly contested include:
  - Space – it will no longer be a sanctuary
  - Near-space – China saw an operational domain where the US didn't operate
  - The electromagnetic spectrum – it is now contested as never before
- Near space is from above 100,000 ft. (an altitude where aircraft can't fly) to 320,000 ft. (an altitude below which spacecraft can't stay in orbit)
  - China could not match the US or Russia in space so chose to invest in hypersonics to take a significant lead in near space
  - China has put astounding amounts of effort into hypersonics development making it well ahead of the US
  - Being there first gives China a big advantage in hypersonics
- The electromagnetic spectrum: It combines tactical and operational cyber with electronic warfare and information operations
- Undersea: a big US domain advantage now but it is likely to be challenged over the next 20 years
  - The US is counting on maintaining undersea dominance
  - However, if quantum sensors become available, it is likely that we will have a much more contested domain
- Problem: Responding to these challenges diverts resources from other defense activities

Preparing for and withstanding a looming technological tsunami
- We are already in the midst of rapid, unprecedented technological change as follows:
  - Advanced computing (e.g., quantum computing, deep neural networks) leading to AI
  - AI and Big Data leading to machine learning
  - Machine learning leading to increasingly capable autonomous systems and robots
  - AI/Big Data/machine learning and additive manufacturing will lead to an AI-driven 4th Industrial Revolution
  - Genomics and synthetic biology
  - Nanotechnology, material sciences and additive manufacturing
- A tsunami of changes will sweep away older ways of doing business and bring in new ways with the prospect for even more new military-technical revolutions

What Should DoD Do to Prepare for / Compete in This New Era?
- First, it must build institutional resilience, flexibility, and adaptability

- Expect 25 years of operational and technological surprises
  - We will see a world of fast followers with operational advantages only lasting 2-3 years
  - We need to be ready to move on because the competitors will be copying our moves
- SECDEF Mattis is calling for increased velocity of innovation and delivery of capabilities to warfighters
- Problem: As important as institutional changes are, getting the right talent is also crucial
  - The force must be ready to shake off surprise and drive on
- SECDEF Mattis' first priority: "Rebuild a safe & credible nuclear-deterrent, while maximizing lethality and readiness of a decisive-conventional-force."
- Top operational and programmatic challenges for DoD in the near-term
  - Recapitalize the nuclear triad
  - Own the Electromagnetic Spectrum
  - Prepare to fight and win in space
  - Pursue "Third Offset" technologies, especially AI and improved autonomy
  - Develop new operational and organizational constructs for conventional overmatch
- *Recapitalize the nuclear triad – all three legs simultaneously*
  - All of the systems will be aging out in the 2025-2035 period after decades of life extension efforts
  - Problem: Can we make all these changes perfectly before the systems start failing?
    - Viability of the nuclear deterrence is at some risk because everything has to be executed perfectly on time
  - Assumption: We will build to the New Strategic Arms Reduction Treaty numbers which will come from the Nuclear Posture Review
  - It will be expensive
    - Maintaining the nuclear triad today now costs about 3% of the Defense budget but number will grow to 6% between 2021 and 2043
    - The extra 3% will come out of the conventional forces budgets
      - Unless extra money is granted, conventional forces will be hurt
      - DoD has been fighting with Congress about this for years (e.g., over the replacement for the OHIO class submarine)
- *Own the Electromagnetic Spectrum*
  - In 1975 DoD decided it wanted to "own the night" which involved more than just buying night vision technology – it also had to train its forces to operate with the goggles, etc.
    - It was very hard to do since it required operating extra controls at night
    - It took a decade to do it, but it then gave US troops a tremendous advantage
  - Now DoD must decide to own the electromagnetic spectrum whenever fighting occurs
    - But, the Russians and the Chinese are already good at this
  - We must cyber harden DoD's network
    - It is taking too long and the network has too many vulnerabilities
    - The services haven't been willing to spend money on hardening because it's not sexy, but they will wish they had if we get into a Great Power conflict
  - We must harden the internet of things
    - About 90% of systems were built before we worried about cyber vulnerabilities
    - We must think about cyber hardening as we did about EMP hardening in the Cold War
  - We need more electronic warfare tools, decoys, etc., and we must practice realistically against a near-peer electromagnetic competitor
  - We need to go back to emission control (EMCON) and electromagnetic deception
- *Prepare to fight and win in space*

