

Testimony of
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Subcommittee on Emerging Threats and Capabilities

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Chairman Thornberry, Ranking Member Langevin, Members of the Committee, my name is Alfred R. Berkeley. I am honored to be here as a private citizen. I plan to address, from the business perspective, several areas of your concern. I will speak from my own knowledge and experience, not representing any organization. I have spent my career looking for promising investments in technology companies.

I am a member of Business Executives for National Security, a non-partisan organization of business executives concerned about national security. I am not representing BENS' views today, but appreciate BENS suggesting me to you as a witness.

I will speak specifically to several areas of research and development, but first must tell you that the business executives with whom I talk are far more concerned with several fundamental security issues than with the development of specific capabilities or technologies.

Let me tell you up front that my approach to "What is the proper role of government in fostering innovation?" is simple. Government needs to foster needed innovations that the private sector cannot or will not foster itself. This committee is the focal point of funding such technologies.

I plan to talk about specific technologies, but in preparation for appearing here, I reviewed several ideas that are recurring themes in conversations among business leaders. These ideas are bigger than specific threats or specific capabilities.

1. Creating enough Economic Opportunity to Insure a Committed Citizenry

Business executives that I talk with are concerned that we are not creating enough economic opportunity to insure a committed populace. There are two basic tools to achieve civil stability: a) a good job and b) the opportunity to own something of value, preferably a productive asset.

For better or for worse, a good job has been the bedrock of personal identity and commitment to the community. A military career is a good job, but we need vastly more jobs than the military can offer. Only about 25% of the 18 to 24 year old cohort even qualifies for military service, and the ones that cannot need a productive role in society. We are not creating enough jobs because other countries are doing a better job of creating those same jobs. I am not talking about the short term issue of creating jobs to recover from a recession; I am talking about creating enough jobs to reverse the estrangement of millions of unemployed and under employed whose discontent is warping their sense of belonging to our society.

Economists tell us that here are three factors of production: Men, Materials and Money. Men become useful producers when they are educated. There is a market for talent, and opportunity flows to the hardest working, best educated. Materials are available in the market until they are not available. Our dependence on foreign energy is symptomatic of our problem. We are dependent on sources of many critical materials that may not be reliable. Money is available where there are well functioning capital markets. We may be

on the verge of losing our dominant position as the capital market of choice for risk equity.

The opportunity to own productive assets is as important as having a job. It is very hard in America to “make it” on wages alone. Citizens need to save to fund their own retirement. We will be thrown out of the labor markets in our sixties and live to our nineties. That is frightening.

Our forefathers wisely understood that waves of disenfranchised immigrants, mainly from class-stratified Europe, needed to have a vested interest in the stability of our nation. The various Homestead Acts gave everyone the opportunity to own productive assets. It is important for people to feel they have something of value and a place in the community. It is important to have something that you do not want to lose; something that you can invest in and make more valuable. We have a substitute for the Homestead Act for many years in stock options. Stock options were a way to earn access to ownership of productive assets. We have made it progressively harder for ordinary workers to own equity. In an information age, the next version of the Homestead Acts is a good education.

I believe that the combination of not creating enough jobs and making ownership more difficult means that it is harder and harder to make the licensed economy, the legal economy, available to people, particularly poorly educated people.

Look around you. See the growth of gangs as a way to have a sense of belonging and protection. Look around you. See the growth of criminal enterprises as sources of employment for people with out access to a legitimate job. Look around you. See the profound alienation that infects so many people with cynicism and hopelessness. This is not the path to a stable society. Being the world leader in incarcerating our people is not the right answer. These may be symptoms of “evil people.” More likely, they are symptoms of an underground economy that arose because the licensed economy failed to provide enough jobs. I have no hesitancy in saying that many business leaders see our inability at creating enough good jobs, and the resulting rise of the illegal economy, as the major threat to our national security.

If we parse this problem, we can be more specific. The best opportunity to save ourselves comes from improving the education system.

My business friends find the state of public elementary and secondary education mind-boggling. Where is the science on how people learn? Where is it applied? The military has a good record of taking recruits and educating them in specific skills. Notice that I focus on science. Where is the relevant science? We would not dream of letting our children take untested medicines, but we let them take untested curricula. Many in the business community think it is a betrayal of our fundamental values to use our children’s learning years receiving an education that is not globally competitive.

Here the DOD recognizes the problem and is acting to find answers. I participated in the initiative that Army Chief of Staff General George Casey created to enable Army resources to enhance local school capabilities and encourage students to stay in school. Lt. General Benjamin Freakley of the Accessions Command is actively focusing resources in South Carolina, among other states that have reached out to embrace the Army programs. I would encourage you to do the relevant science, implement it in the military's internal education programs and show the individual States and the nation what is possible.

The business community I know looks at the Federal Government and sees a massive organization essentially operated to optimize the power of the Secretarial Departments, not designed to optimize the delivery of integrated solutions to national problems. I do not have an answer for this, but you asked for business views of our most pressing national problems.

