CRAIG:

Hi, I’m Craig Smith, a former New York Times correspondent and host of the podcast [Eye on AI](https://www.eye-on.ai/). I’m also a Special Government Employee at the National Security Commission on Artificial Intelligence and in this role, I’m serving as the host for NSCAI’s podcast series on the commission’s work. This is the first episode of six looking at the commission’s first-quarter recommendations to Congress.

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In the 2019 National Defense Authorization Act, the Congress established the National Security Commission on AI to consider the methods and means necessary to integrate artificial intelligence into the national security and defense needs of the United States. The commission consists of fifteen commissioners selected primarily by Congress, and is led by [former Google chief executive Eric Schmidt and former Deputy Defense Secretary Bob Work](https://insidedefense.com/insider/former-google-ceo-selected-lead-national-security-commission-ai).

Last month, the commission issued its first recommendations to Congress, covering seven lines of effort, six of which are public and one of which is classified. We spoke with the commissioners leading the unclassified groups about their recommendations, beginning with Andrew Moore whose team considered the need to Increase AI R&D funding.

Andrew grew up in Bournemouth, England, where as a teenager he wrote video games for early personal computers. He attended Cambridge University, studying Math and Computer Science and then got his PhD there, focusing on the application of machine learning to robots. He did a postdoc at MIT and is now on the faculty of Carnegie Mellon University. In 2003, Andrew became a U.S. citizen.

He spoke about his group’s recommendation that Congress double non-defense AI R&D funding to $2 billion next year and establish a National AI Research Resource with datasets for national security-related research.

I hope you find the conversation as thought-provoking as I did.

MUSIC

CRAIG:

Andrew, I wanted to start by talking about your recent work at Google and about how you came to the commission before discussing these first recommendations that you’re making to Congress. Can you tell us about your work at Google?

ANDREW:

I joined Google to help create a new Google office here in Pittsburgh, Pennsylvania, close to Carnegie Mellon university, and that has really grown now. It's a fairly large booming office doing all kinds of work for artificial intelligence. After a recent stint back as Dean of computer science at Carnegie Mellon, I'm here at Google where I am responsible for Google Cloud artificial intelligence. This is the part of Google AI, which is responsible for packaging up our artificial intelligences, things in computer vision and speech and natural language understanding, decision making, all of those things, packaging them up so that other companies in the public sector are able to use those technologies.

CRAIG:

Yeah, wonderful. So, people can access them through an API to the cloud.

ANDREW:

Yes, exactly. Many of the cloud companies have really been pushing on this democratization of artificial intelligence so that folks can come in, perhaps through large data science organizations such as [Kaggle](https://www.kaggle.com/) or perhaps directly into any of the big cloud companies, cloud websites and start to play with AI tools themselves and it's really is actually worth doing. You no longer need a fancy PhD in machine learning in order to be able to play with these kinds of tools.

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CRAIG:

In the recommendations that you've made to Congress that the commission has made to Congress and your line of inquiry in particular, you talk about focusing on non-defense AI R&D at the [National Science Foundation](https://www.nsf.gov/), [Department of Energy](https://www.energy.gov/) and other agencies. And I wanted to ask why is that research environment, the non-defense research environment, considered a national security issue?

ANDREW:

So, both the defense research and the non-defense research are absolutely essential. The reason you need the large non-defense part is because the last 50 or 60 years of United States technology mastership, if you like, has been because the cluster of the best technologists in the world have all been spread around United States universities and public institutions and national labs. That is where the best minds in the world come and it's allowed us to move really quickly, many times ahead of the rest of the world's technologies relevant to national security going all the way from things like GPS to the creation of the Internet, to the creations of the basics of neural network technologies. And so, the starting technology movements, when you see radical changes, are coming from the places which have, if you like, the cafe culture of tens of thousands of experts, academicians working with governments through agencies like [DARPA](https://www.darpa.mil/), the Defense Advanced Research Projects Agency, or NSF, the National Science Foundation, to build big technological programs for the country. Without that, you're going to end up with a place where we start to see the big leading ideas happening from other corners of the earth and other governments, and frankly other militaries and intelligence agencies getting first access, if you like, to the new big ideas.

CRAIG:

Yeah. The recommendations mentioned the National Science Foundation and Department of Energy in particular, but what you're describing includes nongovernmental research institutes, research universities like Carnegie Mellon. Is part of the effort to bring them into the tent as well?