- Space was a service provider (GPS, comms, weather) and little thought was given to fighting those constellations
- We don't need a Space Corps but we do need first an Air Force sub-unified Space Command
- We need to build a more resilient architecture with space battle management and C2
  - One element looks up at space so it can fight the constellations
  - Another element looks down from space to provide space-based combat support
- We need to be able to take the fight to the enemy by going after their systems

- *Pursue "Third Offset" technologies, especially AI and improved autonomy*
  - AI and autonomy will be the pacing technological competition among Great Powers in the 21st century as nuclear weapons were among Great Powers of the 20th century
  - China's national AI plan states that China will:
    - Catch up to the US by 2020
    - Surpass the US by 2025
    - Dominate AI by 2030
  - China's AI plan is the equivalent to Khrushchev banging his shoe and proclaiming "We will bury you"
    - This is especially true since China is spending enormous amounts of money to support this plan
  - Putin also sees AI as the future for Russia and all humankind which offers colossal opportunities and hard to predict challenges
    - He believes that whomever is the leader in this field will be the ruler of the world
  - Given what Putin said and what the Russians have already done in societal and governance attacks, adding AI and automated bots would allow them to do so much more
    - Authoritarian regimes will thrive using these capabilities
  - China has already developed social credit scores using massive data capabilities that monitor everything; scores determine whether you can get a job in state institutions
  - Bottom line: AI and autonomy will drive the 4th industrial revolution, thereby having an impact on everything DoD does
  - To see how well AI is developing in DoD, look at the contracts and compare them to what China is spending
    - Govini has an internet crawler that finds every contract the government lets
      - It tells one how much money has been placed on contract and for what in great detail
    - The slide on the next page shows a first look at DoD's spending on AI
      - The arrows illustrate the 5-year compound-adjusted growth rates
    - What looks good standing alone ($6 billion in 2017), doesn't look that good when compared to what China is spending on the same technical issues
    - Bottom line: The US needs to spend more money here but also spend it more smartly
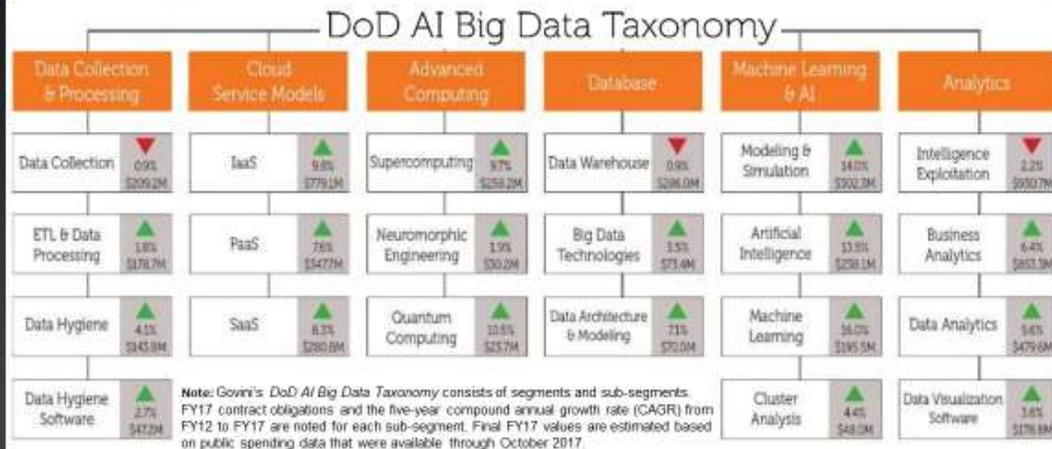
- o AI and automation will have a tremendous impact on battle networks in the near term
  - It will come primarily from human-machine collaborative combat networks
  - It will accelerate and measurably increase operations of the battle networks
- o AI will be merging with other things like quantum physics to accelerate machine learning
  - Example: AlphaGo is a system designed to play the ancient game of Go, which was thought to be too nuanced for a machine to learn and then beat a human
    - AlphaGo was trained by observing 30 million games
    - It learned enough to beat a human grand master 4 games to 1
    - AlphaGo0 trained itself by playing itself after being given the rules of the game
      - In 4 days and 4 million games AlphaGo0 beat AlphaGo 100 to 0
  - Bottom line: Quantum computing will accelerate machine learning well above the already astounding rates to allow for novel complex systems
    - AI and neuroscience will create all sorts of human-machine symbiosis
    - AI and synthetic biology / nanotechnology / additive manufacturing will permit manufacturing items at their point of use
    - AI and materials science will develop new materials with novel characteristics that we can't even understand right now
    - AI and social media could get us closer and closer to being able to manipulate human behavior
    - The battle for talent will be intense but need to get serious about it as a nation

