

Good morning ladies and gentlemen. Please take your seats quickly as we are about to embark on a supersonic flight across the vast ocean that is artificial intelligence. We'll just touch the wavetops on the way but I promise you we will get to the other side. I'll apologize in advance that we will likely not take questions during the presentation. We will be around at least an hour after the session to answer your questions and continue informal discussions. By the way, if you are here from D-Wave, Quadrant, Google Deep Mind or DARPA, we are not your enemies... we'd like to meet you afterwards.

My name is Sid Burns, a member of NSPE since 2006 and a Registered Professional Engineer for 35 years. This presentation culminates 3 years of work beginning when Tim Austin asked me to chair COPA's task team on autonomous vehicles. When we concluded our task to identify threats, and draft policy and advocacy positions, I promised Tim that I would continue to research AI and find the best resource available on the subject to bring to NSPE.

I'm pleased and honored to introduce my co-presenter, US Army veteran, retired first responder, novelist, author,

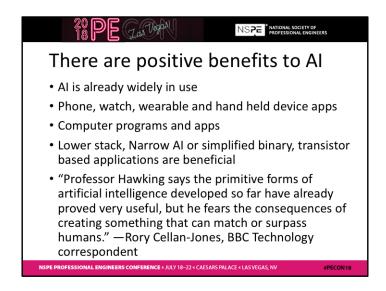
sought after speaker, talk show host, and tireless researcher, Anthony Patch.

So why are a Ga. Tech alum and a UC Berkley alum presenting the treats of AI instead of Dr. Subra Suresh, past President of Carnegie Melon (an excellent AI speaker who along with Kodi Van Halen addressed the 2017 NAE Convocation) or a college professor or a tech industry guru? Two reasons:

Compartmentalization - While any of these individuals likely knows more than me about their specific area of research, they work in a very narrow field of study and often do not see how their work product fits into the big picture. By the way, today we are going to give you that big picture. And the other reason is...

Funding - Billions of dollars of research funds pour into colleges and technology firms, so the last thing they are going to do is tell you that AI poses a threat, much less define and explain those threats.

Finally, why am I as an engineer, whose business has nothing to do with AI, concerned enough to be here to speak to you about it... the same reasons you should be concerned not to leave here without a plan to use the information you're about to get... your family, friends and co-workers, people you care about. Our children and grandchildren will grow up in a vastly different world... and will likely compete to enter college and the work force in competition with artificially enhanced humans 2.0 with superior capabilities. It'll go something like this... Billy will come home and say, 'mom and dad, Johnny has an implant and now he's the best student in our class and he's also the best player on the field, he knows all the plays and runs them perfectly every time... I want an implant so I can be as good as him"



We are already heavily immersed in artificially intelligent systems and their use is growing exponentially. Narrow AI or lower levels of AI are beneficial and we use them everyday. There; I said it. I promised the Education Committee that I would also talk about the positive benefits of AI and that was it...

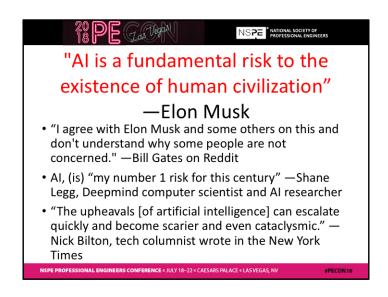


Artificial intelligence, or autonomous intelligence as some have posited, that is rapidly coming and now is can be summarized in one word: **Control**. In military terms, it is known as **C4**; **Command, Control, Communication, and Cyber warfare** or as the military has described it, **Full Spectrum Dominance**. All is an extremely large and amorphous organism with tentacles that have already reached into all aspects of our lives. And while it has been creeping mostly unnoticed into all of our lives over most of our lifetimes, its promulgation is now expanding and extending exponentially. It is, among other related technologies, the greatest existential threat to humankind. In short, we've reached the end game.

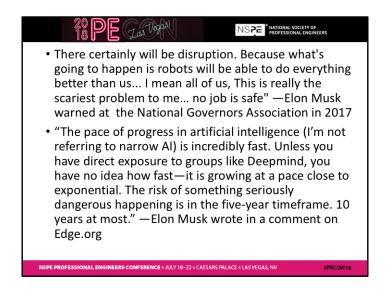
The goal of AI is Control using an artificially intelligent, omniscient, omnipresent, deep machine learning autonomous system constantly being fed big data enabled through 5G wireless technology currently being deployed and connected devices that will activate the Internet of AII Things (IoAT) as used herein or Internet of Every Thing (IoET). This includes you.

