

Why the United States Must Win the Artificial Intelligence (AI) Race

Alfred D. Hull

Dr. Jim Kyung-Soo Liew

Kristian T. Palaoro

Dr. Mark Grzegorzewski

Dr. Michael Klipstein

Dr. Pablo Breuer

Dr. Michael Spencer

The AI Race Winner Will Control AI Impacts on Society

An increasingly urgent debate rages in many circles about the “Artificial Intelligence (AI) Arms Race” rapidly progressing on a global scale. Among many unanswered questions, one is of particular interest to the United States (US) government: Where does the US stand in this race relative to China? This question is critical because the AI Arms Race “winner” will dominate how AI impacts myriad aspects of human society worldwide. For the US to lead the AI race, it will require a conscious partnership among public, private, and academic sectors, and a strategic alignment with our allies. Our relative position as a world leader, our relative position as an economic leader, and our standing as a moral force for all people’s good and ethical treatment are at risk.

The sheer breadth that AI poses, both to improve and degrade human life, deeply troubles many. A common naysayer vision of AI in the future poses a bleak dystopian picture dominated by terminators and bad actors. The high-profile Elon Musk has cast our rapid pursuit of developing AI technology as **summoning the demon**.¹ Others on the other side of this debate think AI is going to open a new global chapter in which we try to understand ourselves better than the outside world.² Which prophetic vision of AI is most accurate is unknown, but what is clear is that AI technology continues to progress. Recently, Google announced that its AI model has over one and a half trillion parameters, ousting the previously most advanced AI, which was Open AI’s 175 billion parameterized GPT-3 model.³ The AI industry dazzles with its breakthroughs, which are being driven more and more by national governments and private companies due to AI’s potential for paradigm advances in national security and corporate efficacy.

This is a work of the U.S. Government and is not subject to copyright protection in the United States. Foreign copyrights may apply.

Russian President Vladimir Putin dramatically but correctly stated that whichever nation wins the AI race will rule the world. The stakes have never been higher. Imagine a world where China wins the AI Arms Race and US citizens become as marginalized as the Uighur Muslims now are, forcefully held in re-education camps under extreme AI digital surveillance. Are we ready to have a “social credit” system⁴ instilled for the next generation of Americans, where they will have their digital data crumbs captured from birth and fed into a national AI engine to predict the probability of dissidence? To Elon Musk’s point of view of AI as a source of untold and unimaginable power for the countries that harness it, the US winning the AI race is inescapable.

As much of US AI competition resides in China and received their AI basic training in North America, we unwittingly have, in fact, armed our AI adversary. Even though the US may still hold the advantage as the launching pad for the next generation of AI scientist-soldiers, and we are able to stem the brain-drain, the question remains: is that alone enough for us to prevail?

The National Security Commission on AI (NSCAI) lists steps⁵ the US should take to overcome the challenge. It also observes that the AI revolution is not a strategic surprise and that time is running out. China has, for years, been investing heavily through Venture Capitalists, Angels, and Accelerators across Silicon Valley and the Bay area. In addition to poaching talent from America’s AI armories, we must work together with Venture Capitalists in China, like Kai-Fu Lee,⁶ a Taiwanese-born American computer scientist who obtained his Ph.D. from Carnegie Mellon and previously worked at Apple, Microsoft, and Google. Kai-Fu now runs Sinovation Ventures with over \$2 billion in assets under management, investing aggressively in the China-based AI unicorn companies. China’s continued heavy investments in AI all aims to make China the world’s dominant AI player by 2030. This resolve is formally etched into the Chinese Communist Party’s (CCP’s) proposal—approved at the Fifth Plenum of the 19th CCP Central Committee in late October 2020.⁷

And what is the US response to this marker? How can we effectively strengthen our trifecta partnerships across domestic technology companies, academic institutions, and military agencies? Large federal agencies can help spur on a tremendous amount of economic activity, but we must coordinate ourselves properly. How do we enact AI-trifecta policies to unleash a flood of federal AI investments and thus catalyze economic development within the US? How do we convince professors to work much more collaboratively with leaders from both industry and defense agency leaders? How can we better weave AI postdoctoral researchers and Ph.D. students into the fabric of our entrepreneurial culture and reinvigorate the American dream? How do we balance AI academic freedom to publish and share breakthroughs without unduly compromising intellectual property?