ANDREW:

Yes. What's so important and many of my fellow commissioners, people like [Eric Horvitz](http://erichorvitz.com/) from Microsoft and [Eric Schmidt](https://en.wikipedia.org/wiki/Eric_Schmidt) from Google and [Steve Chien](https://ai.jpl.nasa.gov/public/people/chien/) from NASA, we've all experienced the growth of big new ideas where something which seemed just like science fiction, like a computer recognizing you when you walk into a room or not only being able to understand your speech, but guess what your next question is going to be; those kinds of things as they've suddenly changed from being science fiction to reality, they've happened initially in the halls of Stanford or the University of Washington or MIT or in many of our hundreds of strong academic institutions. And that's because that's the place where you get these amazingly creative folks who are really all fighting to be world leaders in their academic disciplines and surrounding each of these really creative faculty members are gangs of PhD students, graduate students, postdocs, who themselves their entire job there is to think of world's changing ideas. Some people refer to this as the seed corn of technological innovation. This is the place where the folks who are one day going to be in leadership positions in a national lab or in the services or in NSA or anywhere else like this, this is the place where they will be growing up and learning their craft.

CRAIG:

The recommendations, not your section, but the recommendations begin with a specific and very ominous mention of swarm technology. And then your section recommends funding to understand interacting AI systems including the application of game theory. As a layman reading that, I imagine dogfights between drone swarms. What are you envisioning in those references?

ANDREW:

Game theory refers to this whole area pioneered by [Nash](https://www.nytimes.com/2015/05/25/science/john-nash-a-beautiful-mind-subject-and-nobel-winner-dies-at-86.html) who was the subject of the movie, [A Beautiful Mind](https://en.wikipedia.org/wiki/A_Beautiful_Mind_(film)), and it's this question of what should a person or a robot do when they're dealing with other people are robots who might have different goals. A perfect example that we will all use in our regular lives is if you're in a position where you're buying a house or a car or something like that. So, it's a known sort of skill of people who negotiate, for example, that they won't walk in and immediately tell the sales person exactly how much they're willing to pay. They will be careful about how much information they divulge at the right time in order to make sure that the negotiation ends up in a good way. Making artificial intelligences be aware of the need to sometimes sort of show discretion, not tip their hat in their activities, actually matters throughout commerce, even in worlds like the medical world and certainly in things like national security or military operations.

CRAIG:

The recommendations talk about funding. Can you walk us through those recommendations in R&D funding for AI? There seem to be several lines of funding: defense funding, non-defense funding, and it would be helpful to understand that.

ANDREW:

Absolutely. So overall the commission is recommending that we roughly double the funding for non-defense research spending from about a billion dollars a year to $2 billion a year in the United States. And the things that this will enable us to do is make sure that we've got the first mover technology in all the sub areas of artificial intelligence, ranging from things like understanding what is seen on a video screen through to planning the movements of tens of thousands or sometimes millions of different objects in a large operation, through two areas like anticancer technologies or indeed general pandemic management systems. So, these are the kinds of things we want to see this investment used for so that we've increased the number of people in the United States, especially U S citizens, who are getting trained up with skills to be in the AI workforce. If you don't mind, I'd love to give you a verbal picture of how we are recommending we split up this investment.

CRAIG:

Absolutely, yeah, please.

ANDREW:

So, it's kind of fascinating. I've always enjoyed being in the United States to do research because I personally believe it is by far the best execution engine for really making sure that the most brilliant ideas get a chance to prove themselves. And one of the agencies which has got a track record over and over again of funding work, which has turned into multi-billion and multi tens of billion-dollar industries, is the National Science Foundation. So, there's many different parts of National Science Foundation and how it works with artificial intelligence. It includes things like the question of, well, machines are really good at learning at the moment in many contexts, but in other contexts they're still not as strong as humans. Is there any way that we could make them learn a hundred times more effectively, like an order of magnitude change?

If that's possible, I predict with some confidence that it will come out of a university research lab, two or three grad students who want to show that professor that that's smarter than the professor or something, will work through the nights and they will find something like this. So that's where the foundational AI research will come. And National Science Foundation has been a very effective tool for evaluating who's got the best potential for coming up with these big innovations.

National Science Foundation will also be funded for work on the hardware, things like semiconductors, microelectronics, micro sensors that will be embedded all around the worlds to help get a better situational understanding of what's going on in the world. The next is the Department of Energy. As you may know, Department of Energy has powered a lot of the big, big science research areas in the United States. It was an offshoot, I believe, of the Manhattan Project and the work done there, foundational work in physics. But since that has expanded to looking for the new ways that massive super computation can help in much more than simply nuclear warfare simulations, but as moved into things like cancer biology, weather modeling, and huge simulations of massive cities or even countries and how they operate so that people can play what if games.