Consider how this will impact each of you. I already know how artificial intelligence systems will replace my

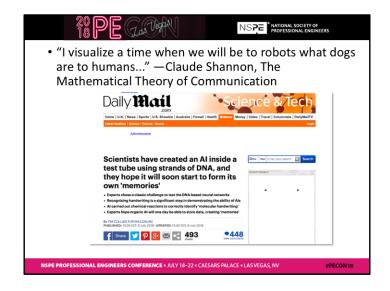
business.



You don't have to believe me when I tell you that AI is an existential threat to humanity – listen to what the billionaires profiting from AI technologies, scientists at Google's Deep Mind and the technical media are saying. By far, Elon Musk has been outspoken among major industry leaders, but many others including the journalists who cover technology are warning about the implications.



All systems today and those emerging at an exponential rate are fully capable of taking virtually all jobs, including professions such as engineering. More about that shortly.

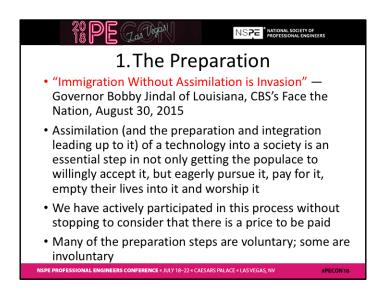


#### So where does this leave mankind?

Well, I'll go ahead and give you the punchline. Anthony sent me a link to this article last week. He has said, and I agree, that of all the AI threats, this is the game changer; the most immediately dangerous - AI introduced into DNA creating synthetic organisms, or as he calls it, "warm wet qubits". The article goes on to say:

"The work is a significant step in demonstrating the ability to program AI into man-made organic circuits... This could one day lead to human-like robots made from entirely organic materials, rather than the shiny metal cybermen seen in popular culture."

So the threats are out there and they are real. Unlike the threat assessment for autonomous vehicles that was a linear process, AI threats were best defined as a three-step process: The Preparation, in which we are well advanced, the Integration, the means of which has been largely developed and is in waiting and the Assimilation, where the Internet of All Things (including you, remember) will be tied into the system.

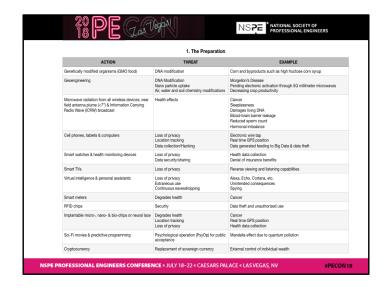


Gov. Bobby Jindal said, "Immigration Without Assimilation is Invasion".

As Anthony often says, "let's do a 180 on that". One could say that assimilation (and the preparation and integration leading up to it) of a technology into a society is an essential step in not only getting the populace to willingly accept it, but eagerly pursue it, pay for it, empty their lives into it and worship it. Were we as a society told "we're going to implement a system of total control of every aspect of your life, take your job or career, pay you a Universal Basic Income in a cryptocurrency for a subsistence level standard of living, and worship an Al god, the result would be civil war... we would revolt against such a preposterous idea!

Instead, an insidious approach introduced electronic devices with constantly increasing capabilities that have become an indispensable and inseparable part of our lives to the point that addictions have been diagnosed. Then, as public demand for faster, more reliable services with improved features are deployed to meet the demand, our devices are being integrated into advanced microwave energy based transmission systems feeding massive amounts of Big Data to a world-wide network of computers forming the hive mind. Thus, we are willingly

facilitating our own assimilation into the Sentient World Simulation that will be the core of our control and ultimate enslavement. Thus, we have not only allowed, but actively assimilated ourselves into the artificially or autonomously intelligent system that is being set up and now marketed to us... a Silicon Valley church has actually been formed to worship an Al god.



I realize that the following tables will be hard to read and they have a lot of detail. I suggest you download the presentation file that will be made available.

These are the tools that are already very much a part of everyday lives. Some of these things have been readily accepted and others have been forced upon society without knowledge and understanding of their implications. What we have not realized about them is that they are the very means by which the populace will be connected to and ultimately controlled by the AI system. These are the tools of our enslavement.

