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U.S.–CHINA: WINNING THE ECONOMIC COMPETITION

HEARING

BEFORE THE

SUBCOMMITTEE ON
ECONOMIC POLICY

OF THE

COMMITTEE ON
BANKING, HOUSING, AND URBAN AFFAIRS
UNITED STATES SENATE

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

ON

EXAMINING THE HIGH STAKES OF THE STRATEGIC ECONOMIC COMPETITION BETWEEN THE UNITED STATES AND CHINA

JULY 22, 2020

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C O N T E N T S

WEDNESDAY, JULY 22, 2020

WITNESSES

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U.S.–CHINA: WINNING THE ECONOMIC COMPETITION

WEDNESDAY, JULY 22, 2020

U.S. SENATE, SUBCOMMITTEE ON ECONOMIC POLICY,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
Washington, DC.

The Subcommittee met via Webex at 9:31 a.m., Hon. Tom Cotton, Chairman of the Subcommittee, presiding.

OPENING STATEMENT OF CHAIRMAN TOM COTTON

Chairman COTTON. Welcome to today's meeting of the Economic Policy Subcommittee, which is open to questions from all 25 Members of the Banking Committee.

I would like to thank Senator Cortez Masto and her staff and all the Committee staff for helping pull together this hearing.

We have an exceptional roster of witnesses prepared to testify today. I want to introduce them briefly.

First, Professor Walter Russell Mead is the Chace Professor of Foreign Affairs and the Humanities at Bard College and a distinguished fellow at the Hudson Institute. You can also read him now twice a week in the *Wall Street Journal*'s opinions section, where he is the Global View columnist. I certainly do.

The Honorable Chris Giancarlo is the founder of the Digital Dollar Project and is here today to speak about that effort and the importance of an emerging technology known as the "blockchain." He is also the former Chairman of the Commodity Futures Trading Commission.

Mr. Tim Morrison is a senior fellow at the Hudson Institute, where he specializes in Asia-Pacific security. Formerly, he served as Deputy Assistant to the President for National Security under President Trump.

Dr. Lisa Cook is a professor of economics and international relations at Michigan State University. She previously served as Senior Economist at the Council of Economic Advisers under President Obama.

Mr. Martijn Rasser is a senior fellow in the Technology and National Security Program at the Center for a New American Security. He previously served as a senior intelligence officer and analyst at the CIA.

I want to thank you all for testifying. Thanks to our audience today for tuning in to this hearing entitled "U.S.–China: Winning the Economic Competition".

While, of course, we would have all preferred to convene in person, perhaps it is appropriate that we have to hold this hearing due

to a virus that first emerged from Wuhan, China—after a cover-up by the Chinese Communist Party.

This should serve as a reminder that the misrule and strategic calculations of the Chinese Communist Party can have profound consequences for us, half a world away. It also serves as a reminder of the high stakes in this strategic competition between the United States and China.

We should not underestimate our opponent in this struggle. China is the most formidable adversary the United States has faced in living memory. Near the height of its power in 1980, the Soviet Union's economy was 40 percent the size of the American economy. In 1943, the combined economies of our enemies Nazi Germany and Imperial Japan were also 40 percent the size of the American economy. Today China's economy is two-thirds the size of our economy. So China is richer than any adversary we have faced.

It is also far more entangled with us economically, as we were reminded in the early days of this pandemic. We rely on China for the manufacture of many important goods, from the medicines in our cupboards to the electronics in our cellphones.

This reflects not only the decline of our industrial capacity and the failure of decades of naive "engagement," but also the Chinese Communist Party's grand ambitions, which Chairman Xi describes as nothing less than the "great rejuvenation of the Chinese Nation."

Beijing is investing hundreds of billions of dollars to develop technologies it believes are key to the future—not just airplanes and automobiles but frontier technologies like semiconductors, artificial intelligence, and quantum computing.

The task we face is to preserve and in some cases rebuild America's position as the technological and economic leader of the world, and to end our compromising dependence on China for essential goods.

The Senate is scheduled to vote today on one such measure: a bipartisan bill I led to strengthen the semiconductor industry. We passed it in an overwhelming majority as an amendment yesterday, and I believe it will pass finally today. But there is much more that is left today, and that is the purpose of this hearing.

Finally, I want to note for the benefit of our witnesses and audience that the Economic Policy Subcommittee majority is preparing a report that addresses this very issue, which will include concrete proposals about how to compete with—and beat—China. Your testimony will help inform our report, which will likely be released later this year.

So thank you again for serving as witnesses. I look forward to your testimony, and I would like to remind all witnesses and Members of a few important technical details for this hearing.

For Members, please make sure you turn on your camera when you are ready and able to speak. If you do not turn on your camera, I will assume that you are away from your desk and not able to speak at that moment.

For Members and our witnesses, please remember to mute yourself when you are not speaking. If there is background noise, it will

cause the central camera to change to you even if you are not talking.

Finally, I want to remind everyone that all 25 Members of the Committee are welcome to join and ask questions today, even if they are not Members of our Subcommittee.

Senator Cortez Masto, I turn it over to you.

OPENING STATEMENT OF SENATOR CATHERINE CORTEZ MASTO

Senator CORTEZ MASTO. Thank you. Senator Cotton, thank you so much, and I appreciate the collaborative relationship we have with your staff in putting this hearing together.

Today's hearing gives us an opportunity to discuss how we ensure our economy is strong for all Americans and for future generations.

I am pleased to see the panel here today and engage in this discussion. I know Dr. Lisa Cook has engaged in path-breaking economic research that has found that it is not enough just to create the laws to support innovation. You know, patents, copyright courts, and Government-funded research and development do not result in greater economic growth and prosperity for all if the Government fails to provide the most basic protections to those facing disadvantage.

If the U.S.A. wants to maintain its status as the world's biggest and most dynamic economy, the holder of the world's currency, the leader in international alliances and collaboration, and the most liquid and wealth-producing capital markets, we must assess how we structure our Government to ensure we meet the needs of our families and respond to changes in the world.

Let me just focus on my home State for a minute. Nevada has been hit particularly hard by the pandemic with an unemployment rate of 15 percent. Our State economy relies on travel, tourism, entertainment, and hospitality—all hard hit sectors. More than 430,000 Nevadans have filed for unemployment.

So the question is: How can we—and the rest of our Nation—rebuild our crumbling infrastructure, provide effective job training to displaced workers, and improve the educational outcomes of our children? How can we invest in our public health infrastructure and collaborate with those of other Nations to prevent future pandemics? How do we recover economically from this pandemic in a way that benefits those hit the hardest by this whole crisis?

To respond to these crises, we must rely on a vibrant and responsive public sector. We need civic institutions to not only battle our urgent health, economic, and racial crises, we need Government at all levels to invest for future economic growth.

In particular, America's economic growth will in large part depend on maintaining our technological edge.

The U.S. has long led in many key technologies, which has helped underpin our economy and helped shape international norms and standards, promoting values such as freedom, innovation, and fairness.

To build a strong future economy, we must invest heavily in a range of key strategic technologies, such as 5G wireless, artificial intelligence, and quantum computing.

And we are holding this hearing in part because the U.S. and Chinese economic competition over these technologies—who makes them, who owns them, who benefits from them, who exports them, and who determines the norms and standards users must adhere to—will define much of the century.

Emerging technologies can improve societies, but we must ensure that guardrails that govern their use are designed to foster innovation and fairness, and that they protect minorities and the free flow of ideas.

China is attempting to displace the United States as a leader in high-tech sectors, but China does not play by the same rules of the road. It subsidizes State-owned enterprises, it restricts market access, and steals U.S. intellectual property.

Moreover, by seeking to become a global leader in these technologies, China is also seeking to shape how they are used around the world by setting the standards.

However, unlike the United States, which ensures international standards are consistent with democratic values, China has used new technologies such as AI to surveil and repress their own people, from the Uyghurs to Hong Kong's protesters.

This is why I am pleased also to welcome Mr. Rasser, who is leading pivotal research into the competition between the United States and China in the area of technology.

It is the vitality and creativity of our scientific research communities that will drive American innovation. And to ensure our future competitiveness, we must educate and prepare the workforce for the industries of the future.

We are made stronger by investing in our people, by investing in a just society, and by working with our allies and friends in a multilateral fashion. To be competitive in the long term, we must continue to invest in scientific research and development, which is the building block for the next generation of technology.

In Nevada, we know that technology is an economic driver for our State. Our Innovation State Initiative was making progress prior to this pandemic.

So I look forward to hearing from all of the witnesses, and I hope that today's discussion will help us progress a discussion of how we can improve the lives of every American and ensure we provide a better future for the next generation.

So thank you for joining us.

Chairman COTTON. Thank you, Senator Cortez Masto.

We will now go to the witnesses' opening statements. Your written statements will be admitted in their entirety to the record. We'll have opening statements for up to 5 minutes, and we will start with Professor Walter Russell Mead.

STATEMENT OF WALTER RUSSELL MEAD, JAMES CLARKE CHACE PROFESSOR OF FOREIGN AFFAIRS AND THE HUMANITIES, BARD COLLEGE

Mr. MEAD. Well, Senator Cotton, Ranking Member, it is an honor to be in this hearing, and thank you for inviting me.

When we look at China today, I think we see a puzzle as well as a problem; that is, China, we thought for some time, Americans tended to think that China had moved beyond Marxism, that it

was sort of nominally Marxist but Communist ideology was no longer a factor in Chinese thinking. And that really turns out not to be true. Today's China combines a Leninist party structure, State control if not always ownership of the means of production, near totalitarian controls over society, a planned economy, an intolerant atheism, and a ruthless determination to hold onto power at all costs.

That Beijing incorporates market mechanisms into its system is not new. Even Lenin introduced a new economic policy as a way to speed recovery from Russia's civil war. But the Chinese Communist Party, armed with information technology that lets it monitor and control economic activity on a scale Lenin could only dream of, has grafted market mechanisms onto a Communist State structure with great success.

American policy responses to this puzzling entity must take account of the geographical, ideological, and economic dimensions of the new China. None of it will be easy. Even in a competitive relationship, our goal cannot be to stop China's economic growth or to dictate the course of its political development. The United States has no desire and has no power to prevent more than a billion people from working toward a better life.

Nevertheless, the U.S. relationship with a revisionist and possibly revolutionary neocommunist China cannot simply be business as usual. Countries like China and Russia that claim they are actively seeking to undermine U.S. interests and counter U.S. values need to be taken at their word.

U.S. diplomats and agents abroad must respond to attempts to extend hostile influence in strategically important countries and proactively defend American interests.

When we come to economics, the United States cannot simply treat trade as a purely economic question with a country like China. As the Senator mentioned, distinctions between State-owned corporations and private business cannot really be taken at face value. Chinese businesses and investors are under the thumb of central officials.

Given the party's ambitions, other countries have no choice but to monitor Chinese investment and financial flows, to audit supply chains for key materials, and to eliminate strategic dependences on China and to eschew the use of Chinese tactics that threaten their telecom and infrastructure security.

China's attempts to achieve technological supremacy through theft and illegal behavior are not, again, purely economic questions. They are security questions and need to be addressed with that degree of urgency.

The steady military buildup of Beijing has implications for the U.S. defense budget, and the United States needs to scale up its efforts to secure primacy on land, at sea, in the air, in cyber, and in space. This, again, is not simply a matter of defense spending. It's a matter of investment in technology. It requires a very broad whole-of-Government approach.

Developing the right policies for this new situation is a difficult but necessary task. It represents a significant commitment of American resources. It will require bipartisan cooperation. This Subcommittee hearing is certainly an excellent example of that.

But at the end of the day, Beijing cannot be allowed to dictate its terms of engagement with the global system to which it is fundamentally hostile.

Thank you.

Chairman COTTON. Thank you, Professor Mead.

We will turn now to Chris Giancarlo.

STATEMENT OF J. CHRISTOPHER GIANCARLO, SENIOR COUNSEL, WILLKIE FARR & GALLAGHER, AND FORMER CHAIRMAN, U.S. COMMODITY FUTURES TRADING COMMISSION

Mr. GIANCARLO. Thank you, Chairman. Thank you, Ranking Member and Senators. It is an honor to be with you.

As a former market regulator, I think a lot about how to strengthen the global competitiveness of U.S. financial markets and our overall economy, and I believe there are many steps we can take. Or perhaps there is one that is more important than the others, and that is, upgrading our own national currency, the U.S. dollar, into a modern programmable instrument for a new digital 21st century.

Let me begin with three observations from my public service.

First, we know that most of—excuse me. I lost my testimony here. We know that much of America's physical infrastructure—its bridges and its tunnels and its airports and mass transit systems—have been allowed to age and deteriorate and become obsolete.

Well, sadly, the same is true about much of our financial infrastructure. Systems for payment and settlement, shareholder and proxy voting, and investor access and disclosure that were global models in the 20th century are falling behind the times in the 21st, and nothing reveals the limits of our existing financial system more clearly than the tens of millions of Americans having to wait a month or more to receive COVID relief payments by paper check.

My second observation is that we are entering a new era when things of value, like contracts, stock certificates, and titles of ownership, will be stored, managed, and moved around instantaneously from person to person. They will move without central validators, but through collaborative cryptography, tokenization, shared ledgers, and a network of computational algorithms. It will make sending money as easy and cost-free as sending a text message.

My third observation is by acting now, we can harness this wave of innovation for greater financial inclusion, capital and operational efficiency, and economic competitiveness for generations to come.

The Digital Dollar Project is a not-for-profit effort to encourage public discussion on potential advantages of a U.S. central bank digital currency, or CBDC, as it is known. The project's recent white paper proposes a new additional form of money, a tokenized digital bearer instrument. It would have the same legal status as the dollars in one's purse but on a mobile device. And it would operate alongside existing forms of money, distributed through the existing two-tiered banking system, and potentially recorded by distributed ledger technology. This type of CBDC is about the core financial architecture of the dollar itself.

Today most of the world's tradable commodities, benchmarks, and contracts, are priced at America's deep and liquid commodity futures markets overseen by the CFTC. Those market prices are

set and accounted for in the U.S. dollar, and this dynamic is one of the important pillars of the dollar's reserve currency status. Tomorrow those tradable commodities and contracts will be digitized, tokenized, and coupled with smart contracts. The question is whether the digital commodities and contracts of the future will still be priced and accounted for in the U.S. dollar if the dollar remains an analog instrument. Or will they be priced and accounted for in some other currency that is similarly digitized, tokenized, and programmable?

We must face this question today. It would be foolish to take the dollar's predominant global status for granted. We must future-proof the dollar for a digital tomorrow. Doing so will spark creative new industries, jobs, and economic growth. But it is an enormous undertaking. It must be done carefully, thoughtfully, and deliberately. Something that is worthy of the dollar's global importance will take time to get right, but now is the time to get started.

The recent launch of SpaceX reminds us that America explored outer space and the lunar surface through a series of pilot programs. They were known as Mercury, Gemini, and Apollo. So, too, should the U.S. explore a digital dollar in a series of well-conceived pilot programs.

Today a team of fine researchers of the Federal Reserve is already thinking about a U.S. CBDC. The next step should be a series of pilot programs driven by the Fed and the there that draw upon the innovativeness of the private sector to test various designs, technologies, and protocols.

Throughout modern history, the U.S. has been a leader in innovation. Whether launching the space program or building the Internet, it incorporated America's core values of the rule of law, privacy rights, freedom of speech, individual liberty, and free enterprise. The world today is asking what role America will play in the future of money. The choice is either we take a leadership role or we accept that the values of others will be enshrined in this new technology. Let us choose to lead, and in so doing let us enhance democratic values, increase financial inclusion, and future-proof the dollar for generations to come.

Thank you.

Chairman COTTON. Thank you.

Mr. Morrison.

STATEMENT OF TIM MORRISON, SENIOR FELLOW, HUDSON INSTITUTE

Mr. MORRISON. Chairman Cotton, Ranking Member Cortez Masto, it is not too much to say that the United States and the Chinese Communist Party are well into the great power competition of this and the next generation. To understand the stakes, we need look no further than what the General Secretary of the Chinese Communist Party, Xi Jinping, pledged to the party in January 2013, shortly after taking power, and I quote: "Capitalism is bound to die out and socialism is bound to win. This is an inevitable trend in social and historical development." He added his assistance to the party of, and I quote, "the eventual demise of capitalism and the ultimate victory of socialism."

This is not a promise of peaceful coexistence between competing world views. General Secretary Xi promises an existential fight, one he intends to win.

Attached to my statement I have included what we used to call the "wheel of death" when I served in Government. It shows how the CCP leverages what FBI Director Wray calls its "whole of society" approach to steal its way to economic development and military modernization. I urge the Members of this panel, the staffs, and everyone watching to familiarize themselves with this unclassified U.S. Government product. Do not assume you are not involved in the competition with the Chinese Communist Party

In my prepared remarks, I recommend to you three specific areas of focus to enhance U.S. economic strength to win the competition with the Chinese Communist Party, which I will briefly summarize for you.

First, trade. Today the U.S., Mexico, and Canada comprise one of the freest, mostly deeply integrated trade blocs on Earth. It serves 478 million people without economic output of approximately $24 trillion per year. Now, imagine if a newly sovereign United Kingdom, with its 66 million people and nearly $3 trillion in gross domestic product, joined USMCA. What about Japan's $5.1 trillion in GDP and 126 million citizens? Australia, South Korea, New Zealand together represent $3.7 trillion in gross domestic product and 81 million people. They could be brought in too.

At a combined economic output of nearly $36 trillion and 751 million citizens, a USMCA joined by the remaining Five Eyes, plus Japan and South Korea, could be the freest and most productive trade bloc on Earth, and it would be based on Western values with the rule of law. The choice between access to CCP's socialist marketplace and such a free trade bloc is really no choice at all.

Second, leveraging U.S. foreign assistance and investment. The Chinese Communist Party really does not hide its plans. It certainly has not tried to hide its Made in China 2025 plan. In essence, the CCP has destroyed the free market in its prioritized areas. We need to strengthen the free trade bloc, as I outlined above, and implement a strategic approach that can level the playing field to defeat China Incorporated. And we have tools. We have lots and lots of tools.

For example—and this is not an exhaustive list—the Export-Import Bank, the Development Finance Corporation, ID, the Millennium Challenge Corporation, and many, many others. In essence, the United States already has what amounts to a $200 billion sovereign wealth fund. What is missing is a clear strategy and clear lines of authority to harness it.

Who in the U.S. Government has the responsibility to make sure that the CCP does not acquire advanced aerospace technology in Ukraine, a key port in Portugal or Israel, or some of the world's largest rare earth deposits in Greenland? There must between clear direction given by the President for how he expects U.S. foreign aid to be utilized in the strategic competition with the CCP.

Last, leveraging export controls. Export controls have historically been a key tool the U.S. uses to prevent the spread of military sensitive, and especially proliferation sensitive, technologies. They can also be used to advance U.S. values, as the Commerce Department

proved yet again this past Monday with the third tranche of Entity List designations related to the CCP's digitized concentration camps. But the United States may also reach a point with export controls where it creates an incentive to off-shore technology and production to put activity outside the reach of our export controls and other tools.

Secretary Ross should be commended for his 100 percent commitment to the China competition. That said, it is time for additional agencies with their authorities to come to the table.

Additionally, policymakers should consider whether it continues to make sense to split responsibility for the administration of export controls between the Department of Commerce and the Department of State. Such separation adds complexity for exporters and creates gaps through which our adversaries can seek to acquire our technology.

Mr. Chairman, Ranking Member, Members of the Subcommittee, when confronted the last strategic great power rivalry, we managed to make this a bipartisan fight. Teamed up were national security hawks and human rights doves, Wall Street and labor, churches and intellectuals. So must it be this time around as well.

Thank you.

Chairman COTTON. Thank you.

Dr. Cook.

STATEMENT OF LISA D. COOK, PROFESSOR OF ECONOMICS AND INTERNATIONAL RELATIONS, MICHIGAN STATE UNIVERSITY

Ms. COOK. Chairman Cotton, Ranking Member Cortez Masto, and Members of the Subcommittee on Economic Policy, thank you for the opportunity to speak to you today on "U.S.–China: Winning the Economic Competition".

At least three factors currently make or could make the innovation economy in the United States competitive domestically and internationally.

First, by several measures the innovation workforce generates positive spillover for the entire economy and better pay and job security for those in the innovation economy. The innovation economy comprises 7 to 25 million workers. These innovation workers earn substantially more than the median income for all workers. The median innovation worker earned over $85,000 per year compared to nearly $38,000 for other workers. Innovation economy jobs are also growing faster than in other sectors, and unemployment rates are lower. During and following the Great Recession, the U.S. workforce contracted, while the innovation workforce was less affected by the overall economic contraction.

Despite the popular conception of the innovation economy, one does not need a Ph.D. in engineering to participate in the innovation economy. For example, digital tools are being developed and refined to augment traditional contact tracing. This includes case management, proximity tracing, and exposure notification. In some States, as little education as a high school diploma is required, and online training is both free and available. In general, if workers are able, getting additional training is desirable during periods of weak

labor markets such that skills are not lost or are enhanced, something we observed during the Great Recession.

Second, another feature that makes the U.S. competitive internationally is the protection of intellectual property rights. This is a feature of the American innovation system that is the envy of other countries and is used by firms that plan to sell their products and processes internationally. My research shows that firms in some emerging markets like China decided to do what Soviet inventors did during the cold war and take advantage of the U.S. patent system to protect their intellectual property. Chinese interests in protection of intellectual property rights has been increasing over several years. How do we know this? It can be measured in the number of U.S. patents obtained by inventors who are Chinese residents, and the share——[Loss of signal.]

Chairman COTTON. We are apparently having connectivity issues with Dr. Cook, so for the moment, why don't we move to Mr. Rasser. We will work on Dr. Cook's connection and hopefully have the conclusion of her opening statement once she is back online.

Mr. Rasser.

STATEMENT OF MARTIJN RASSER, SENIOR FELLOW, TECHNOLOGY AND NATIONAL SECURITY PROGRAM, CENTER FOR A NEW AMERICAN SECURITY

Mr. RASSER. Thank you. Chairman Cotton, Ranking Member Cortez Masto, distinguished Members of the Subcommittee, thank you for the opportunity to testify today on how to win the economic competition with China.

This contest of economic power is rooted in technological advances. U.S. economic security is entrenched in American technological leadership. Today that leadership is at risk. Preserving it requires renewed investments in R&D and in human capital. It means addressing illicit tech transfer which costs the U.S. economy hundreds of billions of dollars. The United States must also protect its competitiveness by controlling exports and securing supply chains.

While the United States can do a lot on its own, it can do much more with its unmatched network of allies. The stakes are high: long-term economic security, technological competitiveness, critical infrastructure integrity. A multinational approach to technology policy should be a cornerstone of the U.S. strategy to outcompete China.

Working with allies, the United States can develop and execute a full strategy to build a technology future where the most innovative and dynamic companies succeed, not those swaddled by mercantilist industrial policies, a future that promotes and protects democratic norms and principles, not one that erodes our freedoms or threatens our values.

So what would this look like? Let me touch on two examples of fundamental importance to the economic competition with China: 5G and semiconductors. 5G networks will be essential to and inseparable from all we do. 5G will enable a transformation of global infrastructure. Getting 5G right is all the more urgent. We all know the risks while they pose this to U.S. national security and that of its allies.

The United States has a chance to introduce a paradigm shift in the communications industry. Wireless infrastructure built on a modular architecture with open interfaces, often referred to as "OpenRAN." A modular architecture allows an operator to choose multiple vendors for a range of offerings. No more being locked in with a single, large, integrated vendor. Open interfaces, which means equipment from any vendor working with that of another, make that possible.

This new industry goes to the heart of concerns over untrusted vendors such as Huawei. The upsides are big: better security, robust supply chains, cost savings, and healthy competition. All this blunts Beijing's industrial policies. The United States cannot bring about this shift on its own. It should join forces with allies in Europe and Asia on joint R&D and promoting OpenRAN deployments.

Preserving America's edge in semiconductors needs a similar approach. Semiconductors are the backbone of modern military and economic power. The United States has a major global lead in semiconductor design. China looks to challenge that position. To safeguards its advantage, the United States should pursue a three-part strategy.

One, place multilateral export controls on semiconductor manufacturing equipment. Beijing wants to position itself as a semiconductor powerhouse. To build its own foundries, however, China is dependent on foreign machines. This equipment is made by companies in just a handful of countries: the United States, Japan, the Netherlands. Together they account for 90 percent of global market share. This is huge leverage. Working together to control exports to China protects a key advantage.

Two, secure semiconductor supply chains. A new international consortium comprised of tech-leading democracies could pull resources to build new foundries and shift production out of China. Now you have greater geographic diversity and you offset lost revenue from export controls with new production lines.

Three, create the next generation of microelectronics. This means investing in R&D for breakthroughs, new materials, and designs. Here also, working with allies is the smart play. Collaboration options range from personnel exchanges to setting up joint R&D centers. Congress can promote these partnerships by enhancing visa and work permit regimes, providing grants and loans, and organizing multinational innovation prize competitions.

U.S. technological leadership is at the core of the economic competition with China. The United States needs a national strategy for technology with allied collaboration as a key feature. Together, the world's leading tech democracies can build and maintain an innovative global economy that promotes and protects democratic norms and values.

I look forward to taking your questions. Thank you.

Chairman COTTON. Thank you, Mr. Rasser.

Dr. Cook, we regret the connection difficulties. Please complete your opening statement.

Ms. COOK. Thank you, Senator Cotton.

Between 1963 and the year 2000, Chinese residents were granted 917 patents from the U.S. Patent Office. That ranked it number 30 out of all the other foreign countries. By 2019, they were granted

22,294 patents, 24 times the period 1963 to 2000, and they ranked number 3 behind Japan and South Korea and represented 10.9 percent of patents issued to foreign residents by 2019.

It is clear that the U.S. patent system is offering something the Government of China will not or cannot offer its inventors and entrepreneurs: determination of originality, or first to patent, and defense of intellectual property, and, by extension, the ability to compete abroad, to encourage innovation, and, therefore, to promote long-term economic growth.

A third factor that could make the U.S. system of innovation competitive internationally is more diversity and inclusion at every stage of the innovation process. My coauthor and I calculate that, between 1970 and 2006, patent output for all U.S. inventors is 235 patents per million; for women, it is 40 patents per million; and for African Americans it is only 6 patents per million. Cook and Yang find that U.S. GDP per capita would be 0.6 percent to 4.4 percent higher if there were more African Americans and women included at each stage of the innovation process. I propose a number of policy interventions which might broaden participation in the innovation economy. Among these are increasing the participation of women and minoritized groups in STEM education and in the SBA's SBIR and STTR programs and addressing racial and gender workplace climate issues at tech firms and other institutions where invention and innovation occur.

In addition, to broaden participation in patenting and innovation, accurate demographic data related to patenting must be available. The SUCCESS Act, which this body passed in 2018, and the IDEA Act, which is currently being considered by this body, are based on my previous research and create the foundation for careful collection of and reporting on such data. I urge passage of the IDEA Act in order to measure and encourage progress in patenting, innovation, competitiveness, growth, and higher living standards in the United States and for all Americans.

Thank you.

Chairman COTTON. Thank you, Dr. Cook. Thank you to all of our witnesses.

We will now move to the first round of questions. Out of deference and gratitude to the Members who showed up for this hearing, almost all of the Subcommittee, we will keep the first round to 5 minutes. For those of you who have more questions, we will have subsequent rounds in which timing will be more flexible. I will begin, and I will lead by example.

The coronavirus pandemic has exposed the extent of our dependency on China for critical goods. Earlier this year, the Chinese Communist Party imposed export restrictions on personal protective equipment produced in China that is so important for our doctors, our nurses, our law enforcement officers, and other frontline workers.

Xi Jinping and the party maintain control over other segments of supply chains for personal protective equipment, life-saving drugs, rare earth elements, microelectronics, to name just a few. It is an economic and national security imperative that we end this dependence.

I want to ask Professor Mead first, can you please discuss any historical parallels between our present economic and supply chain entanglement with China and what we might draw from such historical parallels to past great power competitions?

Mr. MEAD. Senator, thank you. If we look back to, say, the 1930s and 1940s when the U.S. was facing industrialized opponents in Nazi Germany, Fascist Italy, and Imperial Japan, we can see that in these cases there actually were ways in which U.S. investments in U.S. products were supporting our opponents. There are allegations that Ford factories were still producing military equipment for Germany after the war began. A lot of Japanese rearmament and military operations dependent on scrap metal and energy exports from the United States.

So we have definitely seen cases in the past where an economic entanglement may be originating in time of peace, then in time of war or time of great tension proved to be problematic.

The Soviet Union was less of an example of this because the Soviet Union was not entangled in the supply chains of the Western world the way China has become. I think our problem here is that we have assumed that trade was simply an economic question with China. It seems to me that is not the case. It is political, it is security-related, and we need to reexamine the relationship with that in mind.

Chairman COTTON. In addition to strategic reasons for pulling up supply chains, there are also compelling moral reasons. The State Department just issued a business advisory that factories in Xinjiang and elsewhere in China are at risk of using slave labor. The Chinese Communist Party is known to use slave labor to manufacture goods.

Mr. Mead, do you have any thoughts on how we can convince or maybe compel U.S. business leaders to move those supply chains out of China not only for our strategic calculations but also for these moral considerations?

Mr. MEAD. Well, you are right. The moral issues are quite serious, and the evidence that is coming to light now about both the extent of the repression of minorities in China and the tactics being used really do require substantial response.

I would say one thing that we should do is look at some of the examples that we have seen from the World War II era, you know, where Japanese companies and German companies have had to pay compensation for slave labor. I think we should make sure that there is—you know, we should construct a framework so that companies that are using slave labor cannot get away with it and have to pay compensation and restitution, and that there is real liability to that. What that would do is it would ensure that corporations would police their own supply lines to a much greater extent, and this I think is something that we need to do.

Additionally, identifying particular factories in China or industries where this kind of labor or these tactics are a greater concern could also be quite beneficial and important, and that is something the Government can do.

Chairman COTTON. Thank you for that answer. I could not agree more than neither multinational corporations nor the Chinese Communist Party should be benefiting from slave labor.

I have more questions on this topic, but to honor our 5-minute rule, I am going to stop now and turn the questioning over to Senator Cortez Masto.

Senator CORTEZ MASTO. Thank you. So far this has been just an incredible conversation. But let me maybe just start—there is so much to it. Let me start with emerging technologies because—and, Mr. Rasser, let me start with you because I absolutely agree that 5G is a game changer, and whichever country has the ability to take the lead in this space is just going to benefit tremendously in the next century.

Let me ask you, give me your thoughts on what we should be doing to develop 5G. There has been a conversation amongst us, and Senator Cruz and I believe that when we are looking at developing 5G, it should be a public–private partnership, and the private sector should be involved. There has been discussion that the Government should take literally control over the growth of 5G in this country.

Talk to me about not only best practice and how we should approach this, but, two, if we do not approach this in the future, who is our biggest competitor in this space? And when would they overcome us in addressing and taking on the lead when it comes to 5G?

Mr. RASSER. Thank you, Senator. As you mentioned, the 5G question is critical. A lot of the options that are being discussed now, such as building a U.S. national champion or perhaps taking an equity stake in a company like Nokia or Ericsson, I see that more as just nibbling at the edges of the problem, because what we are still doing then is perpetuating a very inefficient industry. Right now we are facing an oligopoly dominated by four companies, and that still plays into Huawei's game, where Chinese industrial policies can still create an unlevel playing field, which makes it very difficult and very expensive for any U.S.-backed company to compete.

That is why I am advocating for a whole new approach, which is really promoting open architecture, OpenRAN, as the way forward. This creates a much more competitive industry and one where primarily U.S. companies are already very strong. And by creating new entrants into the market, you diversify the supply chains; you create healthy competition, and particularly this is an area where Huawei in particular is not very well placed to compete. The barriers to entry for software are quite low, which will encourage a lot of new companies to come in. And Huawei, as we know, is particularly bad at software development, so the whole compelling reason that Huawei presents now for being the go-to source for 5G equipment goes away.

But, again, I do want to emphasize that in order to promote this shift in the industry, we do have to work with allies and partners on this shift in the industry. We do have to work with allies and partners on this because so much of the 5G industry is focused in Europe and Asia right now. We have world-class companies here in the United States, such as Cisco and Qualcomm, for example, but it will take a collective effort to really promote that effort.