- *Develop new operational and organizational constructs for conventional overmatch*
  - Why is this a programmatic issue?
    - Like blitzkrieg, air/land battle, and carrier revolutions, it will not be just people looking for technological silver bullets
      - It will also be operators thinking about a problem
      - They will then use these technologies in news ways that provide an operational advantage
    - The competitor that can inject these technologies into new operational and organizational constructs will have the advantage
  - We need to incentivize the services to go after these innovative merges
    - Suggest setting up warfighting labs to allow for experimentation
    - We must also insert funds where needed
    - We must use wargame incentive funding to encourage the testing of new operational concepts
    - The Army could have asked for funding to try something dramatic (e.g., turning a BCT into a multi-domain vanguard force with all the necessary training and tactics)
      - DoD probably would have funded it as part of the incentivizing of innovation
- Mr. Work noted that he held a minority opinion in DoD on the concept:
  - Given all that has to done to be competitive, before adding capability to each of the Services, we must hone the force we currently have
  - The US needs the best led, best trained, best maintained and best over-provisioned force in the world
  - It needs a new revolution in training with no waivers of certification
    - Commanding officers who grant waivers should be relieved of command
  - We should cut presence before cutting maintenance
    - COCOMs always want more equipment and are always asking for more ships
    - Navy says to do its mission it needs 350 ships
    - But currently have 276 ships providing the same presence as 355 would
  - Navy is in big trouble already because of its lack of focus on training, maintenance, and certification
    - This is in part due to incessant demands for ship deployments and the Navy's inability to say no
  - DoD needs to fill its magazines and build reserve stocks
  - It also needs to buy more in some discrete areas such as Patriot Missile batteries
  - DoD needs to be able to get into the operational and strategic reserves faster
  - Bottom line: Use these actions to get through the current crisis, hone the current force, and decide what the force of the future will look like before pursuing it
- Possible funding scenarios to do all of the above
  - *Best Case* (unlikely to happen):
    - Congress agrees on substantial increases above the Administration's defense request
    - It ends BCA caps – if it doesn't, sequestration which holds back funds will automatically be triggered
    - Congress also passes an appropriation bill by the end of the current Continuing Resolution (CR) in December
  - *Next Best Case:*

- - Congress agrees on substantial increases above the Administration's defense / non-defense requests
  - It passes another Balanced Budget Agreement (maybe for 2 or 3 years) and does so prior to the expiration of the current CR
  - However, the problem with 2-year CRs is that DoD can never make hard decisions since it thinks the budget situation will get better in 2 years
  - Compared to other drawdowns since WWII, the post-Afghanistan/Iraq drawdown is the shallowest by a wide margin
    - It is different this time, because with DoD operating under CRs 30% of the time (since 2012), it really means working with an 8-month fiscal year
    - This is the first time in history we have had a presidential transition while under a CR
  - DoD never made hard decisions that it knew it had to regarding having too much force because it thought budgets would increase
  - Problem: Trump has promised a big (355 ship Navy, etc.) but BCA is still the law
    - So, unless the caps are raised or BCA is ended, a 355 ship Navy will not occur
  - *Next Best Case:*
    - Congress accepts the Administration's defense / non-defense budget requests and passes an appropriation bill by the expiration of the current CR
    - Problem: November will be all about tax reform and the CR expires about the 9th of December leaving very little time to do anything
  - *Next (Not so Good) Case*:
    - Congress uses the OCO (Overseas Contingency Operations fund – the Pentagon's slush fund) to cover base defense budget shortfalls
    - Problem: OCO is only 1-year money so one cannot start a major force build-up
  - *Worst Case (Somewhat Likely):*
    - Another long-term or year-long CR