Finally, how can we provide ramps for any American to embark on the AI knowledge journey? Some have proposed ways to make AI training widely accessible by all in the federal

government (see ACT-IAC's *AI Federal Workforce Certification*).⁸ Finding, training, and keeping the next generation of AI work- force talent within the US will help build our AI work- force, thereby protecting our national AI competitive advantage. With this backdrop in mind, the solution to how the US can win the AI race becomes clearer. Allies are critical to winning the AI race. From a pure numbers game, which country can match China's over one billion people and speak English? The answer is, not surprisingly, India. Additionally, imagine if the US included our European allies and Mexico? Strategic AI relationships built to have our partners overseas and nearshore will mark a significant step in augmenting the US in the AI Race.

The US should aggressively foster strategic AI relationships with its allies: India, Mexico, Canada, Ghana, and the Europe Union, to co-develop AI training, tools, and solutions, and to co-host AI summits. Needless to say, no one will call a timeout while the US figures out what it wants to do, least of all China, which enjoys the strength, talent, and aspiration to challenge US technological leadership, military establishments, and global position, as evidenced by China's citizen surveillance and social credit scoring systems.⁹ Thus one key to victory in the AI race is recognizing the benefits of establishing and nurturing alliances among state actors, industry, academia, and free societies. The ingredients for success currently exist, but they remain in urgent need of being further strengthened and coordinated. The AI race will not be won unless the US acts swiftly to cultivate and resource these synergies. The time *to strike first, strike hard, with no AI mercy*, is now. To do that, we must first understand the spectrum of technologies and discipline that fall under the AI umbrella.

AI Goal – Computers that Mimic Human Intelligence

The AI ecosystem of fields facilitates several tools, such as Generative Adversarial Networks. Some compare AI's field with building artificial animals or persons, or at least something similar.¹⁰ While there is some contention regarding where to draw the outer boundaries around AI is still debated, but most agree that the nucleus of AI is to cause computers to mimic human intelligence. AI researchers since the 1950's have been using the principles that are now known as "Machine Learning" well before they were integrated into the AI ecosystem. After decades of remaining idle, the more recent and exponential growth in the development and use of AI technology today is due to three key factors: (1) cheap computational power (e.g., GPUs) to run Machine Learning, (2) Deep Learning algorithms, and (3) heaps of Big Data, a.k.a. the Data Deluge, to churn through the models for training and validation purposes.

The keys to winning the AI Arms Race will be a sound grasp of the current AI ecosystem and use of AI tools to promote education and address misconceptions. Educational efforts are especially critical to assemble diverse groups of thought and opinions and create a culture of inclusivity. Diversity is essential because, while AI algorithms are superb at finding patterns within high-dimensional vectors of data, and the map $f()$, AI cannot yet ascribe meaning to these maps. Academically trained humans are needed to be "in the loop" to create, monitor, and

be held responsible for clarifying the value and the importance of these AI tools. The following categories will help explain where AI is in its Capability Maturity Model (CMM):

- 1. Artificial Narrow Intelligence (ANI):** Machines' ability to accomplish specified tasks
- 2. Artificial General Intelligence (AGI):** Machines perform previously undefined general tasks
- 3. Artificial Super Intelligence (ASI)/The Singularity:** Machines have AGI capabilities and have achieved self-awareness.

Another reason for the urgent calls to invest in AI education is that the AI Arms Race cannot be won solely by the nation with the most advanced AI technology. NSCAI's publication *Technical Talent in Government*, reports that "the Department of Defense (DoD) and the Intelligence Community (I.C.) both face an alarming talent deficit.¹¹ *This problem is the greatest impediment to the U.S. being AI-ready by 2025.*" This AI talent deficit can only be addressed by aggressively recruiting, training, employing, and retaining the most technically savvy and diverse talent. Thus, our competitive advantage largely will be driven by our ability to identify, nurture, train, integrate, collaborate with, cultivate, and sustain the next generation of human capital technical talent. Since we already see AI innovations across all industries, such as healthcare, education, finance, science, smart cities, and space, building an educated populace around this technology will enable us to move effectively to and govern AGI while vigilantly preventing ASI. An ASI reality is the point at which the US could lose control of AI from technology outpacing and outgrowing what benefits humans. Better understanding AI-related disciplines and research obviously includes a rudimentary understanding of the inherent dangers in poorly executed AI. Few other technologies for good can affect more catastrophic than poorly implemented AI.

Misguided View That AI Will Explicitly Marginalize People

To better understand AI requires us to examine how it shapes society through the lens of the Internet of Things (IoT). Items like wearable computers, smart refrigerators, digital helpers, and myriad other sensors integrate our personal data into the Internet. Our data is continuously being captured, monitored, and analyzed, and thereby perpetually fuels the next generations of AI and algorithms. This in turn is accelerating the pace of the AI Arms Race, often with little regards for how this process is being adequately vetted to prevent bias and other inaccuracies.