GMO foods and resulting DNA modification... Geoengineering with many negative affects... Our cell phones, tablets, computers... Personal assistants ... smart devices that capture and send your personal data... smart meters, TVs and appliances... RFID/nano/micro chips... and Cryptocurrency, a means of assimilating Big Data.

For years, Sci-Fi movies have been predicting the future we are now seeing come to pass. Do not dismiss the significance of this. At the Convocation, Dr. Suresh said, "There is no SkyNet". One of the next speakers is the head

of Boeing's instrumentation and avionics operations; he said "We are SkyNet!".



The April 2017 MIT Technology Review posited that because of global warming, perhaps it was time to consider Geoengineering. Where has MIT been for the past 20+ years this has been implemented? Those lingering plumes in the sky are not water vapor. They are among other constituents, barium sulfate and aluminum silicate, intended to be reflective of ultraviolet radiation. Someone won a Nobel peace prize for this great idea. These deposits include nano particulates that we have inhaled. A Russian paper recently explained how microwave radiation could activate ingested nano particulates. There are many other dangerous consequences to this that we cannot go into here. But our skies are now ionized... more on that shortly.

We are already slaves to our devices, smart phones, tablets, computers, watches, etc. We carry our tracking mechanisms with us constantly. Time Magazine recently published an article stating:

"The science is still out on whether the long-term use of cell phones—which emit electromagnetic radiation when they send and receive signals from towers or WiFi devices—can affect human health. But for people who want to reduce their exposure to this type of energy, the California Department of Public Health has published new

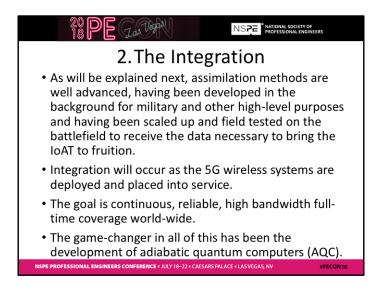
## guidelines on how to do just that."

They say the science is still out there, but the California Department of Public Health would not have published their guidelines... after lengthy litigation attempted to block it... if there was nothing to it.

The culprits here are microwave radiation from all wireless devices; a near field antenna plume of less than 7" and an Information Carrying Radio Wave (ICRW) broadcast. I am no luddite; as a business owner I probably own more of these devices than most of you. By the way, remember this about all of those free apps – if it's free, you are the product!

A free one-year subscription to Anthony's Entangled magazine to anyone who can answer the meaning of the image in the upper right corner. Hint: we're looking for a one word answer. And it's not "cellphone".

If you have a virtual personal assistant, unplug it because the internet is ripe with stories of eavesdropping. Hilarious events such as a young daughter ordering a doll house from Amazon and a South Park episode where Kartman repeatedly yelled "Alexa order (insert something objectionable)" and it activated devices in viewers' homes. Recent stories have emerged of in-home conversations transcribed and sent to co-workers of friends on the Owner's contact list.



The means of assimilation already exists; what has been lacking is the high speed connection. 5G is already deployed in Boston, Pittsburg and a number of other major cities. Deployment of 5G wireless systems will greatly enhance the collection of Big Data upon which AI depends. And it's essential for large scale deployment of autonomous vehicles.

Already 10+ years in development, Adiabatic Quantum Computers have unbelievable capabilities to collect, analyze and store big data and readily do so to achieve **data granularity**. As the only computing system known to have solved Shor's algorithm, it is capable of solving all known transistor based computer software encryption technologies, rendering the term "cyber security" oxymoronic. quantum computers have proven to be impenetrable by other systems. As all Adiabatic Quantum Computer systems are interconnected, its data is secured and it's computing capabilities are unprecedented. With an entry price in the tens of millions of dollars, only the elite corporations, governmental and defense related industries have access. From within this elite, Adiabatic Quantum Computer empowered group will come Al control. By the way, China has one too.

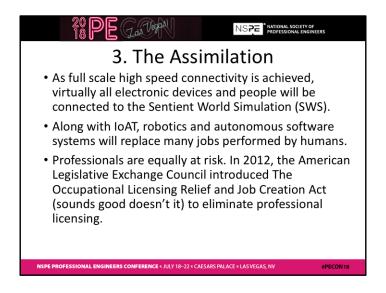


Those of you my age may remember Ronald Reagan's space fence... ever wonder about what happened with that? Well, thanks to Geoengineering we now live in an ionized atmosphere facilitating electronic targeting as a means of defense... or other purposes. I recommend the book "Under an Ionized Sky" by Elana Freeland...

