

LiSPI 2019 Post-Workshop Homework Assignments with Critiques and Comments

Responses have been lightly anonymized. Critiques and comments are in blue.

Response #1

I would like to thank Chairman Smith, Ranking Member Johnson, and the other members for giving me the opportunity to speak about opposing the bill to authorize funding NSF at the directorate level. As a formally trained computer scientist who receives funding from the CISE directorate and serves on CISE proposal review panels, I can tell you that CISE research depends heavily on the research from all directorates. Work from SBE is critical in helping us understand the impact of technology on society and how to make these interactions better. Prime examples include the impact on tablets on our children and how people connect and propagate information via social networks. More pressing is that research funded through SBE helps artificial intelligence researchers better understand how to ethically address fairness and accountability issues that will have dire impacts on every American- because researchers funded through SBE have studied these issues long before people in computing realized they could be issues. Whereas GEO funded researchers provide key knowledge and data to help us understand what is happening to our world so that researchers can collaborate and make accurate simulations about the future. This collaborative knowledge with computing researchers can help us create an environmentally resilient country that can continue to supply resources to all Americans. Thus, I encourage the committee to not authorize funding NSF at the directorate level and instead allow the NSF directorate to work with researchers to identify funding priorities that can dynamically adapt to America's innovation needs each year.

This response is strong because of the good, specific examples of areas of computer science that would be impacted if research in other areas were reduced. Maybe most compelling is the link between SBE-funded research and AI, just because of the high level of congressional interest in making sure the U.S. continues to lead in AI. There is well placed sensitivity in not linking the GEO portion too explicitly with a hot-button issue like climate change but instead focusing on “environmental resiliency” and supplying resources to all Americans. The only change you might consider is not framing it as an argument against Congress authorizing funding at the directorate level at NSF — because Congress certainly has the right to fund at the directorate level — but instead arguing about the priorities they’ve chosen to set with those authorizations. Imploring them to work with researchers to help set those priorities is probably a better way to make the case than setting it up as a flat opposition to directorate level authorizations.

Response #2

I am [redacted] from [redacted]. My background is in cyber security, particularly as it pertains to distributed and cloud computing and the Internet of Things. Much of my research is defense-related and funded by DoD, and it relates to holistic approaches to security. Although I tend to agree with the motivation behind the proposed funding levels, I do not support the proposed legislation for two reasons.

Science is very frequently interdisciplinary. In particular, cyber security is to a large extent an interdisciplinary field. Cyber security research is frequently influenced by advances in the understanding of social psychology, behavioral economics, and other social sciences. We draw on these fields to better understand cyber security culture, awareness, and behaviors, which allows us to ultimately improve the security of our critical systems and data. A reduction in

funding of social sciences would effectively cut cyber security research off at the knees and be counter to the stated aims of the America COMPETES Reauthorization Act. My technical research would be adversely affected by the proposed bill.

Second, advances in one field can often have significant implications for others. For example, the concept of social proof and its effect on behavior has been studied with respect to its implications for commerce and economics. Further advances in this field could significantly affect other disciplines as well, to include cyber security. Constraining the NSF by appropriating funds at the directorate level would have unintended consequences in regard to interdisciplinary research. With such restrictions the NSF cannot quickly and effectively respond to breaking developments in one field that may have profound implications for other fields which result in job creation and innovation and which we would not be aware of unless we do the research.

Great response. Strong example of SBE linkages to cyber security and to your own work in particular. Minor suggestion: from CRA's perspective, we probably wouldn't want to credit the motivation behind the proposed funding levels, only because that suggests we'd agree with the majority position that there are areas of SBE and GEO that aren't worth federal support (even if that might be true, it's bad politics for us). Also, you probably need to explain "social proof" for your congressional audience. But otherwise the logic of this is good — science is interdisciplinary and constraining NSF with directorate-level authorizations would make that interdisciplinary funding more difficult.

Response #3

The National Science Foundation, DoE's ARPAe, NIST, and the other entities affected by this proposed legislation are major sources of innovation, producing research that leads to a large number of new patents, start-ups, industry adoption, and other types of technology transfer. Especially for fast-moving industries such as quantum computing, artificial intelligence, cloud computing, etc., it is important that the agencies have the freedom to quickly move to support research in critical technology areas to meet industry and national needs. For this reason, I think it would be most advantageous to allow those agencies to control funding allocations across areas so that they can respond quickly to meet the needs of those areas that have the highest potential for impact.