Society's embrace of AI is no surprise, as researchers worked for the last sixty years, driven by the vision of more efficient decision-making machines. With the increase of computational power, the utility, sophistication, and prevalence of AI tools have increased exponentially, but this progress also has a dark side. In 2009, the Nikon Corporation grappled with this issue when its AI-powered digital camera took a picture of an Asian person's face and asked the photographer if the subject had blinked. In 2015, Google suffered a very public outcry when it discovered that its facial recognition AI tool had mislabeled a black person as a gorilla.¹² Although these respective companies have made efforts to address these biases in their AI technology,

and other companies have taken these incidents to heart, many problems still exist, especially concerning the data used in AI training.

In 2014, Amazon developed an AI tool to automate the evaluation of job applications and identify optimal candidates. After a year of using this tool, Amazon realized that women were being excluded from hiring results due to the training data. The training data used included technology job applications over the past 10 years, most of which were by men, leading the AI tool to exclude resumes including the word “women.” Amazon subsequently abandoned this AI-based application process in 2017.¹³ MIT researcher and founder of the Algorithmic Justice League Dr. J. Buolamwini highlighted the dangers of facial recognition AI bias.¹⁴

Considering the examples provided by Dr. J. Buolamwini of AI’s shortcomings in producing accurate or equitable results, we approach law enforcement applications of AI with wariness. Presently, within law enforcement, AI is most used for predictive policing and identification of demographics of likely offenders.¹⁵ The Bureau of Justice compiled incarceration rates by demographic in October 2020; the results were stark, with White incarceration rates shown to be one-third of Hispanics and one-fifth of Blacks.

Year	Per 100,000 U.S. Residents			Per 100,000 U.S. Residents within each demographic group				
	Total	Federal	State	Male	Female	White	Black	Hispanic
2009	504	61	443	952	67	245	1,544	694
2010	500	61	439	938	66	245	1,500	672
2011	492	63	429	932	65	240	1,447	660
2012	480	62	418	910	63	236	1,383	636
2013	479	61	418	907	65	236	1,354	626
2014	472	60	412	891	65	233	1,305	605
2015	459	56	403	866	64	228	1,247	586
2016	451	53	398	848	64	223	1,206	585
2017	442	51	391	833	64	221	1,169	569
2018	432	50	382	812	63	218	1,134	549
2019	419	48	371	789	61	214	1,096	525

Figure. Sentenced prisoners under the jurisdiction of state or federal correctional authorities, by jurisdiction, sex, and race or ethnicity 2009-2019¹⁵

Suppose these results are used as training data for predictive policing, without context or accounting for variables of extraneous circumstances. In that case, law enforcement will inevitably target minority males, which is, inarguably, unjust. What further diminishes the efficacy of crime prediction models is the law enforcement community’s lack of education in understanding its models.¹⁶

US educational systems must incorporate AI and critical thinking into its curricula, just as cybersecurity has been a recent addition. As an example, in May 2017, the Trump administration, through the Executive Order on Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure, tasked the Departments of Commerce and Homeland Security to submit a report on findings and recommendations to educate and train the American

cybersecurity workforce, including cybersecurity-related education curricula, training, and apprenticeship programs, from primary through higher education.¹⁷ The Departments' joint response outlined several recommendations for reskilling the existing workforce and aligning education and training to employers' requirements. However, the Departments' educational proposals focused on collegiate level education instead of elementary education. Similar challenges exist for the AI talent pool; more foundational education, ideally in elementary school, must occur to win the upcoming Arms Race in AI development and application. Gamification of critical thinking skills and logic construction facilitate early childhood learning which, in turn, should continue through secondary education. This also will optimize opportunities to cultivate interest in the STEM fields, with reduced anxiety that often accompanies these studies.

Furthermore, leveraging, expanding, and promoting existing programs, such as Scholarship for Service (SFS), will further incentivize pursuit of AI as a career choice.¹⁸ Another cybersecurity lesson learned is the need to retrain the current workforce. The earlier-referenced executive order incentivized existing government employee volunteers to develop new skills by guaranteeing job placement in the cyber workforce, which should grow a strong AI workforce more quickly. With proper implementation and training, AI can and should help reliably execute decisions within design parameters.

However, concern still exists. Presently, the bias of the algorithm creator or environment ultimately encroaches into the AI, knowingly or unknowingly. "Real world" applications of AI involve some people or groups winning while others lose, as happens now with a person making decisions. We see this in the judicial system, workplace adjudication of conflict, and in other locations. However, some tasks should never be assigned to AI, and many believe that researchers should not only ask, "can we?" but also, "should we?" Ethics are a very personal set of beliefs, honed by the individual's education and experience, and other factors such as religious faith, social community, and focus on assigned goals. Leaving ethical decisions to AI will always include a bias and will always result in someone losing.