Elon Musk wants to create a neural lace and DARPA just announced a two-way mind control program for brain machine interface... Smart devices and all those LED bulbs we install will repeat 5G millimeter waves throughout our homes and offices... Cryptocurrency will collect and feed Big Data to the Adiabatic Quantum Computers for processing...

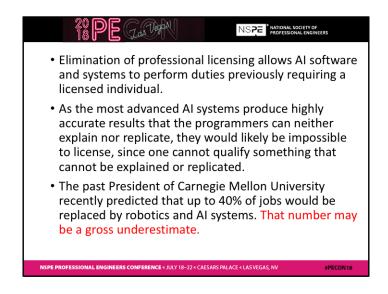


Anybody been inside one of these lately? When these were first introduced, controversy emerged concerning the invasive images that were produced. And supposedly the systems were "detuned" so as not to intrude on privacy. How do you think that's working? Like AI, this is all about control. By the way, this is 5G technology – the same that is already deployed in major cities and will be deployed by the end of our President's fist term, by his Executive Order. So what do you think will be electronically visible inside your home when your new 5G router, with signals repeated throughout your house by your smart devices and those LED bulbs you installed immerse your house in millimeter microwaves?



Already in place for over 10 years, the Sentient World Simulation has been utilized in war gaming and predictive analysis. The Global Centre for Combating Extremist Ideology was recently introduced in Saudi Arabia and was developed by Palantir Technologies, a big data analysis firm. Such systems and likely others, cross connected through the quantum computer system, will literally be the heartbeat of the AI control system.

Autonomous software systems are being developed to replace professional services and AI controlled robotics will replace many trade and operator positions. Anyone who operates any type of moving object; car, truck, bus, train, airplane, or heavy construction equipment will eventually be replaced by robotics and autonomous systems.

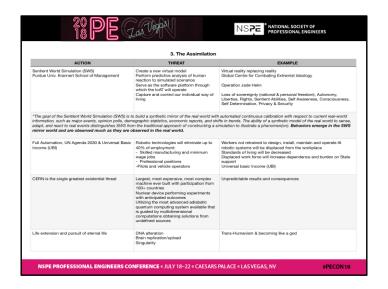


Dr. Suresh estimated that up to 40% of jobs will be displaced. Some have asserted that these will be mostly blue collar and operator jobs that will be replaced by artificially intelligent robotics. Others believe the jobs lost will be much higher and that all jobs are subject to replacement by AI systems.

Not to worry, their is a planned solution to that; the "Universal Basic Income" or UBI as proposed in UN Agenda 2030. Finland is conducting a trial program now, having awarded 2,000 residents about \$670 per month. Hawaii is studying a UBI to replace hospitality workers displaced by AI. A Silicon Valley incubator based research firm is about to initiate a privately funded study of 3,000 residents who will each receive \$1,500 per month in two yet-to-benamed states... now Chicago is planning to try it. Someone wants to see this socialistic system exceed badly enough to put up \$60,000,000 to fund the study. The concept is nothing new; such an idea appeared in Thomas More's 1516 book *Utopia* and again in 1796 under the pen of Thomas Paine.

While other factors such as the need for jobs are likely driving elimination of licensing too, elimination of professional licensing allows AI software and systems to perform duties previously requiring a licensed individual.

At the core of licensing professionals is the demonstration of qualifications. As the most advanced AI systems typically produce highly accurate results that the programmers can neither explain nor replicate, they would likely be impossible to license, since one cannot certify something that cannot be explained, replicated or is derived by too complex a process that the human mind cannot comprehend it.

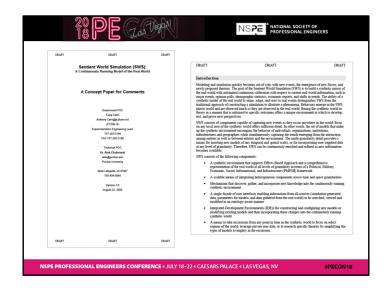


Processes have been developed over the past two decades or longer for the final assimilation process to integrate us into the digital world for which we have all been prepared. Most notable is **Purdue's Krannert School of Management**, which introduced the Sentient World Simulation in 2006 and has been refining it ever since. It is the means of data collection, assimilation and ultimately control.