Senator CORTEZ MASTO. Thank you. So let me open this up to the panel as well, because I know—we have talked about this, and this is my concern. We see how China has literally subsidized State-

owned—subsidized a lot of what we see, Belt and Road Initiative, and so much that is happening. And to the extent that we invest in our research and development here in the United States, there is so much more that needs to be done.

But let me ask you this: How are our global and regional development organizations, including the United Nations, the World Bank, the Asian Development Bank, and AIIB, financing and promoting China's one belt, one road goals? And in what ways, if any, do such activities support or undermine our interests? I will open it up to the panel. Does anybody have any thoughts around that, those concerns?

Mr. RASSER. I will jump in real quick. It is pretty evident how Beijing has taken advantage of their entry into the international system that the United States built after the war. I think it is time for fresh approaches to international organizations such as creating a technology alliance, for example, amongst the world's tech-leading democracies that can, with their combined purchasing power, help rising countries, middle powers, build secure digital infrastructure, for example, by providing new technological alternatives and providing grants and loans in order to help them build this, provide viable alternatives to cheap Chinese technology.

Senator CORTEZ MASTO. Thank you. I notice my time is up. I will throw it back to the Chairman. Thank you.

Chairman COTTON. Thank you, Senator Cortez Masto. Thank you, Mr. Rasser, for a very informative answer.

We will turn now to Senator Tillis.

Senator TILLIS. Thank you, Mr. Chairman. I have got to do an AV fix here real quick. Sorry. I was watching you on TV for the opening comments, and now I will turn it off.

Thank you for this important Committee, and I was particularly interested in the opening testimony. Mr. Rasser, I want to maybe pick up where you left off in response to the Ranking Member's question. I know that we are trying to figure out what that fresh approach looks like, and I think a part of this is to what extent the other Nations are going to step up. I know recently China has mentioned possible incentives to their manufacturing base to onshore some of the manufacturing that is in China. What should that look like both from an international coordinated perspective and what we are doing? I am in the camp of trying to provide a basis for the numbers to work in the United States, to bring back some of the jobs, but I think it is equally important that we look at relationships with our allies, more reliable Nations, to potentially move some of the links in the global supply chain out of China.

At the same time, we have to pay attention to the complexity of the supply chains and the fact that some of the inputs may themselves come from China.

So how can we work on that in a coordinated fashion?

Mr. RASSER. Thank you, Senator. Well, one of the ways is what Mr. Morrison mentioned. I think it is a great idea to look at an expanded democratic trading bloc, for example. But, in general, there is a lot of interest that you are seeing now. There is, for instance, what the Quad is doing now, for the first time doing military maneuvers in the Indo-Pacific. There is great interest and greater cooperation on that front in India just because of China's reach and

recent belligerence, but also in Europe, which before has been somewhat fractious. The pandemic crisis presents the United States and its allies a real opportunity to bring about substantial change. Senator Cotton mentioned the extensive brittleness of our supply chains. All these countries have a common interest in securing supply chains for critical inputs into our economies. So because of the complexity of those supply chains, I really see the only feasible way to do this in a time- and cost-effective manner is to collaborate on figuring out how to best restructure these supply chains.

Part of that will be bringing capacity back home, but we also need geographic diversity in the supply chain so that we can have a search capacity if need be, or in the event of another major crisis where part of the supply chain is knocked out that we can restart production and manufacturing in other areas.

Based on discussions I have been having with colleagues around the world around the concept of the technology alliance, one of the key areas of common interest is exactly what you said, to rebuild supply chains in a way that they are secure, robust, and resilient.

So the appetite is there. The devil is in the details, and that is something I am working on in a project right now, and I will be putting forward recommendations on that front in coming weeks on how to get that dialogue started and what specific steps to take.

Senator TILLIS. Well, it seems to me—and I want to get on to a question of Ms. Cook, but, you know, it seems to me if we dust off the TPP and we advance discussions with two trade agreements with Asia Pacific countries predominantly and Europe, those should be a stream in there that really tries to focus on this onshoring and the kinds of agreements that you have talked about particularly around technology. I hope that we can actually get those back on the books, if not TPP in its original form, then a series of bilateral relationships with a number of jurisdictions in Asia Pacific that could also potentially be hosts for some of the links in the supply chain.

Ms. Cook, in my remaining time, I love the way the Chairman has managed the time. I may stay on for another round. I just wanted to mention to you and to everyone here, I think intellectual property theft, if we do not have that concomitant with trying to accelerate R&D and more innovation in this country and with our allies, we could be aiding and abetting a process where China steals our intellectual property. I have monitored this closely as the Chairman of the Intellectual Property Subcommittee on Judiciary, and we have got to fix that leakage for innovation that allows them to catch up pretty quickly. It is very clear that China constantly steals our technology, puts something on the market that looks substantially similar.

Ms. Cook, I am going to follow up with you on your points on diversity and innovation. I have held a Subcommittee hearing on that subject, and I am going to be very interested in getting your feedback. I think it is a priority for us to accelerate innovation.

Thank you, Mr. Chair.

Chairman COTTON. Ms. Cook, would you like to answer that?

Ms. COOK. Did you want me to respond, Senator Cotton?

Chairman COTTON. Go ahead.

Ms. COOK. OK. I was just going to say that I think you are exactly right that China is taking advantage of our public good, the U.S. patent system. This is a 35-percent increase, a 30-fold increase almost, in the number of patents they have gotten in the U.S. system. And on the other side, they are using our technology without compensating the inventors who have been investing in this kind of technology, whatever the technology is. So I completely agree with you wholeheartedly. We have got to stay competitive and get as many people involved in innovation as we can.

Senator TILLIS. Thank you.

Chairman COTTON. Thank you.

We will turn now to Senator Menendez.

Senator MENENDEZ. Thank you, Mr. Chairman.

While this hearing is looking at our economic competition with China, I am working with my colleagues on a bill to create a comprehensive China strategy, including trade and economic issues and investments here at home, which we plan to introduce soon. But given the shortcomings of President Trump's "all bluster and tactics, no strategy" approach to China, a comprehensive and integrated approach I think is very much needed.

At the start of his trade war with China, the President told Americans that if they were willing to accept some short-term pain, higher prices for manufacturing inputs and consumer goods, the long-term tradeoff would be worth it. China would stop its predatory behavior, and we could finally have a level playing field.

But after the Phase 1 part of the deal, the Administration chose to keep the tariffs in place because, by the Administration's own account, China still has not dismantled overcapacity, China had not stopped stealing American intellectual property, and China had not stopped subsidizing its own State-owned industries.

Ambassador Bolton recently wrote that, in his negotiations with President Xi, President Trump "stressed the importance of farmers and increased Chinese purchases of soybeans and wheat in the electoral outcome. In other words, from my perspective, the President sold out American manufacturers, innovators, and workers for a literal hill of beans. And it is even unclear now whether China is buying the U.S. agricultural products they said they would.

Then last week the President, as he does so many times, said the quiet part out loud. He said that he is no longer interested in talking to China about trade. He admitted what many Americans already knew, that the Administration never really had an intention of solving our trade problems with China. The President got what he wanted: a shallow promise from Communist China to help his base while America got saddled with more economic pain and a corrupt and ineffective trade policy.

So my question to this panel: Does anyone on the panel believe that the Phase 1 deal requires China to end its massive State subsidies?

[No response.]

Senator MENENDEZ. Do I take your silence as saying no, you do not believe so?

Mr. MEAD. Senator, if I could briefly speak, it is a good question. I think one response to that would be that China has built its entire economic system on a foundation of subsidies, control, export

promotion using dumping, and other things. It is not going to make that change lightly. It is a difficult change. It is something that is likely to be a multiyear, multi-Administration task. So my own sense would be we have a long way to go, and it is going to take a lot of deep thought and a bipartisan effort to really make those changes happen.

Senator MENENDEZ. Does the Phase 1 deal do anything—again, I will pose it to the panel—to reduce Chinese overcapacity in steel and aluminum?

[No response.]

Senator MENENDEZ. I assume the silence means it does not. Does the Phase 1 deal require China to end cyberattacks on U.S. companies or even the U.S. Government? I think the answer to all of this is pretty clear. No.

Mr. Giancarlo, I want to ask you about another flaw in the Phase 1 deal. We know that China committed to buy a total of $32 billion worth of agricultural products by the end of 2021, but we do not know the specific breakdown of the purchase commitments from each individual product like rice, wheat, or soybeans.

Now, when the deal was announced, USTR Ambassador Lighthizer said that those specific targets would not be made public in order to prevent market manipulation. But here is the problem: The Chinese Government does know those individual targets, and if they wanted to, they could use that information to distort or even profit off movements in our agricultural markets.

To your knowledge, does the Phase 1 deal include anything to prevent China from using this nonpublic information to manipulate U.S. commodity markets?

Mr. GIANCARLO. I do not have information on that specifically, Senator. During my tenure at the CFTC, though, we were not aware of overt efforts to manipulate markets by China.

Senator MENENDEZ. Would you recommend that the Administration share the full details of the Phase 1 deal with the CFTC and SEC so those agencies can police potential market manipulation that could come from the China Phase 1 deal?

Mr. GIANCARLO. Again, during my time there was good information sharing, but I cannot speak to whether that specific information was passed——

Senator MENENDEZ. Yeah, my question was: Would you suggest in the absence—let us assume there is not any sharing. Would you suggest that they do that?

Mr. GIANCARLO. Yes, I think that information sharing amongst agencies is critically important so each individual agency can fulfill the mission it has been assigned to do.

Senator MENENDEZ. Thank you, Mr. Chairman. I have other questions. I will wait for the second round.

Chairman COTTON. Thank you.

Senator Kennedy.

Senator KENNEDY. Thank you, Mr. Chairman, and I want to thank all the members of our panel today.

I would like to offer up a proposition for each of our panelists to react to. I will take about a minute to do so, if each of you would, please, and here is the proposition. Our goal should be a China that has a vested interest in a stable world order. In order to

achieve that, China must be made to stop its predatory behavior, not just in terms of its economics but its predatory behavior socially and its predatory behavior militarily.

The final tenet of the proposition that I would like your reaction to is that that will be impossible to achieve by America alone, that we have to have a coalition of like-minded countries—Europe, Canada, Australia, New Zealand, South Korea, Japan, as much support as we can get in Africa and South America.

Do you agree with that proposition or is that proposition wrong?

Mr. GIANCARLO. Senator Kennedy, maybe I can lead off on this. I think ultimately the future is going to be determined in a contest of values. The values of a liberal world order, of openness, freedom of speech, rights of privacy, free entrepreneurship is going to be in conflict with the closed-society approach, a society of central control, central surveillance. And it is going to be that battle of ideas that I think is going to determine what the future is going to look like. And what we need to do, I fully agree, is align with other value systems, the other economies that share those value systems, and make sure that those values are on offer to the developing part of the world for them to choose which course they want to take and what the future will look like.

So I agree with you wholeheartedly that we need to ally ourselves with others that share these values in the global economy and make sure that the future order of events reflects those values and not the alternative that China is offering of closed systems, State surveillance, State control, lack of privacy, lack of freedom of speech.

Senator KENNEDY. Anyone else?

Mr. MEAD. Senator Kennedy, if I may, I agree with the proposition insofar as China accepts that we are not going anywhere, and I do not believe they have accepted that yet. As I mentioned in my opening, General Secretary Xi believes that history dictates that socialism will prevail over capitalism. I believe China absolutely wants a stable world, but it is a world where socialism has defeated capitalism. They need to understand we are not going anywhere.

And so I think the extent to which we can partner with like-minded democracies—Korea, the Five Eyes, Japan—will strengthen our bid for survival. But General Secretary Xi is telling his people, who are very proud of their 5,000-year-old civilization, that capitalism will be defeated. So the first thing we have to do is prove to them that we are not going anywhere.

Senator KENNEDY. OK. Thank you. Who else?

Mr. RASSER. Yes, Senator, I agree with what you stated, and I concur with the comments of my fellow panelists. China is a revisionist power. It does not want to be a part of the international system that the United States and its allies created. So, yes, a united front is absolutely necessary to make sure China understands that what it seeks is not realistic and not feasible. Thank you.

Senator KENNEDY. Do you think we are doing enough to achieve that united front?

Mr. RASSER. Not yet, Senator, but there is a lot of good movement underway in order to make sure that that is happening. So we are seeing a lot of good initiatives popping up around the world.

Now the task at hand is to solidify all those individual efforts into a more coherent strategy where we can all move forward together.

Senator KENNEDY. Cut me off, Mr. Chairman, when I am over time. I cannot see the clock.

[Laughter.]

Ms. COOK. I can just jump in, if I might.

Chairman COTTON. Go ahead, please.

Ms. COOK. Just for a moment. In the narrower realm of intellectual property rights, you are exactly right. On the one hand, China would like a system that protects its own firms' intellectual property rights, and that is why the U.S. system is being taken advantage of extensively.

On the other hand, when I was in China, I was being told that it is a developing country so, in fact, it deserves to have property rights abrogated, that it does not have to follow these. And I pointed out to them that they have been protecting property rights for millennia. I looked at the terra cotta soldiers and reminded them that even there you could see intellectual property rights being protected when we do not know who the inventor of Venus de Milo is, our oldest object in the Western world. So I had to point out to them that they have been interested in this for a very long time. They have been interested in it globally, and we have an interest to have allies who work with us to protect intellectual property from whatever firm, whatever inventor, in any part of the world. Thank you.

Senator KENNEDY. Thank you, Mr. Chairman.

Chairman COTTON. Thank you, Senator Kennedy.

Senator Jones.

Senator JONES. Thank you, Mr. Chairman. Thank you for this hearing. Thanks to all our witnesses today.

First, let me kind of align myself with what Senator Kennedy's proposition is. I completely agree with my friend from Louisiana about that. But I will say my one big concern that I have had over the last year-and-a-half or so has been that we seem to be going it alone against China. I think that trade issues and agreements with China are important. They have been a rogue country. But my concern has always been we seem to also be starting trade wars with our friends and allies at the same time, and I thought that was, you know, counterproductive.

Having said that, I would like to also talk a little bit about the markets, and we talk a lot about technology and semiconductors and all of those things. And I appreciate Senator Cotton's work on the semiconductor issue. I was also a part of the bills, and I am so pleased that we will get it in the NDAA.

But closer to home, I want to talk about health care manufacturing. You know, when this pandemic started a few months ago, the images of doctors and nurses who were having to wear garbage bags and makeshift PPE and reuse masks and do those things really struck me that we had a real serious problem with health care manufacturing in this country.

I wrote a letter to our Governor asking that she provide State incentives to try to bring some of that back to Alabama. We used to have a huge textile manufacturing segment in Alabama.

I have introduced a bill, Health Care Equipment in America, that would give some tax incentives to kind of repurpose some existing structures that have been abandoned from businesses or either to startup new ones. And I would like to ask, you know, is that the kind of effort we need? Because I really believe certainly that we can on a bigger scale look at a lot of different things to try to bring jobs back. But health care manufacturing, those masks, the PPE, the ventilators, those kind of things, that is not something that is going away. And, in fact, I think it is something that this country is going to be using in greater and greater numbers, even as this pandemic slides down, hopefully within the next few months.

Dr. Cook, could you address that a little bit about what we need to do to try to bring this kind of manufacturing for issues like these, what would normally be like a little bit lower-paying job than these high-tech jobs, but bring those back to this country? What can we do to ensure that that happens?

Ms. COOK. I think you are exactly right. We have got to diversify the supply chain that we have been caught out, as we are, with respect to health care manufacturing as well as other types of manufacturing, even simple manufacturing. I think that we really need to think more about this. And as you know, since I am sitting in the middle of manufacturing central in Michigan, the infrastructure is still here, and we can still do this if we thought broadly about how that could be done, absolutely. This is a national security priority. It is a national health priority. I agree with you.

Mr. MORRISON. Senator Jones, may I——

Senator JONES. But I will be quick to add that Alabama's going to give Michigan a run for your money on manufacturing, with automobiles and other things.

Mr. Morrison, did you want to say something?

Mr. MORRISON. Yes, sir. I appreciate that. Sorry for interrupting. Your point about the supply chain that we talked about and health care manufacturing in particular is spot-on, and it reminds me, frankly, that we do not actually understand the extent of our supply chain and its compromise to China.

I had a colleague in Government who told us a story when he was talking to the Chinese about 5G, and the Chinese were clearly growing very testy with our success on countering Huawei on 5G. This Chinese diplomat told my colleague in Government that there are 2.5 million Americans with Huawei code, Huawei, on their pacemakers, and he said, "It would be horrible if they could not get an update." That is the extent to which our health care supply chain is compromised. And I think, frankly, we do not actually even understand the full extent of it. We all think about 5G, we think about face masks, but who thinks about who has built the software code for our pacemakers for 2.5 million Americans?

Senator JONES. Well, thank you for that. I appreciate that, especially since my Mom is back home in Alabama with a pacemaker. So if she starts speaking Chinese, I will understand now. And I am not making light of that. I think it is a very, very serious problem.

One thing very quickly as my time expires. State-owned entities, we have got local governments around the country that are purchasing and doing different things in procurement. What are the

tools out there—and I will ask this of anybody real quickly. What are the tools out there to help State and local governments in their procurement understand who they are actually purchasing from and contracting with? And do we need some kind of data base of some type that these folks could access to help them in their procurement decisions? I will just open that up to anybody who might have an answer.

Mr. GIANCARLO. Well, Senator, I might jump in on this. You know, as we think about delivery systems, we need to think about the technology on which they are built. The world is quickly moving to a new technology, distributed ledger technology for global supply chains, and with it will come the opportunity to identify every element along the supply chain from original origin all the way to final delivery and final manufacturing capacity.

Now, as we think about that technology, however, we have to recognize that China is also providing leadership in that area with their new blockchain initiative across their entire country and then out through their distribution systems. So we in the United States also need to make sure that we remain a leader in this technology as well so we can have exactly that verification identification that you are talking to at the final point of purchase.

Senator JONES. Great. Well, thank you.

Thank you, Mr. Chairman. I may have some questions for the record. Thank you.

Chairman COTTON. Thank you.

Senator McSally.

Senator MCSALLY. Thanks, Chairman Cotton, for holding this very important hearing. For those of us who served, Senator Cotton and myself, we have seen China on the rise and the growing national security threat. The economic element of that is really important for us to be addressing today and what we can do—how we got here and what we can do to address this for our own national security, for our public health, and to ensure that China does not replace us. They are trying to replace us and dominate the world. We have seen that. They are doing it in plain sight as a parasite off of us. So I appreciate the thoughtful discussion today about this.

As was already discussed, unlike previous—you know, the cold war of the West against the Soviet Union, we are in a situation where over the last many years we have become economically entangled with China. And as has already been discussed, supply chains for national security elements, our critical minerals, our pharmaceuticals, our PPE, semiconductors somehow in plain sight have been shifted over to China, and we are now in a place where we are reliant on an adversary for these things. And they have already threatened at different times to cut those off.

How do we disentangle ourselves as quickly as possible to ensure that our national security is not at stake as tensions continue to rise so it is protecting American jobs, but also American security? There was a hearing yesterday about coronavirus vaccine development, and companies were asked, yeah, they said they would be making the vaccines in America, but it was not clear whether there were any elements that would be reliant on China, who could use it against us to threaten to cut that off with increased tensions.

So, Mr. Morrison, can you comment on—like this is a very different great power competition and the entanglements are deep and wide, and what do we need to do immediately? What does Congress need to do? And then what does the private sector need to do on their own to, as quickly as possible, disentangle us economically?

Mr. MORRISON. Thank you, Senator. You are exactly right. When I got my last flu shot, which I guess was probably last October, I grabbed the little wrapper that the flu shot came in, and sure enough, "Made in China." So the flu shot itself we do not even produce here anymore. And so can we make sure that the syringes and other basic commodities, the active pharmaceutical ingredients we need, are not under the thumb of the Chinese Communist Party?

Unfortunately, we did not get into this mess overnight since the decision was made to bring China into the World Trade Organization over 20 years ago, and we are not going to get out of it overnight. We need to do a number of things in parallel. We need a new free trade bloc. We need to harness—I referenced we have $200 billion or so between the DFC and the Eximbank that amounts to a sovereign wealth fund. We need to harness that right now. We need to harness the Defense Production Act, harness free trade. We need to map our supply chain, 2.5 million Americans with Huawei source code on their pacemakers. Where else are those kinds of compromises?

But we have a plan. The Chinese are not shy. They use the Made in China 2025 plan. Start with those strategic goals, those State champions, map those supply chains, figure out who our allies are that we can partner with. I do not know about you. I will not lose much sleep with 5G partnerships with Sweden, Finland, or Japan. But I do when it is Huawei or ZTE.

Senator MCSALLY. Yes.

Mr. MORRISON. And so just to not burn all your time, we need to do a lot of things, and we need to do them all at once because we have been digging this hole for over 20 years now, and we need to stop digging as the first triage.

Senator MCSALLY. Great. Thanks. I know other panelists may have something else to say, but I also want to address the—so, you know, first talk about our supply chain for things that we need and how we have outsourced it to our adversary. But, similarly, we have China investing in U.S. companies. We have China bidding for public transportation bids in major American cities. We have China supplying drones to local law enforcement and other entanglements. On the stock market we have double standards is not having the same kind of oversight. So can we talk about the reverse of it, too, and what China is doing that also puts us at risk economically and security-wise and using our rules and taking advantage of them, which is also a place of vulnerability for us? And that is for any of the panelists. Mr. Morrison.

Mr. MORRISON. Congresswoman—I am sorry. Excuse me. Senator, forgive me. I worked with you on HASC. There are any number of things that the Administration is considering. You talked about drones. The President right now is considering an Executive order to prohibit Chinese drones.

Senator MCSALLY. Yes.

Mr. MORRISON. You know, there is a 2013 MOU with China that allows for Chinese companies to benefit from access to our equity markets and not have to comply with basic standards that American, European, and Japanese companies do. That needs to be torn up posthaste.

I think, again, there are any number of things that are actively being considered where Congress and the oversight from this body—from this panel, from this body, and the other body can help to shed light on where Chinese is trying to compromise our freedoms and our transparency, but do not reciprocate in any measure on their own domestic market.

Senator MCSALLY. Great. If any other panelist wants to jump in, I know that the Chairman wants to keep good time here.

Mr. GIANCARLO. Just very quickly, you know, China's whole premise is based upon technological superiority going out into this new century. We need to make sure that our technological capabilities, which have proven themselves over time, can continue to develop. We need leadership at the highest level in many areas. There is some very good work coming out of some of financial regulators here in the U.S., but perhaps greater coordination and some instructions from Congress would be helpful to further our own ability to keep technologically, certainly in the financial technology area.

Senator MCSALLY. Great. Thanks. I am way over my time. I will wait for another round, but thank you, Mr. Chairman.

Chairman COTTON. Thank you, Senator McSally.

I believe that everyone has had a chance to answer questions in the first round. Unless I am mistaken, we will move to the second, and I will start that round by speaking directly to Mr. Giancarlo's opening statement about the digitized dollar. This is a somewhat technical line of questioning, but very important as he outlined in his opening statement. For us, maintaining the dollar's supremacy is not merely an economic matter; it is a critical strategic matter as well. It is what allows us to have such effective sanction regimes around the world, in addition to its other benefits.

So, Mr. Giancarlo, what do you consider to be the critical next step that the U.S. needs to maintain that supremacy in international finance?

Mr. GIANCARLO. You know, throughout history what makes one currency get greater patronage from global market participants is technological capability. During the period of the European exploration of the east coast of North America in the 16th and 17th centuries, there were many currencies in use. There were pounds, there were Dutch guilders, there were French francs. But the currency that was most attractive back then was the dollar, but it was not the U.S. dollar. It was the Spanish dollar. And the reason it was the most attractive was because it was minted with New World silver, which was lighter and, therefore, required less alloy, more consistently pure, but also it was breakable into eight equal pieces, known as "pieces of eight," which made it fractionable. So the point was technologically that dollar was superior than other currencies in use.

As we go into a digital 21st century, we need to think about our dollar and how do we enhance its technological capability in the world. And this is what China is experimenting with today in their own currency, to make it technologically superior by making it digital, tokenizable, fractionalizable, and programmable. This is the new frontier. We are going into a new Internet of Things of value where all things in the world will be digitized, including some of the key commodities that are priced in dollars today. And we have to ask ourselves, as soybeans, as cotton, as copper, as energy products themselves become digitized and programmable, how long can the dollar remain the world's reserve currency if we do not also modernize it itself and make it tokenizable and ultimately programmable? And that is why what we propose is a series of pilot programs to start experimenting with our own dollar to make it fit for purpose, future-proof, you might say, in a digital environment in a digital century. That is what China is doing. That is what central banks around the world are doing. And the United States unfortunately has been a little bit late to this experimentation. But that does not mean we lose this because ultimately the winner is not who is first. The winner is what economy gets their values, free enterprise, freedom of speech, a liberal world order built into their currency. I believe that is what has made the dollar strong for the last 80 years, and as we look at this new century, that is what we need to do to make it strong for the century to come.

Chairman COTTON. You talked about the need for pilot projects at Treasury and the Federal Reserve. What kinds of pilots are you envisioning? And how long do you think they might last?

Mr. GIANCARLO. So there are a lot of elements. The dollar is so important in the global economy. We cannot just overnight fiddle with it and make changes. We have got to do that in the same way we explored space through a series of deliberate pilot programs with each one building on the one before and what did we learn. We need to examine the issue of privacy, which is so important to the cash dollar, to the accounts-based dollar, needs to be equally important to a digital dollar.

We need to look at financial inclusion, which is critically important, and we have communities today that are underserved by the accounts-based system. We need to see how a digital dollar can do a better job of providing on-ramps into financial inclusion for those communities.

We need to look at areas that are underserved by banks and how we can use a digital dollar to serve them. We need to look at wholesale payments, and we need to look at international payments.

There are so many elements of this, but if we get started in a series of well-crafted pilot programs, involving, as we have always done in the United States, the private sector and the public sector working together, we could do discrete programs in, say, one Fed regional area that is focused on rural issues. We can do another one in another area focused on inner-city issues. We can do another program looking at global remittances. There is so much that we need to look at. We could gather that information on that, and we can build something that would be durable and long-lasting.

Chairman COTTON. Thank you, Mr. Giancarlo.

Professor Mead, as someone who wrote a very fine book called *God and Gold,* what are your thoughts on this new frontier in the role of currency and international relations?

Mr. MEAD. Well, I think it has been key to the rise of the American world system that we know now as it was to the British system before us that a strong financial system which is capable of using both Government and private debt in a productive way, which also imposes sort of reasonable limits on spending and inflation, has been a foundation of prosperity and of power for hundreds of years. I do not see that changing. And I think that, you know, even today the need of so many countries to use the U.S. banking system is one of our most effective tools of power.

So we cannot just take an asset like that for granted. We have to assume that as the nature of finance changes, the nature of currencies change, we have to stay at the front edge, the leading edge of that curve of innovation. So I think we do need to be thinking actively about how the dollar can be a fundamental building block for economic activity in this time of the information revolution.

Chairman COTTON. Thank you both.

Senator Cortez Masto.

Senator CORTEZ MASTO. Thank you. Thank you also for this really enlightening, engaging conversation. But let me pull it back to the workforce because I think this is key. And, Dr. Cook, the introduction about the innovation economies that create innovation, jobs that are higher-paying, it will create more opportunities for jobs in the future, you do not need a Ph.D. But you also have done a lot of research in how important it is to diversify that workforce and how social conditions have an impact on that innovation or invention and economic growth. Can you talk a little bit more about that? Why is that diversity important?

Ms. COOK. It is important because we could reap the benefits of higher living standards from having more women and African Americans—so those were the focus of my research, so I am not saying other types of diversity, but I am just saying that that has been my narrow focus. We are losing out on 0.6 percent to 4.4 percent higher GDP per capita by not including more women and minorities and invention and innovation at every stage. So that is the stage of education and training, the stage of actually inventing, working in labs, also in the process of IPOs and being entrepreneurs. We are missing out on all that talent.

An analogy that has often been used in Washington is we are proceeding with one hand behind our backs, and what we have been saying during this entire hearing is that we need to be more competitive. And this is one way to help us to be more competitive, is to bring more people into the workforce, not necessarily everybody with a Ph.D. I talked about people who could do contact tracing with just a high school degree and with online training. So I think that we have to be more focused on making sure that our workforce is more competitive.

Senator CORTEZ MASTO. Thank you. And as part of that workforce and that innovation, having the best and the brightest, does that include international students? And let me open this up to anyone who is interested in this respect. Part of what I believe we are looking to do here is not only create the best and the brightest

in our workforce and give opportunities, but that innovation and that research, if we are going to look to work on a national strategy with our allies, does that mean that we shut the door to international students or we include international students in as part of that research that is necessary for the innovation?

Ms. COOK. I think that is absolutely necessary. I think that my view and my research suggests that we need to augment the free flow of ideas as much as we can and make sure that we are the ones doing it. This is what every country depends on, including China. They depend on us being the technological leader and coming up with these new ideas, coming up with an infinite number of new ideas. So we need to have as much of the free flow of information as we can. So that comes from minimizing workplace climate that is hostile, say, in tech industries, and then making sure that we have people from every sector, whether they are women or other minoritized groups, in the tech industry and in other parts of the innovation economy.

So I think cutting out international students is cutting our arms off in the process of doing this innovation.

Senator CORTEZ MASTO. Thank you. And as part of the workforce, let me also kind of jump to an industry: mining. Nevada is a mining State. We have lithium mining. We started to do a little rare earth mining. I have watched over the years as China, and smartly so, has cornered the market in rare earth mining.

But let me ask the panel in general, this type of mineral is important for our technology, right? Nevada right now has the only lithium mining that is going on in the country. Do you think there is an opportunity for us to start focusing on this type of mining in this country, bringing back this manufacturing, control the supply chain for mining particularly when it comes to rare earth minerals that is important for the technology that we are all talking about? And if we are to do that, how do we develop that strategy?

Mr. RASSER. If I may, Senator, rare earth elements are critical. They are essential components for a lot of our consumer electronics, but more importantly for military systems, but also for electric vehicles, windmills.

Fortunately, the United States has quite plentiful deposits of rare earth elements, but, yeah, to your point, China has cornered the market not just in mining but, in particular, for processing.

Now, there are some good efforts underway in Texas and Colorado, for example, to open up new mines and rebuild processing facilities. But, again, here I think this is an area where partnering with a country like Japan, for example, or Denmark because of their big deposits in Greenland makes a lot of sense. Certain elements like the ones that are in the Greenland deposits, for example, are hard to find outside of China. These are the heavier rare earth elements. So it would make a lot of sense for the United States to partner with Denmark on establishing environmentally sound mining and processing facilities in that part of the world.

But the opportunity here in the United States is just tremendous. It is an area where we should be investing more money. The Department of Defense is doing some, but it is still—there is some legislation in Congress right now that would help push that forward, but more needs to be done on this because China has threat-

ened just last year to cutoff supplies. Beijing has shown that it is willing to ultimately really hit us where it hurts. And if they do cut us off from rare earth elements, it is going to make America's economic recovery postpandemic extremely difficult and also put us at serious military risk as well.

Senator CORTEZ MASTO. Thank you.

Chairman COTTON. Thank you, Senator Cortez Masto.

Senator Menendez.

Senator MENENDEZ. Thank you, Mr. Chairman.

In my view, the best way to make America more competitive against China is not to strike a deal that requires purchases of specific goods. It is to work with our allies that are facing the same threats and, most importantly, to reinvest in the fundamentals that made America the greatest economy in the world. And whether it is on trade, national security issues like Huawei, human rights, we have pretended to confront China, but we have not done anything to actually make us more competitive.

So, Dr. Cook, especially now that we are facing a daunting recession with millions of Americans out of work and the lowest borrowing costs we have seen in decades, how do we best go on the offense and invest in our economy, educational system, infrastructure, and health care so that we can replenish America's resources and the sources of innovation and competitiveness that made us the envy of the world?

Ms. COOK. You said one of them, and sitting at a university I think it is incredibly important that we not only invest in R&D—our R&D budget is one of the lowest in the world as a share of GDP—it is also infrastructure. Our students have gone back to rural areas, to their homes, and we do not have the kind of digital infrastructure that we need. We have been shown to not have the kind of underlying infrastructure that we need to produce this infinite flow of ideas, and this is where we got our competitiveness from. You are exactly right. And we are showing that we are sitting on a very, very shallow foundation. So I think that would be the first strategy.