If this paradigm remains unchecked, then an uneducated, misguided, and ham-fisted application of AI in the US will, at best, result in the unequal distribution of AI's benefits among the populace and, at worst, explicitly marginalize groups of people. Our adversaries welcome the opportunity to capitalize on our society's resultant divisions and sow further division for political purposes. As seen in the 2016 US Presidential election, the selective presentation of information as "facts" distorted views of reality and quickly reinforced individuals' confirmation bias. This example portends future problems if AI remains unharnessed and considered a panacea for problems. However, AI, with its promise comes with threats and problems difficult to predict, exasperated by invalid or incomplete data or inappropriate questions asked of the data.

AI Researchers Must Consider the Ethical Implications of Their Products

According to *Merriam-Webster*, ethics is “the discipline dealing with what is good and bad and with moral duty and obligation.”¹⁹ The myriad tools of the AI ecosystem present a vast array of ethics issues, including everything from bias and fairness to safety and job losses, and civil rights abuses. Resolving to comprehensively win the AI race will also require careful consideration of the ethical implications relating to AI technology before, not after implementation. Failure to do that means China very likely will fill the ethical vacuum with its own AI standards and ethical frameworks. Among the questions AI policymakers should ask is how AI implementers can ensure accuracy of its the training data? How does the AI technology account for missing data? What assumptions are baked into the AI model? In other words, how does the creator’s own ethical framework influences these assumptions? Taking all of these together, hat is the AI prediction quality?

Autocratic governments are less answerable to these questions than pluralistic, democratic societies must be, and care less about unfavorable outcomes for their people derived from AI solutions. Their priority is societal order, which they attain by suppressing free speech and open discourse. Such nations will not hesitate to use AI data to acculturate their population effectively, even if such data is inaccurate. Both politically and technologically, their aim is not to be broadly representative of the people they govern; it is to homogenize. Thus, technology will be used to enable such political-cultural homogenization.

All societies, which aim to be free and open while striving to provide equal access for all, can potentially benefit from optimally deployed AI. It also is incumbent on democratic societies to heed lessons learned from instances of misapplied AI to avoid disastrous results. One example was a report of police deploying a pre-cog-like AI causing sheriffs to arrive at homes before a predicted crime would occur.²⁰ Another example entailed AI researchers developing RealTalk, using deep fake technology to replicate a person’s voice convincingly. This AI technology will undoubtedly have nefarious applications in the information sphere. The anecdote demonstrates how the private sector excels in answering “Can we?” without first asking “Should we?” As a threshold matter, advancing AI technology should always include a threshold consideration as to (a) how the new technology could be misused, and (b) what, if any, rudimentary guardrails are needed to minimize such misuse.

Put another way, AI innovators must consider the ethical implications of their products. If their product can be used in a harmful manner, should it proceed to market? Users must ask, what type of bias, and historical, measurement does this AI tech rely upon, and are we replicating bias society-wide by using it? As AI technology continues to permeate daily life, understanding how AI technology decisions are made is important. Simply because AI technology recommends a particular action, how can the user guarantee that the AI incorporated guiding principles such as proportionality and does no harm to safety and security?²¹ No matter how sophisticated AI technology becomes in regards to statistical (or any other parameter of)

accuracy, it can never substitute a user's ethics. This, and trusting technology efficacy, raise questions for leaders in open societies to answer and be held accountable. Wholly apart from the technical experts and duly elected leaders, every American eligible to vote plays a role in responsibly bringing AI to market, implementing safe AI solutions, and understanding how the AI tools we use enhance or detract from the just and equitable type of society we hold sacred.

Elements of DoD are already thinking about these questions and discussing the importance of creating AI tools with ethical considerations addressed on the front end.²² This may require creators to first consider potential harm, precedent, setting into motion nefarious adversary responses, etc., and setting parameters contemplating when an AI solution may violate specific ethical parameters. The Defense Innovation Board studied and released ethical considerations for DoD AI adoption, including the AI must be responsible, equitable, traceable, reliable, and governable. Given DoD's immense buying power, each of these ethical principles will impact how AI creators build and market their products and how users interact with those products.