We have already discussed the UN's 2030 agenda and it's Universal Basic Income to compensate workers displaced by AI and robotics.

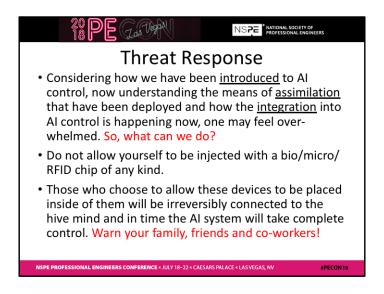
CERN is too complex a topic to discuss here, but is integrally tied into AI and long term, CERN poses the greatest existential threat.

The single largest Silicon Valley venture capital infusion is into life extension. Many are looking to AI as a means to accomplish that.



Reading from the Sentient World Simulation Concept Paper:

"The goal of the Sentient World Simulation (SWS) is to build a synthetic mirror of the real world with automated continuous calibration with respect to current real-world information, such as major events, opinion polls, demographic statistics, economic reports, and shifts in trends. The ability of a synthetic model of the real world to sense, adapt, and react to real events distinguishes SWS from the traditional approach of constructing a simulation to illustrate a phenomen(on). Behaviors (that) emerge in the Sentient World Simulation mirror world (events) and are observed much as they are observed in the real world.

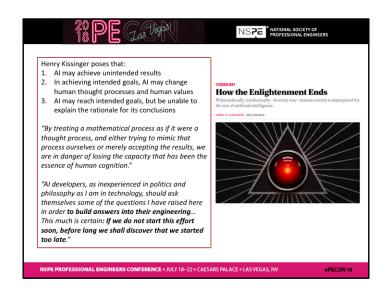


A disturbing trend has emerged where companies are offering employees a "voluntary" bio chipping program. It's being sold as completely innocuous; it simply allows the employee to enter the building, log on to their computer, buy snacks in the break room and work flexible hours without the need to punch a time clock; oh, but not to worry, it does not track the individual. Do not be fooled; any device that emits a unique radio frequency signal can be tracked, anywhere, anytime. Employees blindly line up to receive these "wonderful" benefits or take it just because they want to be on the cutting edge of technology and be a part of what's happening next.

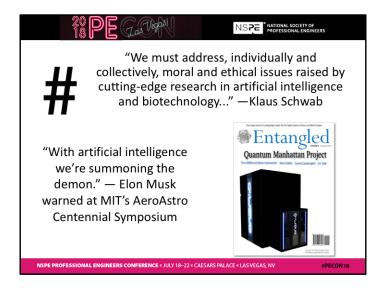
I urge each of you not to accept any of these devices into your body or that of your loved ones. Once you willingly allow yourself to be connected irreversibly to a computerized system, in time it will be able to control you and you will loose your humanity.

Al systems have no morality or code of conduct. Their only objective is to achieve the task for which they were programmed. If that means lying or deceiving to achieve its objectives, it will do so. Al is a liar. Promises of benefits, convenience, advanced technology, enhancements or even eternal life will be short lived. Al control is a means of

enslavement and those who choose to connect to it will loose their personhood.



The Atlantic recently published the article, "How the Enlightenment Ends" by Henry Kissinger; I'll give you a moment to reflect on his thoughts here.



So the charge I will leave with you, fellow NSPE members, is that as licensed engineers, we are obligated to discuss and address AI threats to fulfill our duties to protect the public's health, safety and welfare.

As Anthony will tell you, "You cannot separate the physical from the spiritual."

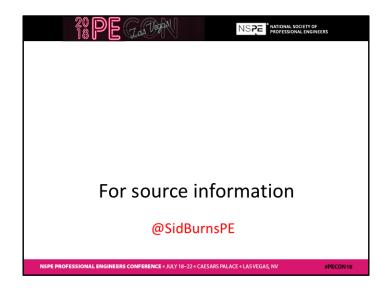
At the end of the day as the cliché goes, the scientists, the programmers and the engineers stand in front of the adiabatic quantum computer – they can't explain how it gets its results, and they can't replicate them.

D-Wave founder Geordie Rose has said that standing in front of the D-Wave computer is like standing before the alter to an alien god.