Senator MENENDEZ. Thank you.

Finally, in response to the COVID–19 outbreak, we have seen how the Chinese Government leans on its relationships with domestic tech firms to track people's whereabouts. Individuals can have their social credit scores impacted by actions they take to help or hurt the fight against COVID. We have also seen how Chinese firms like Alipay and WeChat have used COVID as an excuse to expand surveillance capabilities, better integrate wide-ranging data sets to increase the sophistication of their surveillance and thereby demonstrate their usefulness to the Government.

For example, according to the *New York Times*, visitors to office buildings, shopping malls, and metro transportation are now scanning QR codes using their phones, allowing the Chinese Government to track their movements.

So, Mr. Rasser, how should the U.S. Government and U.S. companies approach this situation where the Chinese Government is using a serious public health issue to potentially expand its censorship and surveillance reach? Should USTR, for example, or the Department of Commerce warn U.S. companies of the potential nega-

tive implications to privacy rights if they help China expand its surveillance? Is there a risk that U.S. companies and China wanting to do the right thing will cooperate, but then inadvertently strengthen China's censorship in the surveillance regimes?

Mr. RASSER. Yes, absolutely, Senator. Part of the strategy should be to educate the American private sector on exactly what it is that the Chinese Government is doing. But we also need to go beyond that and ensure that there is a very robust export control regime focused on end uses, because right now it is still the case that some of the technologies being used in Xinjiang, for example, but also for the broader social credit system, there are American technology components in those devices that are being used to perpetuate that.

And then the third component would be America taking a leading role in shaping the norms for how surveillance technologies are used worldwide, and to your point, this is really critical that we then also work with like-minded countries to make sure that the message is clear that this type of activity by Beijing is unacceptable and that it is also very much unacceptable that Beijing is trying to export not just these technologies but also how those technologies are used to other countries, because that is a direct threat to democracy and democratic institutions around the world, and we have to put an end to that.

Senator MENENDEZ. Thank you very much. Thank you for your insights, all of you.

Chairman COTTON. Thank you, Senator Menendez.

I have just a few follow-up questions. First, in the category of direct foreign investment and the Committee on Foreign Investment in the United States, Mr. Morrison, the U.S. Government recently released a list of Chinese military companies that are operating in the United States. These include the aircraft company AVIC, China Industry Shipbuilding Corporation, Huawei, and China Mobile, among others. Do you believe that we should bar these companies from doing business in the United States?

Mr. MORRISON. Senator, absolutely. These are companies that are State-owned enterprises. They are fronts for the Chinese military. Not only should we bar them from operating in the United States, lobbyists who represent them in Washington should have to explain that. If you are a Chinese military company and you are a lobbyist, should you have to register under FARA and, therefore, record your dealings with the Government on their behalf? If you are a U.S. company and having a joint venture with one of these companies, should you have to explain that to your shareholders as a material risk to their value because you are partnering with the Chinese military? There are, you know, a litany of things that the issuance of that report tees up that I hope the interagency is executing.

Chairman COTTON. I would agree, very much so. Is there any compelling reason to allow Chinese companies to invest in critical U.S. industries more broadly?

Mr. MORRISON. There is, of course, a balance in terms of allowing free access to capital, but where you are looking at the Chinese Communist Party, no one would have thought to allow the Soviet Union and its Sate-owned enterprises to invest in U.S. electric grids or to invest in our information technology. And I think we are

still in the beginning stages of the course correction of the gamble that we made that if China has McDonald's, there will be a peaceful future. That was essentially the bumper sticker behind why we should have PNTR with China in 1999 and 2000. And that is a gamble that I think many of the architects of that whole strategy have now admitted that they were wrong. And so we have to stop the digging and begin to dig out of that mistaken gamble.

Chairman COTTON. So that touches on inbound Chinese investment in the United States, which is covered by the Committee on Foreign Investment in the United States. Outbound U.S. technology is covered through export controls, but we do not monitor outbound U.S. investment into China. So U.S. banks, private equity firms, venture capital firms are free to invest in cutting-edge Chinese technology startups. Do you believe that the U.S. Government should consider outbound investment controls to China as well?

Mr. MORRISON. Senator, when I worked on the Armed Services Committee, I worked on the modernization of the CFIUS law, FIRRMA, and one of the things that Senator Cornyn and Senators like yourself tried to do was give CFIUS authority over joint ventures. One of the problems with the ultimate conclusion of that legislation in the fiscal year 2019 NDAA was that joint ventures would be dealt with through export controls, through controls on emerging and foundational technologies. As you know, because I believe you wrote a letter with Senator Schumer, those export control regulations have still not been issued by the Department of Commerce.

Let me bring it back to your fundamental question. When you are an American company, you do not necessarily have access to information that the U.S. Government has on who your partner in China truly is. With the DOD report, you now have a better idea that, at least for 19 or so companies, these are fronts for the Chinese military.

What if you are not dealing with a company on that list, you are dealing with another company? We know there is no such thing as a private sector in China. We know that Chinese has a national security law where any company or citizen has to answer any edict from the party without any rule of law. And we also know China has a rule on civil–military fusion. You might think you are doing business with a civilian company, but everything you give to that civilian company has to, by force of law, be given over to the military for its access.

So does that mean we have to cutoff all outbound investment? I do not know if that is what we have to do, but we certainly have to figure out how do we share more information with U.S. companies about who is ultimately their business partner and what are the risks of a technology transfer or any other cooperation in China? People make the mistake of mirror imaging, that there are private companies in China as there are in the United States. That is simply not the case.

Chairman COTTON. Thank you, Mr. Morrison.

Senator Cortez Masto, any more questions from you?

Senator CORTEZ MASTO. No, Senator Cotton, other than to say thank you to all the panelists. Thank you so much for the great conversation today.

Chairman COTTON. Yes, I want to reiterate our thanks to the panel for this very valuable hearing. I believe all other Senators have concluded their questions as well. However, you will have the opportunity to submit questions for the record. Those will be due in 1 week, on July 29th, from Senators, and we will ask our witnesses to respond to those as promptly as possible.

Again, thank you all very much for your appearance today. This hearing is adjourned.

[Whereupon, at 11:14 a.m., the hearing was adjourned.]

[Prepared statements, responses to written questions, and additional material supplied for the record follow:]

PREPARED STATEMENT OF CHAIRMAN TOM COTTON

Welcome to today's meeting of the Economic Policy Subcommittee, which is open to questions from all 25 Members of the Banking Committee.

I would like to thank Senator Cortez Masto and her staff and all the Committee staff for helping pull together this hearing.

We have an exceptional roster of witnesses prepared to testify today. I want to introduce them briefly.

First, Professor Walter Russell Mead is the Chace Professor of Foreign Affairs and the Humanities at Bard College and a distinguished fellow at the Hudson Institute. You can also read him now twice a week in the *Wall Street Journal*'s opinions section, where he is the Global View columnist. I certainly do.

The Honorable Chris Giancarlo is the founder of the Digital Dollar Project and is here today to speak about that effort and the importance of an emerging technology known as the "blockchain." He is also the former Chairman of the Commodity Futures Trading Commission.

Mr. Tim Morrison is a senior fellow at the Hudson Institute, where he specializes in Asia-Pacific security. Formerly, he served as Deputy Assistant to the President for National Security under President Trump.

Dr. Lisa Cook is a professor of economics and international relations at Michigan State University. She previously served as Senior Economist at the Council of Economic Advisers under President Obama.

Mr. Martijn Rasser is a senior fellow in the Technology and National Security Program at the Center for a New American Security. He previously served as a senior intelligence officer and analyst at the CIA.

I want to thank you all for testifying. Thanks to our audience today for tuning in to this hearing entitled "U.S.–China: Winning the Economic Competition."

While, of course, we would have all preferred to convene in person, perhaps it is appropriate that we have to hold this hearing due to a virus that first emerged from Wuhan, China—after a cover-up by the Chinese Communist Party.

This should serve as a reminder that the misrule and strategic calculations of the Chinese Communist Party can have profound consequences for us, half a world away. It also serves as a reminder of the high stakes in this strategic competition between the United States and China.

We should not underestimate our opponent in this struggle. China is the most formidable adversary the United States has faced in living memory. Near the height of its power in 1980, the Soviet Union's economy was 40 percent the size of the American economy. In 1943, the combined economies of our enemies Nazi Germany and Imperial Japan were also 40 percent the size of the American economy. Today China's economy is two-thirds the size of our economy. So China is richer than any adversary we have faced.

It is also far more entangled with us economically, as we were reminded in the early days of this pandemic. We rely on China for the manufacture of many important goods, from the medicines in our cupboards to the electronics in our cellphones.

This reflects not only the decline of our industrial capacity and the failure of decades of naive "engagement," but also the Chinese Communist Party's grand ambitions, which Chairman Xi describes as nothing less than the "great rejuvenation of the Chinese Nation."

Beijing is investing hundreds of billions of dollars to develop technologies it believes are key to the future—not just airplanes and automobiles but frontier technologies like semiconductors, artificial intelligence, and quantum computing.

The task we face is to preserve and in some cases rebuild America's position as the technological and economic leader of the world, and to end our compromising dependence on China for essential goods.

The Senate is scheduled to vote today on one such measure: a bipartisan bill I led to strengthen the semiconductor industry. We passed it in an overwhelming majority as an amendment yesterday, and I believe it will pass finally today. But there is much more that is left today, and that is the purpose of this hearing.

Finally, I want to note for the benefit of our witnesses and audience that the Economic Policy Subcommittee majority is preparing a report that addresses this very issue, which will include concrete proposals about how to compete with—and beat—China. Your testimony will help inform our report, which will likely be released later this year.

So thank you again for serving as witnesses. I look forward to your testimony, and I would like to remind all witnesses and Members of a few important technical details for this hearing.

For Members, please make sure you turn on your camera when you are ready and able to speak. If you do not turn on your camera, I will assume that you are away from your desk and not able to speak at that moment.

For Members and our witnesses, please remember to mute yourself when you are not speaking. If there is background noise, it will cause the central camera to change to you even if you are not talking.

Finally, I want to remind everyone that all 25 Members of the Committee are welcome to join and ask questions today, even if they are not Members of our Subcommittee.

Senator Cortez Masto, I turn it over to you.

PREPARED STATEMENT OF SENATOR CATHERINE CORTEZ MASTO

Thank you Chairman Cotton.

Today's hearing gives us an opportunity to discuss how we ensure our economy is strong for all Americans and for future generations.

I appreciate the collaborative relationship we have with your staff in putting this hearing together.

I'm pleased to welcome Doctor Lisa Cook, whose path-breaking economic research has found that it is not enough to create the laws to support innovation. Patents, copyright courts, and Government-funded research and development do not result in greater economic growth and prosperity for ALL if the Government fails to provide the most basic protections to those facing disadvantage.

If the U.S.A. wants to maintain its status as the world's biggest and most dynamic economy, the holder of the world's currency, the leader in international alliances and collaboration and the most liquid and wealth-producing capital markets, we must assess how we structure our Government to ensure we meet the needs of our families and respond to changes in the world.

Let me just focus on my home State for a moment. Nevada has been hit particular hard by the pandemic with an unemployment rate of 15 percent. Our State economy relies on travel, tourism, entertainment and hospitality—all hard hit sectors: more than 430,000 Nevadans have filed for unemployment.

How can we—and the rest of our Nation—rebuild our crumbling infrastructure, provide effective job training to displaced workers, and improve the educational outcomes of our children? How can we invest in our public health infrastructure and collaborate with those of other Nations to prevent future pandemics? How do we recover economically from this pandemic in a way that benefits those hit the hardest, low-income, frontline workers

To best respond to these crises, we must rely on a vibrant and responsive public sector. We need civic institutions to not only battle our urgent health, economic, and racial crises, we need Government at all levels to invest for future economic growth.

In particular, America's economic growth will in large part depend on maintaining our technological edge.

The U.S. has long led in many key technologies, which has helped underpin our economy and helped shape international norms and standards, promoting values such as freedom, innovation, and fairness.

To build a strong future economy, we must invest heavily in a range of key strategic technologies, such as 5G wireless, Artificial Intelligence (AI), and quantum computing.

And we're holding this hearing in part because the U.S. and Chinese economic competition over these technologies—who makes them, who owns them, who benefits from them, who exports them, and who determines the norms and standards users must adhere to—will define much of the century.

Emerging technologies can improve societies, but we must ensure that guardrails govern their use are designed to foster innovation and fairness, and that they protect minorities and the free flow of ideas.

China is attempting to displace the United States as a leader in high-tech sectors, but China does not play by the same rules of the road—it subsidizes State-owned enterprises, restricts market access, and steals U.S. intellectual property.

More, by seeking to become a global leader in these technologies, China is also seeking to shape how they are used around the world by setting the standards.

However, unlike the United States, which ensures international standards are consistent with democratic values, China has used new technologies such as AI to surveil and repress their own people, from the Uyghurs to Hong Kong protesters.

This is why I'm pleased to also welcome Mr. Martijn (MARTIN) Rasser, who is leading pivotal research into the competition between the United States and China in the area of technology.

It is the vitality and creativity of our scientific research communities that will drive American innovation. And to ensure our future competitiveness, we must educate and prepare the workforce for the industries of the future.

We are made stronger by investing in our own people, by investing in a just society, and by working with our allies and friends in a multilateral fashion. To be competitive in the long-term, we must continue to invest in scientific research and development, which is the building block for the next generation of technology.

In Nevada, we know that technology is an economic driver for our State. Our Innovation State Initiative was making progress prior to this pandemic.

I look forward to hearing from our witnesses and I hope that today's discussion will help us progress a discussion of how we can improve the lives of every American and ensure we provide a better future for the next generation.

PREPARED STATEMENT OF WALTER RUSSELL MEAD

JAMES CLARKE CHACE PROFESSOR OF FOREIGN AFFAIRS AND THE HUMANITIES, BARD COLLEGE

JULY 22, 2020

Good afternoon, Mr. Chairman, Ranking Member Cortez Masto, and Members of the Subcommittee:

It is an honor to be invited to testify before this Subcommittee and its distinguished Members. It is a great privilege to join you today to discuss the economic challenges the United States currently faces and will continue to face with regard to China.

Today there is great concern over China's growing strength, its assertive behavior, and its potential to overtake the United States as the preeminent economic power in the world. Rising powers are often the cause of great concern to established powers like the United States. In the 1970s and 1980s, leaders in the United States looked on at Japan's growing economy with worry. The U.S. imposed tariffs on semiconductors and other products that were the focus of dumping allegations. In the run-up to the 1984 presidential election, Walter Mondale asked "What do we want our kids to do? Sweep up around the Japanese computers?" A growing trade deficit with Japan and concerns over the low valuation of the yen amplified worries in Europe and the United States.

Unlike Japan, though, China does not accept the basic characteristics of the international system. More importantly, China does not share the same ambitions as Japan. In the recent past, China appeared to many observers to be a capitalist country operating within the global economic system with the common aspiration of expanding its economy and furthering its development. However, China's political and economic apparatus is controlled by the State's Communist Party. China must be thought of not as a developing Nation working within the global economic system but as a communist country actively hostile to the current global economic system and world order. Because the Chinese Government increasingly deploys the economic and financial tools at its command to undermine and subvert the American-led global system, every economic question about China is also a political one.

China's Regression and the Current Threat

The diagnosis is not in my view that there can be no decent relationship with a China ruled by the CCP. I would say rather that China under Xi Jinping has taken a wrong turn. The CCP has in the past been the instrument of a terrible despotism under Mao, and in the service of Mao's political and economic delusions, China lost several decades on the road to modernization and inflicted horrific suffering on itself.

After Mao's death, the CCP leadership drew back from the brink. The fanatics behind the cruelties and distortions of the Cultural Revolution were removed from power, and a chastened CCP leadership took steps to prevent a return to the personalistic dictatorship of Mao even as it abandoned the madness and folly of his economic vision. Realizing that China needed to move toward a market economy and the institutionalization of power, they enacted a series of visionary reforms that raised living standards throughout the country while increasing the personal freedom of the Chinese people.

Americans viewed this turn toward a more humane and successful approach to governance with respect and sympathy and hoped that continuing development would open the door to further economic and political development. Many Chinese, including senior figures in the CCP, shared this hope.

Unfortunately, in recent years China has taken a different turn. Instead of continuing to evolve away from totalitarianism and personalistic rule, the CCP has re-

gressed. The repression of Tibetans, Uighurs and others recall the atrocities of Mao's time, and the CCP inflicts the kind of degrading and humiliating control of intellectuals and civil society participants that limit China's development and lower its intellectual and cultural standards. Thoughtful voices calling for reform have been forced into silence or marginalized in today's China, but there is an internal opposition to the new hard line that might one day renew the promise of a better future for China's people.

Tempted perhaps by the allure of the power that new surveillance technologies make possible, China's leadership seems ready to sacrifice the cultural and economic development of the Chinese people and of China's neighbors to entrench its own power and privilege. Ren Zhiqiang, a member of the CCP who has been known to criticize the State's censorship, has been missing since mid-March after he published an article that criticized Xi Jinping's leadership and referred to him as a "clown." In the midst of the COVID–19 pandemic, the Cyberspace Administration of China (CAC) has increased its censorship of social media.

It is important to make clear that America's goal in our relationship with China cannot be to block its economic development or to dictate the course of its political development. The rise of China is a great moment in human history and we have no desire—and we have no power—to prevent more than one billion people from standing up.

Nor should American policy be predicated on the destruction of the CCP. While under its present leadership and on its present course, the CCP is a threat to China's development and to world peace, there are healthy elements in the CCP who would like to steer China on a more sustainable course.

Policy Considerations

There are ways the United States can work to prevent a worst case scenario and try to prevent U.S.–China competition from boiling over into an all-consuming contest as difficult, as dangerous and as long as the Cold War, and we should explore them. But at the same time, we cannot delay dealing with the challenges China's behavior currently presents in the hope that American restraint would find an echo in Beijing. Certain changes in Beijing require responses in American policy and both condition and limit the opportunities to engage. There are six areas of concern I would like to highlight for you today.

The first is that the CCP leadership not only seems to view harsh and even brutal crackdowns at home as necessary to its survival; it has also adopted international policies that undermine world peace, corrode the international trading system, limit the opportunities for economic development in many countries, and support harsh Governments and dictators who need outside support to control their own unhappy people.

The CCP leadership envisions Belt and Road as a means to not only offload the excess steel, concrete, and infrastructure that China produces, but also as a means of restructuring the global economic system around China's economic needs. Not only would their success undermine American economic competitiveness, it will also set back the development aspirations of the people in target countries, who will be trapped in a subservient relationship with China.

Belt and Road is an extension of the Xi regime's efforts to return back to the Maoist concept of total penetration of the State. The purpose of China's foreign investments and infrastructure projects is to adjust the norms of the current international order to more closely align with the values of the CCP. As Elizabeth Economy noted in 2018, Xi has stated that "China should be capable of 'constructing international playgrounds'—and 'creating the rules' of the games played on them." Projects in Pakistan include the development of surveillance programs similar to those used in China and ventures to deliver Chinese media to Pakistani citizens. The CCP's goal is to make China indispensable for not just Pakistan's economy, but its security and society too.

In 2018, Beijing established the China International Commercial Court (CICC) as part of the BRI to help resolve commercial disputes related to BRI projects. One can interpret this as an effort on the part of the CCP to safeguard its SOE's involved in BRI projects and force partner countries and foreign firms to adhere to Beijing's trade practices. While the BRI is marketed as a series of international development projects, it is clear that the CCP intends to use increased economic integration to challenge the current norms of the global economic order.

Debt-trap diplomacy furthers China's efforts at drawing other countries into its orbit. Even before the advent of BRI, China carried out a policy of bilateral and opaque lending programs. According to the International Monetary Fund, the share of poor countries' debt held by China increased from 6.2 percent in 2013 to 11.6 percent in 2016. China has lent roughly $1.5 trillion to over 150 countries globally

through loans and trade credits. This makes China the largest creditor in the world. However, it is unclear exactly how much China has lent and at what terms because China does not report on its loans and debtor countries often fail to report the data themselves. The Harvard Business Review completed a years-long analysis of China's lending practices and their data show that China lends at market terms, unlike traditional institutions such as the World Bank that offer countries in need easier terms than they can receive elsewhere. Chinese loans are also frequently backed by collateral. HBR found that the average stock of debt owed to China increased from less than 1 percent of a debtor Nation's GDP to over 15 percent from 2005 to 2017. Twelve countries owe 20 percent or more of their nominal GDP to China. Half of China's loans are unreported.

These lending practices should be of great concern to the United States and its allies. Experts note that some BRI projects are unfeasible; Morgan Stanley predicts that by 2027 BRI expenses could reach $1.3 trillion. Poor countries that have accepted loans from China have already faced the consequences of default. Sri Lanka was unable to repay the loan to construct a port in Hambantota and allowed China to sign a 99-year lease for use of the port in exchange. Across Africa, Nations in debt distress risk forfeiting strategic assets to China due to its lending practices.

The CCP has made inroads into the developed world as well, particularly in Europe. Last year, Italy broke with the G7 to endorse the BRI. Italy faces a projected GDP decline of 9.1 percent this year and is dissatisfied with the relief efforts of the European Commission. It is unlikely that, without a major aid package, Italy will reject future Chinese investment. Chinese firms already have a controlling stake in the Greek port of Piraeus and Italian ports, which are desperate to prevent Greece from taking their traffic, could welcome further Chinese ownership.

China's Belt and Road Initiative and other predatory lending practices violate the standard and fair practices of development that international institutions such as the IMF and World Bank adhere to. While many of the BRI projects may not be completed, the initiative will, and has already, expand China's influence in poor countries as well as its material holdings. The BRI can be seen as part of the Xi regime's strategy to undermine the established global order and replace it with one that is more favorable to the CCP's principles.

One of the great ironies of the post-Cold War era is that China's attempts to maintain State control over its growing economy has created many of the problems that doctrinaire Communists predicted would hasten the downfall of capitalism. Lenin believed that as capitalist countries became wealthier, their domestic economies would become awash with excess capital and production. Banks would chase increasingly precarious investments in factories that could never quite make enough profit to stay solvent, and the resulting economic collapse would pave the way for the revolution to bring true Communism to the industrial world.

The only way to stave off the catastrophe was to find new markets for this extra capital and industrial capacity, which for Lenin was the true motive behind capitalist imperialism. The European powers built empires and extended their reach around the world in search of new projects for their bankers and new markets for their goods, but competition for the remaining virgin territories would become more intense, eventually leading to wars between the imperial powers.

Capitalism eventually resolved this dilemma by increasing the purchasing power of each consumer and through the creation of a global market, but China has closed off this path to development and now has caught itself in Lenin's trap. Worse, decades of State directed overinvestment in both manufacturing and infrastructure producing firms has produced powerful lobbies. Even a ruler as powerful as Xi Jinping can only restructure the Chinese economy away from heavy production and infrastructure spending by alienating powerful factions that could threaten his hold on power. From this perspective, Belt and Road is not just a geopolitical exercise for Beijing, but also a gamble to keep unproductive but important sections of the Chinese economy going as long as possible.

In any case, the combination of a Leninist State-guided economy and an imperialist foreign policy forces the United States, among others, to treat China as something other than a "normal" market economy pursuing normal market competition.

Under these conditions we can no longer treat trade as a purely economic question. Given China's clear interest in challenging other countries, other countries have no choice but to audit their supply chains for key materials to eliminate any strategic dependence on China and to protect themselves against Chinese technology that may be used for other purposes. Nor can our diplomats simply engage with China as a "normal country." Countries like China—and Russia—who have essentially declared themselves to be actively seeking to undermine American interests and countering American values—need to be taken at their word.

The second problem involves the connection between State power and technological development. In a world driven increasingly by the logic and the power of the information revolution, China's attempts to reach technological supremacy through theft, illegal behavior and the elimination of competition pose direct security threats to other countries, including the United States. The CCP requires many foreign companies that wish to sell their products in China to partner with a Chinese firm and transfer their technology to their local partner, who often later becomes their competitor. Hackers and other actors affiliated with the Chinese Government actively seek to steal American technology, acquiring everything from information about antisubmarine weapons to kernels of genetically modified corn. Just yesterday, the U.S. Government indicted two hackers for allegedly conspiring with the Chinese Government to steal trade secrets related to our national defense and health care.

While some have warned against erecting a "digital iron curtain" as tensions between the U.S. and China continue, there are legitimate reasons to be wary of cooperation with China on IT and of Chinese investment in telecommunications initiatives such as 5G in the U.S. and its allies. The CCP has demonstrated its willingness to use surveillance technologies for both espionage and for monitoring its citizens. China's domestic development and foreign investment strategies are both centered on the growth of its high-tech and IT sectors.

China's focus on the development of surveillance, communications and artificial intelligence technologies is intimately connected to its ideological project. The Cyberspace Administration of China (CAC) has released research stating that "If our Party cannot traverse the hurdle represented by the internet, it cannot traverse the hurdle of remaining in power for the long term." Xi himself has stated his ambition for China to become a "cyber superpower." The ways in which China develops and uses these technologies is then of utmost relevance to how the U.S. should cooperate with or counter China.

The use of advanced technologies to exert State control is central to Xi's mission. In 2015 at the World Internet Conference in the Zhejiang province, Mr. Xi called for "cyber sovereignty." Domestically this philosophy has been expressed through increased censorship and monitoring. As China continues to broaden its reach, we should expect CCP attempts to make other States adhere to its philosophy as well. The Chinese Government recognizes as legitimate few, if any, restrictions on the State's use of technology to control its people.

These threats must be addressed even at significant political and economic cost. China's trading partners must protect themselves against illicit practices by both State-owned and private firms in China, and they are entitled to exact retaliation by placing limits on Chinese business.

The third problem posed by communist China's role in the world economy is that under the new system of hyper-centralized control that increasingly and sadly characterizes China today, distinctions between State-owned corporations and private business can no longer be taken at face value. The installation of party committees in both SOE's and private enterprises, in accordance with the 2012 constitution, gives the CCP immense influence. The extent of said influence within private businesses, unfortunately, is impossible to know. In 2017, more than two out of every three private sector companies in China had CCP officials working in their offices overseeing their activities.

The Chinese Government protects domestic companies from competitors by hamstringing foreign investors that want to invest in Chinese startups that could threaten the court favorites. Demanding hundreds of regulatory documents from potential investors, central and local governments create a complex and foreboding market for FDI. These restrictions are often successful in limiting competition in sectors of particular political interest to the CCP. While foreign investors whose projects are rejected may appeal, all approval authorities and People's Courts are under the control of the CCP. This limits any FDI that may conflict with the CCP's agenda.

Chinese business and Chinese investors are under the thumb of the Chinese Government. This necessarily reduces the willingness of foreign Governments, including the American Government, to treat them in the same way Governments treat true private actors.

The fourth issue that demands a response involves China's open efforts to infringe on the law of the sea and to make illegitimate territorial claims.

By now, many are familiar with China's island-building campaign in the South China Sea, which is a vital artery of international commerce. International tribunals have ruled against the Chinese Government's territorial claims, but the CCP has ignored those rulings. The Chinese navy, coast guard, and paramilitary naval units also regularly harass and attack civilian vessels in international or disputed

waters, attack the naval and coast guard ships of neighboring countries, and further other Chinese attempts to exploit the natural resources of disputed territories at great cost to China's neighbors and the local environment.

Creating instability in a region that one-third of global shipping traverses threatens global and American prosperity, but China's ambitions do not stop there. China makes and attempts to enforce territorial claims against other neighboring countries and is trying to claim a stake in the Arctic Ocean as well, which could become both an important shipping route and a source of valuable natural resources in the coming decades.

The fifth issue is that China's steady military buildup combined with its increased efforts to partner with countries like Russia and Iran have major implications for the American defense budget. We must scale up our efforts to ensure levels of primacy on land, at sea, in the air, in cyber and in space that deter any rivals from contesting. Some of this effort may require restructuring our forces to operate better in the vast and varied Indo-Pacific theater and to respond to new threats, such as the new aircraft carriers China is building rapidly. But other steps need to be taken that will have both military and nonmilitary applications. Among these are investing in research and development to maintain the current American technological lead in fields like artificial intelligence as well as basic sciences in fields like biology that are likely to define the economies of the late twenty-first or even twenty-second centuries.

China and Russia are working together to develop their AI capacities. In June of last year during Xi Jinping's visit to Russia, the two States announced a joint investment fund with a focus on funding AI research. It launched in September with a $1 billion budget. In December of 2019 Vladimir Putin signed a decree declaring 2020 "the year of Russian–Chinese Scientific, Technical and Innovation Cooperation." Chinese and Russian firms have cooperated on the development of facial recognition products and other AI technology. Last June, Huawei acquired the rights to Russian firm Vocord's facial recognition technology for $50 million. Vocord's website specifically highlights the surveillance applications of its technology in public spaces, while offering a tool for seeing "which relative your child most resembles." Huawei's vice president Jiang Tao has spoken of the construction of "an AI ecosystem" in Russia.

While China and Russia have not announced cooperation on military AI, China has already exported unmanned aerial vehicles (UAVs) like the Rainbow CH-4 to the United Arab Emirates, Saudi Arabia, Pakistan and elsewhere in the Middle East. Through its foreign investment strategy China has increased poor Nations' dependency on it and increased its own assets including strategically located ports and military bases. Through the Made in China 2025 strategy Beijing has directed the State-led economy toward high-tech innovation. Beijing now intends to export its products and philosophical model globally. China is furnishing militaries in the Middle East and exporting its surveillance technology to many parts of the world. There is a direct line connecting China's domestic development strategy to its geopolitical strategy that is focused on undermining the liberal order.

Unlike the arms race of the Cold War, IT has dual uses. While the civilian applications of emerging technologies are lucrative and private enterprises ought to have the ability to expand their markets abroad, these technologies can be used by militaries and Governments for ends that could pose a threat to national security.

The sixth issue is that the new levels of repression currently being used against ethnic and religious minorities in China and the prospect of a further extension to other groups as yet only lightly targeted requires an international response. There are many elements of Chinese governance that Americans do not like, but we do not insist that Chinese practice conform to our ways or those of our Atlantic partners and friends in order to have normal relations. However, the systemic destruction of cultures and religious communities crosses a line that neither the United States nor other countries can ignore.

China's attempts to silence or eradicate religious and ethnic minorities in China do not merely strengthen the elements within the CCP committed to a brutal and totalitarian vision of their country; they also leave the world poorer by depriving the Chinese and other people of the beauty, insight and wisdom created by these communities, many of which have been a part of China's heritage for centuries, if not longer. The high-tech repression the CCP is perfecting at home now will be used abroad in the future, to the detriment of both Americans and other peoples. Although the United States and its partners should not seek to overthrow the current Chinese Government or attempt to force it to make structural changes that will threaten its survival, it is important to raise the costs of Chinese repression and impede its spread outside of China's borders.

It is important to remember that the realities of our current conflict with China do not mirror those same challenges we faced in the Cold War the Soviet Union. Unlike with the Soviet Union, the economies of the U.S. and its allies are deeply connected to the Chinese economy. China remains the second largest economy in the world, to completely sever economic relations with it would have devastating implications for the United States. Rather, we should focus on areas where we have mutual interests. Sectors that involve the production or development of security-sensitive technology should be encouraged to consider their level of interaction with China with care. In other sectors it will remain profitable to cooperate and trade.

Conclusion

I would like to leave you with a couple of thoughts. We should take China and the challenges it poses seriously, but we think calmly and rationally about the relationship. China is not 10 feet tall. It has achieved some remarkable, even historic, economic growth, but it lacks important factors needed for long term stability and success.

Despite the heated, chest-thumping rhetoric from the so-called "wolf diplomats," China's leadership is worried about the future. In developing our policies in response to the China Challenge, we must understand these fears—not only because they point to strategic vulnerabilities which can be exploited, but because more importantly they point to factors and forces which could either prevent a full rupture between China and the United States or ensure that in the event of such a rupture the United States and its associates and allies would prevail.