ANDREW:

The other places, which are hotbeds of very revolutionary artificial intelligence are the National Institutes of Health, where many of the fundamental computer science ideas can have an immediate payoff from the kinds of discoveries they make. And, recently, a classic example of this is all the work that's gone into accelerating genomics and understanding very rapidly what the function is of a new organism or identifying what parts of a problem protein might be targeted by a particular kind of drug. All of these things, we currently have armies of hundreds of thousands of scientists trying out all kinds of experiments and, if you combine those hundreds and thousands of scientists with the power of massive artificial intelligence modeling, prediction and intelligence, guided experimentation, we've already seen over the last decade that you can get a multiplying effect of the power of these kinds of scientists. [NIST](https://www.nist.gov/), the National Institute of Standards and Technology, is actually going to be extremely important as we wrestle with societal questions about how we would like to see artificial intelligences behave.

ANDREW:

For example, NIST is the classic organization which can help us figure out how should we validate whether an autonomous vehicle is safer than a human driver – and do it in a way which is transparent so that the whole population can have a chance to understand the care that's being put into testing these things, validating them and being transparent about the underlying assumptions they're making. NASA is another important agency, which I personally would count as the absolute number one institution on the planet for autonomy because deep space probes and satellites, which are operating for medium to long periods of time, need to be able to take care of themselves, make rapid decisions often without any immediate help coming to it from earth. And so there, as the science of making systems more able to make their own decisions grows, we expect to see NASA and some of the offshoots of their kind of programs being the ones that are most critical. Finally, we do need to invest in fellowship and scholarship programs. The United States has seen a significant decline in the number of US citizens who want to go into advanced research careers. And part of the reason for that is there is no funding for students. And so, they quickly will turn to other areas, ones which are not necessarily so important for the public sector. And so, there's going to be funding for fellowships and scholarships to help both students and early stage faculty established themselves as worldwide AI experts.

MUSIC

CRAIG:

I have some questions on each of those.

ANDREW:

Excellent.

CRAIG:

You include increased funding for National Institutes of Health and in the report, you specifically mentioned harnessing methods to address public health emergencies such as the rise of new pathogens. And certainly, we're in the middle of a pandemic and it's on everybody's mind. It's a global threat to the human species. But an even larger global threat to the human species is climate change. And I, I've asked this question before, has the commission discuss funding AI to address climate change, which is arguably a greater threat to national security?

ANDREW:

So, climate change is a perfect example of a place where advanced artificial intelligence is going to be essential. And indeed, some of the big projects which had been started up already at the national federal level are around things like humanitarian assistance and disaster recovery approaches. An AI Institute in the DOD called [JAIC](https://www.ai.mil/), the Joint Artificial Intelligence Command, has started up programs exactly in that domain because we do have to be ready for everything the world can throw at us and they can be natural phenomenon, floods, tsunamis, and so forth, and they could be unnatural phenomenon, terrorist attacks, massive scale electricity grid outages or other things like this. And so, the basic research is there to support rapid response to both the kind of emergencies that we can absolutely predict are going to happen again, such as pandemics, floods, and the other effects of climate change, or equally important for things that we don't even have on our whiteboards yet, but are going to be other threats.

CRAIG:

Yeah. Okay. On NIST, you talk about enabling NIST to set standards, for example, in autonomous vehicles. What kind of testing standards do you imagine? Because it's a very broad and fuzzy area, but the actual testing and the standards have to be fairly specific.

ANDREW:

That's exactly right. So unfortunately, the question of is this system safer than another system? You’d think you can quickly test that, but it's very hard and you actually need sophisticated expertise of which the United States, in my opinion, has always been in the lead for coming up with useful ways to test. So, I'll give an example. You might have a great autonomous system to put into a bunch of vehicles and they seem to test very well, but perhaps there's some tiny, tiny problem in there where suddenly perhaps 5 million cars in a fleet all have the same problem at the same time. And even if that's only a one in a million chance, you've got to have testing facilities which can root out those kinds of little things. So, through other national programs such as the National Highway Safety Administration for the design of roadways, we do have the technological expertise for building up testing frameworks so that we can make sure that while the entrepreneurs and scientists are developing entirely creative new ways of solving a problem, we can evaluate at the end, that the problem is something that we find acceptable and functional.