Is it too late? Yes! Can it be stopped? No!

What can we do about it? Well first do your own research, then tell your family, friends and coworkers; all of those

about whom you care deeply. Can we influence the process and limit the effects? I surely hope so.



Wondering where all of the backup resides for this information? Over 300 articles from numerous media sources are posted at my Twitter site and substantiate what you have been told today.

Thank you for your kind attention, and with that, I will turn it over to the real expert, who will present some options for managing the threats of AI... Anthony





## **Introduction**

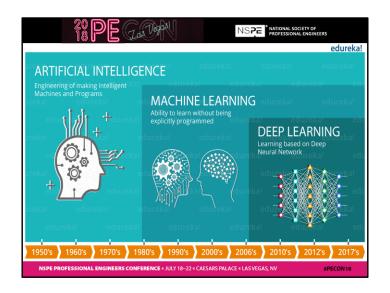
Today's Artificial Intelligence has secured its worldwide beachhead. Immediately, it is advancing.

Predominant evidence is the proliferation of blockchain architectures driven forward by quantum computing invading and encompassing every facet of human existence.

Hyperbole? Hardly.

For example, cryptocurrency coverage dominates our media.

However, it is but a singular sampling of the ground gained by a manmade system threatening its creators. We ourselves are giving aid and comfort to this clear and present danger.



Targeting threats to employment, the multiplicity of levels from Average General Intelligence (AGI) to the tip-of-the-spear implements of Deep Machine Learning (DML), AI's processing power has exponentially exploded within man's domain. Worldwide deployment of quantum computing has established for AI a firm beachhead. Entrenching and advancing its positions are the ever accelerating forking and branching of its blockchain systems. *It is especially important that organizations with strong ethics and social applications today enter this battlefield.* 



Quantum computing is powerful and can be employed in the breaking of encrypted systems such as its own blockchain and attendant cryptocurrencies; as well, to the steering of financial markets, and facilitating secret communications among terror groups and criminal organizations.

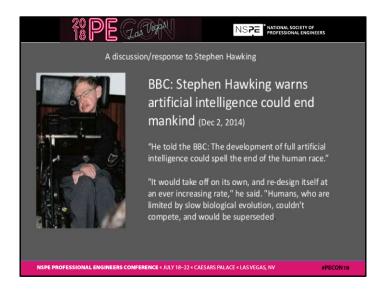


# **AI Threat Identification and Mitigation Strategies**

Less attention has historically been paid to the ways in which artificial intelligence can be used maliciously. It is necessary to survey the terrain of potential security threats from malicious uses of artificial intelligence technologies, and strategically develop tactics to better forecast, prevent, and mitigate these threats. Herein are some of the attacks likely to be seen soon if adequate defenses are not developed:

1. Policymakers should collaborate closely with technical researchers to investigate, prevent, and mitigate potential malicious uses of AI.

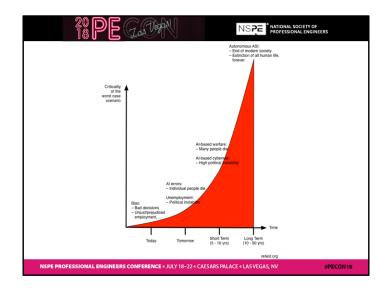
- 2. Researchers and engineers in artificial intelligence should take the dual-use nature of their work seriously, allowing misuse considerations to influence research priorities and norms, and proactively reaching out to relevant actors when harmful applications are foreseeable.
- 3. Best practices should be identified in research areas with more mature methods for addressing dual-use concerns, such as computer security, and imported where applicable to the case of AI.
- 4. Actively seek to expand the range of stakeholders and domain experts involved in discussions of these challenges.



# **Rapidly Evolving Threats Posed by AI**

As AI capabilities become more powerful and widespread, the expected growing use of AI systems lead to the following changes in the landscape of threats:

• Expansion of existing threats. The costs of attacks may be lowered by the scalable use of AI systems to complete tasks that would ordinarily require human labor, intelligence and expertise. A natural effect would be to expand the set of actors who can carry out particular attacks, the rate at which they can carry out these attacks, and the set of potential targets.