This argument would be made stronger by some examples of how other disciplines help the advancement of those fast-moving industries, but the overall logic of the argument — that directorate level authorizations make it more difficult to fund fast-moving or emerging areas — is fine. And though NSF, DOE, ARPA-E and NIST are all mentioned in the bill, this particular proposal only affects NSF and its research directorates. You'd want to note that in your response just so that the policymakers recognize that you understand exactly what they're proposing.

Response #4

My name is [redacted], a professor of [redacted]. This means that the act must benefit me since it increases the funding for CISE, the main directorate that supports my work and research, and allows authorization at the directorate level. However, I highly believe that what is proposed in the act increases the funding for CISE yet decreases the quality of its research. Research disciplines are not independent islands. The best research is done at the intersection of several disciplines and the act encourages interdisciplinary research ... at first sight. But, decreasing the funding for GEO and SBE negatively affects other disciplines, mine included. Weather forecast,

for example, requires collaboration between CISE and GEO. Productivity of programmers requires interaction between CISE and SBE. STEM education requires the interaction among several directorates, including CISE and SBE. The US economy depends on the interaction among different fields. Therefore, I oppose this act or reauthorization because it decreases funding for SBE and GEO at the bases of non-usefulness.

The logic of this argument — “you might be increasing funding for CISE but you’re decreasing the quality of it” — is strong but might have been more compelling with a better example of how SBE or GEO-funded research really informs CISE research. Particularly the SBE-CISE connection, where you could mention hot-button issues like cyber security and artificial intelligence that are both well-served by contributions from SBE. But the logic is sound. You might change, “This means that the act must benefit me...” to something like, “While I might be a beneficiary of this approach, I can’t support it because...” just to smooth the tone a bit, too.

Response #5

We support the newly proposed NSF reallocation (i.e., plus-ups) on the basis of climate change driven by human influence on the environment which may be summarized, primarily manifest in energy consumption carbon footprint (non-renewal energy sources) or release of carbon dioxide into the atmosphere from fossil fuels especially in transportation.

Developing new ways to rapidly shift from fossil fuels to electrification, most critically in the transportation sector, may well be the biggest challenge mankind will ever face. If engineers/computer scientists (E/CS) can develop novel solutions that reduce, then eliminate, both smokestack and tailpipe emissions, we will have a fighting chance against climate change. If the world’s E/CS are not up to this challenge, we will need to shift our focus to re-engineering our buildings and infrastructure to cope with the negative consequences. Either way, this is a time for E/CS like no other before, where practical skills and imagination have the potential to shift the fate of mankind.

Actually the consumption of energy on a per capita basis has modestly increased by 2.2x over 70 years since 1950 (US population was 152M in 1950, and in 2020 will likely hit 330M). However, efficiency, mostly due to the science and technology developed by the proposed NSF plus-up directorates, is estimated to have improved by ROM 200% (not fact checked, I’ve heard President Bill Clinton make this claim and in checking EIA.org he’s seems to be right).

Human social/behavior/economies must also change to squeeze greater efficiency (i.e., less waste) out of our energy usage. Overall US energy usage has roughly tripled during that same 70yr period (<https://www.eia.gov/energyexplained/us-energy-facts/>). The mix of energy sources has changed for the better in term of hydrocarbon/CO2 production. Looking at the rationale behind those improvements, based on the cite above its mostly attributable to developments “STEMing” from the R&D that would be supported by directorates at NSF that are slated for the plus-up.

No doubt, human behavior is most directly affected by economy, and energy consumption is directly correlated with energy usage (well-known and studied fact), but the disruptive or game changing efficiencies are coming from Technology/Engineering/Computer Mathematical-Physical Sciences R&D.

Moreover, to make a difference and curb climate change trends, developed economies MUST study and help underdeveloped economies improve energy usage efficiency as well as the mix of their energy sources. Transportation, our (US) biggest consumer of energy, is a great example. Vehicles these days are 3-5x more efficient than those of the 50s and represent many improvements in terms of less waste (e.g., precision navigation) lighter, stronger and safer transportation modalities. These improvements are slowly making a difference in the USA energy usage profile, but in many underdeveloped nations our climate fate is murky at best. We have a long ways to go for example, leveraging hydrogen fuel cells in transportation where practical, nuclear power generation where (politically) feasible, and/or harnessing fusion energy on a more long term horizon.