China's recent behavior raises significant concerns for the United States as well as for the global economic system that has raised hundreds of millions out of poverty in just a few decades. In response, the United States and its partners should push back against harmful Chinese actions while also encouraging the CCP to make choices that will enhance both Chinese well-being and global peace. China's behavior was more acceptable in the past, which means that it can be in the future. If a new Cold War must come, America can and must rise to the challenge. But we should not abandon all hope that wiser counsels will prevail in Beijing. Our goal is and should remain the construction of a relationship which promotes the prosperity and security of both the American and Chinese peoples.

PREPARED STATEMENT OF J. CHRISTOPHER GIANCARLO

SENIOR COUNSEL, WILLKIE FARR & GALLAGHER, AND FORMER CHAIRMAN, U.S. COMMODITY FUTURES TRADING COMMISSION

JULY 22, 2020

Thank you Chairman Cotton, Ranking Member Cortez Masto, and Members of the Subcommittee for the opportunity to testify today.

I am Chris Giancarlo, Senior Counsel at Willkie Farr & Gallagher. I am also a founder and principal in the Digital Dollar Project.

Three Observations

A few weeks ago, I had the honor to appear before the full Senate Banking Committee. In my testimony, I offered three observations from my years of service on the Commodity Futures Trading Commission. The first stems from the fact that so much of America's physical infrastructure—its bridges, tunnels, airports, and mass transit systems—that were state-of-the-art in the 20th century, have been allowed to age, deteriorate, and become obsolete in the 21st century.

Sadly, the same is true about too much of America's financial infrastructure. Systems for payment and settlement, shareholder and proxy voting, investor access and disclosure, and indeed, financial system regulatory oversight, that were once state-of-the-art and global models in the 20th century, have fallen behind the times and, in some cases, embarrassingly so in the 21st century. This aging financial system infrastructure puts the United States at a competitive economic disadvantage to economies like China that are building new financial infrastructure based on 21st century digital technology.

For example, it typically takes days in America to settle and clear retail bank transfers. In many other countries it takes minutes, if not seconds. It also takes days to clear and settle securities transactions, and weeks to obtain land title insurance. And, nothing reveals the limits of our existing financial system more starkly than the U.S. Government's response to the current COVID–19 pandemic, in which tens of millions of Americans had to wait a month or more to receive relief payments by paper check, while an estimated 1.1 million payments totaling nearly $1.4 billion were distributed to deceased Americans. Meanwhile, other economies, like

China's, are advancing rapidly in deploying instantaneous, digital currency payment systems.

Another observation is that the world is indeed entering a new era when things of value, such as money, contracts, stock certificates, land records, cultural assets like art and music, our personal identities, and even our votes, will be stored, managed and moved around in a secure way instantaneously from person to person without central validators. This is what some people call the Internet of Value.

That first internet wave over the past few decades was an internet of information,[1] which was then followed by the Internet of Things, where everything from assembly lines to refrigerators becomes connected to the internet. All of that is about to be superseded by the next wave, the Internet of Value. In this new era, trust will be less often provided by established, central institutions, as is the case in most of the world's existing financial market infrastructure. Rather, with proper governance it will be achieved through cryptography, tokenization, shared ledgers, and a network of computational algorithms. In the same way that the first wave of the internet enabled immediate transfer of words and information through distributed computer networks, this next wave will enable instantaneous person to person transfer of things of value, be they shares of stock, automobile titles, or money.

My third observation is that, if we act now, we can harness this wave of innovation for greater financial inclusion, capital and operational efficiency, and economic growth for generations to come. If we do not act, however, this coming wave of the internet will lay bare the shortcomings of America's aged, analog financial systems.

These three observations—the aging of our existing financial market infrastructure, the coming Internet of Value, and the economic and social benefits if we do act—have driven my professional engagements since leaving the CFTC.

The Digital Dollar Project

Early this year, I created the Digital Dollar Foundation, a not-for-profit enterprise, along with my brother, Charles Giancarlo, a veteran Silicon Valley engineer, entrepreneur, and corporate executive and Daniel Gorfine, the CFTC's former Chief Innovation Officer. The Foundation partnered with David Treat and his innovation team at Accenture on a pro bono basis as lead architect and technology advisor.[2]

Together, the Foundation and Accenture launched the Digital Dollar Project (*https://www.digitaldollarproject.org*). The Project's purpose is to lead public discussion of the merits of a tokenized form of a U.S. CBDC or, what we alliteratively termed in January of this year, a "Digital Dollar." The Project is not a commercial enterprise, but an effort to encourage research and public discussion on the potential advantages of a U.S. CBDC, convene private sector thought leaders and actors, and propose possible models to support the official sector, from key agencies to member of Congress, as it considers development, testing and adoption. The Project looks to advance the public interest in future-proofing the dollar for consumers and institutions here in America and around the world.

To gain diverse perspectives from key stakeholders, the Digital Dollar Project formed a nonpartisan advisory group that includes a broad array of economists, business leaders, technologists, innovators, lawyers, academics, and consumer advocates across the social and political spectrums.[3] The Advisory Group helps explore design options and approaches for creating a U.S. CBDC through a deliberative process, including stakeholder meetings, roundtable discussions and open forums.

The Project recently published its inaugural white paper detailing a path forward and considerations for the development of a U.S. CBDC. The white paper proposes for consideration as a champion model a tokenized U.S. CBDC that operates alongside existing monies, is primarily distributed through the existing two-tiered architecture of commercial banks and regulated money transmitters and is recorded on new transactional infrastructure informed by distributed ledger technology (DLT). The white paper outlines the benefits of a CBDC in the context of the U.S. dollar, and proposes potential use cases and pilots.

Among the multitude of highly effective payment options in the United States (e.g., cash payment, credit, debit, etc.), a CBDC would offer a new choice for digital transactions, instantaneous peer-to-peer payments, and in-person transactions. It could also potentially lower costs and further diversify payment rails. A U.S. CBDC

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[1] An early example of the first Internet wave is Wikipedia, which is composed collaboratively by largely anonymous volunteers who share information and compose peer reviewed entries without pay. A later example is Facebook, an online social community that is valued largely for its prowess in analyzing and merchandising large data sets.

[2] Globally, Accenture's work on central bank digital currency includes engagements with the Bank of Canada, the Monetary Authority of Singapore, the European Central Bank, and Sweden's Riksbank.

[3] Members of the Advisory Group are set out in the appendix hereto.

could be distributed to end-users through commercial banks and trusted payment intermediaries. It would facilitate financial inclusion by broadening access to services through additional mechanisms, such as digital wallets. In particular, a U.S. CBDC could expand the ability of currently un- or-underbanked populations to access digital financial services and transact on e-commerce platforms that do not deal in physical cash. [4]

Central Bank Digital Currencies: Decentralized Fiat Money

Before delving further into the benefits of a U.S. CBDC, it may be helpful to review the ability to distribute money with existing financial infrastructure. Practically speaking, traditional dollar bank notes are local instruments. They are distributed by the Federal Reserve to local banks and restricted to physical transactions in the presence of payer and payee, making them impractical for large value payments. Traditional dollar banknotes do not work in modern eCommerce.

A U.S. CBDC would represent a new format of central bank money to complement bank notes and reserves while integrating seamlessly with existing banking and payment functions. The innovation rests in the adoption of properties akin to a token or digital bearer instrument, allowing the dollar to become digital and portable. Distributed ledger technology (DLT) may offer the most effective approach to issue, distribute, transfer, and redeem tokens. It would enable the dollar to be sent in real time anywhere in the physical and virtual worlds as easily as sending a text message.

The Digital Dollar Project proposes that issuance, distribution, and redemption of a U.S. CBDC take place just as cash does today. It would be issued by the Federal Reserve to domestic banks or regulated entities against reserves. Banks would distribute Digital Dollars to domestic end-users' digital wallets against bank deposits and against collateral to nonresident banks. It would be redeemed against bank deposits and collateral at banks and against reserves at the central bank. The token-based properties would allow Digital Dollars to be intermediated through existing channels.

For domestic end-users, digital wallets would offer essential payment functionalities and be integrated with existing banking services to enable a seamless integration with the financial system. Payments at points of sale could still be conducted through conventional terminals or fully contactless solutions. Regulated entities would extend such wallets to their customers through existing outlets for mobile phone applications covering required know-your-customer and anti– money laundering provisions. For unbanked end-users, wallet services could come preloaded on mobile phones. Advanced off-line capabilities are possible to allow local transactions to take place when the telecommunication networks are down.

The DLT network would operate on an autonomous permissioned network and ensure validity and integrity of all transactions. The verification of transactions would rest on the complete history or lineage of the tokens from original issuance in order to attest tokens are genuine and have not been double spent. The advantages of tokens derive from their bearer instrument nature and the ease with which interactions with existing banking and payment functions can be performed. Participants only need to interact with the tokens and do not require to be connected to a payment system.

DLT network participants would include the central bank and potentially resident banks, other financial intermediaries, and new entities that can help afford greater resilience in payment processing. The distributed nature of the DLT platform would enhance security as manipulation of the network would be computationally near impossible. The DLT platform would add to payment system diversification by operating on separate payment rails using the Internet, enabling distribution of central bank money independent of the functioning of the banking system.

Tokenized Money: A Brief History

Money has evolved over the span of human civilization. Initially trade was through barter: a chicken for a clay pot. However, what does a society do when a person wants to trade a blanket, but doesn't need a clay pot in return? The answer was a token that society recognized as representing value and could be traded for any good whether a clay pot, a chicken, or a blanket. The first token may have been shells or beads. It evolved to things that carried some inherent value such as salt (the currency of the Roman army from which the word "salary" derives) or coins

[4] Bank notes are often used to make small payments in the physical world, although, on average, physical cash usage is in decline compared against other payment methods. This dynamic is likely to progress in a post- COVID–19 world, thereby making it increasingly important for digital financial options to extend more broadly.

minted from precious metals like silver and gold. In more recent times, tokens of currency were based on intangible items of little intrinsic value such as paper or, today, polymer notes. As economies evolve into the future, so will their tokens.

The physical paper greenback dollars in circulation today are tokens. In comparison, the dollars that can be spent by use of credit and debit cards and money drawn with a check are account based. Most money used in the U.S. economy is account based.

A major distinction between token-based and account-based money is the process of verification upon use. With token-based money, verification is primarily performed by the recipient confirming that the token is authentic and not counterfeit. On the other hand, accounts-based money requires third-party authentication of the identity of both parties to the transaction and the adequacy of funds in the transferor's account.

Tokenized Money: A Glimpse at Its Future

The Digital Dollar Project believes that the time is right for the U.S. to explore development of a token-based form of central bank digital currency. The Project believes that it would bring a number of potential benefits to payment, clearing, and settlement systems as well as enable new access points for populations that traditionally have been underserved by financial services. The Project recognizes that such an innovation would undoubtedly pose risks and challenges. That is why the Project recommends that such development be done carefully, thoroughly and thoughtfully through a series of pilot programs.

A U.S. CBDC is ultimately about core financial system architecture. A dollar CBDC would take advantage of emerging distributed ledger technology to enable more direct monetary relations and diversified payment systems. It would offer new functionalities and more refined tools to overcome existing limitations of central bank money. It would enhance the dollar's functionality for a new digital age.

Today, prices for most of the world's key tradable commodities, contracts and significant items of value are established in America's deep and liquid commodity futures markets overseen by the CFTC. Those market prices are set in U.S. dollars. As a result, those commodities are paid and accounted for in U.S. dollars. This dynamic is one of the important pillars of the U.S. dollar's primary reserve currency status.

Tomorrow with the Internet of Value, those U.S. dollar-denominated commodities, contracts and significant items of value will be rendered into digitized, tradable tokens and coupled with algorithmically driven smart contracts. The question is whether the instrument in which those important commodities and contracts are accounted will be correspondingly digitized or whether it will remain an analog instrument. If so, will the digital commodities and contracts of the future will still be priced and accounted for in analog U.S. dollars? Or will the digital commodities and contracts of the future be priced and accounted for in some other currency that is digitized, decentralized, and programmable?

We must face these questions today. It would be foolish to take the dollar's predominant status in the international financial system for granted. Creating the Digital Dollar will provide it with the best opportunity to maintain that status.

Global Competition for the Future of Money

There is an enormous amount of work being done currently by overseas central banks on central bank digital currency. I have included in the appendix to my testimony a chart of some of the major developments underway around the world.

As this Subcommittee knows well, China appears to be particularly advanced in development of a central bank digital currency, known as the Digital Currency Electronic Payment (DCEP) system. A number of large, important Chinese businesses are now joining this initiative as partners in testing and implementing the technology.

A key purpose of the DCEP is to integrate China's impending digital currency, the Renminbi, into thousands of DLT applications involving autonomous sensors and 5G telecommunications technology. Its development is designed to provide China with a significant advantage in operating outside of the current Western-dominated, bank centric accounts-based financial system.

Imagine, for example, a large African city with a water filtration station in which an electronic sensor developed and provided by China recognizes that its reserves of chlorine are running low. In time, using 5G telecommunications technology, that Chinese-built sensor will instruct a computer to automatically order chlorine supplies from a Chinese supplier in return for a direct, digital Renminbi payment with little to no human management and no transmittal through the global, account-based bank system.

Undoubtedly, creating direct information and money transfer mechanisms that avoid transaction intermediaries will bring efficiency gains to smart cities, supply chains, and electricity grids. At the same time, working around the Western-dominated, traditional banking system will undoubtedly help China's independent economic expansion. In time, China is likely to integrate DCEP into its expanding Belt and Road Initiative by encouraging participating economies to direct peer-to-peer payments using digital Renminbi. Or it could lure developing economies throughout South East Asia and Africa to peg their digital domestic currencies to that of China.

The stakes of the contest for the future of digital money are as high as any of the transformational technological revolutions of the past 100 years. On the outcome lies a balance of geopolitical power. Chinese technological dominance in deploying digital currency systems that serve the coming Internet of Value certainly pose challenges for the U.S. and other democratic societies. If payment systems can bypass the global, account-based banking system, the United States will lose a powerful policy tool of economic sanctions, a tool that, whatever one's opinion of specific instances or frequency of utilization, is less widely destructive than a key alternative: warfare. In addition, if foreign central banks come to maintain lesser amounts of dollar reserves to fund purchases decreasingly priced in dollars, demand will decline for U.S. Government bonds. This will result in higher interest rates for the United States Government and American consumers as well.

With such developments, we are indeed entering a new world. The question is who will design and build those digital systems, what tokenized currency will be utilized within them and what social values will be brought to bear. If the U.S. dollar is to remain the world's primary reserve currency in the unfolding century, then it also must evolve from an analog to a digital currency and a unit of account that measures, supports and transacts with the world's digital tokenized things of value.

Assuring Democratic Values in the Future of Money

This post-World War II period of the dollar's ascendance has been accompanied by another historical rarity: the birth of a truly global market for goods and services. And that birth led to the emergence into the middle class of hundreds of millions of historically impoverished people. It is not a coincidence, but a consequence, I believe, of the ascendancy of the U.S. dollar as a global reserve currency that today more people than ever before in recorded human history enjoy improved health, child welfare, educational, and civil liberty attributes that accompany material where-with-all.

I also believe that this remarkable flowering of human well-being has something to do with the global flowering of democratic ideals of individual liberty, freedom of speech, personal privacy, limited Government, the rule of law, and the aspirational nature of democratic societies, which I frequently cited during my time in public service. These ideals are encoded in the U.S. currency, the dollar.

Some of those ideals are also set out in America's Constitution. One in particular, the Fourth Amendment's right to privacy, is the source of a rich body of jurisprudence defining the balance between individual rights to privacy, including financial privacy, and the State's ability sometimes to abridge that privacy for legitimate interests in law enforcement, national defense and other overriding concerns. Amongst the major democracies and certainly compared to autocracies, the United States has some of the most constitutionally established and well developed protections against Government infringement of individual financial privacy.

With the proper legal and jurisprudential development around the Fourth Amendment and thoughtful design choices around anonymity and individual privacy, the Digital Dollar could well enjoy superior Constitutional privacy rights over many competing instruments, whether provided by commercial interests or other sovereigns. This would especially be so compared to a digital instruments of non-democracies which, it would be implausible to believe, will not be used as an instrument of State surveillance.

It may turn out that the United States has an ace to play in the contest for the future of digital money: privacy rights. Coding traditional American ideals of economic freedom and balanced privacy into a Digital Dollar will surely enhance its global appeal. Hundreds of millions of people in the developing world may well be reluctant to surrender their growing economic security and autonomy to authoritarian State surveillance, simply for the convenience of digital payments. As it has so often in its history, the U.S. has the opportunity to lead in a way consistent with its finest ideals.

Piloting Development of the Digital Dollar

A well-architected, durable and universal U.S. CBDC is in America's national interest and, I believe, in the interest of the world economy. Crafting it will be an

enormous and complicated undertaking. It needs to be done carefully, thoughtfully, and deliberately. Something as complex and worthy of the U.S. dollar's global importance should not be completed in a hurried manner. It will take time and seriousness to get it right.

Nevertheless, now is the time to get started. The recent launch of SpaceX reminds us that the United States explored outer space and the lunar surface through a series of pilot programs known as Mercury, Gemini, and Apollo. So too, should the U.S. explore a Digital Dollar in a series of well-conceived and executed pilot programs.

The Federal Reserve is already looking thoughtfully at central bank digital currency. It has assembled some fine researchers. It should now take the next step and work with the U.S. Treasury to kick off a series of pilot programs drawing upon the innovativeness of the private sector to test various design options and specific approaches, technologies, and protocols.

Among other imperatives, the pilot programs should explore how a central bank digital currency can:

- Preserve the effectiveness of U.S. monetary policy and financial stability;
- Enable ease of payments and provision of financial services to those parts of the American population that are financially underserved or excluded;
- Enhance scope, access, diversification, and resilience in U.S. dollar payments;
- Provide needed scalability, security, and privacy in retail, wholesale, and international payments;
- Unlock further innovation by creating the public infrastructure for tokenized and programmable money, upon which the private sector can develop;
- Offer comprehensive and seamless integration with the financial infrastructure and interoperability with central bank digital currency infrastructures being developed outside of the United States;
- Adhere to existing KYC/AML requirements amid distribution through regulated payment intermediaries and banks, preserving the two-tiered banking system;
- Ensure requisite individual privacy and security laws and regulations in payments is preserved and enhanced;
- Enhance economic policy insights through greater transparency offered via digital payments; and
- Develop U.S. leadership and best-in-class technology to support needed digital currency functionalities.

In addition, the U.S. Treasury and the Federal Reserve could regularly update Congress on the progress of these pilot programs and their achievement of these objectives, including enhancing financial inclusion, and offer proposals to further build out and implement a U.S. CBDC across the financial system.

When the U.S. has led the world in technological innovation—whether exploring outer space in the last century or cyberspace in the turn of this century—it has done so through public/private partnerships.[5] In these partnerships, the U.S. Government has directed central policy frameworks to further the public interest while the private sector supplied technological innovativeness, large project management capability, and competitive urgency. Without the blending of the two, exploration of the lunar surface and cyberspace may have slipped beyond the 20th century into the 21st.

It may be argued that developing a dollar CBDC is so important to the national interest that it should be the exclusive work of the public sector and not involve the private sector. I disagree. It is because the development of a dollar CBDC is so important to the national interest that it must involve the private sector. It is the way America succeeds in doing big technological things. It was the basis for successful exploration of both outer and cyberspace. It is the right way to explore the future of money.

Conclusion

A new technological age is unfolding, bringing with it the digitization of things of value that can be tokenized, decentralized, and programmed. Across the globe,

[5] In the 1960s, NASA partnered with a host of private sector vendors, engineering firms, and contractors to land a man on the moon and accomplish America's then highest priority. Also in the 1960s, the Pentagon's Defense Advanced Research Projects Agency (DARPA) contracted to the private sector development of key Internet components while, later in the century, the National Science Foundation created NSFNET to contract with both private companies and public universities to lay the groundwork for the Internet as we know it today.

Governments and private entities are experimenting with tokenized commodities, contracts, legal titles and, most critically, commercial and central bank digital currencies.

A U.S. CBDC would address limitations in the ability to distribute emergency monetary relief revealed by the COVID–19 crisis. It can provide the tools and infrastructure to make emergency liquidity distribution work better and faster. It can provide advantages over traditional bank accounts in terms of expanding access for underserved populations and a foundation for new and more inclusive financial services.

Yet, a U.S. CBDC is about more than financial relief amidst a pandemic. It is about the architecture of money in this new digital era. It offers new functionalities and more refined policy tools. It takes advantage of emerging distributed ledger technology to enable more direct monetary relations and a more diversified payments infrastructure. It recrafts the architecture of central bank money and, in effect, reimagines the future of money itself.

Throughout its history, the United States has been a leader in innovation and building systems for the next generation. Whether launching the space program or building the internet, the United States has conducted large technological endeavors through public and private partnerships reflecting longstanding American values of free enterprise, economic stability, technological innovation, individual liberty and privacy, and the rule of law. It is how America does big things.

This global wave of digital currency innovation is quickly gaining momentum. The questions for the United States are what role it will play in this wave of the Internet and to what degree will its core values be brought to bear. The United States must take a leadership role in this next wave of digital innovation or be prepared to accept that the innovation will incorporate the values of America's global competitors.

The launch of a U.S. CBDC is a logical and critical next step to increase financial inclusion, enshrine democratic values in the future of money, drive societal and economic benefits, and future-proof the U.S. dollar for generations to come.

[Attachment A: "The Digital Dollar Project Summary" located in the Additional Materials section of this hearing]

PREPARED STATEMENT OF TIM MORRISON

SENIOR FELLOW, HUDSON INSTITUTE

JULY 22, 2020

Chairman Cotton, Ranking Member Cortez Masto, thank you for the invitation to testify and thank you for holding this hearing on this most important topic.

It is not too much to say that the competition between the United States and the Chinese Communist Party is the great power contest of this and the next generation (at least).

Don't take my word for it. Take the word of the General Secretary of the Chinese Communist Party, Xi Jinping.

In his January 2013 remarks to the Party, Secretary Xi laid out the competition from the view of the Chinese Communist Party.

> Facts have repeatedly told us that Marx and Engels' analysis of the basic contradictions in capitalist society is not outdated, nor is the historical materialist view that capitalism is bound to die out and socialism is bound to win. This is an inevitable trend in social and historical development. But the road is tortuous. The eventual demise of capitalism and the ultimate victory of socialism will require a long historical process to reach completion. In the meantime, we must have a deep appreciation for capitalism's ability to self-correct, and a full, objective assessment of the real long-term advantages that the developed Western Nations have in the economic, technological, and military spheres. Then we must diligently prepare for a long period of cooperation and of conflict between these two social systems in each of these domains.
>
> For a fairly long time yet, socialism in its primary stage will exist alongside a more productive and developed capitalist system. In this long period of cooperation and conflict, socialism must learn from the boons that capitalism has brought to civilization. We must face the reality that people will use the strengths of developed, Western countries to denounce our country's socialist development. Here we must have a great strategic determination, resolutely rejecting all false arguments that we should abandon socialism.

> We must consciously correct the various ideas that do not accord with our current stage. Most importantly, we must concentrate our efforts on bettering our own affairs, continually broadening our comprehensive national power, improving the lives of our people, building a socialism that is superior to capitalism, and laying the foundation for a future where we will win the initiative and have the dominant position.

It has been said that the first line of encryption the Chinese use is Chinese itself. The Chinese Communist Party is not shy, ashamed, or particularly secretive about its plans: the extent to which it hides them at all, it hides them with the Chinese language.

General Secretary Xi promises the "eventual demise of capitalism". He promises that Chinese socialism will "win the initiative and have the dominant position." This is not a promise of peaceful coexistence between competing world views.

Professor Josh Eisenman has compared this Chinese socialism to earlier incarnations of national socialism in Mussolini's Italy and Hitler's Germany given the common themes of fascist Government. It appears fascism truly is back, just not necessarily where some are looking for it.

So General Secretary Xi has been clear about his plan. What is our plan in the United States?

On May 20th of this year, the White House released the "U.S. Strategic Approach to the People's Republic of China", in response to Congressional direction, which was nested within earlier strategic documents like the National Security Strategy of 2017. It laid out two principal lines of effort:

> Our competitive approach to the PRC has two objectives: first, to improve the resiliency of our institutions, alliances, and partnerships to prevail against the challenges the PRC presents; and second, to compel Beijing to cease or reduce actions harmful to the United States' vital, national interests and those of our allies and partners. Even as we compete with the PRC, we welcome cooperation where our interests align. Competition need not lead to confrontation or conflict.

This document should be read alongside the recent public statements of Administration senior leaders like National Security Adviser O'Brien, FBI Director Wray, and Attorney General Barr.

What we are witnessing is a full court press by our senior national security leaders to alert Americans to the national security threats posed by what Director Wray referred to as a "whole of society threat" in 2018 testimony before the Senate Select Committee on Intelligence.

Attached to my statement is a public version of what we used to call the "wheel of death" when I served in Government—it shows how China leverages its "whole of society" approach to steal its way to economic development and military modernization. I urge the Members of this panel, the staffs, and everyone watching, to familiarize yourselves with this unclassified U.S. Government product: don't assume you aren't involved in the competition with the Chinese Communist Party.

Let's be clear, it isn't enough to win a competition in a "whole of society" contest with only the national security apparatus aligned. Our economic apparatus must be aligned as well, and there is work to be done in this respect.

I recommend to you three specific areas of focus to enhance U.S. economic strength to win the competition with the Chinese Communist Party:

1. Expand the surface area of the competition with China by creating a truer competitor to the China market;
2. Reform our approach to the promotion of U.S. exports and alternatives to China Inc. into a true strategic process for winning the competition; and,
3. Overhaul our approach to export controls (a critical and effective tool, when used as a part of a balanced, integrated policy framework).

First, Developing the Free Market To Defeat Chinese Mercantilism

The Trans-Pacific Partnership (TPP) arose from trade discussions in the early 2000s under President George W. Bush, culminating in an agreement between 12 Nations signed by President Barack Obama in his final year in office.

Unfortunately, support for free trade had begun to fade by 2016, when both major party candidates for the Presidency announced their opposition to TPP.

Given how the PRC has abused and violated its commitments under earlier trade agreements, to the detriment of American workers, seemingly with no response from policymakers in Washington, D.C., the diminution of support for new trade agreements should not have been a surprise.

To be clear, the withdrawal of the U.S. from TPP was a loss for our economic well-being and for our efforts to counter the CCP's predatory behavior.

Yet, on July 1st of this year, the United States, Mexico, Canada Agreement (USMCA) took full effect.

USMCA, the fullest update to date of the 1994 North America Free Trade Agreement, deepens the integration of the economies of the United States, Mexico, and Canada making North America one of the most deeply integrated economic zones on Earth.

The USMCA agreement was also remarkably successful by political standards, being endorsed by both the U.S. Chamber of Commerce and the AFL–CIO and passing the Senate on an 89 to 10 vote and the House on a 385 to 41 vote.

Of critical importance to the competition with the Chinese Communist Party, the update to NAFTA includes critical provisions that address the impacts of "State owned enterprises" including those not in North America that could affect trade or investment within North America.

Together, the USMCA economies serve 478 million people; their economic output is approximately $24 trillion per year, representing approximately 28 percent of the world's output at 7 percent of its population.

Now imagine if a newly sovereign United Kingdom, with its 66 million people and nearly $3 trillion in gross domestic product, joined USMCA.

What about Japan's $5.1 trillion in GDP and 126 million citizens?

Australia, South Korea, New Zealand together represent $3.7 trillion in output and 81 million people. They could be brought in too.

At a combined economic output of nearly $36 trillion, and with 751 million citizens, a USMCA joined by the remaining Five Eyes, plus Japan and South Korea could be the freest and most productive trade bloc in the world. And it would be based on western values for the environment, labor, transparency and the rule of law.

The choice between access to a socialist marketplace ("with Chinese characteristics") and such a free trade bloc is really no choice at all.

Compare that to the status quo where international banks like HSBC believe they have to choose between the PRC and the West as the CCP violates China's international agreements and destroys Hong Kong's autonomy.

It would be far easier for Western companies to compete with Made in China 2025 State champions to build independent energy, telecommunications, and pharmaceutical supply chains. As I mentioned, USMCA builds in tools to counter State-owned enterprises in a way the World Trade Organization has refused to do.

But what if we don't build such an economic bloc? By some projections, in 2050, the U.S. will not only not be the largest economy by 2050, it won't even be the number two economy. How well postured will we be to compete with the CCP in that position?

Second, Leveraging U.S. Foreign Assistance and Investment

As I alluded before, the Chinese Communist Party really doesn't hide its plans. China certainly hasn't tried to hide its Made in China 2025 plan.

U.S. business has just seen fit to ignore what's plainly obvious, lured into Beijing's maw by the promise of market access.

As you'll see in the enclosed 2019 *Newsweek* article, this may be changing, finally. But significant damage has been done.

The CCP has proven successful at boosting prospects of its favored domestic champions—among the most infamous, Huawei—with tens of billions of dollars in tax breaks, cheap financing, access to cheap resources, and privileged domestic market access.

In essence, the CCP has destroyed the free market in its prioritized areas.

What's needed to counter the CCP's approach isn't to copy what they've done.

We need to strengthen the free trade bloc (as I outlined above) and implement a strategic approach that can level the playing field. And we have tools . . . lots of them. For example:

- the Export Import Bank, with a lending limit of approximately $135 billion according to the Congressional Research Service;
- the Development Finance Corporation, built on the foundation of the old Overseas Private Investment Corporation with $60 billion in financing authority;
- in FY20, the Congress appropriated over $56 billion for international affairs, including approximately $20 billion that USAID manages;
- numerous other related organizations like the Millennium Challenge Corporation, the Economic Support Fund, the Global Fund, and many, many others; and,

- extensive infrastructure at the U.S. Departments of State and Commerce to advocate U.S. trade around the world (you have likely met with representatives of these services on your CODELs and in meetings with various Chambers of Commerce of U.S. business around the world).

What's missing is an organizational infrastructure and a clear mission.

There needs to be an ongoing evaluation of the important battlegrounds of the competition and a regular process to triage these battlegrounds and leverage our tools.

Who in the United States Government has the responsibility to make sure the CCP doesn't acquire advanced aerospace technology in Ukraine, or a key port in Portugal, or some of the world's largest rare earth deposits in Greenland? If there's no U.S. company interested, the answer is often "no one." On the other hand, the CCP, with no accountability to its people, is willing to make the investment.

There must be clear direction given by the President for how he expects U.S. foreign aid to be utilized in the strategic competition with the CCP. To carry out that direction, it is imperative to reestablish the international economics directorate at the White House that lashed up the National Security and National Economic Councils.

DFC, as I noted, was built on top of OPIC, a development agency with a culture and mission established over decades. Included in its implementing legislation, the BUILD Act, was an effective prohibition on conducting business other than in low-income countries. The China competition doesn't take place only in low income countries.

Ex-Im has requirements on minimum thresholds of U.S. content to qualify for its support. Do these thresholds make sense if the larger goal is to ensure a proposal other than Huawei's wins a 5G tender?

At over $200 billion in capacity, we have what could effectively be a sovereign wealth fund for the China competition; what we need is a clear strategy to use it, with clear lines of authority and accountability to implement it.

While the 2017 National Security Strategy and the May 2020 Strategic Approach were important foundational documents, much remains to be done.

Lastly, Leveraging Export Controls as a Vital Tool in an Integrated Technology Protection Framework

Export controls have historically been a key tool the U.S. uses to prevent the spread of military sensitive, and especially proliferation sensitive, technologies.

They can also advance U.S. values and interest, as the Commerce Department proved yet again this past Monday with the third tranche of Entity List designations related to the CCP's digitized concentration camps, and its July 1 Business Advisory warning companies of the risks of supply chains involving Uighur forced labor.

In the competition with the Chinese Communist Party, control of emerging and foundational technologies will take on new importance.

This is among the reasons why Congress overhauled export controls in the FY19 National Defense Authorization Act, in tandem with the modernization of the CFIUS process.

The Administration has had remarkable success with its campaign to counter Chinese 5G by using export controls: use of the Entity List and, more recently, updates to the foreign direct product rule, were directly responsible for the recent decision by the United Kingdom to alter its plans concerning Huawei.

But, the United States may also reach a point with export controls where it creates an incentive to "off shore" technology and production to put activity outside the reach of export controls.

Secretary Ross should be commended for his 100 percent commitment to the China competition. That said, it is time for additional agencies to come to the table.