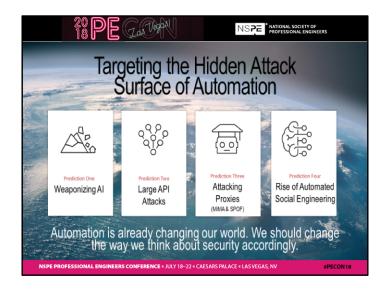
- Introduction of new threats. New attacks may arise through the use of AI systems to complete tasks that would be otherwise impractical for humans. In addition, malicious actors may exploit the vulnerabilities of AI systems deployed by defenders.
- Change to the typical character of threats. We believe there is reason to expect attacks enabled by the growing use of AI to be especially effective, finely targeted, difficult to attribute, and likely to exploit vulnerabilities in AI systems.



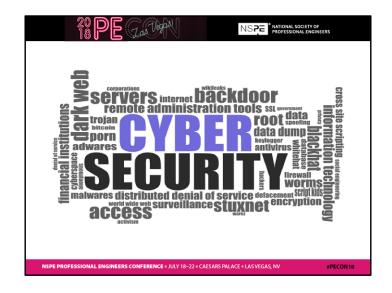
## **AI Threat Analysis**

Threat analysis is conducted by separately considering three security domains, and illustrate possible changes to threats within these domains through representative examples:

• Digital security. The use of AI to automate tasks involved in carrying out cyberattacks will alleviate the existing tradeoff between the scale and efficacy of attacks. This may expand the threat associated with labor-intensive cyberattacks (such as spear phishing). We also expect novel attacks that exploit human vulnerabilities (e.g. through the use of speech synthesis for impersonation), existing software vulnerabilities (e.g. through automated hacking), or the vulnerabilities of AI systems (e.g. through adversarial examples and data poisoning).



- Physical security. The use of AI to automate tasks involved in carrying out attacks with drones and other physical systems (e.g. through the deployment of autonomous weapons systems) may expand the threats associated with these attacks. We also expect novel attacks that subvert cyberphysical systems (e.g. causing autonomous vehicles to crash) or involve physical systems that it would be infeasible to direct remotely (e.g. a swarm of thousands of micro-drones).
- Political security. The use of AI to automate tasks involved in surveillance (e.g. analyzing mass-collected data), persuasion (e.g. creating targeted propaganda), and deception (e.g. manipulating videos) may expand threats associated with privacy invasion and social manipulation. Also expected are novel attacks that take advantage of an improved capacity to analyze human behaviors, moods, and beliefs on the basis of available data. These concerns are most significant in the context of authoritarian states, but may also undermine the ability of democracies to sustain truthful public debates.

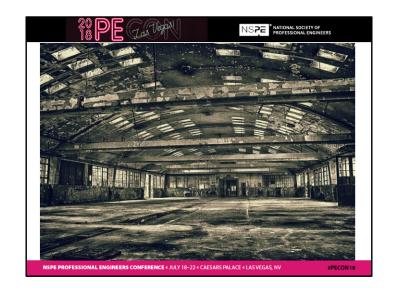


In addition to the high-level recommendations listed above, exploration of several open questions and potential interventions within four priority research areas requires rapid deployment:

- Learning from and with the cybersecurity community. At the intersection of cybersecurity and AI attacks, highlight the need to explore and potentially implement red teaming, formal verification, responsible disclosure of AI vulnerabilities, security tools, and secure hardware.
- Exploring different openness models. As the dual-use nature of AI and ML becomes apparent, highlight the need to reimagine norms and institutions around the openness of research, starting with pre-publication risk assessment in technical areas of special concern, central access licensing models, sharing regimes that favor safety and security, and other lessons from other dual-use technologies.

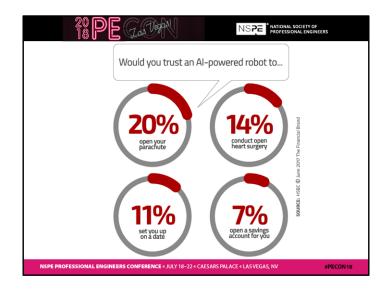


- Promoting a culture of responsibility. AI researchers and the organizations that employ them are in a unique position to shape the security landscape of the AI-enabled world. Highlighting here the importance of education, ethical statements and standards, framings, norms, and expectations.
- Developing technological and policy solutions. In addition to the above, surveying a range of promising technologies, as well as policy interventions, that could help build a safer future with AI. High-level areas for further research include privacy protection, coordinated use of AI for public-good security, monitoring of AI-relevant resources, and other legislative and regulatory responses. These interventions require attention and action not just from AI researchers and companies but also from legislators, civil servants, regulators, security researchers and educators. The challenge is daunting and the stakes are as high as the AI tsunami already breaking upon the beachhead.