Lastly, the US has a unique strength compared to its competitors: we are diverse, respect the enforcement of the rule of law, and value our open, flexible society. An open, transparent society can evaluate evidence, absorb feedback, and make changes critically. It is an open system where information—including ethical judgments—is not closed off. That is not to say that our competitors have no ethical guidelines. In a closed society, the regime does not receive critical feedback and insularly defines its own ethics and accountability. This arrangement for closed regimes works until it cannot absorb any more shocks, eventually collapsing. Incorporating unethical AI into their systems will hasten the fall of these closed regimes. If adequately implemented with ethical considerations for the US open system, it may lead to unforeseen prosperity vis-a-vis our competitors and a healthier political system.

AI's Dual-Use Capabilities Provide Both Positive and Negative Potentials

"If soldiers are not to cross international boundaries, goods must do so. Unless the shackles can be dropped from trade, bombs will be dropped from the sky."²³

The AI race is a product of a broader science and technology (S&T) rivalry between the US and China that is quickly developing into a technology war.²⁴ China's ascendancy in global economic power, its rapid technological growth, and the CCP Vision of Victory seeks to position China as the world innovation leader and dominant force in emerging key technologies all combine to threaten US technological superiority.²⁵ The CCP's restricted, centralized approach gives China an unprecedented advantage to expedite S&T policy creation, allowing state-owned enterprises (SOEs) and commercial sector businesses the unfair advantage of easy access to incentives and funding in opposition to the national security and foreign policy interests of the US. In response to business initiatives taken by China, the US has implemented counterbalancing measures through use of the Department of Commerce's Entity

Lists which targets Chinese digital technology companies.²⁶ This was done under the auspices of protecting US commercial interests, slowing the pace of China's digital technologies development, and providing the US time to better develop its own S&T initiatives and AI strategies.

According to the US founding principles heavily influenced by the philosophers Sidney²⁷ and Locke,²⁸ the US regards the development of AI in accordance with democratic principles: limited representative government, individual freedoms, private property, and authority derived from the electorate. Internationally, the US uses its economic and technological dominance to promote democracy, free markets, and the current international order.²⁹ China's objectives, in contrast, are primarily to ensure the CCP's regime survival. For the CCP, technological sovereignty is needed to grow a high-tech economy, modernize the PLA, and spread its commercial and geopolitical influence throughout the world. China aims to use AI to suppress individual liberties using surveillance, repressive controls, and predictive analytics. These are not conditions most Western democracies prefer to be subject to or live under.³⁰

AI's dual-use capabilities provide both far-reaching positives and negatives. AI's commercial integrative capacity is expected to be an economic boom and the primary catalyst for the upcoming fourth industrial revolution with an additional global economic value more than \$13 trillion by 2030.³¹ International cooperation in an open-source environment can use AI to solve real-world problems such as food security, clean water, reliable and sustainable energy, affordable health care, and pollution mitigation. Therefore, competition between autocratic and democratic governments and their world views need not result in a zero-sum game.

States invariably take self-serving actions when they believe their survival is at stake, so AI will be integrated almost certainly into military weapons systems, intelligence collection, and other uses deemed essential. The US and partner nations must account for AI's dual-use capabilities representing threats to economic and national security interests. Measures need to be taken following the NSTC AI R&D Strategic Plan and the NSCAI Final Report.^{32, 33}

The US can win the AI race. Primary recommendations include dedicating funding for long-term AI investment, developing safe and dependable AI systems, strengthening military-academia-industrial complex collaborations, hardening US cybersecurity, and governing the integration of AI into national security interests. These strategies and recommendations should be the foundation that ensures the US will remain the AI technology leader. We win by taking bold, transparent actions for the collective good, to lift the human condition by providing "responsible, equitable, traceable, reliable, and governable" AI.³⁴ At the same time we must protect US technological supremacy, intellectual property, technology transfers, and national security.³⁵ To remain a shining beacon of ethics and humanity, the US must continue to champion humans-in-the-loop and systems free of ignorance and bigotry while preserving and embodying the liberties and values of a free society.

CONCLUSION

If having read this article, you find yourself more curious about and invested in the US winning the AI Arms Race, then there is legitimate hope that this race can be won with our democratic principles intact. The odds of the US establishing itself not only as the leader of the free world, but also as leader of the development and use of AI in pushing human progress forward for citizens the world over, grow as more Americans recognize this to be an all-hands-on-deck situation. To prevail over the competition will require national resolve and all of us going all-in to win this AI race. Doing this will undoubtedly build the necessary momentum to get the US to the next stage of ramping up a national AI strategy, including immediate and significant government investments with more robust partnerships across the spectrum, particularly with academia, private industry, and our allies.

Equally important, our national AI strategy must be girded on the foundation of education and training, which will require dramatic realignment of education to our technology goals, perhaps even using AI learning tools themselves, to include customized instruction for each learner. Moreover, the access to AI education and training must be equitable for everyone to ensure that AI tools going forward minimize biases.