For example, the Secretary of the Treasury has authority under the International Emergency Economic Powers Act (IEEPA), to add companies to the Specially Designated Nationals list, which would have the effect of blocking their access to the international banking system.

Such a designation would eliminate the incentive that export controls can create to offshore technology and production.

Policymakers should also consider whether it continues to make sense to split responsibility for the administration of export controls between the Department of Commerce and the Department of State for separate export control lists.

Such separation adds complexity for exporters, creates gaps through which our adversaries can seek to acquire U.S. technology, and it wastes resources that could be better applied to creating a nimble, streamlined process that serves both commerce and national security (including law enforcement).

Mr Chairman, Ranking Member Cortez Masto, Members of the Subcommittee, I don't think it's really questioned any longer that the Chinese Communist Party is a threat.

It's not too much to say, as commentator Andrew Sullivan did recently that,

> [t]here is no doubt at this point that communist China is a genocidal State. The regime is determined to coerce, kill, reeducate, and segregate its Uighur Muslim population, and to pursue eugenicist policies to winnow their ability to sustain themselves.

Likewise, General Secretary Xi himself spoke of the "eventual demise" of our way of life.

When we confronted the last strategic great power rivalry, we managed to make this a bipartisan fight.

Teamed up were: national security hawks, human rights doves; Wall Street and labor; churches and intellectuals.

So must it be this time around.

Republicans and Democrats can unite to counter the common threat of the Chinese Communist Party's doctrine of national socialism.

Thank you again for the invitation to be here today.

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(Source: https://www.judiciary.senate.gov/download/12-12-18-demers-testimony)

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NEWSWEEK MAGAZINE

How America's Biggest Companies Made China Great Again

BY BILL POWELL ON 06/24/19 AT 12:21 PM EDT

ILLUSTRATION BY ALEX FINE FOR NEWSWEEK

WORLD CHINA COMPANIES

In the summer of 2010, Jeff Immelt, then the CEO of General Electric, sat on one of the private planes at his disposal, headed to a conference of Italian business executives in Rome. He had just come from meetings in Shanghai and Beijing, and was in a sour mood. GE had spent years—and invested millions - in China, believing, like so many other Fortune 500 companies did, that it was the future: the largest

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and thus most important market in the world. The year before GE's sales there had been $5.3 billion.

Now Immelt was losing faith. Growth in the company's key businesses, including power and medical imaging, had begun to slow from the levels GE expected. Government regulators, meanwhile, seemed increasingly hostile, holding up permits and increasing inspections of company facilities for what seemed like no reason. In Rome, Immelt let his fellow CEOS know what he was thinking. "I really worry about China," he told the group, according to several executives present. "I am not sure that in the end they want any of us [foreign companies] to win, or any of us to be successful."

Former GE Chief Jeff Immelt at ribbon-cutting ceremony for a technology center in ShanghaiLIU JIN/AFP/GETTY

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In the years to follow, similar grousing would become commonplace among senior Fortune 500 executives. Life wasn't getting any easier in China, it was getting tougher. But few companies—GE included—were willing to do much about it, by bringing their complaints to the U.S. government and petitioning for a formal trade complaint. The risk of angering their hosts in Beijing was too great. Indeed, when news of Immelt's remarks in Rome later made headlines in the financial press, GE beat a hasty retreat, issuing a statement saying that the CEO's words had been "taken out of context."

Nearly 10 years later, the U.S. China relationship—for decades routinely called the most important bilateral relationship on the planet—has all but collapsed. When this magazine went to press, Presidents Donald Trump and Xi Jinping were scheduled to meet on the sidelines of the G20 meeting in Osaka, in the midst of a deepening trade conflict between the world's two largest economies. The deteriorating economic relationship is but one aspect of what has devolved into Cold War 2.0, as the two countries now openly vie for influence in East Asia and beyond.

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 THE PARTY OVER? Clockwise from top: Chinese President Xi Jinping and his wife Peng Liyuan with President Donald Trump and his wife, Melania.
XINHUA/XIE HUANCHI/GETTY

In the U.S., in the community of China watchers and policy makers, the stunning turn in relations with Beijing has triggered an increasingly acrimonious debate about a basic question, one with deep historical resonance: Who lost China?

The role of big business in the current dismal state of affairs can't be ignored.

For more than a decade, I watched it unfold from a front row seat, as China bureau chief for Fortune Magazine and then for Newsweek. As the world's most populous nation, China has always been a dream market for foreign businessmen. Shirtmakers in England at the turn of the century dreamed of selling "two billion sleeves" in China. Today,

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Mark Zuckerberg takes Mandarin lessons in the hope that one day he can lure 1.3 billion Chinese to Facebook.

China Has Always Been Irresistible.

When, under Deng Xiaoping, the architect of Beijing's rise to economic power, China began opening itself to foreign investment, the money flowed in: first in search of cheap labor in low tech industries like footwear and textiles, then in pursuit of those 1.3 billion customers, as China got steadily richer as economic reforms took hold. For American CEOS, the potential Chinese bonanza meant that U.S. policy toward Beijing had to revolve around nurturing—and expanding—the economic relationship. So potent was the vision of China transforming itself from an insular, hostile and dirt poor nation into the country of "one billion customers," as James McGregor, former head of the American Chamber of Commerce in Beijing put it, that even the shock off the 1989 massacre in Tiananmen Square—the thirtieth anniversary of which just passed—faded in relatively short order. Just two years after Tiananmen, American direct investment in China shot up from just $217 million in 1991 to nearly $2 billion the next year.

For U.S. policymakers and businessmen alike, it was hard to overstate

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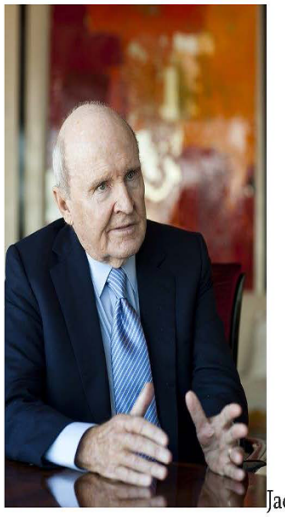
how promising the world looked back then. The Soviet Union had fallen and Deng was bringing China into the world. Immelt's predecessor, former GE CEO Jack Welch, told me on a visit to Shanghai a few years ago that in those days "we all had our fingers crossed that the sky would be the limit [for China economically]. And we basically turned out to be right."



Jack Welch, a fan of the largest and most important market in the world.
BROOKS KRAFT LLC/CORBIS/GETTY

The big business community made it clear—first to the Clinton

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administration and then to his successor, George W. Bush—that trade with China was its highest priority. Washington readily agreed. "The Fortune 500 and the U.S. Chamber of Commerce didn't just influence policy," says Alan Tonelson, a veteran trade analyst in Washington, "they made policy."

The first goal for corporate America was to get trade relations normalized "permanently" (known as PNTR, for "permanently normalized trade relations"). Prior to 2000, because of the post Tiananmen hangover, Washington every year would have to decide whether to grant China the same access to the U.S. market that it did other trading partners. With the U.S. Chamber of Commerce and the U.S. China Business Council as point men in Washington, corporate America lobbied hard for the move. More than 600 companies pushed for China's PNTR status. They got what they wanted. After a contentious debate with human rights advocates, the U.S. approved PNTR in 2000.

Unacknowledged at the time by its corporate advocates was the huge impact on corporate supply chains that the seemingly obscure legislative change would eventually cause. As the economists Justin Pierce and Peter Schott argued in an influential 2016 study entitled

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"The China Shock"—which looked at how swiftly U.S. manufacturing employment declined as China's rise accelerated—"without PNTR there was always a danger that China's favorable access to the U.S. market would be revoked, which in turn deterred U.S. firms from increasing their reliance on China based suppliers. With PNTR in hand, the floodgates of investment were opened, and U.S. multinationals worked hand in glove with Beijing to create new, China-centric supply chains."

The Fortune 500 crowd was only getting started.

China's next goal was to join the World Trade Organization, the international body that sets the rules of global trade and is supposed to enforce them. WTO accession would be China's economic coming out party—the ultimate signal that Beijing had transformed itself into a global trading power. The U.S. business community was all for it, arguing that it meant "at long last that China agrees to play by the rules of the road," while ensuring that U.S. exporters "would benefit from a broad reduction in Chinese tariffs on imports," as a paper from the U.S.-China Business Council argued at the time.

In December of 2001, they got their wish. China officially acceded to the WTO. And the U.S. Chamber of Commerce practically turned

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handstands, issuing a statement saying that it was "unquestionably a win for U.S. exporters and U.S. consumers."

WTO accession served as rocket fuel to U.S. corporate investment in China. It skyrocketed in the first decade of the new century (see chart) In 2012 I met James Vance, the American CEO of a supplier to Nashville's Hospital Corp. of America, a guy whose company made walking boots, air-casts, slings and other low end medical equipment. He said not long after China joined WTO his firm moved production mostly from the southeastern part of the U.S. to the province of Guangdong in southeastern China. The reason: "We could make the stuff so much cheaper and export it to the world than we could in the U.S. It was that simple." And because it was that simple, nearly everyone got into the act. By 2015, the share of China's exports to the U.S. that came from foreign-owned companies was no less than 60 percent.

A neighbor of mine in Beijing in the early 2000s headed Ford Motor Corp.'s massive new plant in the city of Chongqing, 900 miles to the southwest. (He would go out during the week and return to his family on weekends.) In an era when it was politically incorrect for an American corporate executive to say so, he told me one evening he

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thought eventually Ford would move more production to China, not just for the domestic market (which is now, by the number of vehicles sold, the largest car market in the world) but to send abroad as well. "This place will become just like Japan, an export powerhouse," he said. (Ironically, the fear of exactly that happening in such a high profile, politically sensitive industry, particularly in the developed world, has actually slowed China's emergence as an auto exporter.)

Over the last 30 years, prominent American companies have become part of the fabric of Chinese life. Starbucks is as ubiquitous in Beijing or Shanghai as it is in New York. General Motors sells more cars in China than anywhere else in the world. KFC and Papa John's are in all major cities. And Apple has opened 42 of its iconic retail stores.

An Apple store in Hong Kong. BUDRUL CHUKRUT/SOPA IMAGES/LIGHTROCKET/GETTY

But the company's reach in China goes far beyond that. An entire

network of companies, led by Taiwan's Foxconn, assembles or supplies Apple products in China. Today, nearly five million Chinese are employed by companies in that network.

The decision to set up such China-centric supply chains would become the stuff of the "China Shock"—the outsourcing of manufacturing jobs that would, to the dismay of most of the U.S. corporate establishment, play a significant role in the election of Donald J. Trump more than a decade and a half later.

The belief among executives back in the early 2000s was that China's economic reform would continue indefinitely, in part because Beijing had been embraced by the outside world. China would eventually become the world's largest economy, but that was OK, because it would be a "normal" country, playing by the rules as laid down in the post World War II U.S. dominated order. As former Deputy Secretary of State Robert Zoellick famously wrote, the goal of western policy toward Beijing was to encourage it to become "a responsible stakeholder" in that established world order. All along, until Donald Trump came to office, the underlying assumption was that Beijing was willing to let the United States define what being a "responsible stakeholder" meant. That was a mistake.

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Trouble in Paradise

For most of the first decade of this century, reform did continue. But the Fortune 500's love affair with the nation came back to bite them. Increasingly, China began to generate its own competitors to the foreign firms that had set up shop there. State owned companies in big industries (oil and gas, pharmaceuticals, finance and telecommunications among them) pushed their government to favor domestic players, and make life harder for foreigners. When Hu Jintao became President in 2003, he was receptive to that kind of pressure. Economic reform slowed.

Then something else happened: the 2008 global financial crisis, which tanked the U.S. and the rest of the developed world, but not China. The political leadership in Beijing looked around and said, in effect, "wait a minute: we were supposed to play by these guys' rules and look what happened to them." In the future, economically speaking, China would increasingly play by its own rules.

That has particularly been the case under Xi Jinping, who succeeded Hu in 2012. Xi is a nationalist who believes sooner or later China will be number one, and the sooner the better as far as he's concerned. The American business community began to understand that the ground in China was shifting under their feet soon after Xi took power. XI's

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government made it plain, in its so called Made In China 2025 plan, that it sought to dominate key growth industries in the world. And though that meant for now Beijing would still buy high technology components from the U.S., it would do so only in the service of developing Chinese competitors, who, the government hopes, will eventually supplant American, Japanese and European firms in every key industry. So much for the 1.2 billion consumers.

James McGregor, the former head of AmCham in Beijing and now the China CEO for APCO Worldwide, the consulting firm, says he's been shocked at how slow on the uptake many U.S. companies have been about what the trajectory in China is, and has been. He notes, "In industry after industry there is a smaller and smaller piece of the pie available to a lot of foreign firms. That's just a fact."

The reason they were slow to adapt to that is, well, things had been going so well. "A lot of them had convinced themselves that [Beijing] would ride the reform bicycle forever and the economy would grow and grow and everything would be fine." The fact that that wasn't happening put at risk all the hard work and investment needed to establish a beachhead in China.

Well before Donald Trump was elected, the carping about Beijing's

policies from the Fortune 500 crowd intensified. In the annual reports issued by the American Chambers in both Beijing and Shanghai, the number of respondents who felt the regulatory environment in China was worsening steadily increased. A senior executive at Honeywell in 2015 told me flatly that his company was fed up with Beijing's demands for technology transfer. Friends at CISCO and Microsoft said the same. Privately, the complaints about companies like Huawei stealing intellectual property also ratcheted up.

Moaning and groaning was one thing. Actually doing something about it, from a corporate or governmental policy perspective, was another. It rarely happened. And for that, big business is partly to blame. Michael Froman, who was the United States Trade Representative under Barack Obama, acknowledges that businesses's unwillingness to put its name publicly on trade complaints—in bringing a high profile case to the WTO, for example—"was a definitely a real problem. Not many of these companies," he says, "wanted to stick their heads above the parapet for fear of taking incoming fire." In eight years of the Obama administration, 16 cases against China were brought to the WTO.

That number could well have been higher, trade hawks like Alan

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Tonelson believe, were it not for corporate America's relative passivity in the face of the economic challenges Beijing posed. The government had been persuaded that, as in the 1950s in America (when the first "Who Lost China" debate raged) what was good for General Motors was good for the country.

Then came the election of Donald Trump, who came to office threatening holy hell if Beijing didn't reduce its trade surplus with the U.S., stop its intellectual property theft and forced technology transfer. Worn down by Beijing and shocked by Trump's election, some members of the Fortune 500 snapped out of their stupor. The status quo when it came to dealing with Beijing wasn't going to cut it.

In December of 2016, during the transition, a small group of senior executives from the U.S. semiconductor industry made the pilgrimage to Trump Tower to meet with incoming administration officials, including the man who would be the new U.S. Trade Representative, Robert Lighthizer.

The delegation, two sources present say, included a representative from Intel, who acknowledged his company was beyond fed up with IP theft, among other concerns. In an interview, Lighthizer is circumspect when asked if U.S. companies waited too long in allowing

the government to get tougher with China. "That may be true of some, but not for others," he says, noting that in his years as a trade lawyer at Skadden Arps he brought several cases against China as an attorney for U.S. steel companies. But, he allows, "yes, I'd agree it was past time for a more robust response [to Beijing.]"

The problem now is that Trump's response has been to use the battering ram of tariffs, which some in the administration hope will force U.S. multinationals to rip up their China-centric supply lines. Anecdotally there are reports that some companies have begun to do that, but corporate resistance to it is, not surprisingly, intense. "Having spent so much time and money building out their supply chains, there aren't too many CEOS who want to spend more time and money rebuilding them somewhere else," says former Trade Representative Froman, now a senior executive at Mastercard. And with a Presidential election now less than 18 months away, the possibility that a Trump successor may not be a "tariff man" (or woman) also means companies are unlikely to tear up their supply lines, at least for now.

Beyond that, there is little consensus as to what U.S. policy should be toward China, whoever is inaugurated in 2021. "These guys just long

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for the good old days," says trade analyst Tonelson. And he may be right. The U.S. Chamber of Commerce, which insists today it did the right thing in helping lead the charge for China gaining permanent trade status and joining the WTO, is a staunch opponent of Trump's tariffs. And a recent survey of American companies by AmCham Beijing showed that more than forty percent of respondents said they simply wanted a return to the "pre tariff status quo."

That fact, make no mistake, will put smiles on the faces of Xi Jinping's trade negotiators whenever they next meet their American counterparts. China knows that the recent history has been that the U.S. government will dance to U.S. business's tune. Trump and his team of advisers may not be inclined to do that. But their problem is, there are no easy solutions to resolving the trade issues that beset U.S.-China relations. Lighthizer has been telling Trump to hang tough and, if necessary, increase the tariffs on Beijing, arguing that that will force China to a deal sooner or later.

But corporate America hates that idea, and, problematically for Trump and his re-election prospects, so does the U.S. stock market. Increasing costs to U.S. businesses and consumers from goods made in China isn't a winning formula on Wall Street, nor in 2020.

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The truth now dawning on both the U.S. China policy crowd and the Fortune 500, is that there may not be any answer for the dilemmas Beijing now presents to the U.S. No less than Henry Kissinger, the man who, under Richard Nixon, secretly paved the way for the U.S. and China to re-establish relations, recently said he thought designing a "grand strategy" to deal with China today is "too hard."

If that turns out to be true—and it may—American big business will have to stand up and partly take the blame.

PREPARED STATEMENT OF LISA D. COOK

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JULY 22, 2020

At least three factors currently make or could make the innovation economy in the United States competitive domestically and internationally.

First, the innovation economy is vast, porous, and encompasses a wide array of good-paying jobs. By several measures, the innovation workforce generates positive spillovers for the entire economy and better pay and job security for those in the innovation economy. In 2017, the National Science Foundation calculated that the innovation economy comprised roughly 7 to 25 million workers. These innovation workers earn substantially more than the median income for all workers. In 2017, the median innovation worker earned $85,390, compared to $37,690 for all workers. Innovation economy jobs also are growing faster than in other sectors, and unemployment rates are lower. During and following the Great Recession, the U.S. workforce contracted, while the innovation workforce was less affected by the overall economic contraction. At that time, the income gap between innovation workers and the general labor force also widened. In 2012, innovation economy earnings were double those of other workers; by 2014, the median innovation worker earned an additional 25 percent more than the general labor force. [1]

Despite the popular conception of the innovation economy, one does not need a PhD in engineering to participate in the innovation economy. In fact, during the pandemic, there are many opportunities for worker retraining that could move unemployed workers from jobs disrupted by COVID–19 to jobs in the innovation economy. For example, digital tools are being developed and refined to augment traditional contact tracing. [2] This includes case management and proximity tracing and exposure notification. In some States, as little education as a high school diploma is required, and on line training is both free and available. In general, if workers are able, getting additional training is desirable during periods of weak labor markets such that skills are not lost or are enhanced, something we observed during the Great Recession.

Second, another feature that makes the U.S. competitive internationally is the protection of intellectual property rights. This is a feature of the American innovation system that is the envy of other countries and that is used by firms that plan to sell their products and processes internationally. This is particularly true, my coauthor and I find, for emerging markets (Cook and Kongcharoen, 2010b). Specifically, we find that countries that are export-intensive and that move up the value chain of production ultimately start protecting intellectual property rights related to exports after exports begin. Their own intellectual property is at stake and countries need to be able to take violators to court. The evidence suggests this is true on average.

However, firms in some emerging markets like China, decide to do what Soviet inventors did during the Cold War, and take advantage of the U.S. patent system to protect their intellectual property. [3] Chinese interest in protection of intellectual property rights has been increasing in recent years. How do we know this? It can be measured by the number of U.S. patents obtained by inventors who are Chinese residents and the share of patents granted to Chinese residents relative to all foreign patents.

Between 1963 and the year 2000, Chinese residents were granted 917 patents from the U.S. Patent and Trademark Office (USPTO). At that time, it ranked number 30, between Singapore and India. Chinese residents obtained approximately 0 percent of foreign patents issued by the USPTO during that period. By 2014, Chinese inventors residing in China had dramatically increased their holdings of U.S. patents to 7,236, which was eight times as many as were obtained for the 38 years between 1963 and 2000, ranked number 8 among foreign countries, and epresented 4.6 percent of foreign patents obtained in the United States. By 2019, Chinese inventors in China were granted 22,294 patents, which was more than 24 times the

[1] Cook (2020) and National Science Foundation (2019).

[2] CDC (2020).

[3] Cook (2012) shows that there was substantial patent activity by Soviet inventors (and institutions) obtaining U.S. patents during the period of the Cold War, although they were largely not awarded patents in the Soviet Union.

number in the period 1963 to 2000, ranked number three behind Japan and South Korea, and represented 10.9 percent of patents issued to foreign residents in 2019.[4]

From a recent visit to China that included visits with Chinese businesses, it is clear that the U.S. patent system is offering something the Government of China will not or cannot offer its inventors and entrepreneurs: determination of originality (or first to patent) and defense of intellectual property.[5] U.S. patents are and will be critical to Chinese innovation being able to compete abroad, not just in the United States. They also serve to encourage innovation and, therefore, to promote long-term economic growth.

A third factor that could make the U.S. system of innovation competitive internationally is more diversity and inclusion at every stage of the innovation process. Cook and Kongcharoen (2010a) calculates that, between 1970 and 2006, patent output for all U.S. inventors is 235 patents per million; for women, 40 patents per million; and for African Americans, 6 patents per million. It also finds that mixed-gender patent teams are more productive than single-sex patent teams. Like Hunt, Garant, Herman, and Munroe (2013), Cook and Yang (2018) finds that GDP per capita would be 0.6 percent to 4.4 percent higher if the process of innovation included more women and African Americans. In several places, I propose a number of policy interventions which might broaden participation in the innovation economy: Cook (2019), Cook and Gerson (2019), and Cook (2020). Among these are increasing the participation of women and minoritized groups in STEM education and in the Small Business Administration's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs and addressing racial and gender workplace climate issues at tech firms and at other institutions where invention and innovation occur. In addition, in order to broaden participation in patenting and innovation, accurate demographic data related to patenting must be available. The SUCCESS Act, which this body passed in 2018, and the IDEA Act, which is currently being considered by this body, are based on my previous research and create the foundation for careful collection of and reporting on such data. I urge passage of the IDEA Act in order to measure and encourage progress in patenting, innovation, competitiveness, growth, and higher living standards in the United States and for all Americans.

[4] USPTO (2015, 2020) and author's calculations.
[5] Cook (2015).

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PREPARED STATEMENT OF MARTIJN RASSER

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JULY 22, 2020

Key Observations[1] [2]

Chairman Cotton, Ranking Member Cortez Masto, distinguished Members of the Subcommittee, thank you for the opportunity to share insights on a topic of vital importance to the United States. I want to begin with five observations on the economic competition with China:

1. *U.S. economic security is entrenched in American technological leadership.* The 21st century will be defined by competition; a contest of economic power rooted in technological advances. How countries decide to compete will shape the lives of billions of people. Technology-leading countries will determine how to harness new technologies to combat disease, feed their people, counter climate change, gain wealth, explore the universe, gain influence over others, secure their interests, and protect their independence and freedom. The leaders in adopting emerging technologies such as artificial intelligence (AI), quantum sciences, biotechnology, and next generation telecommunications, and those who shape their use, will garner economic, military, and political strength for decades.
2. *American technological leadership is at risk.* The United States of today is rooted in investments in education, science, research and development (R&D), and infrastructure made decades ago. On its current trajectory, with a shrinking share of global R&D spending, human capital shortfalls, and the rapid rise of a near-peer competitor, the United States cannot continue to coast. America's ability to harness the emerging technologies that will fuel the 21st century economy to the fullest extent possible is at stake. Falling short would squander economic and societal benefits and expose the United States to avoidable risks and challenges.
3. *The United States needs a national strategy for technology to effectively compete.* China has become a serious technological competitor. On strategic emerging technologies such as 5G wireless networks, AI, and genomics, China is at rough parity with the United States, and perhaps ahead. Much of China's success lies in its ability to formulate a comprehensive, long-term Government strategy to gain dominance in key strategic technologies. In contrast, in the United States such policymaking is generally reactive and piecemeal: The United States needs a strategic, national level approach to effectively compete with China.
4. *Multinational collaboration should be a cornerstone of a national technology strategy.* The United States cannot go it alone. No one country can achieve its full potential in desired capabilities across the spectrum of critical technology areas on its own. Nor can any single State muster the resources to nurture all the necessary talent and control vital supply chains needed to achieve and maintain such technological leadership. Instead, America should maximize one of its greatest competitive strengths: its unmatched network of allies and partners. Broad-based, proactive, and long-term multilateral cooperation among like-minded countries is needed to maximize effectiveness across a range of areas, including R&D, supply chain diversity and security, standards setting, multilateral export controls, and countering the illiberal use of technology.
5. *The pandemic crisis presents opportunity and urgency to act.* The global order is at an inflection point where decisions made by world leaders in coming months will shape the world for decades. The stakes are high: long-term economic and technological competitiveness, critical infrastructure integrity and security, and cohesion among the world's liberal democracies. Collaboration between the allies will help to ensure that the upheavals of the postpandemic world can be dealt with more effectively. It will also improve the chances that the coming decades are ones where their societies and economies can prosper, all while blunting the coercive power of authoritarian countries.

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[1] In addition to new material, this testimony includes original content from the witness's previously published and forthcoming work, and media commentary.

[2] A portion of these observations are derived or pulled directly from a forthcoming report from the Center for a New American Security's Technology Alliance Project, which the witness leads, and from *The American AI Century: A Blueprint for Action*, for which the witness was the lead author.

Recommendations[3]

The U.S.–China tech relationship requires a recalibration. Congress and the Administration can advance U.S. national security and competitiveness by undertaking major investments in the U.S. tech sector, establishing new rules for technology development and trade, and increasing collaboration with allies.

Promote American Innovation

- *Increase R&D spending.* The United States should increase total national R&D spending from 2.8 percent to 4 percent of gross domestic product (GDP) and Federal R&D spending from 0.7 percent to 1.2 percent.
- *Increase science, technology, engineering, and match (STEM) education and training.* The U.S. Government should invest in improved STEM education and professional development for teachers. Congress should incentivize private industry workforce training in STEM.
- *Attract foreign STEM talent.* Congress should raise the cap for H1-B visas and remove the cap for advanced-degree holders. Congress should also create new ways to recruit high-skilled immigrants to tackle acute talent shortages for STEM jobs.
- *Secure and diversify supply chains.* The United States should diversify and secure supplies for key technology inputs such as rare earth elements and semiconductors by investing in domestic industries and working with partners to build trusted international supply chains.

Protect Key Areas of Competitive Advantage

- *Establish multilateral export controls on semiconductor manufacturing equipment (SME).* The United States should protect its competitive advantage in hardware by establishing multilateral export controls on SME and design tools in partnership with key allies Japan, the Netherlands, and South Korea.
- *Establish end-use based export controls for China.* The U.S. Commerce Department should develop export control regulations for U.S.-origin and U.S.-developed products with end uses at odds with American security interests and values, such as human rights abuses or adversary military uses.
- *Ensure sufficient resources for counterespionage investigations.* Congress should ensure the FBI and Department of Justice are sufficiently resourced to conduct counterespionage investigations, particularly in Chinese language resources and scientific and technical expertise.
- *Develop better collaboration with universities.* The FBI should increase collaboration with universities to counter espionage threats. This should include reestablishing the National Security Higher Education Advisory Board or similar body.
- *Create a new sanctions authority to target Chinese firms that steal U.S. technology.* The Treasury Department, working with the Commerce and State Departments, should cut off from the U.S. financial system Chinese firms that engage in intellectual property (IP) theft.

Partner With Other Democratic Technology Leaders

- *Create a new international regime for technology policy.* The United States should lead the creation of a new international organization for technology policy comprised of democratic, technology-leading Nations (a "technology alliance"). Multilateral cooperation is needed to maximize effectiveness in R&D, supply chain security, standards-setting, export controls, and countering illiberal uses of technology.

What Multinational Tech Policy Could Look Like

I provide two vignettes of strategic multinational technology policy opportunities. Today, technology policy coordination among the United States and its allies is largely ad hoc, stove piped, and disjointed. The resulting decisions and actions often fail to take into account the broader strategic context, blunting the effectiveness of the policies designed to achieve a desired outcome and impairing the ability to effectively respond to second and third order consequences, be they anticipated or unforeseen. These inefficiencies are rooted in an underappreciation of how intricately linked the technology futures of the world's liberal democracies are. To illustrate what comprehensive multilateral technology policy collaboration could look like, I

[3] These recommendations are derived or pulled directly from *The China Challenge: Strategies for Recalibrating the U.S.–China Tech Relationship*, for which the witness was a coauthor.

will focus on two technology areas of fundamental importance to the economic competition with China: 5G and semiconductors.

The Way Forward on 5G: Open Interfaces[4]

Communication networks are the central nervous system of the 21st century economy. The fifth generation of wireless—5G—will be essential to and inseparable from all we do. Getting 5G right is all the more urgent. Next generation 5G networks will enable telemedicine, self-driving cars, and a proliferation of Internet of Things devices to fuel the future digital economy. Secure, reliable 5G networks will be essential elements of national infrastructure. Chinese firms, Huawei most prominently, pose unacceptable risks to U.S. national security, and the security of America's allies and partners.

The United States has the opportunity to promote a sound alternative to 5G that could lead to a paradigm shift in the industry: wireless infrastructure built on a modular architecture with open interfaces. A modular architecture allows an operator to choose multiple vendors for a range of offerings, rather than being locked in with a single large integrated vendor. Open interfaces—the ability of equipment from any vendor to work with that of another—make that possible. Such a shift means upending the industry status quo that is dominated by four telecommunications equipment providers: China's Huawei, Finland's Nokia, Sweden's Ericsson, and South Korea's Samsung. Whereas other proposed responses to the Huawei dilemma and the problematic current state of competition in the telecommunications industry—such as creating a U.S. national champion or taking an equity stake in Nokia or Ericsson—fiddle at the margins, switching to an industry centered on open interfaces would change the game altogether.

A restructured industry based on open interfaces would directly address the prevailing concerns over untrusted vendors such as Huawei and the broader inefficiencies of the industry. There are distinct advantages to be gained in security and interoperability, supply chain resiliency, probable cost savings, and the opportunity to stimulate much needed competition in the sector. Taken together, these advantages do much to blunt Beijing's industrial policies that have enabled Huawei's predatory anticompetitive practices.

The United States should work with allies and partners to promote the shift to telecommunication infrastructure based on open interfaces. Like the United States, these countries have a shared interest in building secure and resilient infrastructure. Operators in Asia, Europe, and North America are already deploying open architecture networks. The focus of these rollouts is on open interfaces for the radio access network (RAN), typically called "open RAN".

There are two key areas for multilateral cooperation:

One, encourage joint R&D and deployment of open RAN. Joining forces with telecommunications technology leaders Japan, South Korea, Finland, and Sweden will harness the knowledge of the world's telecommunications experts. It will also incentivize the relevant companies and Governments to promote open architecture as a preferred alternative.

Two, promote multilateral 5G policies. The world's leading democracies working in concert have the purchasing power to ensure that an alternative to the 5G status quo is viable. Multilateral coordination will help tech-leading democracies regain the competitive edge in global telecommunications and be able to proliferate more secure and robust communications infrastructure to middle powers. Working in concert to help Ericsson, Nokia, and Samsung transition to a revamped industry based on open interfaces will help to cement critical support.

Preserving America's Edge in Semiconductors[5]

Semiconductors comprise foundational technology for the 21st century. This sophisticated hardware is essential for computing, communications, and critical infrastructure, and is a key enabler of fields such as robotics and AI. Semiconductors are the backbone of modern military and economic power. The United States has a major global lead in semiconductor design, a considerable technological strength which China looks to challenge through a concerted technology indigenization and

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[4] These recommendations are derived or pulled directly from the forthcoming report *Open Future: The Way Forward on 5G*, for which the witness is the lead author.

[5] These recommendations are derived or pulled directly from *The American AI Century: A Blueprint for Action*, for which the witness was the lead author, from Martijn Rasser, "Countering China's Technonationalism", *The Diplomat*, April 24, 2020, *https://thediplomat.com/2020/04/countering-chinas-technonationalism/*, and from *Rising to the China Challenge: Renewing American Competitiveness in the Indo-Pacific*, for which the witness was a coauthor.

innovation effort. To safeguard and preserve its advantage, the United States should pursue a three-part multinational strategy.