CRAIG:

Yeah. Yeah. And to me that seems like a fairly urgent need because technology is way ahead of the regulation and the regulation needs to quickly catch up before society can benefit from some of these technologies. The part about NASA, the recommendations about NASA and the need for autonomous operations, you use the word in the recommendations ‘urgent,’ you call it an ‘urgent need.’ And I wondered why you consider that urgent. Is there a particular threat that listeners should be aware of?

ANDREW:

A very interesting thing about artificial intelligence, I think more than any previous technology race, is this: as a country or a company or a society gets better at artificial intelligence, that improvements in AI actually means that it accelerates how quickly the next round of improvements happen. So even now at many web companies, including my own, we didn't do this three years ago, but now when it comes to training up a machine learning system, we've given up having human beings tending to all the intricate details of the training. We've built systems now which themselves are AI's helping make the training systems more effective. And, you're going to see this more and more in other areas: aerospace, the natural sciences, chemistry where the improved AI tools mean that the pace of subsequent improvement of AI tools gets faster and faster. So, this is not the kind of race where we can sit back and see how it pans out for a few years and then jump back in. Cause by that time not only will we have fallen behind in an actual technology level but we'll have fallen behind in our rate of change, of slope if you like, of technology improvements.

CRAIG:

And so, you consider it urgent because of the need for research in order to keep abreast of advances elsewhere? Not necessarily because there is some plan for deployment in space that we'll fall behind on. I mean spaces is a pretty big place. I can't imagine that the Chinese or the Russians are going to dominate the space domain. Is that right? Or, or are you talking about a deployment or implementation?

ANDREW:

So as the commission has been working on these issues, the commission has been considering some specific scenarios which will go into a classified version of the report where there's a particular need for urgency. So, the answer is yes, there are specific reasons, but outside of those specific classified reasons, there are other perhaps equally important questions of the fact that whoever's fastest in AI in 2020 is going to have an extra advantage in 2021 which leads to an extra, extra advantage in 2022

CRAIG:

Yeah. Just a moment ago, you mentioned the strengthening fellowships and scholarships for domestic students and in the report, you refer to it as strengthening the pipeline for domestic students studying AI. Is there a concerned that the U S is becoming overly reliant on international students? And it's kind of ironic to be asking you that given that you were once an international student. I don't see a discussion in the recommendations of visas or OTP or other mechanisms to keep students here? Bill Kerr calls it the gift of global talent.

ANDREW:

It's a very complex question. I think there's two things which I can safely say about the deliberations of the commission so far. First that we agree that it's absolutely essential that we grow the proportion of US citizens who are trained up in these technologies who can go to work in an incredible number of really interesting federal defense, national security problems which needs US citizen geniuses right now. Second thing we all agree on is that every time that a country in the past has tried to create a sort of technology fortress by not bringing in ideas from around the world. In the end, it's led to big problems for that country. So, one of the reasons that the United States has attained this level of huge technological advantage over the last half century is because it's become the beacon for the best minds all around the world to come and join in. So, the commission is clear that they don't want us to lose that beacon for advanced technology,

CRAIG:

But nonetheless, the commission wants or recommends that we have a stronger domestic base so that we are less reliant on foreign talent.

ANDREW:

Yes, we need both. We need to make sure that we remain the world's center of artificial intelligence and we need to make sure that there is still a large proportion who are domestic United States citizens.

CRAIG:

And in your recommendations, you paint a pretty dark picture of current funding trends. What happens if Congress won't allocate the funds? And do you think that doubling non-defense R&D funding to 2 billion in the current environment is feasible?

ANDREW:

Obviously, the current environment is new, but we're already seeing throughout the economy that advanced technology, including artificial intelligence, played a really strong part in helping us with the current pandemic, going all the way from using artificial intelligences to help field the massive number of phone calls going into assistance lines in all the different industries. AI was able to step in that and help. With only using humans, you'd have seen wait times of 24 hours for responses from some of these hotlines. Similarly, for understanding how to keep logistics and supply chains running, it has been pretty essential there. So, I think the main position of the commission here is that exactly, in order to help us get through crises, both those predicted and those unpredicted, we need to invest in a technology base which gives us that kind of resilience and this extra tool in the United States national security operations tool belt of very advanced technology to see it through disaster scenarios.