As the US stands at this critical juncture, let it make the bold choices that will allow the nation, decades from now, to look back proudly. As with all the challenges that the US has faced before and will face in the future, it wins this AI Arms Race by applying America's unique combination of ambition, talent, rigor, diversity, the highest level of ethical standards, transparency, and ingenuity. And when the world notes that the US won this difficult AI race, it also will note that it is the US that continues to protect the inalienable rights of life, liberty, and the pursuit of happiness for all.♥

BIOS

Mr. Alfred Hull is the HQDA Data Policy & Governance Branch Chief/Senior Data Scientist, and previously led Artificial Intelligence & Machine Learning efforts for the Navy Program Executive Office Manpower, Logistics, and Business Solutions. He earlier led Data Science, Engineering, and Systems Development & Sustainment teams at Naval Information Warfare Command, supporting PMW150: Business Management Systems Portfolio. He spent seven years in fortune 500 companies doing Operations Research and Decision Science work at Amazon.com, Target Corporation, and Dollar Tree Corporate Headquarters. Alfred holds an MBA from George Washington University and two undergraduate degrees in Decision Science and Maritime & Supply Chain Management from Old Dominion University.

Dr. Jim Kyung-Soo Liew is President and Founder of SoKat.com, and Associate Professor of Finance at Johns Hopkins Carey Business School. He has published pioneering research at the intersection of social media and big data, cryptos/blockchain, and financial markets. He currently teaches Big Data and Artificial Intelligence: Extracting Business Value, Crypto-Currencies and Blockchain, and Leading Entrepreneurship and Innovation at the Johns Hopkins Carey Business School. He also serves as ACT-IAC's Co-Chair of the AI Curriculum Committee and Chair of the Data Readiness for AI Committee.

Mr. Kris Palaoro is a NAVWAR systems engineer who works across engineering and logistics, focusing in data engineering and analytics on the ADVANA Jupiter platform. He holds an MBA with a concentration in finance, an MS in International Relations with a concentration in national security affairs, an ME in systems engineering, and four other undergraduate degrees. He is DAWIA level 3 in engineering, level 3 in logistics, level 2 in program management, and is certified as a PMP and CSWF advanced master.

Dr. Mark Grzegorzewski is Resident Senior Fellow in the Department of Strategic Intelligence and Emerging Technology at Joint Special Operations University. His publications include: "Technology Adoption in Unconventional Warfare", and he authored the chapter: "Why Silicon Valley is a Poorly Suited Model for SOF" in the "Big Data for Generals ... and Everyone Else over 40." He also recently published with the Modern War Institute on "Incorporating the Cyberspace Domain: How Russia And China Exploit Asymmetric Advantages in Great Power Competition."

Dr. Michael Klipstein has worked on national cyber topics for over a decade, ranging from USCYBERCOM continuity of government networks, the National Security Agency hard targets, leading a Cyber National Mission Team, and building two Nation Cyber Protection Teams. He taught at Columbia University, created curricula for the Joint Staff for international partner nations in cyberspace, and served as Director of International Cybersecurity Policy for the National Security Council.

Dr. Pablo Breuer is a non-resident senior fellow of the Atlantic Council's GeoTech Center and twenty-two-year veteran of the U.S. Navy with tours including military director of U.S. Special Operations Command Donovan Group and senior military advisor and innovation officer to SOFWERX, the National Security Agency, and U.S. Cyber Command as well as serving as Director of C4 at U.S. Naval Forces Central Command. A DoD Cyber Cup and Defcon Black Badge winner, he has served as faculty at the Naval Postgraduate School, National University, California State University Monterey Bay, and was a Visiting Scientist at Carnegie Mellon CERT/SEI. Pablo is also a co-founder of the Cognitive Security Collaborative and coauthor of the Adversarial Misinformation and Influence Tactics and Techniques (AMITT) framework.

Dr. Michael Spencer is the founder and a Board of Director for the Halcyon Institute, a technology-based research and policy analysis think tank dedicated to the development and integration of dual use digital technologies such as AI, big data, cloud networks, 5G, ICT, cybersecurity, advanced semiconductors, quantum computing, IOT, etc. He is also currently an adjunct professor at Saint Leo University where he teaches courses in Democracy, Democratic Institutions, and Historical Immigration.