One, is to enact multilateral export controls in concert with allies and partners, to protect their collective competitive edge in hardware. China is currently heavily dependent on imports of foreign-manufactured semiconductors to meet internal demand. As part of its Made in China 2025 plan, China is looking to reduce its reliance on foreign chips by ramping up domestic semiconductor production.[6] Yet this desire to indigenize production is a major source of strategic leverage for the United States.

To accomplish this goal, China needs foreign imports of semiconductor manufacturing equipment (SME), which are the equipment and tools needed to establish a chip fabrication facility, or foundry. The global SME market is highly centralized, with the United States, Japan, and the Netherlands accounting for 90 percent of global SME market share.[7] In key areas the market is even more concentrated. A single Dutch company is the sole supplier of extreme ultraviolet lithography machines required to make the latest generation of semiconductors.[8] Nearly the entire global supply of photoresists, chemicals essential to the production of semiconductors, is produced by a handful of companies based in the United States, Germany, Japan, and South Korea.[9]

The Commerce Department and State Department should work with key allies and partners (the Netherlands, Japan, South Korea, and Singapore) to establish multilateral export controls on SME, restricting sales to China. While export controls on semiconductors themselves should be rare and targeted, such as the action against Huawei and a handful of other companies linked to the Chinese military, the United States should enact broad restrictions on sales of SME to China, working in concert with allies and partners, in order to sustain the U.S. advantage in hardware.

Two, is to secure and diversify semiconductor supply chains by setting up new semiconductor manufacturing facilities known as "fabs". The United States should lead the creation of a semiconductor fab consortium, consisting of the like-minded countries that produce and consume much of the world's chipset output.

These countries—such as the United States, Germany, France, South Korea, Japan, the United Kingdom, and the Netherlands—could collaborate to set up new fabs outside of China.

These countries have a common interest in moving semiconductor supply chains out of China and introducing greater geographic diversity in global semiconductor supply chains. Taiwan in particular plays an outsized role in the global semiconductor market and its proximity to China makes it vulnerable to espionage, sabotage, and blockades. The consortium could serve as a mechanism to cooperate with Taiwan on safeguarding its semiconductor industry against undue Chinese influence. One way to do this is building new production capacity elsewhere, such as the agreement the United States concluded with Taiwanese semiconductor firm TSMC. Consortium members can also help Taiwan with investment screening and building safeguards against Chinese attempts to siphon human capital.

Three, is to lay the foundation for the next generation of microelectronics. This entails doubling down on R&D. Breakthroughs in areas such as novel materials and microelectronics design will be necessary to continue effective transistor scaling—the process of increasing the number of transistors on a single chip—because re-

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[6] "The Potential Impacts of the Made in China 2025 Roadmap on the Integrated Circuit Industries in the U.S., EU and Japan", working paper, U.S. International Trade Commission, August 2019; "Addition of Entities to the Entity List and Revision of an Entry on the Entity List", 84 FR 121 (June 24, 2019); Ana Swanson, Paul Mozur, and Steve Lohr, "U.S. Blacklists More Chinese Tech Companies Over National Security Concerns", *New York Times*, June 21, 2019; Ana Swanson and Paul Mozur, "U.S. Blacklists 28 Chinese Entities Over Abuses in Xinjiang", *New York Times*, October 7, 2019; and Department of Commerce, "Addition of Certain Entities to the Entity List", Richard Ashooh, 15 CFR Part 744, October 7, 2019, *https://s3.amazonaws.com/public-inspection.federalregister.gov/2019-22210.pdf.*

[7] John VerWey, "What's Causing U.S. Semiconductor Equipment Production and Exports To Grow?" Usitc.gov, January 2019, *https://www.usitc.gov/publications/332/executive-briefings/ebot-john-verwey-semi-manufacturing-equipment-pdf.pdf.*

[8] "The Health and Competitiveness of the U.S. Semiconductor Manufacturing Equipment Industry", working paper, U.S. International Trade Commission, July 2019, *https://www.usitc.gov/publications/332/working-papers/id-058-the-health-and-competitiveness-of-the-sme-industry-final-070219checked.pdf.*

[9] "Photoresist", *Science Direct*, *https://www.sciencedirect.com/topics/engineering/photoresist*; and Kiran Pulidindi and Soumalya Chakraborty, "Photoresist and Photoresist Ancillaries Market Size By Product", *Global Market Insights*, *https://www.gminsights.com/industry-analysis/photoresist-and-photoresist-ancillaries-market.*

searchers are approaching the physical limitations of silicon, the prevailing semiconductor material.

Mechanisms to promote multinational collaboration range from personnel exchanges to establishing cooperative international R&D centers at home and abroad. DARPA's Electronics Resurgence Initiative could serve as a model for what an expanded multinational effort could look like.[10] Such collaborative relationships can be encouraged by enhancing visa and work permit regimes, providing grants and loans, and organizing multinational innovation prize competitions. Such competitions could be modeled on DARPA's series of Challenges and the XPRIZE competitions, which have successfully tackled some of the toughest science and engineering problems.[11]

In closing, U.S. technological leadership is a core component of the economic competition with China. To maximize its potential in this competition, the United States should craft a national strategy for technology that has collaboration and cooperation with allies and partners as a key feature. Working in concert, the world's tech-leading liberal democracies can build and maintain a vibrant, innovative global economy, all while promoting and protecting democratic norms and principles and blunting Chinese mercantilist policies.

I look forward to your questions.

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[10] Defense Advanced Research Projects Agency, DARPA Electronics Resurgence Initiative: *https://www.darpa.mil/work-with-us/electronics-resurgence-initiative*.

[11] Prize Challenges, Defense Advanced Research Projects Agency, *https://www.darpa.mil/work-with-us/public/prizes*; "AI to Solve the World's Grand Challenges", XPRIZE Foundation, *https://www.xprize.org*.

RESPONSES TO WRITTEN QUESTIONS OF CHAIRMAN CRAPO FROM WALTER RUSSELL MEAD

Q.1. Mr. Mead, you write extensively on the threats that China poses to U.S. economic competitiveness—including the threat of cyberattacks. The Idaho National Laboratory in my hometown of Idaho Falls is a world leading institution that pursues research into and development of leading edge strategies and methods to secure our Nation's industrial control systems and critical energy infrastructure. With this context, in mind, I have two questions.

What are the potential disruptive effects that a successful cyberattack could have on our economic competitiveness?

A.1. As American companies have adopted the revolutionary information technologies that the internet has offered, they have become more effective but also more vulnerable. Cyberattacks can take different forms and threaten the economy in different ways.

The first threat is that of cyberespionage or intellectual property theft. Industrial espionage has existed at least since the Byzantine emperor sent some of his subjects to China to learn how to make silk almost 1,500 years ago, and it is as formidable a threat as it is old. Chinese hackers have become notorious for stealing research from American firms, but they are not the only bad actors: the scientists racing to find a cure to the coronavirus have had to remain vigilant against cyberattacks.

Perhaps an even greater danger comes from hackers who destroy data or make it unusable. Some use viruses to encrypt data, making it unreadable, and then demanding money from their victims to undo the damage. These so-called ransomware attacks have briefly crippled hospitals and other companies, but the costs have been fortunately low so far. But there is no guarantee that it will remain that way. What would be a reasonable price if the formula for a coronavirus vaccine is locked away? Or if the operating system for a key power utility is corrupted? These dangers, and more, are also present when a cyberattacker is motivated not by money, but by a desire to harm the United States.

Q.2. What is the importance of ensuring that our Nation is prepared to prevent, identify, and address any efforts to compromise our cybersecurity?

A.2. Robust cybersecurity is important for many reasons, but I would like to briefly touch on two. The first is for protecting secrets vital to national security. Decoding enemy communications was one of the Allies' greatest advantages during World War II. After British scientists like Alan Turing used some of the first computers to break the German Enigma codes, the battle in Europe swung dramatically in the Allies' favor. German submarines that had previously been invisible were suddenly easy to find and troop movements were discovered before they had even begun. American codebreakers earned similar advantages over their Japanese counterparts and gave the U.S. Navy the advance warning it needed to win the Battle of Midway. Internet communications today are as important as radio messages were 80 years ago, and they are just as vital to keep secure.

The second reason is that it is more difficult to know what a measured response to a cyberattack looks like, weakening deter-

rence. U.S. Government agencies and private firms are victims of cyberattacks on a routine basis. The attacks come from non-State actors and foreign Governments alike. It is not clear what sort of attack prompts a military response. It is less clear still what sort of response would be effective. A weak response could prove meaningless, a forceful one could lead to dangerous escalation. In order to have a symmetric and effective response to cyberattacks, the U.S. will need to enhance its ability to trace the origin of cyberattacks. Cyberweapon programs are cheaper, faster to develop and more difficult to detect than the nuclear weapons programs of the Cold War. Because of this, the U.S. cannot trust arms control treaties to limit the spread of cyberweapons programs. The U.S. must rely on cybersecurity programs and intelligence agencies to prevent and identity cyberattacks.

I would add that, from an economic perspective, the fear of espionage and cyberattacks is likely to reduce the utility of the internet for U.S. companies. The success of the U.S. economy in the information age is due in part to the ability to move many elements of business online. Financial institutions have legitimate concerns that a cyberattack could compromise their security and lead to significant losses. For instance, the effect of a cyberattack at the present moment, when more U.S. white collar workers conduct business remotely than ever before, would be devasting. If U.S. firms cannot trust in the security of their networks, they will have to limit the extent to which they conduct business through the internet.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR SINEMA FROM WALTER RUSSELL MEAD

Q.1. With the understanding that effective AML/CTF responses may require bilateral or multilateral cooperation, as such criminal activity is not geographically confined, what recommendations do you have for approaching these threats knowing that it may be necessary to cooperate with non-allied Nations?

A.1. Given the global nature of the threat, the United States should cooperate as broadly as possible. However, since a number of non-allied States actually support criminal activities and others are penetrated to varying degrees by powerful, corrupt non-State actors, such cooperation will need to be carefully managed, and in some cases will not be advisable at all.

Q.2. China has added U.S. defense firms to its sanctions list. Is this a serious economic threat to the defense supply chain in the United States?

A.2. U.S. defense firms have had limited interactions with China since 1989. The direct impact to our defense supply chain is minimal. The sanctions are, first and foremost, a warning to the U.S. to limit its engagement with Taiwan. Diplomatic shifts with Taiwan are occurring, but sanctioned firms such as Lockheed Martin have sold products to Taiwan for decades. In recent years, though, China has increased its belligerent behavior in East Asia. The Hong Kong national security law is an ominous sign of the CCP's long-term ambitions vis a vis Taiwan. China's maritime claims over

the South China Sea threaten regional security and international trade. The CCP has shown a willingness to conduct military drills in disputed parts of the South China Sea. Last month's missile launches in the South China Sea make this clear. The U.S. has responded to China's aggression, amongst other things, with sanctions and tariffs of its own. China's sanctions are a response the U.S.'s continued commitment to its East Asian partners' security. The sanctions do not pose a direct economic threat to U.S. defense firms but they do signal an increased effort on the part of the CCP to force the U.S. out of East Asian security.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR SINEMA FROM J. CHRISTOPHER GIANCARLO

Q.1. With the understanding that effective AML/CTF responses may require bilateral or multilateral cooperation, as such criminal activity is not geographically confined, what recommendations do you have for approaching these threats knowing that it may be necessary to cooperate with non-allied Nations?

A.1. The United States cooperates with countries around the world on a broad range of anti–money laundering and criminal issues. There are a number of existing mechanisms that enable that cooperation, including The Egmont Group of Financial Intelligence Units, which is a multilateral forum that brings together 166 countries and enables them to share information confidentially to combat money laundering, the financing of terrorism, and other offenses. Similarly, the United States shares information through MLAT exchanges, bilateral engagements, and other multilateral fora. As just one example, the United States and Gulf Cooperation Council countries formed the Terrorist Financing Targeting Center several years ago to work together specifically to combat terrorist financing. I believe that these types of exchanges are very important to preventing abuse by bad actors of the international financial system and should continue.

Q.2. China has added U.S. defense firms to its sanctions list. Is this a serious economic threat to the defense supply chain in the United States?

A.2. My professional expertise and Government service experience is concentrated in financial and commodity derivatives markets, emerging cryptocurrencies, and central bank digital currency. That background makes me ill-equipped to provide an informed opinion on this important question of national security.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR SINEMA FROM TIM MORRISON

Q.1. With the understanding that effective AML/CTF responses may require bilateral or multilateral cooperation, as such criminal activity is not geographically confined, what recommendations do you have for approaching these threats knowing that it may be necessary to cooperate with non-allied Nations?

A.1. Reply not received in time for publication.

Q.2. China has added U.S. defense firms to its sanctions list. Is this a serious economic threat to the defense supply chain in the United States?

A.2. Reply not received in time for publication.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR SINEMA FROM LISA D. COOK

Q.1. With the understanding that effective AML/CTF responses may require bilateral or multilateral cooperation, as such criminal activity is not geographically confined, what recommendations do you have for approaching these threats knowing that it may be necessary to cooperate with non-allied Nations?

A.1. Reply not received in time for publication.

Q.2. China has added U.S. defense firms to its sanctions list. Is this a serious economic threat to the defense supply chain in the United States?

A.2. Reply not received in time for publication.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR CORTEZ MASTO FROM MARTIJN RASSER

Q.1. You have proposed that the U.S. and like-minded allies, such as Australia and European partners, undertake a multilateral effort to proactively handle emerging technology policy. How would we operationalize such an alliance? In the U.S. interagency, which department should run point on this effort and what kind of resources would be needed to ensure it could lead such a comprehensive policy? What can Congress do to best support this effort?

A.1. The first step in operationalizing this effort is developing an actionable blueprint that addresses the bureaucratic considerations (such as membership, organization structure, functioning, and institutionalization) and outlines what the organization's top priorities should be. Together with colleagues in Europe and Asia-Pacific, I led an effort to do exactly that. The resulting report is nearly complete, and I will forward it to your staff and the committee clerk as soon as it is ready.

While this project did not focus on the mechanics of how each member country would run this effort, for the United States suitable lead entities would be the Department of State or the Office of Science and Technology Policy (OSTP)/National Science and Technology Council. Resources required include having the requisite representatives from the departments of State, Commerce, Treasury, Energy, and Defense, and agencies and offices such as OSTP, National Science Foundation, and the Office of the United States Trade Representative attend the grouping's meetings as appropriate. As envisioned, the grouping's gatherings would rotate similar to the G7's model and would not require a sizeable permanent staff to keep operating costs down.

There are at least three ways Congress could support this effort. One is to publicly highlight the merits of a strategic multilateral approach to technology policy with a series of expert-led Congressional hearings. Two is to pass a Sense of Congress resolution to

formally express support for the concept. Three is to appropriate funds to support U.S. leadership of and participation in such a grouping.

Q.2. Two years ago, Congress reformed the CFIUS process which has helped address the impact of Chinese investment in critical sectors. While some countries have started developing similar processes, many strategic partners are only beginning to review Chinese investments in critical sectors. How can we help those allies emulate a CFIUS like process? Does the Department of Treasury or another department have the capabilities to lead a comprehensive interagency campaign to work with our partners and allies and provide technical assistance? If not, what is needed to support a comprehensive investment screening effort with partners and allies?

A.2. A straightforward and affordable way to improve investment screening by strategic partners is better information sharing. A first step could be the creation of a joint database of legal, extralegal, and illicit Chinese activities aimed at acquiring foreign technology across North America, Europe, and the Asia-Pacific region. The database should include a list of companies, research institutes and individuals affiliated with or collaborating with the People's Liberation Army and China's State security apparatus. Ideally, the list would be accompanied by a set of risk indicators to help public and private actors from alliance member States identify entities of concern.

Information on China's technology transfer organizations, talent programs, and State-backed investors and their activities should also be shared among America's strategic partners. At the same time, existing cooperation agreements and projects with Chinese entities in key emerging technology areas should be reviewed to identify potential vulnerabilities.

The Treasury Department's Office of Investment Security and the State Department's Bureau of Economic and Business Affairs have limited capacity to spearhead a multilateral and collaborative approach to investment screening, for lack of a strategic process and insufficient staff. A critical deficit in both departments is the inability to provide the requisite technical assistance due to budget and manpower shortfalls.

I thank my CNAS colleague Elizabeth Rosenberg for sharing insight to help craft this response.

Q.3. Through observing the ongoing human rights crisis against Uyghurs and other minorities in Xinjiang, we have seen how the Chinese Government harnesses cutting-edge technology in order to repress and surveil its citizens. We also know that last year, the Chinese Government was using equipment from a U.S. biotechnology company in order to conduct its DNA collection and surveillance of Uyghurs. How can the U.S. Government and companies ensure that U.S. technology is not being used for malign purposes? How can we ensure that U.S. allies also have safeguards in place to ensure that their innovation is not used to carry out human rights abuses?

A.3. Measures to address ethical and human rights risks of science and technology (S&T) cooperation with untrustworthy entities

should be a priority, particularly with regard to frontier applications of AI and biotechnology.

As my colleagues and I noted in the report the American AI Century:

> To prevent U.S. AI companies from enabling human rights abuses, Congress should modernize P.L. 101-246, Title IX, which "restricts the U.S. licensing of exports and reexports of crime control and crime detection equipment and instruments listed in the Export Administration Regulations to China." This modernization should include hardware incorporating AI-enabled biometric identification technologies such as facial, voice, and gait recognition. Additionally, the White House should levy further sanctions on and expand the Department of Commerce Entity List to include businesses and entities that provide oppressive technology, training, or equipment to authoritarian regimes implicated in human rights abuses.
>
> Congress also should consider legislation to prevent U.S. entities from investing in companies that are building AI tools for oppression, such as Chinese AI company SenseTime. The United States can exert further pressure by invoking the Global Magnitsky Act to sanction foreign individuals involved with human rights abuses. These actions are necessary to provide guardrails around legitimate U.S.–China AI cooperation and ensure that U.S. organizations do not contribute inadvertently to human rights abuses.

The Administration has undertaken important action such as using the Entity List and sanctions authorities to expose companies supporting repression of Uyghurs and forbidding U.S. entities from dealing with them. The Xinjiang Supply Chain Business Advisory is also a useful resource. To strengthen U.S. policy, the Administration should work to fully implement the Uyghur Human Rights Policy Act of 2020.

The United States should also launch a multinational dialogue with its allies on research integrity, aimed at developing common guidelines for universities, grantmaking institutions, businesses, and Government agencies engaged in foreign research collaboration with nondemocratic Nations. The exchange should be multistakeholder and focus on protecting sensitive technical information, IP, and national security while safeguarding the openness of scientific inquiry. Measures to address ethical and human rights risks of science and technology (S&T) cooperation with untrustworthy entities should be another priority.

I thank my CNAS colleague Elizabeth Rosenberg for sharing insight to help craft this response.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR SINEMA FROM MARTIJN RASSER

Q.1. With the understanding that effective AML/CTF responses may require bilateral or multilateral cooperation, as such criminal activity is not geographically confined, what recommendations do

you have for approaching these threats knowing that it may be necessary to cooperate with non-allied Nations?

A.1. The topic of AML/CTF is outside my areas of expertise. I'm afraid that I'm not in a position to offer an informed response to this question.

Q.2. China has added U.S. defense firms to its sanctions list. Is this a serious economic threat to the defense supply chain in the U.S.?

A.2. U.S. defense firms have limited exposure to China and generally would not be materially impacted by sanctions, which to date have only been announced for Lockheed Martin and remain unspecified. (An exception is Boeing, which builds both defense and commercial aircraft and has significant commercial airline sales to China. Chinese dependence on Boeing to maintain its fleet of commercial aircraft, however, make sanctions on Boeing unlikely.) There is, however, one defense area where Chinese sanctions could pose a serious risk to the U.S. defense supply chain: rare earth elements (REE).

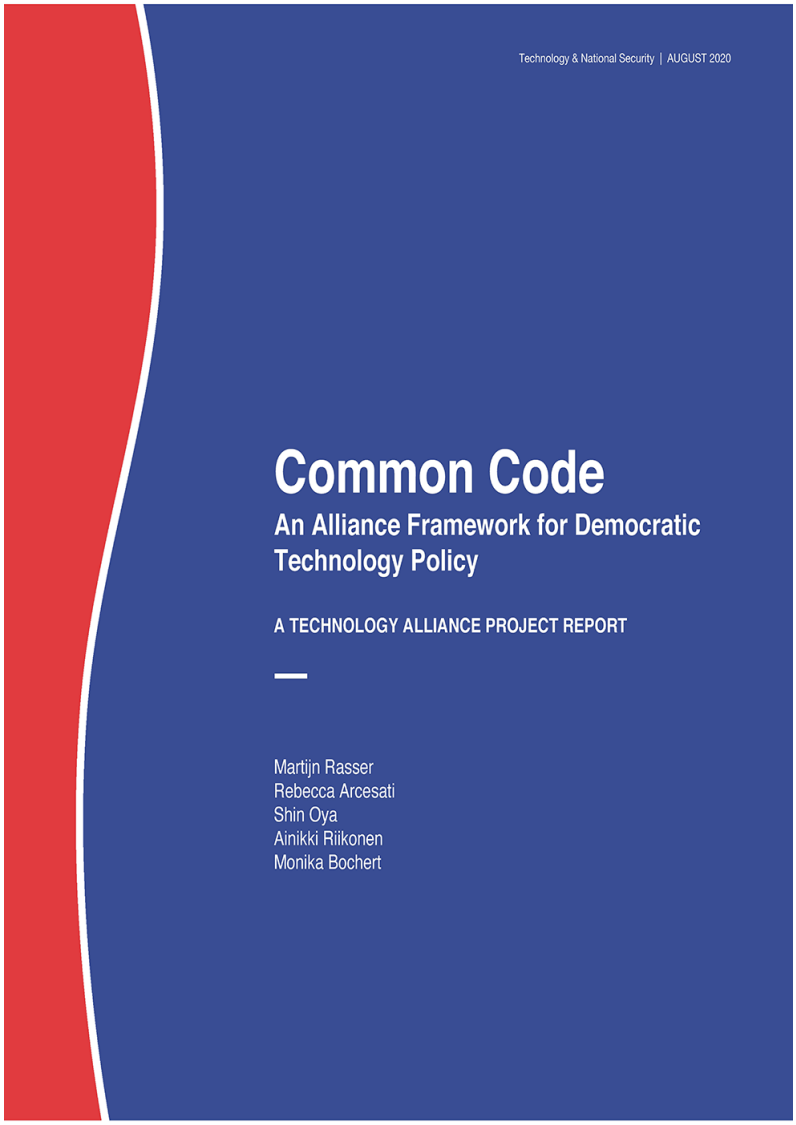
REE are essential materials for components such as optical fiber, missile guidance systems, and fin actuators. A single F-35 aircraft produced by Lockheed Martin, for example, contains more than 900 pounds of REE. China currently dominates the global rare earths industry, accounting for most mining and having a near lock on global processing capacity. Should China cut off REE supplies to Lockheed Martin, as a *Global Times* article from July 14 suggested it would, it could disrupt F-35 production. Other defense articles that rely on REE could similarly be impacted. China has threatened sanctions on various other defense firms, including Raytheon, General Dynamics, BAE, and Oshkosh.

The U.S. Government should take urgent steps to mitigate the risk of disruption to rare earth element supplies. As my colleagues and I noted in the report Rising to the China Challenge:

> The U.S. Government can take a number of important steps to help reduce U.S. reliance on China for rare earths. The U.S. Department of Defense, for instance, has already initiated efforts to expand mining and processing of rare earths outside China, including in Australia. To reduce dependence on overseas suppliers more generally, Congress should ensure funding for the Department of Commerce's plan to reinvigorate mining and processing of rare earths in the United States, and Department of Energy research into and scaling of rare earth recycling from consumer products, which can stretch existing U.S. supplies. Finally, Congress should support Department of Energy efforts to develop artificial substitutes, which have proved capable of reducing dependence on rare earths altogether.

ADDITIONAL MATERIAL SUPPLIED FOR THE RECORD

COMMON CODE: An Alliance Framework for Democratic Technology Policy



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Executive Summary

The 21st century will be defined by competition—a contest of economic power rooted in technological advances. How countries decide to compete will shape the lives of billions of people. Technology-leading countries will determine how to harness new technologies to combat disease, feed humanity, counter climate change, gain wealth, explore the universe, gain influence over others, secure their interests, and protect their independence and freedom. The leaders in adopting emerging technologies such as AI, quantum computing, biotechnology, and next-generation telecommunications, and those who shape their use, will garner economic, military, and political strength for decades.

The world's liberal democracies stand at a crossroads. Political power and economic might is diffusing. The integrity and efficacy of postwar institutions are increasingly challenged. Fresh thinking and new approaches are needed to tackle the challenges ahead to ensure that the future of technology is a beneficial one.

No one country can achieve this on its own. The requisite knowledge and capabilities are too dispersed. Broad-based, proactive, and long-term multilateral cooperation among like-minded countries is needed to maximize effectiveness across a range of areas, including research and development (R&D), supply chain diversity and security, standards-setting, multilateral export controls, and countering the illiberal use of advanced technology. To achieve the necessary level of coordination and collaboration, the world's tech-leading democracies should spearhead the creation of a new multilateral architecture for technology policy—a technology alliance.

Technological leadership by the world's major liberal-democratic nations will be essential to safeguarding democratic institutions, norms, and values, and will contribute to global peace and prosperity. A unified approach by like-minded nations also is needed to counteract growing investments in and deployments of emerging technologies by authoritarian, revisionist powers.

Many have made the case for such a grouping, most notably the United Kingdom's recent call for a "Democracy 10" to tackle 5G and other technology issues.[1] Similarly, former U.S. government officials have advocated for the creation of a "Tech 10."[2] Despite this interest in a new coordination mechanism for multilateral technology policy, the work needed to create it has been elusive.

This document lays out what that alliance framework should look like, the opening chapter of a new, multilateral techno-democratic statecraft strategy for the 21st century. It answers the key questions needed to move from concept to an actionable blueprint necessary to tackle the 21st century technology competition:

- What countries should be members of the technology alliance, and why?
- Should the alliance be able to collaborate with non-members, and why?
- Should the alliance grow, and how?
- How should the alliance be organized and structured?
- What is the ideal voting system?
- How should the alliance engage with stakeholders from industry and civil society?
- What is the best meeting structure and frequency?

After detailing recommendations for creating the technology alliance itself, the blueprint addresses the new organization's top priorities, areas where the project leads identified both a common code between the proposed member countries and an urgent need for improved coordination:

- Restructure supply chains with a focus on security and diversity
- Safeguard competitive technological advantages with tailored multilateral export controls and by curbing unwanted technology transfers
- Fund and build secure digital infrastructure by creating new investment mechanisms
- Craft standards and norms for a beneficial technology future.

The technology alliance's longer-term agenda should include efforts to:

- Pursue joint R&D
- Engage in technology forecasting
- Focus on data flows
- Promote technology interoperability
- Counter disinformation and other illiberal uses of technology
- Maximize human capital.

A summary of recommendations that answers these questions and expands on the tech policy priorities follows. The body of the report consists of seven sections. They detail the case for why collective action by the world's tech-leading democracies is needed, present the purpose and goals of the proposed grouping, make recommendations on the bureaucratic considerations to create it, discuss the common code for technology policy with specific courses of action, and close with a preview of what steps follow.

Summary of Recommendations

CREATING A TECHNOLOGY ALLIANCE

Recommendation 1: Establish a technology alliance of the following core members: Australia, Canada, European Union (EU), France, Germany, Italy, Japan, South Korea, Netherlands, United Kingdom, United States.

- Membership criteria are countries with large economies and broad capabilities in technology areas critical to the 21st century economy. They must be committed to liberal democratic values, the rule of law, and respect for and promotion of human rights.
- The EU would be a core member with no voting power on alliance activity. The EU can engage in agreed-to actions in line with its competencies.

Recommendation 2: Create a mechanism to collaborate with other countries and organizations.

- Countries and organizations beyond alliance founding members still bring to bear significant expertise that is key for broader technology policy objectives.

Recommendation 3: Plan for a modest expansion of core membership.

- Growing the group should be considered once the alliance framework is proven. India is a logical candidate for member expansion.

Recommendation 4: Create an informal organization and adopt a network structure for organizational architecture.

- The organization would not be subject to a formal treaty.
- A network approach promotes nimble decisionmaking and preserves equal standing among member countries.

Recommendation 5: Use a consensus-based "one-member, one-vote" system to start.

- Consensus among the members is necessary to avoid a relapse to fractious, ad hoc decisionmaking.
- Additional alternative voting structures could be added once the alliance concept is proven and mature.

Recommendation 6: Ensure multi-stakeholder participation to inform alliance decisions and actions.

- The views and technical expertise of actors from industry, NGOs, scientific and technical organizations, and academia are essential for effective policy action.

Recommendation 7: Hold regular meetings, especially between working-level officials and stakeholders.

- The technology alliance would be most effective if regular meetings occur.
- Heads of state and ministers to provide strategic direction (annually), senior government representatives to set goals (quarterly), mid-level officials to guide implementation (as needed), and working groups and committees of subject matter experts to inform actions and implementation (as needed).

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TOP PRIORITIES: THE COMMON CODE FOR ACTIVATING THE TECHNOLOGY ALLIANCE

Recommendation 8: Secure and diversify supply chains

- Member countries would benefit from coordinating and cooperating on the scope, process, and policy instruments to diversify important supply chains, which is a complex and expensive effort.

  Proposed Area of Focus: Establish a semiconductor fab consortium.

  - Complex supply chains foundational to economic and national security—such as semiconductors—are particularly well suited for an international cooperative approach. Semiconductor manufacturing facilities, referred to as "fabs," are expensive, costing between $10 and $20 billion.

Recommendation 9: Protect critical technologies

- Protecting technologies and know-how from theft, usurpation, and misuse is foundational to safeguarding economic and national security.

  Proposed Area of Focus: Align export controls for semiconductor manufacturing equipment.

  - Restrictions on semiconductor manufacturing equipment (SME) exports to China would be an effective way of maintaining a technological competitive advantage in semiconductor fabrication.

  Proposed Area of Focus: Strengthen information sharing on Chinese technology transfer activities.

  - Share knowledge and experience and assist other members with investigating unwanted tech transfer would make this acquisition pathway much more challenging.

  Proposed Area of Focus: Harmonize definitions of "critical technologies"

  - Agreement here would improve actions on a range of technology policy issues from investigating export control violations to joint studies on the trajectory of technological change.

  Proposed Area of Focus: Share counterintelligence best practices and provide capacity building for industry.

  - Better cooperation on commercial espionage, which costs alliance members $100s of billions each year, would help to protect valuable technology and know-how.

  Proposed Area of Focus: Develop guidelines for research integrity.

  - Such guidelines should emphasize addressing the balance between protecting sensitive technical information and openness for scientific inquiry, and addressing human rights and other ethical risks of international cooperation in science and technology.

Recommendation 10: Create new investment mechanisms

- Democracies have shared interests in promoting secure digital infrastructure built by fair and sustainable investment mechanisms. Digital infrastructure provides a backbone for economic and societal connectivity, but low-quality vendors pose risks for the confidentiality, integrity, and accessibility of infrastructure.

  Proposed Area of Focus: Pool resources to create a multinational investment mechanism for digital infrastructure.

  - Build on existing capacity to prioritize secure digital infrastructure development in middle powers and developing countries.

Proposed Area of Focus: Establish common criteria to certify fair investments.

- Use the Blue Dot Network certification model as the foundation for broader sound and sustainable development projects.

Proposed Area of Focus: Pursue new approaches to digital infrastructure.

- Promoting novel ways of building out digital infrastructure could position firms in member countries to compete effectively on level playing fields. For example, promoting open radio access networks for 5G wireless networks would reintroduce competition, widespread innovation, and vendor diversity to the telecommunications sector.

Recommendation 11: Reclaim the integrity of international standards-setting

- China is pursuing a comprehensive strategy to have Chinese-origin technologies be the foundation for global technology platforms and reduce its dependence on foreign intellectual property (IP) and standards. The way the Chinese government links standardization with mercantilist industrial policies is at odds with the purpose and spirit of international standards-setting.

Proposed Area of Focus: Counter unfair practices in international standards-setting bodies.