Conclusion
- The Post-Cold War era saw conditions remarkably favorable to US interests, which allowed the US to take a strategic holiday
- International security environments over the next 25 years will be more challenging
  - We are likely to face at least 7 big international security challenges requiring more strategic thought
  - This will be complicated by at least 5 big operational programmatic challenges
    - Again, DoD should be investing to first hone the force it has before growing it
- SECDEF has told the services that they must operate as if they were going to war in one week
- DoD needs to focus on the elements above to change the competition in favor of the US and start to think about the future
- Bottom line: Need to be *Guns up, Ready to Fire*

QUESTION & ANSWER SESSION
Re: Nuclear Weapons – How do we know that ours will work?
- Supercomputing now is so advanced that experts believe they fully understand the basic physics and workings of nuclear explosions
- They are confident that the weapons will operate as expected
    - Sandia and Lawrence Livermore Labs were created to do this
        - We now need to build equivalent laboratories for autonomy and AI
- Bottom line: No experts have pushed DoD to run actual nuclear explosion tests

Re: Change – How well accepted are Mr. Work's views in DoD?
- When at the Pentagon, Work wanted to get DoD to focus on Great Power competition
    - It does now seem to have been accepted
    - It requires improving conventional deterrence
- The Third Offset is a good *term*, but it is not a *strategy*
    - The Chairman of the Joint Chiefs of Staff often talks about the erosion of US overmatch
    - The concept has wide-spread agreement
    - The Army is particularly in support with significant amounts of experimentation and new operational concepts stimulated by incentive funding for warfighting and wargaming
- There has been less success at shifting of resources
    - Funding for AI and automation visibly went up to $6 billion, but that's not enough
- He failed at getting the concept *don't build a new force before you hone the old one* accepted
    - He also wanted to know what the new force will look like before buying legacy equipment
        - The basic idea was don't buy things that don't provide a competitive advantage
        - Do we really want to spend money on 5th generation fighters for dropping bombs on individual terrorists?
        - We need to build unmanned tankers, not spend on more manned aircraft tankers
- Problem: Leadership is a little slower to accept change than are officers at the O-4/O-5 and below levels

Re: The Third Offset – How to make it understandable
- We used operational descriptions
    - In 1972/73 major national security experts started a long-range R&D development planning program which spent two years looking at what was happening
    - Looked at what was happening in the conventional competition in Europe
    - We determined that to convince the Soviets that they could not meet their campaign objectives there would be two choices for the US:
        - Make nuclear weapons more useful, e.g., lower yields, neutron bombs, etc.
        - Develop conventional weapons with a near-zero miss
    - The potential of guided munitions was easy for operators to understand
    - Problem: Explaining what AI and autonomy will do for you on the battlefield is a much more difficult sell
- We restarted another long-range R&D development planning program and explained what AI and automation would do for the force of the future including being able to:
    - Fight from range
    - Use large numbers of low cost munitions thus reintroducing mass on the battlefield
    - Blind the other forces sensors
- We also looked at future from the top since all battle networks would have some form of a sensor grid, a C4I grid, an effects grid for both soft and kinetic effects, and a resources grid
    - We have been operating like this for 25 years so everyone understands how they work