CRAIG:

It seems like the government's tossing around trillions of dollars here and there, so maybe 2 billion isn't asking too much. The recommendations include funding for unsupervised, self-supervised and transfer learning. That's something that I'm very interested in. That's basic research and the recommendations in another section talks about a five to one ratio of government funding for applied versus basic research. What do you regard as a healthier ratio and are the recommendations intended to right that balance somewhat?

ANDREW:

Yes. The five to one ratio in the report was specifically referring to hardware and hardware systems. And in fact, it does vary across different parts of technology. But I want to give a real example of how this all plays together. Let's suppose for instance that we want as a country to by 2028 have autonomous medical recovery helicopters based on electric helicopter motor technology, which is coming in, and we decide we want to have the ability for even in incredibly dangerous situations for medivac to be automated. That's a very practical problem. It sounds exactly like the kind of thing which is not basic research. But at the moment one of the biggest problems with trying to even envision doing that is you can have a helicopter which you train up using artificial intelligence on thousands of practice missions where it records everything that happens.

ANDREW:

Each mission, it gets a little bit better through the use of machine learning. But still, I can guarantee you that's once it's out there in the field, that helicopter will see a situation that no helicopter has seen before. Maybe it's due to a new kind of pollutant that's in the emergency scenario, which no one had foreseen. It turns out that one of the technologies you listed, transfer learning, is all about an autonomous system which has learnt how to do things in one way, recognizes that it's in a whole new situation and it says, well, I'm going to have to relearn here on the spot how to control myself in this new situation, but I want to bring along the lessons that I learned in my earlier stages of training so I don't have to relearn everything from scratch. So that's I think an example. I need to see some very significant progress in the domain of basic research and transfer learning before I would be able to build on autonomous helicopter for a medical evacuation that I would feel safe releasing for general use even in unforeseen circumstances.

CRAIG:

Hmm. Yeah, that's interesting. But in terms of software research or non-hardware research, do you have a sense of what the ratio is and whether there needs to be more basic research funding? Generally?

ANDREW:

I think it varies one-to-one in some cases tend to one another cases. But I'd like the world to hear maybe more about exactly how we discussed the stuff in the commission because the big question is not about a laboratory where people are doing basic research in theory and then they sort of throw their results over a wall to applied to people. The way that modern research is done anywhere from a large pharmaceutical company to a big tech company like Amazon or Google is that you have people who are doing the basic research and practicing on really hairy applied problems like the one I just described. So, within the whole way that we are envisioning the life cycle of research projects in the United States, we do hope to see less compartmentalization between the different stages of research. We need to be bringing the needs of national security right into universities so that students and faculty who've got an idea of what research they can do, which will save lives in the short term, and we need to be bringing some of the new big theoretical capabilities out to the field so that people who are actually in the field can understand what might be possible.

CRAIG:

Further on in the recommendations, you talk about a national AI research resource that would democratize AI by making compute or resource intensive computation and large curated data sets available to researchers. Can you talk about how that would work? Are you talking about a broker or a repository, a kind of a Github or what exactly you're talking about?

ANDREW:

It's mainly about the distinction between what happens if you're in the public research world versus what would happen if you are in a large company right now, like a Facebook or a Pinterest or a Microsoft. These commercial researchers inside that companies usually have access to all kinds of important useful data to test their big ideas on. A good example of that is imagery data from maps where the kinds of volumes of data that someone inside a maps-based company can experiment with is two, three orders of magnitude larger than the datasets which will be available for academic researchers to use. And so that can sometimes lead to brilliant students who would have done something great just being hamstrung and they're having to play with toy problems. And the last thing we want is our best young minds just playing with toy problems. So, this results is a place where we can have things like exabyte levels of data around imagery or a hundred petabytes kind of data stalls that are needed for large scale genomic analysis. So rather than every university or every, God forbid, every professor trying to build up their own local data store of data to practice their experiments on, we need to build something where the academic United States are able to share and experiment with data at this much larger level.

CRAIG:

Hmm. That's interesting. So, it would be a collection of databases managed by the government and accessible to the private sector and academia alike.

ANDREW:

Yes. These would have to be public datasets. So, for example, they would not have any private information about individuals and indeed part of the work needed to create the data sets is a huge area of artificial intelligence right now, which is data disclosure limitation. Making sure that information which is available for searches is something where you can't even in theory, trace back the source of data to individual people.

CRAIG:

But you're talking about physical databases, not a list of resources, not a clearing house where people can go and see what databases are where and then reach out to those institutions, companies and request access. It would be a physical store of data.