SPECIAL THANKS TO TECHNICAL EDITORS

Susan An Esq., Chief Executive Officer, Sokat.com

Alka Patel, Chief, Responsible AI, DOD Joint Artificial Intelligence Center (JAIC)

Sam Gunter, Johns Hopkins University

NOTES

1. M. McFarland, October 24, 2014, Elon Musk: “With artificial intelligence we are summoning the demon.” *The Washington Post*, <https://www.washingtonpost.com/news/innovations/wp/2014/10/24/elon-musk-with-artificial-intelligence-we-are-summoning-the-demon/>.
2. Sanchita Dash, “Elon Musk and Jack Ma Fight about AI and Mars, but Agree That ‘Love Is the Answer,’” *Business Insider*, August 29, 2019, www.businessinsider.in/elon-musk-and-jack-ma-fight-about-ai-and-mars-but-agree-that-love-is-the-answer/articleshow/70892426.cms, accessed February 5, 2022.
3. Will Heaven, “OpenAI’s New Language Generator GPT-3 Is Shockingly Good—and Completely Mindless,” MIT Technology Review, July 20, 2020, www.technologyreview.com/2020/07/20/1005454/openai-machine-learning-language-generator-gpt-3-nlp/.
4. A. Lee, August 9, 2020, What is China’s social credit system and why is it controversial? *South China Morning Post*, <https://www.scmp.com/economy/china-economy/article/3096090/what-chinas-social-credit-system-and-why-it-controversial>.
5. National Commission on AI, “NSCAI Submits First Quarter Recommendations to Congress,” NSCAI, April 1, 2020, www.nsc.ai.gov/2020/04/01/nsc-ai-submits-first-quarter-recommendations-to-congress-2/#:~:text=NSCAI%20recommended%20steps%20to%3A%20increase%20funding%20for%20non-defense, accessed February 5, 2022.
6. Dr. Lee, K.-F. (2021), Founder - Sinovation Ventures, sinovationventures.com, <https://sinovationventures.com/index.php/home/aboutus/teams.html>
7. Proposal of the Central Committee of the Chinese Communist Party on Drawing Up the 14th Five-Year Plan for National Economic and Social Development and Long-Range Objectives for 2030, December 2, 2020, Center for Security and Emerging Technology, <https://cset.georgetown.edu/research/proposal-of-the-central-committee-of-the-chinese-communist-party-on-drawing-up-the-14th-five-year-plan-for-national-economic-and-social-development-and-long-range-objectives-for-2030/>.
8. ACT-IAC AI Working Group, 2020, ARTIFICIAL INTELLIGENCE FEDERAL WORKFORCE CERTIFICATION EMERGING TECHNOLOGY COMMUNITY OF INTEREST Artificial Intelligence Working Group, In ACT-IAC Accelerating Government, https://www.actiac.org/system/files/AI%20Knowledge%20Certification_2.pdf.
9. A. Lee, August 9, 2020, What is China’s social credit system and why is it controversial? *South China Morning Post*, <https://www.scmp.com/economy/china-economy/article/3096090/what-chinas-social-credit-system-and-why-it-controversial>.
10. S. Bringsjord and N.S. Govindarajulu, 2018, Artificial Intelligence, *Stanford Encyclopedia of Philosophy*, Stanford University, <https://plato.stanford.edu/entries/artificial-intelligence/>.
11. E. Schmidt, R. Work, C. Catz, E. Horvitz, S. Chien, A. Jassy, M. Clyburn, G. Louie, C. Darby, W. Mark, K. Ford, J. Matheny, M. Griffiths, K. McFarland, and A. Moore, 2021, Final Report National Security Commission on Artificial Intelligence, <https://www.nsc.ai.gov/wp-content/uploads/2021/03/Full-Report-Digital-1.pdf>.
12. Vincent, James, “Google ‘Fixed’ Its Racist Algorithm by Removing Gorillas from Its Image-Labeling Tech,” *The Verge*, *The Verge*, January 12, 2018, www.theverge.com/2018/1/12/16882408/google-racist-gorillas-photo-recognition-algorithm-ai.
13. J. Dastin, October 10, 2018, Amazon scraps secret AI recruiting tool that showed bias against women, *Reuters*, <https://www.reuters.com/article/us-amazon-com-jobs-automation-insight-idUSKCN1MK08G>.
14. J. Buolamwini, T. Gebru, S. Friedler, and C. Wilson, 2018, Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification, *Proceedings of Machine Learning Research*, 81, 1-15, <http://proceedings.mlr.press/v81/buolamwinil8a/buolamwinil8a.pdf>.
15. Bureau of Justice Statistics, Report title: Prisoners in 2019 NCJ 255115, October 22, 2020, accessed March 3, 2021, <https://www.bjs.gov/index.cfm?ty=tp&tid=1>.
16. C. O’Neil, WEAPONS OF MATH DESTRUCTION: How big data increases inequality and threatens democracy, New York: Broadway Books, 2017.
17. Executive Office of the President, May 16, 2017, Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure, *Federal Register*, <https://www.federalregister.gov/documents/2017/05/16/2017-10004/strengthening-the-cybersecurity-of-federal-networks-and-critical-infrastructure>.
18. CyberCorps. (n.d.). SFS. www.sfs.opm.gov, retrieved February 5, 2022, <https://www.sfs.opm.gov/>
19. *Merriam-Webster*, 2019, Definition of ETHIC, <https://www.merriam-webster.com/dictionary/ethic>.