Initiatives that involve more than one Department of government are hard to implement, but there are examples of success. The Administration's recent changes to the Export Control regime are worth mentioning. Outdated export control attitudes were crippling our long term economic growth. A concerted effort and a solid National Academies study laid the ground work for a new policy that offers a better balance between short term security needs and long term security needs. It is important to recognize that short term security needs can be and often are at odds with long term security needs.

2. Energy Independence

After the concerns about our ability to create enough jobs, enough economic opportunity, my friends in the business rank gaining more energy independence. You are as aware of these issues as I am, but I am here to tell you that my business associates think energy is a root cause of conflict, that it is not an emerging threat but a resident threat, and needs addressing. I am aware of Jonathan Silver's good efforts at the Department of Energy to fund creative approaches to this problem. I suspect sensible technologies already exist in the DOD, for example, nuclear power from small reactors.

3. Cyber Industrial Espionage

Some members of the business community are aware, and many more will be aware of the massive economic losses we are suffering as a result of the theft of our intellectual property. Research, blue prints and designs, negotiating positions, and schedules are all targets of state actors. Protecting these assets is probably beyond the capability of most businesses. There is a role for Federal in spotting suspicious patterns and alerting business to known threats. I encourage you to fund the National Counterintelligence Executive's effort's to raise business awareness on this trillion dollar drain on our resources and attack on our future. Cyber espionage affects the Defense Industrial Base as directly as any threat that exists.

I believe that the basic paradigm for securing data must change. Interestingly, I believe the solution is already in the market and will see wide acceptance as business and government becomes aware. The current paradigm tries to protect the operating system

and applications code. The new paradigm will protect the data itself through what is called “bit splitting.” I am making investments in this area. Since the new paradigm is already in the market, the USG need only give it an honest evaluation. No government funding is necessary.

4. Cyber Crime

My own industry, financial services, is the target of massive thefts of cash, principally by criminals living in corrupt sovereignties. Government as a criminal enterprise is something that business cannot solve alone and for which it needs sophisticated diplomatic, law enforcement and military assistance.

5. War on Drugs

We are not solving the problem of drugs. We are filling the prisons with minor offenders and then excluding them from productive citizenship for the rest of their lives. We need to rethink the whole approach. It will be hard, as two whole industries have emerged to profit on the drug trade and the fight against the drug trade.

6. Economic Warfare

Economic competition is one of the “ultimate chess games,” and, over time, determines our standard of living and our national security. Understanding economic competition is as complex a task as exists. Complex adaptive systems are devilishly hard to understand. When I was at NASDAQ, we developed agent based models and generated useful predictive models on a narrow range of policy issues.

Technological innovations in research, development, production, sales, marketing, distribution and service can create competitive advantage. In many ways, economic warfare is more difficult to win than physical war. It is a grinding, relentless game, played every hour of every day, involving the whole population, without end. It is a fundamentally distributed, decentralized game, not particularly susceptible to centralized command and control.

America’s “Value Proposition”

It is important to understand the role of ideas in economic competition. Ideas are one of the main theaters of competition. Physical goods and services are important, but hearts and minds are motivated by ideas. Democracy, personal liberty, individual rights and rule of law are our most powerful tools, but only if the lower order needs in Mr. Maslow’s hierarchy of needs are provided.

The business community believes that America’s approach needs to deliver more value to individuals than the competition: a higher standard of living, a sense of belonging and a sense of purpose. If we can deliver on these “value propositions,” we may have fewer physical battles to fight. These are not DOD’s traditional deliverables. We need an integrated solution with State and Commerce.

What should we invest in to deliver on these values?

In a digital world, where we have a strategic advantage, we need to deliver as much value as we possibly can digitally. The ubiquity of connectivity is creating a new battle space in the war of ideas.

Language

Language is the barrier that we never think of, the barrier that is so much a part of the world that we assume it will be there forever. We can attack the biggest barrier to human understanding and remove the fear and distrust that comes from strangeness if we develop language translation for most of the world's languages.

Language is man's old curse. The stories of Tower of Babel understood that language is a root cause of mistrust. We are close to being able to obliterate that barrier between people. A world wide effort to let anyone talk with anyone, each in their native tongues, would be an extraordinary tool. Technologically, it is close. It is all about synonyms, homonyms and contextual disambiguation.

We need to think big here. Language tools are a new class of weapons that attract people to the benefit they deliver. The ubiquity of connectivity, particularly the smart phone makes it possible.

Education

Higher education is a notional strength. We need to create an "all education, all the time" web site. We need to offer a complete education in a growing number of languages, for anyone in the world that wants to use them.

This concept includes computer adaptive teaching and computer adaptive testing, approaches that the DOD pioneered. Let anyone in the world test themselves and get an honest answer as to how much they know and where their weaknesses are in math, science, and many other courses. The Council on Competitiveness experimented with such a site, with good results. There is unlimited capacity on the web and we need to think big. Education is also a weapon in the war of ideas that attracts people to the benefits it brings. The increasing ubiquity of connectivity, particularly smart phones makes it possible.

Medicine

Similarly, we should deliver the best information available to win hearts and minds through a subject that people really care about, health. The ubiquity of connectivity, particularly smart phones makes it possible.