- Member countries can preserve the integrity of global standards-setting by making resources available for companies to send full delegations and submit the broadest possible portfolio of technologies to standards-setting bodies for consideration, and to call for reforms of the bodies to prevent bloc-voting.

Recommendation 12: Codify norms and values for technology use

- Core alliance members, in cooperation and coordination with partner countries and relevant companies and civil organizations, should define and diffuse the norms and principles for how technology should and should not be used.

Proposed Area of Focus: Establish unified norms for the use of surveillance technology.

- The alliance framework is a useful forum to come to agreement on how surveillance capabilities should fit into existing legal structures, what types of due process should be available, and what uses are acceptable.

LONGER-TERM AGENDA FOR ALLIANCE ACTIVITY

Recommendation 13: Evaluate the broad array of other technology policy areas ripe for multilateral cooperation by tech-leading democracies. They include efforts to:

- Pursue joint R&D, and related IP rights improvements and intra-alliance export control reforms
- Engage in technology forecasting
- Focus on data flows, such as unified policies for data governance and data privacy
- Promote technology interoperability
- Counter disinformation and other illiberal uses of technology
- Maximize human capital.

Methodology

The Technology Alliance project considers how technology will be at the center of the new era of great power competition. CNAS initiated the project with the understanding that whoever leads in the development and adoption of emerging technologies such as AI, quantum computing, biotechnology, and next-generation telecommunications will garner economic, military, and political strength for decades.

The project and this report are a collaboration of researchers from CNAS, the Asia Pacific Initiative (API) and the Mercator Institute for China Studies (MERICS). Together, they ensured diverse input from global stakeholders in the public sector, academia, and industry.

The goal for this phase of the project, which ran from March through June 2020, was to craft a blueprint for how and in what areas tech-leading democracies should coordinate multinational technology policy. This blueprint is the document you are reading now.

To launch the project and to frame the debate, the project leads—Martijn Rasser (CNAS), Rebecca Arcesati (MERICS), and Shin Oya (API)—made available a discussion draft outlining the need for and purpose of a new international organization for technology policy. The document laid out the specific considerations for a technology alliance: membership, organizational structure, governance, functioning, institutionalization and member representation, and proposed areas of activity. This draft was posted on GoogleDocs and generated rich and fruitful online discussions.

To delve into these issues further, the project leaders hosted three virtual workshops, one each in March, April, and May 2020. These events were tailored for the Washington, Tokyo, and Berlin time zones respectively to ensure maximum participation from stakeholders around the world.

A survey with 22 questions with multiple choice and freeform answers was sent to more than 600 people to solicit further feedback on these same topics. This provided an opportunity for others to share thoughts anonymously and in confidence. Parallel to this effort, selected multilateral organizations were reviewed to identify capabilities and gaps in existing structures through which technology policy coordination takes place. Finally, each project lead held one-on-one discussions with stakeholders from around the world. In all, nearly 200 people directly engaged on this project to inform the conclusions and recommendations presented in this report. The anonymized survey results and the overview of multilateral organizations will be released with the public version of this report.

The Case for a Technology Alliance

Multinational cooperation on technology policy is necessary to ensure that the world's liberal democracies are competitive economically and their citizens empowered in the 21st century. With economic power comes geopolitical might. Increasingly, technological leadership means safeguarding one's sovereignty, values, and ideals. It also means providing a bulwark against increasingly destabilizing actions by autocratic governments.

Today, technology policy coordination is largely ad hoc, stovepiped, and disjointed. The resulting decisions and actions often fail to take into account the broader strategic context, blunting the effectiveness of the policies designed to achieve a desired outcome and impairing the ability to effectively respond to second- and third-order consequences, be they anticipated or unforeseen.

These inefficiencies are rooted in an underappreciation of how intricately linked the technology futures of the world's liberal democracies are. No one country can achieve the desired capabilities across the spectrum of technology areas—quantum computing, biotechnology, AI, robotics, and wireless telecommunications foremost—on its own. Nor can any single state muster the resources to nurture all the necessary talent and control vital supply chains needed to achieve and maintain such technological leadership. Broad-based, proactive, and long-term multilateral cooperation among like-minded countries is needed to maximize effectiveness across a range of areas, including R&D, supply chain diversity and security, standards-setting, multilateral export controls, and countering the illiberal use of advanced technology.

Better cooperation among democratic technology leaders also is needed to set the norms and standards for how technology is used. Emerging capabilities in fields like AI-enabled surveillance enable autocratic regimes in China, Russia, North Korea, Venezuela, and elsewhere to more effectively control and suppress their populations. The proliferation of such technologies erodes fragile democratic institutions in middle powers and developing countries around the world. These tech-leading democracies also should set the example at home by working together to build the legal and ethical frameworks for how such technologies are used in their respective countries.

A NEW GROUPING IS NEEDED

No existing multilateral grouping is equipped to navigate the complex waters of the development, use, and diffusion of the technologies that will be central to the 21st century great power competition. The status quo of uncoordinated and reactive technology policymaking for the major democratic technology powers in Asia, Europe, and North America means growing risk of ceding their technological leadership. China is investing ever more to achieve breakthroughs in areas such as AI, genomics, quantum computing, and telecommunications—the technologies on which the 21st century economy will be centered. China will be poised to reap the economic benefits and the accompanying geopolitical clout that prowess confers. Having China's government dictate the terms of the global economy is in no one's interest but Beijing's. It would erode the economic and national security of most countries.

Creating a beneficial technology future will require coordination and collaboration. Technology-leading countries—those with broad-based technological capabilities and committed to liberal norms like democracy, openness, transparency, inclusiveness and a rules-based order—should work together on a range of important but difficult technology matters.

While existing alliances and agreements such as NATO, the Organisation for Economic Co-operation and Development (OECD), and Wassenaar Arrangement signatories deal with aspects of technology policy, none are equipped to handle the range of largely interrelated issues that underpin the critical technologies

of the 21st century. They are also much too large for effective decisionmaking on such matters. The OECD, while a useful forum for tackling broad issues such as the responsible development of AI—and thus a potentially valuable partner for a technology alliance—is too big and diffuse. The G-7 is closest to being the right entity size-wise. Adapting the economic club to address technological issues, however, would require extensive restructuring and taking on new members, muddling the group's original purpose in the process.

Instead, the world's technology-leading liberal democracies—ten countries and the European Union—should join forces to create a collective foundation where each country can collaborate and compete. A key goal for this group should be to ensure a level playing field where the most innovative and dynamic companies succeed, not those swaddled by mercantilist industrial policies.

While China's rise as a technology power is certainly a factor for the need of a technology alliance, the overarching purpose of this proposed grouping should not be taking reactive measures to put China down. Rather, the main focus should be proactive: sensible measures to boost competitiveness, productivity, and innovation to build a beneficial technology future that is rooted in free and open markets and comports with liberal-democratic values.

SEIZING THE MOMENT

The pandemic crisis presents opportunity and urgency to act. The global order is at an inflection point where decisions made by world leaders in coming months will shape the world for decades. The stakes are high: long-term economic and technological competitiveness, critical infrastructure integrity and security, cohesion among the world's liberal democracies, and setting the norms for how emerging technologies should be used.

Broad-based collaboration and cooperation between like-minded countries will help to ensure that the upheavals of the post-pandemic world can be dealt with more effectively. It also will improve the chances that the coming decades are ones where their societies and economies can prosper, all while blunting the coercive power of authoritarian countries.

AVERTING PROTECTIONISM IN TECH-LEADING DEMOCRACIES

Technology policy coordination will be essential to help overcome the fissures developing between leading democracies on protectionism. A common reaction to the fallout of the COVID-19 pandemic has been to call for a retreat from globalization by "onshoring" or "reshoring" supply chains to various countries. There was some discussion along these lines before the pandemic, particularly in the United States, but the realization of how widespread the fragility of global supply chains is during the pandemic crisis prompted legislators and pundits in North America, Europe, and Asia to call for large-scale repatriation of manufacturing capabilities.

Furthermore, Beijing often threatens to weaponize economic interdependence,[3] such as an 80.5 percent anti-dumping tariff on Australian barley in response to Canberra's call for an investigation into the coronavirus outbreak and putting Germany's car industry in the crosshairs if Berlin excludes Chinese telecommunications equipment manufacturer Huawei from German 5G networks.[4]

However, total decoupling or complete reshoring are counterproductive, impractical, and ultimately unfeasible. Autarky and isolationism are not elements of a strategy for crafting a beneficial technology future. Geographic concentration of supply creates vulnerabilities no matter where in the world they are.

Even selective decoupling from China and a shift to managed interdependence present considerable hurdles. Supply chain restructuring and viable diversification impose major costs and political risk. What is

needed instead is a carefully thought-out and managed interdependence that strikes the balance between security, resilience, and efficiency.

While individual states can achieve some on their own, democratic allies and partners have a common interest in doing the same. Multilateral cooperation and coordination on such broad policy issues would lessen the economic impact and help to ease the burden on the inevitable but necessary upheaval these actions will create.

PROTECTING AND PROMOTING NORMS AND VALUES

Technological leadership by the world's major liberal-democratic nations also will be essential to safeguarding democratic institutions, norms, and values, and contribute to global peace and prosperity. Technology, sovereignty, and freedom are increasingly intertwined.

Democracies have not agreed among themselves on a positive agenda for how technologies ought to be used. Lack of agreement damages interoperability among otherwise like-minded states and also impairs democratic states' performance at standards-setting bodies. Despite the strength of their innovation ecosystems, democratic states have not consolidated common norms for emerging dual-use technologies like facial recognition and 5G. At standards-setting bodies, authoritarian states work with their innovation bases to pose standards contrary to democratic values.

Democracies can better shape global norms if they can build a critical mass on common values-based propositions for technology. They also can shape norms more powerfully if they coordinate their policy tools such as export controls on dual-use technologies or sanctions on harmful actors. Without a united vision for emerging technologies, democracies will continue to leave room for authoritarian regimes to abuse technology to entrench themselves and create pathways for democratic backsliding. Democracies can proliferate a positive vision for the future and blunt the expansion of high-tech illiberalism, but only if they work together.

ADDRESSING THE CHINA CHALLENGE TO DEMOCRATIC TECHNOLOGY POLICY

The Chinese Communist Party has a comprehensive vision for global high-tech dominance, which it hopes will bolster its economic competitiveness, military strength, and geostrategic interests. Technology areas such as 5G and AI are central to these ambitions. Beijing mobilizes national champions, influences international standards, develops information and communication technology (ICT) infrastructure worldwide through the Digital Silk Road, and exports surveillance technology.

For democratic technological powers, this poses three challenges. First, unfair competition and predatory technology transfers are central to China's technological advancements. Without a coordinated approach to technology protection, tech-leading democracies could see their technological and industrial bases diminished. China's rapid advances in a number of technologies—5G, quantum computing, AI, and genomics most prominently—have exposed the worrying lack of investment in innovation by many liberal democratic powers. Like-minded democracies seem more focused on competing among themselves, rather than on making the most of their collective R&D strength to fund joint initiatives and spur civilian and military technology innovation.

The second challenge is one of security. Beijing's strategy of military-civil fusion makes it increasingly difficult to assess when collaborations in advanced dual-use technologies with any Chinese entities are contributing to strengthening the People's Liberation Army (PLA)'s capabilities. In the case of Chinese dominance of global 5G networks, Beijing could collect enormous amounts of data, including sensitive personal, commercial, government, and military information and hold critical infrastructure at risk. Despite this, commercial and political considerations have led many democratic countries to rationalize the risks.

Finally, inaction may result in China gaining first-mover advantage in setting the standards and norms governing the development and deployment of emerging technologies such as facial recognition. This is a problem that democracies must address, as Chinese tech firms are enabling surveillance and persecution of ethnic minorities and optimizing mass social control in China.

These firms also are exporting hardware, software, and training packages for urban policing and surveillance to developing nations around the world, including to authoritarian countries with fragile institutions and dismal human rights records.[5] In addition to spreading digital repression, those partnerships allow Chinese firms to collect vast amounts of biometric data and improve their algorithms. China's surveillance state is expansive, and it threatens civil freedoms on a global scale.

Democracies' piecemeal approach to emerging technology standardization and regulation, coupled with their failure at addressing the global digital divide, facilitates the diffusion of China's preferred rules and norms, in turn threatening democracies' own competitiveness, security, and values. Deliberate, collaborative action will be necessary to effectively counteract China's strategy of exploiting the fissures between them.

Purpose and Goals

The purpose of the proposed technology alliance is threefold: regain the initiative in the global technology competition through strengthened cooperation between like-minded countries; protect and preserve key areas of competitive technological advantage; and promote collective norms and values around the use of emerging technologies.

In doing so, this group can best capitalize on the opportunities and mitigate the risks that go hand-in-hand in the technology competition and the broader great-power competition. Through collaboration, each technology alliance member and their partners can position themselves for strong economic growth and enhanced national security. At the same time, alliance members can ensure that the illiberal use of technology is limited and contained. Collectively, the countries can safeguard liberal-democratic institutions and act as a bulwark against authoritarian powers.

Creating a Technology Alliance

How well this new international technology policy grouping can achieve specific goals, fulfill its overall mission, and ultimately execute on its vision hinges on a set of bureaucratic considerations. First and foremost is deciding what countries should comprise the charter members. Representatives of these countries then must determine how to organize themselves for effective decisionmaking, setting policies and processes, and carrying out agreed-to actions.

CORE MEMBERSHIP: WHICH COUNTRIES AND WHY

Recommendation 1: The technology alliance should comprise the following core members:

- **Australia**
- **Canada**
- **European Union (EU)***
- **France**
- **Germany**
- **Italy**
- **Japan**
- **South Korea**
- **The Netherlands**
- **United Kingdom**
- **United States**

***Core member with no voting power on alliance activity. The EU can engage in agreed-to actions in line with its competencies.**

The recommended criterion for charter membership is that countries have large economies and broad capabilities in technology areas critical to the 21st century economy. They must be committed to liberal democratic values, the rule of law, and respect for and promotion of human rights. These countries must also have longstanding interest in international cooperation and coordination and share important defense and intelligence ties.

This project envisaged the creation of a multinational alliance that is mission-driven at its core. This means that founding members should broadly identify with the values and objectives defined in the problem statement. To ensure effective decisionmaking and overall functionality of the technology alliance concept, the core group must be small.

European participants from countries not part of the proposed group of countries made a strong case for the European Union (EU)'s participation in the Technology Alliance. The European Commission has played a leading role in advancing Europe's technology policy, from digital rights protection and 5G cyber security to key investment and norm-building initiatives pertaining to a range of emerging technologies, such as AI and quantum technologies. Meanwhile, the EU has many important competencies in areas such as research and technological funding, competition, and internal market policies.

The participation of the EU—and leading research and innovation hubs across its member states—therefore would maximize the alliance's effectiveness and impact, especially if members embark on even more ambitious activities such as joint R&D and cross-border innovation challenges. However, the organization will need to act as an observer in case of alliance decisions for which consensus among EU member states would be required.

The project leaders considered, but do not recommend, inviting India to be a part of the founding cohort. India's tradition of nonalignment in foreign policy and informal conversations with Indian government officials in March 2020 suggest that the country would not be interested in joining a technology alliance as a founding member. We believe, however, that the technology alliance and India would benefit from its eventual membership as noted below.

COLLABORATING WITH OTHER COUNTRIES

Recommendation 2: Create a mechanism to collaborate on technology policy beyond core member countries.

A nimble and inclusive technology alliance framework would include the capacity to work with other countries. Core alliance members may wish to involve other partners to achieve specific goals. There are numerous countries that, while lacking broad-based technology capabilities and economic heft, or not being fully aligned on all technology alliance goals, have significant expertise that is well suited to broader technology policy objectives. For example, core alliance members could work with Estonia and New Zealand on cyber security, Finland and Sweden on telecommunications, Austria and Switzerland on quantum computing, India on software development, and Israel on robotics and autonomous systems. A collective approach to assist with digital infrastructure development and technology deployments in developing countries around the world would help to blunt the illiberal use of technologies.

Technology alliance members also should consider working with other organizations on issues of mutual interest—NATO on cyber security, the OECD on the economic implications of certain technologies, and the Global Partnership on AI for relevant norms, for example.[6]

EXPANDING THE TECHNOLOGY ALLIANCE

Recommendation 3: Plan for a modest expansion of core membership.

Technology alliance founding members should plan for potentially growing the group once the concept and framework have proven effective. The bar to joining should be set high and require unanimous agreement by the founding members. Beyond considerations of economic heft and broad technological capabilities and normative liberal-democratic principles, care must be taken not to expand the group such that its effective functioning becomes imperiled. One logical candidate for member expansion would be India. The participation of India—the fifth largest global economy by nominal GDP and a vibrant technological ecosystem—would considerably broaden the group's reach and diversity and add developing country representation.

STRUCTURING AND ORGANIZING THE ALLIANCE

Recommendation 4: Create an informal organization and adopt a network structure to promote nimble decisionmaking and to preserve equal standing among member countries.

The single most important decision founding members will make during the creation of a technology alliance is choosing the proper organizational architecture. Structure dictates how an organization

pursues its objectives, how successful an organization is in achieving its mission, and how it benefits its members.[7]

An informal, network-based organizational architecture would allow alliance founding members to form flexible issue-based partnerships around specific projects and initiatives as diverse as the global technology landscape in the 21st century. Network organization entails having a flat management structure that leverages flexibility and the capacity to outsource tasks based on participants' knowledge and experience. It has been utilized most frequently in industry production, but many of its lessons can be transferred to the management of multilateral institutions.[8]

Project participants emphasized the need to minimize formal bureaucratic structures, at least at the outset. The alliance should be informal—not subject to a treaty. Other than a small permanent secretariat to organize meetings and manage the execution of agreed-to actions, substantive expertise and related recommendations should come from specialized, temporary working groups and task forces, which would well suit the purpose of an alliance of countries working on a range of technology-specific initiatives. Stakeholders and experts from government, industry, and civil society from each member country would make up these groups.[9]

ADOPTING A VOTING SYSTEM

Recommendation 5: Adopt a consensus-based "one-member, one-vote" system at the outset of alliance creation.

The proposed technology alliance will require consensus among its core members for any specific course of action to avoid a relapse to fractious, ad hoc decisionmaking on technology policy matters. This approach will be essential to ensuring the technology alliance concept is viable, as reflected in comments by workshop and survey participants. Decisions that entail regulatory alignment most likely would require unanimity.

Once the alliance concept is proven and has matured, alternative voting structures should be considered to allow for more flexibility and a broader range of activity. Numerous project participants noted that a variable voting process would be sensible, such as when a subset of core members have no direct stake in a specific matter. For example, two or more members kick-starting a joint initiative such as a joint innovation challenge or an initiative to draft norms and rules for gene editing that can be scaled at a subsequent stage. The Asia-Pacific Economic Cooperation (APEC) Pathfinders Initiative, which provides a mechanism for a subset of APEC economies to start work on a particular issue for eventual APEC-wide consensus, could serve as a model for how to do so.[10]

ENGAGING WITH OTHER STAKEHOLDERS

Recommendation 6: Ensure multi-stakeholder participation—particularly private industry, NGOs, scientific and technical organizations, and academia—to inform technology alliance decisionmaking.

Technology policy such as export controls, joint R&D, and curbs on investments directly impact corporations, research institutes and universities, and individual academics. Numerous international organizations have shared interests in setting norms and values for technology use. Incorporating the points of view, concerns, and technical expertise of these actors early on will be essential to technology alliance decisionmaking, planning, and execution. Involvement in the aforementioned working groups and task forces will be central to this effort.

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Project participants pointed to the OECD and the Global Internet Forum to Counter Terrorism for other best practices for participatory and multi-stakeholder governance.[11] They include:

- Engaging stakeholders early in the planning process, ideally by the time the problem statement has been defined and throughout the deliberation and planning process
- Establishing a consistent framework for multi-stakeholder engagement to ensure a set of minimum standards are met in terms of impact, scope, number of affected groups, information needs, timing of action, and resources available
- Providing stakeholders with relevant and timely information using non-technical language.

ESTABLISHING MEETING STRUCTURE AND FREQUENCY

Recommendation 7: Hold an annual head-of-state and ministerial-level meeting. Focus on regular meetings between working-level officials and stakeholders.

The technology alliance is likely to be most effective if regular meetings occur. For example, senior government representatives meeting quarterly to set overarching goals, mid-level government officials meeting as needed to guide implementation of the top-level guidance, and frequent meetings of working groups and committees to coordinate and execute the agreed-upon actions. An annual high-level meeting of country leaders and ministers would provide the overall strategic direction for the organization.

Government representation could consist of representatives of ministries of Foreign Affairs, Science and Technology, Trade, Commerce, Economics, Defense, or their approximate equivalents, with the advice of intelligence and security agencies. The working groups and committees would largely comprise subject matter experts from government, private industry, and academia.

Most workshop and survey participants agreed that the details of institutionalization would follow naturally from delineating the specific activities the core members agree to tackle.

The Common Code for Activating the Technology Alliance

The viability of a technology alliance rests squarely on a shared desire for multilateral cooperation and strong agreement on what areas of technology policy are most important to tackle. During the course of the project, we determined that not only is the requisite interest there, there is a remarkable alignment on what the initial technology policy priorities should be. To be effective, however, all core members must agree to specific courses of action to achieve clearly defined strategic outcomes.

RESTRUCTURE SUPPLY CHAINS

Recommendation 8: Secure and Diversify Supply Chains

The proposed technology alliance is well positioned to be the driver for much-needed supply chain resilience and diversity. The fallout from the pandemic made clear that efficiencies gained with increasing globalization came with widespread vulnerabilities. Diversifying supply chains geographically is needed to introduce greater resilience and security for key materials and products. Coordinated planning can reduce the cost and complexity of restructuring those supply chains identified as essential to the day-to-day functioning of society, while introducing greater resilience and security.

In the project roundtables and in other discussions, three considerations crystallized. One is that restructuring supply chains will require rethinking the balance between efficiency and resilience. The most cost-effective option is less likely to be the one that is most desirable from a security and reliability standpoint.

Two, resilience is multifaceted. It includes geographic diversification, reshoring, ensuring surge production capabilities, and stockpiling of essential items.

Three, government engagement with industry on the planning and execution of supply chain restructuring is essential. Only by working in concert can policymakers and industry leaders strike the proper balance between national security, economic security, avoiding the pitfalls of protectionism and autarky, and preserving corporate competitiveness.

Proposed Area of Focus: Establish a semiconductor fab consortium.

Complex supply chains foundational to economic and national security—such as semiconductors—are particularly well suited for an international cooperative approach. Semiconductor manufacturing facilities, referred to as "fabs," are expensive, costing between $10 and $20 billion. A fab consortium among technology alliance members could pool resources to establish new semiconductor production lines in various countries. Member countries have a shared interest in introducing greater geographic diversity in global semiconductor supply chains.

Taiwan in particular plays an outsized role in the global semiconductor market, and its relationship with and proximity to China makes it vulnerable to espionage, sabotage, or blockades. The technology alliance could serve as a mechanism to cooperate with Taiwan on safeguarding its semiconductor industry against undue Chinese influence. One way to do this would be building new production capacity elsewhere, such as the agreement the United States concluded with Taiwanese semiconductor firm TSMC aims to do. Alliance members also can help Taiwan with investment screening and building safeguards against Chinese attempts to siphon human capital. Member countries should cooperate on new leading-edge fabs to ensure they are sufficiently geographically diverse to introduce greater resilience into the global semiconductor supply chain.

SAFEGUARD COMPETITIVE TECHNOLOGICAL ADVANTAGES

Recommendation 9: Protect Critical Technologies

Existing mechanisms for like-minded democracies to work together on technology protection suffer from major weaknesses. First, countries take profoundly different approaches as to which advanced technologies are deemed "critical," the grounds on which those should be protected, and the instruments that should be used.[12] Second, many countries lack the capacity, information, and resources needed to assess the risks posed by China. Third, existing multilateral export-controls regimes have notable loopholes. Fourth, U.S. efforts to persuade allies to align their technology protection measures, most recently through the Multilateral Action on Sensitive Technologies and aggressive lobbying to ban Huawei's technology, often lack positive incentives.[13]

Protecting technologies and know-how from theft, usurpation, and misuse is foundational to safeguarding economic and national security. A large majority of project participants considered multilateral cooperation in this broad area to hold much promise for significant impact. Areas for cooperation include proactive and reactive measures that can readily be taken in concert.

Enact Multilateral Export Controls

Effective export controls require the cooperation of multiple countries. No single country dominates a technology area such that it can unilaterally achieve its policy goals with this approach. Technology alliance members could take steps to create a community where the same level of protection is granted by all members for a clear and narrowly defined set of technologies for which protecting and maintaining a competitive edge is paramount.

Proposed Area of Focus: Align export control measures for semiconductor manufacturing equipment (SME).

The alliance should start with priority items such as SME where the proposed alliance members have unquestioned advantage. China is making huge investments to indigenously design and manufacture its own chips, but it needs foreign equipment and know-how to accomplish this goal. Because 90 percent of global SME is produced by a handful of countries (Japan, the United States, and the Netherlands—all proposed tech alliance members), restrictions on SME exports to China would be an effective way of maintaining their edge in this sophisticated hardware.

The support and cooperation of other tech alliance member countries, and consultation and cooperation with the affected companies, will be essential to offset the costs of technology protection. The aforementioned semiconductor consortium is one way to do so. Another could be forging a common innovation base with R&D of next-generation semiconductor designs and materials.

Curb Unwanted Technology Transfers

A cost-effective and high-impact way to bolster technological competitiveness and to secure areas of technological advantage is through better information sharing between tech alliance members. The globalization of innovation and supply chains means that weak links in one country can lead to major vulnerabilities elsewhere in the world; therefore, no democracy can effectively play defense if it acts unilaterally. More robust information sharing among alliance members could form the basis for more effective IP theft mitigation, counterespionage, investment screening, and export controls.

The Chinese government is undertaking a systematic and multi-pronged effort to access and acquire cutting-edge foreign technology through legal and illicit channels.[14] The scale of the challenge warrants a coordinated response. The tech alliance concept would be an effective bulwark against unwanted technology transfers that damage each member country's economic and national security, so that beneficial and much-needed scientific and technological exchanges with China can continue to take place in safety. This report is not meant to be an exhaustive review of all ways such transfers happen, but two main avenues stand out as being well suited to being tackled in concert.[15]

One such channel is foreign direct investment (FDI). Chinese investors remain keenly interested in high-tech sectors related to the Made in China 2025 industrial policy blueprint. In 2019, the highest number of Chinese transactions in the EU (United Kingdom included) targeted ICT companies, such as semiconductor and data analytics firms.[16] Sharing intelligence and risk assessments of problematic FDI would help to safeguard key companies and critical industries from damaging foreign encroachment.

Another channel is R&D collaboration with companies and universities. These tie-ups often provide Chinese entities with a gateway to foreign technology and know-how, including in dual-use fields and applications that are used for mass surveillance and repression in China. Legitimate research ties often lead to covert technology transfers, and there is ample evidence that most leading economies across the Asia-Pacific, Europe and North America are affected—yet awareness levels and policy responses differ greatly.[17] Meanwhile, research partnerships are only one part of a sophisticated and understudied infrastructure through which the Chinese government seeks to access sensitive technology by exploiting talent exchanges and other lawful channels.[18]

Proposed Area of Focus: Strengthen information-sharing on China's technology transfer activities.

Having each tech alliance member share knowledge and experience and assist other members with investigating unwanted tech transfer would create formidable obstacles to this acquisition strategy. A first step could be the creation of a joint database of legal, extralegal, and illicit Chinese activities aimed at acquiring foreign technology across North America, Europe, and the Asia-Pacific region. The database should include a list of companies, research institutes, and individuals affiliated with or collaborating with the PLA and China's state security apparatus. Ideally, the list would be accompanied by a set of risk indicators to help public and private actors from alliance member states identify entities of concern.[19]

Information on China's technology transfer organizations, talent programs, and state-backed investors and their activities also should be shared among alliance members. At the same time, existing cooperation agreements and projects with Chinese entities in key emerging technology areas should be reviewed to identify potential vulnerabilities. The database would draw on the unique insights of all members, which also could consider jointly sponsoring research in areas where more data is needed.

Proposed Areas of Focus: Create a platform for alliance members to harmonize their definitions of "critical" technologies.

Crucially, this effort should not be limited to mapping high-risk actors and their entanglements with the innovation ecosystems of liberal democracies. The alliance also would provide a platform for technical and national security experts of the participating countries to exchange information on enforcement and violations of export control regulations, and conduct joint studies on the trajectory of technological change, development and adoption in different parts of the world in order to: a) achieve consensus on definitions of "critical" technologies and "dual-use items" through an open, evidence-based, and inclusive process that also takes into account how technology is used; and b) help businesses and research institutions assess and mitigate risks stemming from unwanted transfers of technology and know-how.

Proposed Area of Focus: Share counterintelligence best practices and sponsor capacity-building for firms in need.

In addition to academic espionage, commercial espionage, including through cyber espionage and cyber theft, is an important line-of-effort of Beijing's state-directed technology acquisition strategy. Democracies around the world, including members of the Five Eyes intelligence alliance, Japan, and several European countries have openly criticized such behavior.[20] In the United States alone, an independent commission estimated the annual losses from economic espionage to be more than $300 billion, 50 to 80 percent of which could be attributed to China.[21] The technology alliance could provide a forum for member countries to share best practices and coordinate their responses. For instance, alliance members could improve coordination among their law enforcement agencies, and jointly support counterintelligence outreach to and capacity building for startups and small companies working in the technology sectors most affected by China's technology transfer strategy.[22]

Proposed Area of Focus: Develop guidelines for research integrity.

Finally, alliance members could launch a multinational dialogue on research integrity, aimed at developing common guidelines for universities, grant-making institutions, businesses, and government agencies engaged in foreign research collaboration with nondemocratic nations. The exchange should be multi-stakeholder in nature and focus on addressing the balance between protecting sensitive technical information, IP, and national security and safeguarding the openness of scientific inquiry. Measures to address ethical and human rights risks of science and technology cooperation with untrustworthy entities should be another priority, particularly with regard to frontier applications of AI and biotechnology.

FUND AND BUILD SECURE DIGITAL INFRASTRUCTURE

Recommendation 10: Create New Investment Mechanisms

Democracies have shared interests in promoting secure digital infrastructure built by fair and sustainable investment mechanisms. Digital infrastructure provides a backbone for economic and societal connectivity, but low-quality vendors pose risks for the confidentiality, integrity, and accessibility of infrastructure. Simultaneously, opaque or predatory lending practices can erode states' sovereignty by opening them to financial coercion. Like-minded nations already have begun to coordinate fair investment criteria and should deepen and expand their efforts within the context of tech policy. A standing multilateral mechanism would act as a force multiplier by allowing democracies to cohesively direct resources to common priority areas.

Proposed Area of Focus: Pool resources to create a multinational investment mechanism for digital infrastructure.

Proposed technology alliance member states generally have agencies that can direct financing to projects important for their foreign policy objectives. For example, the Japan Bank for International Cooperation, the EU External Investment Plan, Australia's Department of Foreign Affairs and Trade and Export Finance and Insurance Corporation, and, to an extent, the new U.S. International Development Finance Corporation. Member states should empower their development and investment agencies to make digital infrastructure—for example, 5G, financial technologies, biotechnology software, or maritime domain awareness tools—a priority because of its importance for the capacity of middle powers and for growth in underdeveloped states. They also should boost digital inclusion in emerging economies more broadly by promoting their innovation ecosystems and through skills training. These can include technical skills, business and innovation skills, and training on legal and technology frameworks to support the democratic use of technology.

The EU already has melded digital tech into its development priorities through the Digital4Development strategic framework.[23] The EU has funded cross-border connectivity projects and international partnerships to jump-start local innovation ecosystems, encourage interstate digital trade integration, and equip youth with digital skills.[24] A shared strategic vision among technology alliance member states would maximize the effects of resource allocation and allow for interoperability between connectivity projects. In the spirit of an informal multilateral group, however, coordination of state resources would face fewer political barriers to entry compared to the establishment of a joint investment agency. Developing joint priority areas to direct state resources would work more efficiently.

Proposed Area of Focus: Establish common criteria to certify fair investments.