NOTES

20. K. McGrory and N. Bedi, September 3, 2020, Target, *Tampa Bay Times*, <https://projects.tampabay.com/projects/2020/investigations/police-pasco-sheriff-targeted/intelligence-led-policing/>.
21. United Nations Educational, Scientific and Cultural Organization, November 24, 2021, Recommendation on the Ethics of Artificial Intelligence, <https://unesdoc.unesco.org/ark:/48223/pf0000380455>.
22. J. Barnett, November 17, 2021, DOD organizations plot implementation of ethical AI in new guidance, Fedcoop, <https://www.fedcoop.com/diu-ai-ethics-guidance-for-contractors/>.
23. Otto Mallery, "Economic Union and Enduring Peace," *Annals* 216 (July 1941): 125-126.
24. David Lynch, "How the U.S.-China Trade War Became a Conflict over the Future of Tech," *The Washington Post*: Business, May 22, 2019, accessed November 24, 2019; Gavekal Research, "What's Really at Stake in the US-China Rivalry," Gavekal, May 9, 2018, <http://web.gavekal.com/article/whats-really-stake-us-china-rivalry>; Elsa Kania, "Innovation in the New Era of Chinese Military Power: What to Make of The New Chinese Defense White Paper, The First Since 2015," *The Diplomat*, July 25, 2019, accessed October 13, 2019, <https://thediplomat.com/2019/07/innovation-in-the-new-era-of-chinese-military-power/>.
25. Gavekal Research, "What's Really at Stake in the US-China Rivalry."
26. R. Ashooh, 2019, Addition of Entities to the Entity List and Revision of an Entry on the Entity List. In Department of Commerce. Bureau of Industry and Security, <https://s3.amazonaws.com/public-inspection.federalregister.gov/2019-13245.pdf>.
27. Discourses concerning government by Sidney, Algernon, 1622-1683; John Adams Library (Boston Public Library), BRL; Filmer, Robert, Sir, d. 1653; Sidney, Algernon, 1622-1683; Adams, John, 1735-1826, former owner.
28. Locke's Two Treatises on Government and Essay Concerning Human Understanding.
29. Elsa Kania, "Innovation in the New Era of Chinese Military Power: What to Make of The New Chinese Defense White Paper, The First Since 2015," *The Diplomat*, July 25, 2019, accessed October 13, 2019.
30. Schmidt, Work, Catz, Horvitz, Chien, Jassy, Clyburn, Louie, Darby, Mark, Ford, Matheny, Griffiths, McFarland, and Moore, Final Report National Security Commission on Artificial Intelligence.
31. J. Bughin, J. Seong, J. Manyika, M. Chui, and R. Joshi, 2019, <https://www.mckinsey.com/~media/McKinsey/Featured%20Insights/Artificial%20Intelligence/Notes%20from%20the%20frontier%20Modeling%20the%20impact%20of%20AI%20on%20the%20world%20economy/MGI-Notes-from-the-AI-frontier-Modeling-the-impact-of-AI-on-the-world-economy-September-2018.ashx>.
32. NSTC, 2019, "The National Artificial Intelligence Research and Development Strategic Plan: 2019 Update." Whitehouse.gov., National Science and Technology Council: Select Committee on Artificial Intelligence, June 2019, accessed January 22, 2020, 1-42. <https://trumpwhitehouse.archives.gov/wp-content/uploads/2019/06/National-AI-Research-and-Development-Strategic-Plan-2019-Update-June-2019.pdf>.
33. Schmidt, Work, Catz, Horvitz, Chien, Jassy, Clyburn, Louie, Darby, Mark, Ford, Matheny, Griffiths, McFarland, Moore, Final Report: National Security Commission on Artificial Intelligence.
34. JAIC Public Affairs, 2021. "AI Ethical Principles – Highlighting the Progress and Future of Responsible AI in the DoD". AI in Defense. March 26, 2021, accessed March 12, 2021. https://www.ai.mil/blog_02_26_21-ai_ethics_principles-highlighting_the_progress_and_future_of_responsible_ai.html.
35. Gavekal Research, "What's Really at Stake in the US-China Rivalry."