Near Field Communications

A more general capability, a platform for many applications, is Near Field Communications. The world is on the edge of the next revolution in communications, the mating of sensors and RFID tags with cell phones. The current generation of phones is being manufactured with the ability to read sensors and RFID tags in close proximity to the phone. I have read that 90% of the world's population lives within range of a cell tower. Smart phones will be the

natural delivery method for the language tools, the education tools, the health tools and the dozens of specific sensor and interactive applications discussed above. In ways we probably do not understand now, these applications will change the balance of power between people and between people and governments. The USG needs to deliver *value* and to deliver *values* through these new mechanisms. Digital connectivity can allow us to win hearts and minds one at a time at almost no marginal cost, and with no intermediaries warping the message. These technologies present a wide open playing field, with the opportunity to gain share of mind in important applications. The ubiquity of smart phones makes it possible.

Predictive Analytics

The science of prediction is becoming robust. It has been under development for decades and is about to “burst” onto the scene. The DOD has been a pioneering leader in the technologies and uses of predictive analytics. Many human problems can be mitigated with statistically accurate anticipation. These capabilities are part of the value proposition that the United States can deliver in the war for hearts and minds.

Agent Based Modeling

Agent based modeling is a specific technology that holds great promise for understanding complex systems. The DOD has many agent based modeling activities underway. It is unlikely that we can understand the complex game called economics without agent based modeling. If a vibrant economy truly undergirds national security, we need to understand economics. Much of what we believe comes from oversimplified models based on old technology and know how.

On the issue of our global competitiveness, which is part of the jobs conundrum, I refer you to James Case’s book, entitled Competition, The Birth of a New Science. Incidentally, there is a chapter in Case’s book that addresses the underlying question before this committee: what is the role of government in fostering innovation and economic growth? Mr. Case goes back to Alexander Hamilton’s “Report on Manufactures” in 1797 and highlights Hamilton’s opposition to Adam Smith’s free market approach to fostering innovation. Some things never change!

What does business need from the US Government and the Department of Defense?

Predictability

Business needs predictable inputs and outputs to justify investing. Because there is so much we cannot predict, we crave predictable where we think it should be. I believe that much of the hesitancy that retards investment now comes from uncertainty over interest rates, tax rates and currency values.

Access

At the DOD level, business wants predictable funding, predictable revenues and predictable access. The access issue does not cost much to fix: finding the right person to whom to present new ideas is hard, but can be facilitated. The DOD should be a predictable, reliable customer wherever it can. Evaluating new companies' products and giving honest feedback also helps.

I mentioned the improvements in the export control regime, making larger markets available in many cases, which justify larger investments.

Time horizons

The American financial services industry creates many of the unfortunate incentives that make our businesses so short term oriented. A whole series of public policies that favor speculation over investment combine of force businesses to avoid investments that take long horizons to be profitable or face significant technology risks. We will not solve those issues today, but it is important to recognize that our short term horizons, combined with intense global pressure on prices, has forced companies like AT&T to sell Bell Laboratories and reduce expenditures on research. This has made government support even more important. Furthermore, we are in a period where the investment community feels there are fortunes to be made exploiting applications that address the enormous markets that are relatively newly connected to the World Wide Web, crowding out investments farther down the technology stack, particularly investments in component parts.

Vibrant Capital Markets

This is a complex issue and David Weild at Grant Thornton has studied it seriously. Something changed with Sarbanes Oxley and our ability to fund equity Initial Public Offerings was damaged. That market is a principal source of funding for technology companies. We should try to fix it.

Property rights

The Bayh-Dole Act of 1980 gave universities the property rights in inventions funded by Federal dollars and spawned thousands of technologies. There is nothing better than a bit of self interest to engender hard work. Efforts to change this act should be resisted.

University Affiliated Research Centers

I served on the board of Johns Hopkins University's Applied Physics Laboratory for about 12 years. I was impressed by the breadth and depth of the Laboratory's inventions and contributions, and particularly by the way the laboratory transferred completed development projects to for-profit companies for production. It is a good model for getting commercially hard to justify development done to wring the risk out and then transfer to the tax-paying sector. It is great leverage for the tax-payers' dollars.

Conclusions

I recognize that my comments have not been as specific about individual technologies as you may have expected and may receive from other witnesses. You asked me for a perspective from the business community. The business leaders I talk with are vitally concerned with making our economy vibrant and supportive of innovation and growth. They recognize that a powerful military is necessary but not sufficient to assure our security. You should be concerned that I am bringing you concerns like lawlessness, like criminal enterprises, like gang activity and like cyber espionage. These would not likely have been on business's agenda a decade ago. We are afraid that we are reaching tipping points that are truly dangerous for a democracy.

The DOD has some of the best analysis capabilities in the world. I hope the Department will use its powerful intellectual capabilities to document these issues for the nation, to frame solutions for the nation and offer thought leadership. I believe the situation is so bad that it is a national security issue. I agree with General Casey that having less than a quarter of the 18 to 24 year old cohort eligible for military service is a national security issue. While I believe that this committee must identify and fund the specific capabilities for kinetic and information warfare, I will tell you that the business leaders I know want these larger issues on your agenda.

Thank you for having me.