ANDREW:

So, I got two answers to that very good question. First one is no, and the second one is yes, which I begin with the yes. From the point of view of the researcher, it is the ability to issue a query, say to a geo database if you happen to be a forestry researcher getting accurate visual data about which parts of the world's forests are burning currently in order to validate a new model. The answer is yes, you're the researcher should worry about your research and the dynamics of fire spreading and not the data. Questions of trying to chase down links to lots of distributed data sets everywhere. The reason I also said no is that right now in computer science everything is actually virtual so that the researcher should not even have to be aware of where their dataset is living or whether it's actually distributed in lots of different machines around the world. That's all hidden from them.

CRAIG:

Yeah, so it would be a network of data sources, not a centralized collection as it would have been in the old days in a massive government data center.

ANDREW:

Yes, exactly.

CRAIG:

And that is quite relevant to what's going on today because I've spoken to some researchers working on Covid and the biggest problem right now is getting access to databases that one presumes are out there but aren't necessarily listed anywhere or aren't necessarily public if they are listed. So, there's a scramble to try and figure out where all the data is and something like the national AI research resource then would solve that problem in a pandemic situation. There would be one place to go to get access to all available data set. Right?

ANDREW:

Yes. I think that's actually a nice way of looking at this. I've been involved in plenty of research projects, perhaps have lasted one or two years each. And this is in my academic life, where you have two years to solve a big problem and you suddenly realize you're 15 months into it and you're still hunting down the data. And so, if we can get that right so that the researcher can spend all their time on doing the actual science, we will have made sure that some of our most brilliant minds in the country are being much more productive and able to be much more creative about what they're doing with that data.

CRAIG:

Yeah, and I had a conversation with Eric Schmidt and Bob Work a few months ago and they talked about data sharing among allies. Presumably this resource would not only be connected to domestic data sources, but among allies as well.

ANDREW:

In every form of data, you're going to see different access control levels. And what I mean by that is you'd never have a binary switch of this data is completely available to the entire planet vs this data is only available to this one authorized user with a password. And so, building these large data stores and making them convenient to use has many facets. One of them is setting up the access control policies so that the right people have access to data at the right level. For example, if you're working on medical images, you must have had a certain amount of training to qualify to be allowed to access those medical images because there are responsibilities for not, for instance, back fitting those medical images to figure out perhaps what the individual people are who are involved. And so different researchers who've had different levels of training and committed to certain different levels of responsibility, usually under the auspices of departments such as NIH, National Institutes of Health, have to be given access only to data at the level which they're allowed to see it. And so, as we talk about things like sharing with allies, I see that as part of this bigger picture of any data management system and an inevitable part of the design of that system is to make sure that people with the right level of authority can only access the data that they should.

CRAIG:

Do you have a sense if these recommendations are implemented and presumably recommendations to follow, is the US going to leap ahead - I don't know how you measure that, but some a significant degree of beyond where we would be otherwise - and are there other countries that you're aware of that are doing similar things that you can compare this to? I mean certainly China is doing a lot.

ANDREW:

I'm going to answer both questions. So that's a very interesting question of what do we get out of having this increased level of capability in the United States. And I'm going to give an example which really hit home for me, which I learned about recently, which is in the immediate wake of unemployment claims processing, because of the Covid issues, there's been a huge spike and many, many systems at state level and local level, were completely overwhelmed and went down. What I've seen in the last few weeks are acts of technological heroism, where people built systems almost from scratch to deal with these problems in a matter of days. And in the past, building these kinds of systems, the things which you would have expected to take 24 months, six months of just selecting the vendor, another six months of planning, all kinds of things. So, what we've seen recently, when there's a real need, technology can move much, much faster and you can bring things to bear really quickly. For me as a commissioner, that’s one of the things I most want to see us being able to do in the United States is get to a point where we have a technologically nimble workforce of millions of people throughout the services, throughout the government and the private sector who are able to very rapidly use technology to solve immediate problems in automation. And that's what we're going to get out of this increased level of funding.

MUSIC

CRAIG:

That's it for this week's podcast. I want to thank Andrew for his time. If you want to learn more about the National Security Commission on AI, visit their website at www.nscai.gov. You can find a transcript of this episode there. If you want to want to share your views on AI and national security reach out to NSCAI at inquiry@nscai.gov.

And remember, the singularity may not be near, but AI is about to change your world, so pay attention.