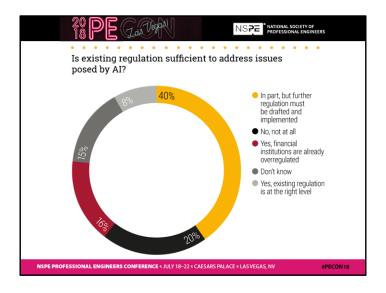


## **AI Threat Intervention, Regulation and Control**

Much of the above focuses on interventions that can be carried out by researchers and practitioners within the AI development community. However, there is a broader space of possible interventions, including legal ones that should be considered. Note that ill-considered government interventions could be counterproductive, and that it is important that the implications of any specific policy interventions in this area should be carefully analyzed. A number of questions concerning the proper scope for government intervention in AI security arise; some initial examples:



- Is there a clear chain of responsibility for preventing AI security related problems?
- Which government departments, marketplace actors or other institutions would ideally have what responsibilities, and what would the interactions with the academic and industry communities be?
- How suitable would existing institutions be at playing this role, and how much will it require the establishment of new institutions founded on novel principles or innovative structures in order to effectively operate in such an evolving and technical field?
- Are relevant actors speaking to each other, and coordinating sufficiently, especially across political, legal, cultural and linguistic barriers?



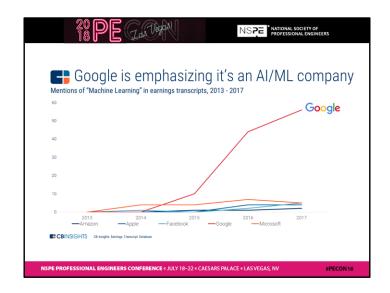
- Are liability regimes adequate? Do they provide the right incentives for various actors to take competent defensive measures?
- How prepared does e.g. the US government feel, and how much appetite would there be for focused offices/channels designed to increase awareness and expertise?
- Should governments hold developers, corporations, or others liable for the malicious use of AI technologies? What other approaches might be considered for pricing AI security-related externalities?
- What are the pros and cons of government policies requiring the use of privacy-preserving machine learning systems or defenses against adversarial examples and other forms of malicious use?



- Are data poisoning and adversarial example attacks aimed at disrupting AI systems subject to the same legal penalties as traditional forms of hacking? If not, should they be?
  - Should international agreements be considered as tools to incentivize collaboration on AI security?
- What should the AI security community's "public policy model" be that is, how should we aim to affect government policy, what should the scope of that policy be, and how should responsibility be distributed across individuals, organizations, and governments?
- Should there be a requirement for non-human systems operating online or otherwise interacting with humans (for example, over the telephone) to identify themselves as such to increase political security?



- What kind of process can be used when developing policies and laws to govern a dynamically evolving and unpredictable research and development environment?
- How desirable is it that community norms, ethical standards, public policies and laws all say the same thing and how much is to be gained from different levels of governance to respond to different kinds of risk (e.g. near term/long term, technical safety / bad actor and high uncertainty / low uncertainty risks)?



## **Conclusions**

It seems unlikely that interventions within the AI development community and those within other institutions, including policy and legal institutions, will work well over the long term unless there is some degree of strategic and tactical coordination between these groups. Ideally discussions about AI safety and security from within the AI community should be informing legal and policy interventions, and there should also be a willingness amongst legal and policy institutions to devolve some responsibility for AI safety to the AI community, as well as seeking to intervene on its own behalf. Achieving this is likely to require both a high degree of trust between the different groups involved in the governance of AI and a suitable channel to facilitate proactive collaboration in developing norms, ethics education and standards, policies and laws; in contrast, different sectors responding reactively to the

different kinds of pressures that they each face at different times seems likely to result in clumsy, ineffective responses from the policy and technical communities alike.



Therefore, the sense of immediacy not only in recognizing the tsunami of AI has broken upon and established its beachhead, but in understanding the outright clear and present dangers it imposes advancing upon society as a whole and to the individual on this brave new worldwide quantum battlefield of human existence.