- o AI and autonomy will allow putting learning machines in each grid to improve the various aspects of the grid
- o Next we will have human-machine collaborations where machines support humans by providing options that will allow for more timely and better decisions
- o We will also be able to bring the power of the network down to the operator
  - ▪ More manned / unmanned platforms working together
  - ▪ More network-enabled autonomous weapons
- o We will start to inject these new capabilities into all of the grids
- o Hypothesis: At the tactical and operational level we will gain an enormous advantage because we will be able to operate at a faster tempo and achieve more relevant effects
- o We will have more options such as extending range to stay out of harm's way with more tanking and/or improved stand-off weapons
- These concepts were meant to spark innovation but were not getting what Work had hoped
  - o DoD developed *Project Maven* using the vast amount of information that DoD already had available from sensor systems such as Gorgon Stare
  - o Full-motion video processing by humans takes enormous amounts of manpower to even process small amounts of the data
    - ▪ However, this December there will be algorithms in the field that will process 100% of the video and alert analysts to what they should look at
  - o It is hoped that such improvements will trigger people to understand that this narrow-focus AI application is just a little of what AI could do for them
- The AI revolution not as intuitive as guided-munitions revolution and as such will require demonstrating the possibilities
- We already see this with today's Smart Homes with thermostats, refrigerators, and air conditioning that you can connect to with wireless devices
  - o We will be putting more and more narrow AI applications into homes and cars
  - o At some point, houses and cars will appear to have *General* AI
  - o Definition: General AI is defined as the intelligence of a machine that could successfully perform any intellectual task that a human being can
- Hypothesis: Humans will control the bottleneck work but from the outside it will appear different since the systems will be operating at such a high tempo
- All 3 Great Powers are working on developing AI systems but for different reasons
  - o The US – People are expensive and we want to cut down on costs and improve safety
  - o Russia – Running out of people
    - ▪ They have a goal of 30% of their force structure to be robotic by 2030 (they won't meet it)
  - o China – Because of past state enforced birth control limits, each soldier is now a sole surviving child and will be needed to support their elderly parents
- Bottom line: We can't determine how the competition will unfold, but we are definitely in a competition for the development of AI and automation

Re: Strategic Concerns
- As DEPSECDEF Work noted, he was less involved in deep strategic issues because he was focused on how to make the Joint Force more lethal and more ready
- The US needs to do everything it can to support democratic values in the renewed grand competition between the democratic block and the authoritarian block
- This is not the time to be disassembling the State Department
  - o The Cold War involved a whole-of-government grand strategy
  - o But we seem to be reducing more and more of grand strategy to military missions
    - ▪ This is a mistake

- The US needs to talk more openly about the sliding of democratic allies and the authoritarian governments it might lead to
  - Such governments weaken alliances and democratic blocks

Re: Cooperation among the Great Powers
- Russia and China are geo-political rivals who are defending their own vital national interests
- There is no reason for the US to not cooperate with Russia on many issues including counterterrorism / counterproliferation / establishing rules on cyber, governance, and societal attacks
  - We need to talk about genomic attacks and how to deter them
  - We should be doing the same thing with China
- Don't consider Russia or China as US adversaries
- Russia only sees NATO as coming at them and they are alarmed
  - They can't tolerate what they see as a hostile military coalition on their immediate borders
  - They used to have a 1,000-mile buffer between them and the West; but now it is only 200-miles
    - In recent years they have had some places with no buffers
- Bottom line: When in a competition, the US must understand what the competitor sees
  - Then it must figure out to discuss the problem and deescalate it
  - Also, goes for relations with China
- Even at the height of the Cold War the US and the USSR were able to sign nuclear reduction agreements while the Soviets were fanning wars of national liberation everywhere
  - Nixon went to China when there were no relations between the US and China and changed the rules of the game by recognizing China
- However, what Russia did during the election will make it difficult to come to any agreements now
  - But the ramifications of miscalculations between the forces are too dire not to try