For fair investment criteria, members of the mechanism can build off the Blue Dot Network (BDN) certification model. The BDN's participants—Japan, the United States, and Australia—certify development projects as "market-driven, transparent, and financially sustainable" with the objective of attracting private sector investment.[25] Criteria for certification originated from the G20 Principles for Quality Infrastructure Investment, the G7 Charlevoix Commitment on Innovative Financing for Development, and the Equator Principles. Drawing from internationally agreed-upon principles lends transparency and credibility to BDN. Drawing from consensus principles likely would translate smoothly to the wider pool of proposed mechanism member states. It also would provide a solid framework for member states to collaborate on providing technical assistance for states to increase their own capacity to prepare investment projects.

Proposed Area of Focus: Pursue new approaches to digital infrastructure.

Information-sharing on successful models would empower member states to adopt and proliferate best practices. For example, Japan leads in 5G infrastructure development based on open interfaces and virtualized radio access networks.[26] Open interfaces, which are public technology standards, prevent vendor lock-in by creating modularity and interoperability between network components. Network virtualization, where software mimics specialized hardware functions but runs on generic hardware, further expands competition by eliminating proprietary hardware systems.[27] An enduring dialogue on innovative and best practices may have prevented perceptions of a lack of options for 5G deployment. Sharing alternative methods would introduce more competition for ideas among member states and expose new ways of building infrastructure. Democracies can coordinate on policy priority areas to direct financing, attract fair investments into middle powers and developing states, and pool experience to proliferate competitive models for digital development.

CRAFT STANDARDS AND NORMS FOR A BENEFICIAL TECHNOLOGY FUTURE

Recommendation 11: Reclaim the Integrity of International Standards-Setting

China is gaining influence in international standards-setting organizations like the International Standards Organization and the International Electrotechnical Commission, part of a comprehensive strategy to have Chinese-origin technologies be the foundation for global technology platforms and reduce its dependence on foreign IP and standards.[28] While Chinese firms' participation in international technical standardization should be a welcome development, the way the Chinese government links it with mercantilist industrial policies is at odds with the purpose and spirit of international standards-setting.

A case in point is the recent experience with 5G standards-setting. Whereas traditionally technologies were chosen as setting the standard based on merit, China's industrial policy often requires Chinese representatives to back a pre-selected contender and provides subsidies for companies to participate in international standard-setting bodies, which also encourages them to put forward as many proposals as possible. The resultant bloc-voting and large number of contributions led to Chinese telecommunication equipment company Huawei greatly increasing its share of 5G standard essential patents compared to 4G.[29]

Beijing looks to expand these efforts. The forthcoming China Standards 2035 strategic plan places a heavy focus on increasing China's influence over global emerging technology standards, which would provide Chinese firms with a competitive edge—and potentially pave the way for increased illiberal use of technologies like AI. In standard-setting organizations such as the United Nations´ International Telecommunication Union (ITU), the Chinese government also has been promoting its vision for global Internet and cyber governance, which favors a state-led approach to managing information flows. In the same body, Chinese firms are trying to shape global standards for facial recognition technology.

Proposed Area of Focus: Counter unfair practices in international standards-setting bodies.

Working in concert, technology alliance member countries can preserve the integrity of global standards-setting. One way is to ensure that companies based in technology alliance member countries and other liberal democracies have the resources to send full delegations and submit the broadest possible portfolio of technologies to standards-setting bodies for consideration. Another is to push for reforms of the bodies themselves to prevent bloc-voting. Doing so will tilt the balance back to technical merit, not governmental industrial policy, driving standards adoption. Finally, given Beijing's efforts to blend standardization and digital connectivity through the Digital Silk Road, jointly investing in digital infrastructure as proposed above would help prevent China from imposing its preferred standards for the digital economy on emerging economies around the world.

Recommendation 12: Codify Norms and Values for Technology Use

The founding members of the technology alliance, in cooperation and coordination with partner countries and relevant companies and civil organizations, should define and diffuse the norms and principles for how technology should and should not be used. An overriding objective for a technology alliance should be to counter digital authoritarianism, to which even companies from democratic countries too often contribute. This goal has two parts. One is promoting a world that is free, open, and democratic by setting clear guidelines on issues such as data privacy, rights, ethics, and the proper use of AI, surveillance, and monitoring technologies. Two is actively combating the illiberal use of technology. The latter can be a combination of sanctions, export controls, technical countermeasures, and making available cost-effective and compliant technology alternatives to middle powers and developing countries.

Proposed area of focus: Establish unified norms for the use of surveillance technology.

Project participants identified one area as a good near-term starting point to codify and harmonize norms: surveillance technologies, particularly facial recognition technology. These capabilities are widely deployed and used in divergent ways in various countries. Technology alliance members could use the organization to come to agreement on how these capabilities should fit into existing legal structures, what types of due process should be available, what uses are acceptable, and what uses cannot be tolerated. Upon establishing these norms, alliance members then can promote them internationally and set measures to prevent these technologies from being used in ways that violate them.

Promising Areas for Longer-Term Alliance Activity

Project participants identified a wide range of other technology policy issues that are ripe for multilateral cooperation and suitable for longer-term attention by the technology alliance. These activities either require considerable planning and agreement before they could commence or were generally regarded by project participants as being of lower priority. They include:

PURSUING JOINT R&D

There is ample opportunity for collaborative basic and applied research of emerging technologies.[30] Because of the breadth of possibilities and the short time line for this phase of the project, the project leads have no specific recommendations at this time on what areas to pursue. One important consideration, however, is resolving IP management and technology transfer stipulations before such work takes place.

There are several IP rights models to consider:

- *Open science model:* This approach comprises making most results of fundamental research publicly available, with some discoveries subject to patent protection. While CERN, the European Organization for Nuclear Research, uses this model to guide its activities, it also maintains a technology transfer office to conduct spin-offs and to monetize aspects of its intellectual property.[31]
- *Short-term contract-law IP rights model:* Such a strategy offers short-term patent protection (e.g., up to five years) upon which the intellectual property enters the public domain. An empirical example is that of Celera Genomics holding IP on sequenced genes up to two years until the publicly funded Human Genome Project effort was able to re-sequence the genes. Critics state that, in this specific case, these short-term IP protections actually stifled innovation.[32]

- *Standard IP rights model:* This approach largely would mirror the prevailing IP rights frameworks among Technology Alliance members, with the caveat that the IP owners will be required to license alliance-funded IP to third parties in Technology Alliance member states, with few carve-outs for exceptions.

Treaty-based exemptions for the U.S. International Traffic in Arms Regulations (ITAR), a regulatory regime that controls the export and import of defense articles and defense services, likely would be necessary to ensure alliance partners can collaborate effectively on initiatives pertaining to defense technologies, including the exchange of necessary data and technical information.[33] One concept would be to create an "ITAR super state." This effort could be part of a broader push to harmonize and improve broader export control laws for alliance member states. Other suggestions are to harmonize license exception programs and multilateral use of temporary export control mechanisms.

ENGAGING IN TECHNOLOGY FORECASTING

The technology alliance should consider implementing technology forecasting into its long-term policy planning processes. The fruits of innovation, whether within or external to the alliance, hold global ramifications for states and societies. Flexible plastic tubing revolutionized the biomedical industry. The internet is evolving economies. Social media have connected communities and opened gateways for new methods of spreading disinformation. In the near future, smart cities proliferated by companies from authoritarian states could supercharge global surveillance and plans to reshape the internet could form controlled splinternets. Democracies will need to prepare for these possible futures—and beyond—and play an active role in shaping a future built on democratic values. To this effect, they should share information on emerging and over-the-horizon trends, study potential outcomes, and coordinate their innovation and regulatory policies accordingly.

FOCUSING ON DATA FLOWS

A key building block of interoperability is consensus on privacy and flows of both personal and non-personal data. Ensuring trust in data exchanges is one of the most pressing and complex challenges for multilateral technology policy. Tech-leading democracies are fragmented in their approaches to data governance, as their regulations restrict cross-border data flows to varying degrees based on different and often divergent public policy, national security, and economic objectives. Japan spearheaded a multinational conversation to achieve interoperability through the Data Free Flow with Trust vision, which focuses on non-personal data.[34]

By bringing together a smaller group of democratic countries, the technology alliance could provide a venue for intergovernmental and public-private dialogue around some of the stumbling blocks to global data governance, most notably divisions between the EU and the United States. Several participants noted how the alliance could foster difficult but much-needed conversations around privacy rules, as well as around digital platform liability and regulation. The opportunity to share, pool, and store non-sensitive datasets (such as anonymized epidemiological data or militarily relevant information) through common standards also was highlighted in project discussions.

PROMOTING TECHNOLOGY INTEROPERABILITY

The technology alliance should promote technology interoperability among member states in the long term. Doing so will maintain the open flow of information and optimize economies of scale. The grouping also should engage on interoperability matters that involve existing organizations of which most or all alliance members are a part, such as NATO and the Maximator intelligence alliance.[35]

Important elements of interoperability are common standards and protocols that dictate how information systems interconnect. Some states have proposed alternative frameworks for the internet, such as the

New IP proposal pitched by government entities and companies from China. The New IP proposal doesn't only upgrade the internet's architecture to accommodate contemporary demands such as multifaceted industrial applications. Additionally, measures in the New IP proposal could act as mechanisms for states to increase their control of information flows. The concept is nascent but offers a glimpse of future potential risks for international connectivity. Technology alliance states can and should consider their own alternative to New IP—one that aligns with democratic principles—and should do so together to avoid creating splinternets among themselves.

Interoperability also is essential for private sector innovation and the implementation of technology in member states. Open interfaces can empower vendor diversity not just for 5G networks but for other systems as well. Smart cities, for example, will have a diversity of sensors, networking equipment, and processing components. Open interfaces that are consistent across member states and across tech ecosystems such as smart cities would allow a diversity of vendors to compete in these ecosystems at scale.

COUNTERING DISINFORMATION

The world's liberal democracies are besieged by foreign influence and disinformation campaigns. China, Russia, Iran, and North Korea are the main perpetrators of foreign messaging that erodes election integrity, exacerbates societal schisms, and undermines domestic and foreign policy. While not solely, or even mainly, a matter of technology policy, technology alliance member states can take cooperative steps to counter foreign disinformation operations.

Information sharing on the modus operandi of foreign disinformation and influence campaigns can help inform the development of technologies to help detect and mitigate the spread of propaganda and lies and boost the diffusion of fact-based information as a countermeasure. Case in point are the examples of election interference by Russia in the United States in 2016 and France in 2017. While each effort is part of a comprehensive strategic propaganda playbook by Russia, each affected country treated it as siloed incidents. More recently, the United States, European countries, and others were impacted in a variety of ways by Chinese disinformation and propaganda related to the novel coronavirus pandemic spread via social media, text messages, and other outlets. Messaging included false claims of imminent country-wide lock downs, accusations of U.S. bioengineering and spread of the coronavirus, and deceptive claims of Chinese largess and altruism. Sharing knowledge on the methods and impact of disinformation campaigns can inform mitigation and response strategies. Engaging the G7's Rapid Response Mechanism, established to prevent and respond to threats to G7 democracies, would be one way to bolster such activity.[36]

Technology alliance members also should broaden their focus on other illiberal uses of technology such as malign foreign influence operations, hacking, surveillance, and repression.

MAXIMIZING HUMAN CAPITAL

The proposed founding members of the technology alliance account for a disproportionate share of the world's scientific and technical talent. This asset is underutilized at present, as growing restrictions on student and work visas, and bureaucratic hurdles to scientific exchanges pose unnecessary barriers to more effective harnessing of valuable human capital. Because technical innovations are more likely to occur with the free flow of ideas, new initiatives to foster cross-border collaboration among democratic states should be considered. These could include a Schengen-like arrangement where qualified scientists, technologists, and engineers can readily travel to and live in core member countries for research in the public and private sectors, and regular talent exchanges to share ideas and build networks among scientists.

Next Steps

The project team is conducting a series of private briefings for government leaders in the Asia-Pacific, Europe, and North America in conjunction with the dissemination of this report. These discussions will form the basis for fine-tuning the recommendations presented here and guide follow-up work as needed. The team will host an event later in 2020 to discuss the recommendations with a broader public. Necessary follow-up work will include further research and engagement with stakeholders on matters such as cost, addressing and providing solutions to barriers to implementation, and considering other externalities.

Ultimately, the goal is to set the stage for intergovernmental dialogue on creating a technology alliance. The results of the Technology Alliance project show there is widespread interest and support for a new, comprehensive approach to managing and harnessing technological change. Similar ideas are percolating in capitals around the world, such as Canberra looking to the Quadrilateral Security Dialogue to address geostrategic competition in cyberspace and London floating the idea of a Democracy 10 to boost alternatives to Huawei for 5G networks.

Now is the time for the world's leading tech democracies to articulate their vision of a technology future where their companies compete in a vibrant, innovative economy all while promoting and protecting democratic norms and principles. Achieving this vision will not be easy. Attaining this outcome requires a comprehensive strategy that will take much time and many resources to execute. No one country can take such action alone and expect to maximize its potential. Instead, sound collaboration with partners is the sensible way forward. A technology alliance provides the framework to ensure that the technology future of tech-leading democracies is beneficial and secure.

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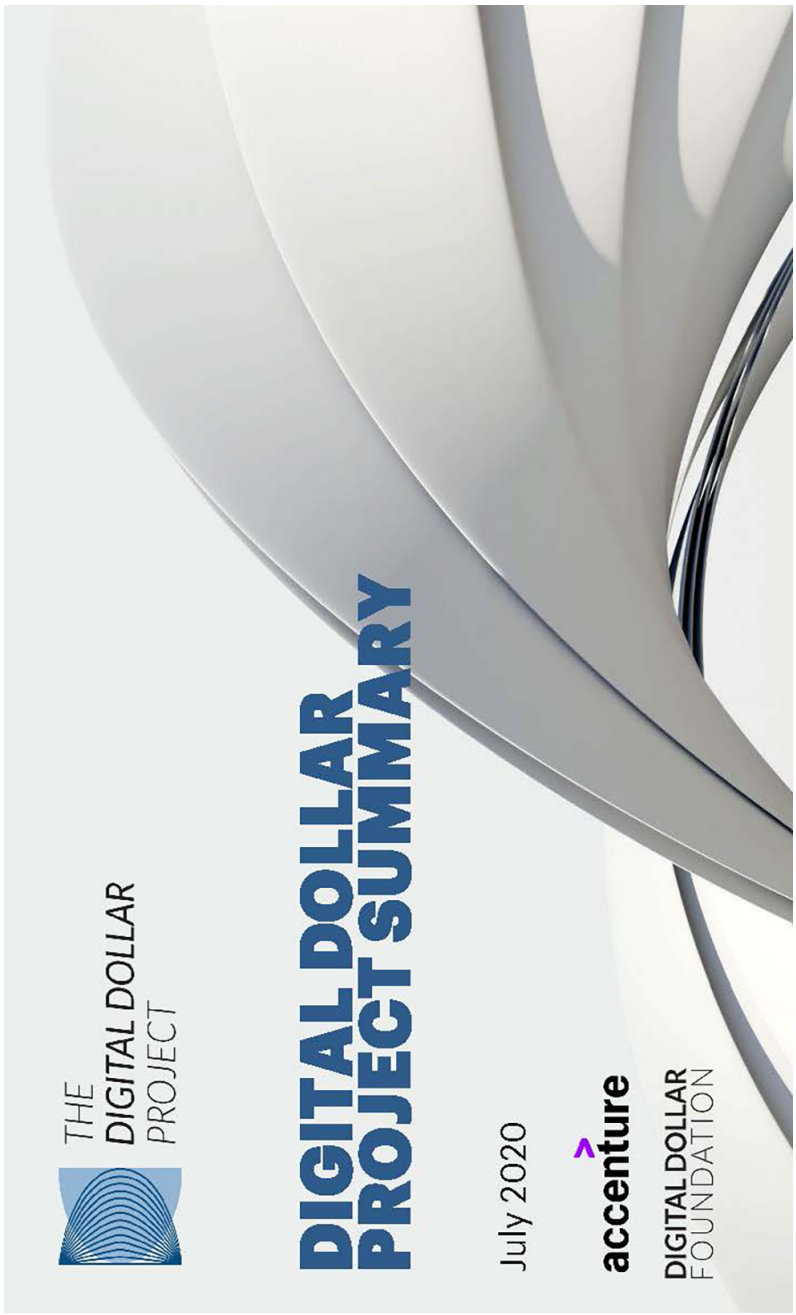

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DDP'S MISSION STATEMENT

The Digital Dollar Project aims to advance exploration of a United States Central Bank Digital Currency (CBDC). Our open and deliberative process will encourage research and public discussion on the potential advantages of a digital dollar, convene private sector thought leaders and actors, and propose possible models to support the public sector.

We are pursuing the development of a digital dollar as a future-proof form of currency that maintains the economic stability of today's US dollar and offers new market opportunities, broader accessibility, reduced costs, and increased efficiencies.

WHAT IS CBDC?

A Central Bank Digital Currency refers broadly to a digital currency issued and backed by a central bank.

It represents a third form of money that exists alongside existing forms and is fungible 1:1 with current central bank monies. While CBDC can be used to describe a specific instantiation, it should be thought of as an encompassing term that can take different forms based on functional and technology requirements.

Note *Two other forms of central bank money are reserves held at the Fed and physical banknotes.*

DOLLAR IS ALREADY DIGITAL

Central bank reserves are considered digital. What are additional benefits of a CBDC?

CBDC innovates by providing new functionalities and utility beyond today's central bank reserves and paper money. The digital dollar offers portability and programmability, which allows Federal Reserve issued dollars to be used irrespective of space and time.

Given that US central bank money can only be passed on to entities with an account at the Federal Reserve or in physical format, a digital tokenized dollar would alleviate some of its existing constraints.

The dollar is already digital in the form of electronic bank accounts, but The Project uses the term 'digital dollar' to reference an electronic form of tokenized fiat currency.

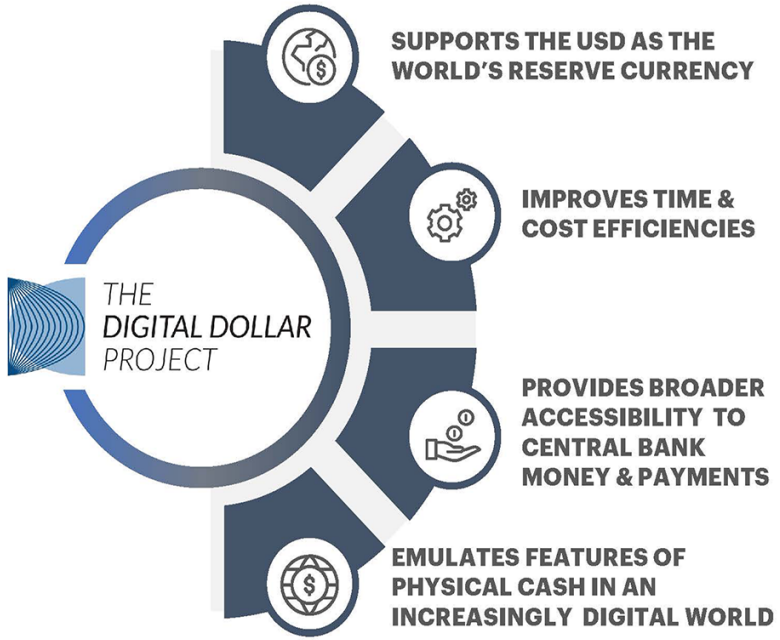
FUTURE-PROOFING THE DOLLAR

The Digital Dollar Project's vision is to introduce a modernized dollar.

"The Digital Dollar Foundation and Accenture have formed a core multi-disciplinary team to consider initial designs and proposals for a digital dollar."

– Digital Dollar Project Issue briefing[1]

A US CBDC, a digital token, delivers a fundamentally unique and modern architecture that will future proof the next era of currency. It is not simply an activity to unlock incremental benefits such as cheaper and faster payments.



Source[1] *The Digital Dollar Project*

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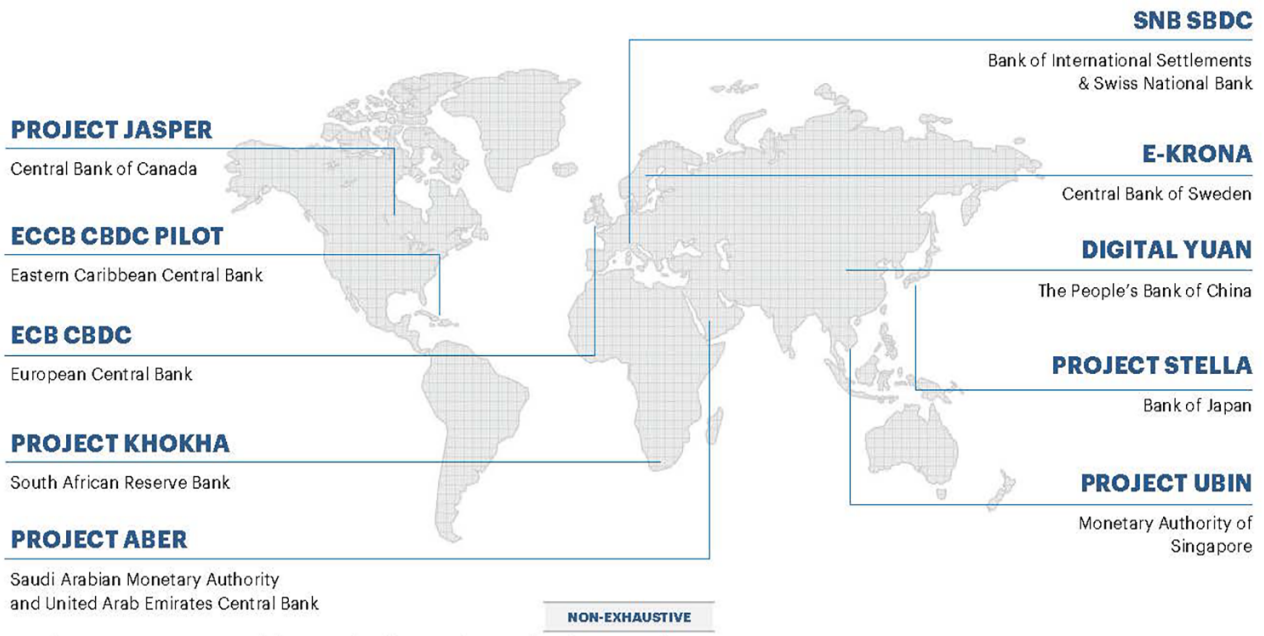
Note *The Advisory Group is expected to grow as the DDP expands.*

THE TIME IS NOW

The exploration of CBDC has become an international movement that will have lasting international impacts.



CENTRAL BANK DIGITAL CURRENCIES

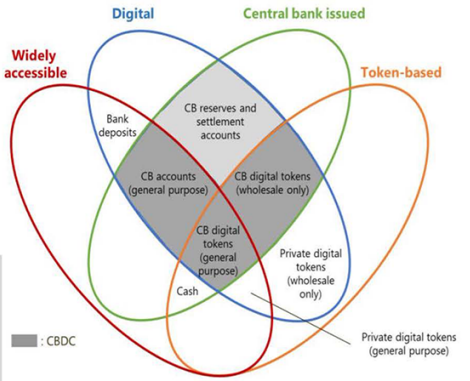
A US CBDC could offer a new architecture to enable new functionalities for the US dollar.

CENTRAL BANK MONEY FORMATS

PAPER	ELECTRONIC	DIGITAL DOLLAR
Physical tokenized currency that is widely accessible (i.e. bank notes)	Computer based reserve accounts that are only accessible to organizations with an account at the Fed	Digital tokens that are widely accessible for P2P, retail, and wholesale payment systems

FIVE CRITICAL DIGITAL CURRENCY THEMES

DIVERSIFICATION	SETTLEMENT	FUNCTIONALITY	CO-EXISTENCE	PROGRAMMABILITY
Creates a diverse payment system that increases resilience, access, and autonomy	Enables end-to-end settlement in financial market infrastructures	Allows offshore settlement and serves as a substitute for foreign exchange reserves	Can exist alongside private and official currencies to maximize economic efficiency	Permits the ability to 'program' rights, intents, and obligations into the digital object



The money flower: a taxonomy of money[1]

Source[1] *BIS*

CBDC FUNCTIONALITY

Technical capabilities have advanced to provide ideal functionality for a digital dollar.

PORTABILITY

CBDC enables digital portability that transfers an object of value and provides immediate liquidity.

ANONYMITY

A CBDC *allows* different degrees of anonymity for its users while offering improved traceability for enhanced oversight.

INSTANTANEOUS

CBDC transactions are fast and immediate; they improve efficiency by avoiding settlement delays and back-office reconciliation processes.

ACCESSIBILITY

A CBDC allows for a wide range of users to access the dollar without requiring an intermediator but still allowing for one if desired.

TECHNOLOGY CONSIDERATIONS

Token-Based – Verify object

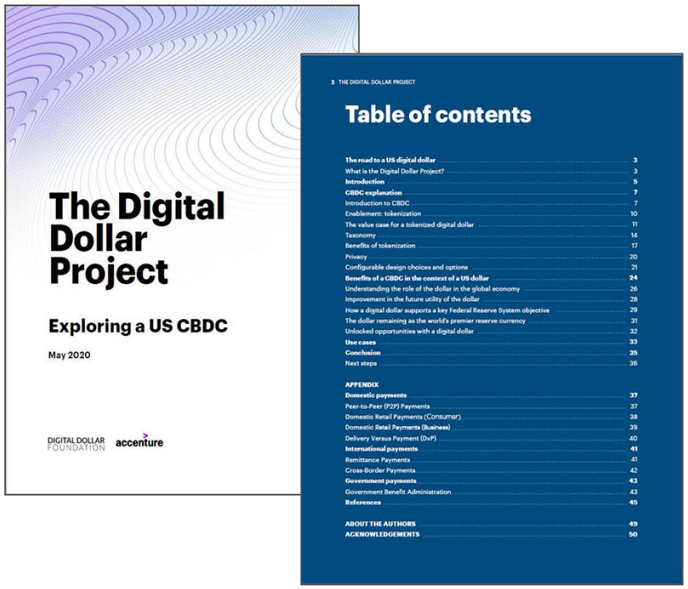
- Depends on the payee's ability to verify validity of payment object
- Requires control for counterfeiting and enables the payee to validate the authenticity of a received coin

Account-Based – Verify identity

- Depends on the verification of account holders' identities
- Involves the transfer of a claim recorded on one account to another

EXPLORING A US CBDC

White Paper published on May 29, available at DigitalDollarProject.org/publications.



TENETS OF A DIGITAL DOLLAR

The following characteristics are part of the Digital Dollar Project's champion model:

Tokenization

A digital dollar will be a tokenized form of the US dollar

Third format of currency

A digital dollar will operate alongside existing fiat currency and commercial bank money. It will mirror many properties of physical money, including its ability to work alongside existing account-based systems

Maintenance of the two-tiered banking system

A digital dollar will be distributed through the existing two-tiered architecture of commercial banks and regulated intermediaries

Privacy

The degree of privacy inherent to a digital dollar will balance individual privacy rights and necessary compliance and regulatory processes, be decided upon by policymakers, and ultimately reflect the jurisprudence around the Fourth Amendment

Monetary policy neutral

A digital dollar will not impact the Federal Reserve's ability to affect monetary policy and control inflation. A digital dollar could act as a new policy tool

Technology decisions & design choices driven by functional needs

The policy and economic requirements of a digital dollar will inform both the underlying technology and ultimate design choices

Future proofing the architecture through flexibility

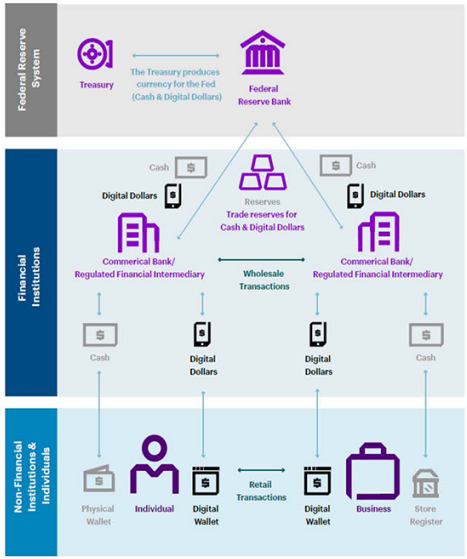
The chosen technological architecture will offer the flexibility to adapt configurability based on policy and economic considerations

Continued private sector innovation

A digital dollar will act as a catalyst for innovation and will not be antithetical to the development of private sector initiatives

THE PROJECT'S PROPOSED CBDC

The Project seeks to encourage the next major innovation in the US currency: a tokenized digital dollar that has the same legal status as physical bank notes.



This US CBDC issued by the Federal Reserve System would enjoy the **full faith and credit of the US government**, represent **a third format of central bank money**, and be **fully fungible** with Federal Reserve notes (bank notes or cash) and reserves.

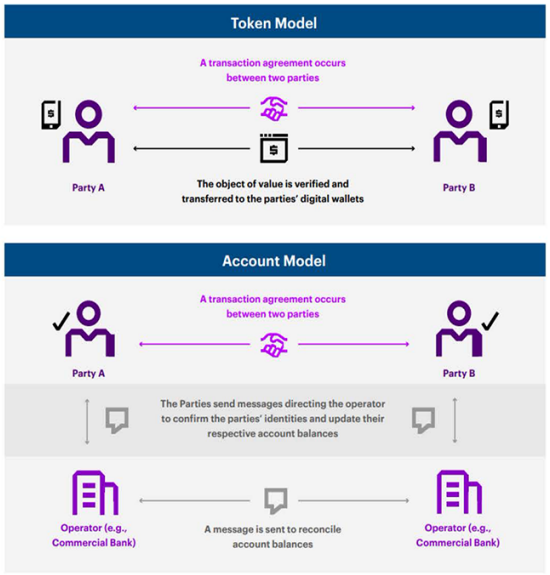
A digital dollar will be **distributed through the existing two-tiered architecture of commercial banks** and regulated intermediaries

Efficiencies unlocked through a tokenized digital dollar would unlock new, **lower cost on-ramps for historically un- and under-banked** to gain **access to financial services** and digital payment tools

A digital dollar will act as a catalyst for innovation and will not be antithetical to the development of private sector initiatives

ENABLEMENT: TOKENIZATION

The inherent portability of a tokenized US digital dollar allows for the token (i.e., a bank note in digital format) to be exchanged in near real-time, regardless of physical location.



Tokenization can provide a new level of **portability**, **efficiency**, **programmability**, and **accessibility**, ensuring the tokenized digital dollar's ability to **complement existing formats of money** while simultaneously **modernizing our payment and financial infrastructure**.

CONFIGURABLE DESIGN CHOICES AND OPTIONS

The concept of programmability in a tokenized CBDC means that the technology can be configured, and potentially reconfigured, to enable critical functional requirements and achieve desired benefits.

PRIVACY

LAWS & REGULATIONS

GOVERNANCE & OPERATING MODEL

MONETARY POLICY

SECURITY

INTEROPERABILITY

POTENTIAL US CBDC USE CASES

A digital dollar, specifically a tokenized CBDC, would enable the following use cases:

WHOLESALE PAYMENTS

A CBDC would be able to support a non-Fedwire or Fedwire participant sending payments to non-Fedwire or Fedwire participants. This would provide a new, faster and more secure method of B2B payments for a broader set of market participants.

RETAIL PAYMENTS

A CBDC would provide an alternative method to making a retail payment. Both cash and credit/debit transactions have high costs associated with them which are passed to consumers.

ATOMIC SETTLEMENT (DVP)

A CBDC would enable atomic settlement of a digitized asset on a single ledger for immediate settlement. The alternative is using a non-CBDC token which may introduce counterparty risk in the settlement medium.

P2P PAYMENTS

A CBDC would serve as a system for individuals sending money to other individuals within the United States and would lower the P2P transaction costs of electronic payments.

CROSS-BORDER PAYMENTS

A CBDC would provide benefits for individuals and institutions when sending USD money across a border.

GOVERNMENT INITIATIVES

A CBDC would streamline government benefit administration and government crisis management.

Note Specific use cases are demonstrative and implementations of a CBDC will be thoughtfully architected with input from in-scope stakeholders and policy makers.

DDP SUMMARY OUTCOMES

The Digital Dollar Project's vision to introduce a modernized dollar should provide tangible benefits to the current system.