Re: What Offsets / Trade-offs Should We Accept
- If DoD gets extra money it should go to the areas discussed before and not to growing the force
  - We already have a 1.2-million-member ground force counting all of the various elements
  - Buying more BCTs at this point makes no sense given their enduring overhead costs
  - We need to put money into honing the force as described above to buy greater capabilities for the Army and Marine Corps
- If we start to have cuts in DoD's topline (which is unlikely) then we will have to be willing to take more risks in land forces and the surface navy
  - We should put more money into submarines
  - We should move the Marine Corps towards more of a high/low mix of forces
  - We should do what the Air Force is doing now by asking questions like do we need J-STARS if it can't survive in an environment controlled by Russian or Chinese A2/AD forces
- We should expect to see more funding going to DoD since the President wants to do so
  - We should put that money not into building up force structure but rather to fixing other problems as previously described

Re: Proxy Wars
- All of the state adversaries the US has are conventionally deterred
  - The Russians don't want a fight even if they are trying to destabilize the alliance
    - Putin wouldn't want to risk a NATO Article V trigger against him

- China doesn't want to take on the US but it wants to make sure that if the US should intervene in their region that they have the option to deter, delay, or defeat if necessary
  - Iran knows it would get crushed
  - N. Korea is going after nuclear weapons because it wants to deter what it sees as a high probability of conventional attack or a regime decapitation strategy
- Instead, all compete with the US in different ways
  - Russians use direct action
  - Chinese use an economic grand strategy of cooption and subversion
  - Iranians go through their own proxies
  - N. Koreans continue to say "Look at me. I'm a threat. Don't mess with me."
- Bottom line: It is likely that the US will wind up in a proxy war – somewhere
  - It is always a surprise to the US where it ends up fighting

Re: Defense Procurement System
- The two smartest people who actually understand the system believe that the split of AT&L into USD for Research & Engineering (R&E) and USD for Acquisition & Sustainment (A&S) was a big mistake
  - Work did see great benefits of giving focus to R&E but one needs to focus on the totality of the R&E budget and push the concept of rapid prototyping
- For comparison, from 1956-1962 when the US was developing missile and rocket systems, DoD had hundreds of failures
  - Now Congress won't allow failures
  - Need to go to rapid prototyping, push the failures, and move on
  - This is what R&E is supposed to do
- A&S is designed to procure platforms as rapidly and economically as possible while reducing life-cycle costs
- The hope is that changes in DoD will permit going after innovation in hypersonics, AI, automation, lasers, etc., in a strategic manner
  - Recommends lots of prototyping
  - However, we must fear the *valley of death* that exists between finishing prototypes and starting production that might be exacerbated by the split in the two functions
- He hopes that the engines of innovation in the services will supercharge the whole system
  - A&S wants to reduce the number of regulations to permit more velocity in acquisition
- The DoD Concept: A reorganization will solve all problems – maybe, maybe not
  - The services used to have acquisition authority but DoD believed could be done much better
  - Added more regulations
- It is not axiomatic that delegating acquisition authority back to the services is a good idea
  - Problem: Do the services have the expertise to take on the acquisition system?
  - Congress won't be happy if the same number or more people will be involved in the switch
- Bottom line: It is a good idea to try but need to focus on the velocity of innovation and velocity of getting capabilities to warfighters
  - If it doesn't work, DoD must admit the failure and try something else

Re: Talent in DoD
- It used to be that the #1 college major was economics – now it is computer science
- Those coming from good schools can go to major power-house companies to get a $2 million package – DoD can't compete with that
- Perhaps DoD could have a National Reserve AI Training Corps of computer specialists

- o Maybe in very specific areas, DoD would give full-rides through college as long as a B average is maintained
- o Treat people as if in they are in the National Guard
  - Once a month they would go to a DoD installation to see their operational problems
  - They then help them think of ways to solve those problems with AI, machine learning, etc.
  - Thirty days a year they would go on a major exercise to help think through those problems
  - This would be in between going to work at Google or some other power-house company
- Good news: DoD has cool problems that people want to work on
- Bad news: China is buying up all the talent by offering them more than Google, etc.
- Bottom line: We are facing a Sputnik moment with the Chinese AI National Plan
  - o The US needs to respond as it did in the 1950s when it established NASA
  - o We now need AI centers of excellence and new ways to provide grants to universities
  - o This is the sort of things that Americans do well
  - o The competition for talent will be fierce