We humbly ask for your support of this newly proposed NSF reallocation strategy, the fate of mankind is waiting!

This answer is too long and a little too convoluted to be a great answer to the question that was posed at our hypothetical committee hearing. The basic argument seems to be the reprioritization that the committee majority is proposing is good because climate change is the most important issue we face and the directorates poised to get increases under the plan are the ones best able to address the challenges of climate change. Yet the argument then notes that "human social/behavior/economies must also change," which would seem to argue for a pretty key role for the social, behavioral and economics sciences directorate that suffers under this plan. It's also confusing that the answer prioritizes addressing climate change but is ok with significant cuts to the GEO directorate, the locus of NSF's climate change research efforts.

So there are some logical issues, but the answer is also just too long for our hypothetical setting where the parentheticals and citations would be out of place.

Response #6

I applaud the committee for their recognition that funding of the National Science Foundation creates jobs and fuels the innovation that drives the US economy. In 2007, the Bureau of Economic Analysis and the National Science Foundation partnered to produce better accounting on how investment in research impacts economic growth and international competitiveness. It has shown that investment in research and development across all aspects of the National Science Foundation accounted for 5 percent of real growth of GDP between 1959 and 2004, and 7 percent between 1995 and 2004. While one might argue that the majority of this impact has been through the development of information, communication and technology (ICT) and biotechnology-related industries, I want to stress that the real impact of these technologies is not solely based on pure technology developments. Even though computing technology plays a significant role in the dominance of the US economy worldwide, that is not simply because of the computer itself. The rise of computing technology since the 1940's has been because of developments in how it can be best deployed to address human concerns. Engineering and computing researchers are not trained to identify these human concerns that their technologies can support. It is the social scientists who best understand these issues, and it is only when there is effective collaboration between the social sciences and the engineering and natural sciences that true innovation with economic impact occurs. Similarly, some of the critical advances in data sciences today have to do with spatial data relating to our location on the planet. Geographic research is essential for fueling a better understanding of spatial data. Cutting off either social sciences research or geographic research in order to bolster the natural sciences, engineering, and computing will actually result

in stifling the economic impact of the whole of NSF on the US economy, and will hamper our international competitiveness.

Good answer: commends the committee for their intent, which is to create jobs and fuel innovation, but then notes that the approach they've chosen might actually undercut that approach by constraining efforts in areas that are key to that job growth and innovation. Great factoids on NSF's contribution to real GDP growth — those would be great to have at the ready going in to a hearing like this to drop into an answer like this. Well done.

Response #7

I commend the Majority's proposal to increase the budget of CISE, ENG, MPS, and BIO by \$406M. I fully concur that supporting fundamental research in these areas creates jobs and fuels innovation that drives the US economy. However, I am afraid that this approach would fail to achieve its intended positive impacts. Your goal is to increase the per-researcher funding allocation for the CISE, MPS, ENG, and BIO directorates. Please, notice that this allocation is a function of the total funding budget divided by the number of researchers competing for it by submitting proposals to the NSF. Although your approach would cut the funding of the SBE and GEO directorates by \$306M, the researchers funded by these directorates would be expected by their institutions to continue carrying out their research mission. Since their home NSF directorates' budgets are to be cut, these researchers will have no choice but to seek NSF funding opportunities elsewhere. As a natural consequence, a large majority of them would definitely end up applying for funding to the CISE, ENG, MPS, and BIO directorates whose budgets are to be increased. The resulting escalated competition for funding in these NSF directorates will cause their per-researcher allocation to stagnate at best or plummet at worst. As a result, your approach would not reach its very worthy goals, resulting in a policy failure. In light of this observation, I would like to ask you to reconsider your budgetary approach, keeping the much-appreciated increases for the CISE, ENG, MPS, and BIO directorates, while leaving the budgets of the SBE and GEO directorates intact.

This is an interesting approach to the argument — arguing that the cuts won't really improve the situation in CISE, ENG, MPS and BIO because the researchers who saw their funding cut in SBE and GEO would instead join the pool of researchers proposing to those other directorates. It's not necessarily wrong, but there are two areas of concern there. The first is that it reinforces a talking point the majority actually used when the community first pushed back against these cuts, which was, "If the research of SBE and GEO is so important to these other disciplines, then they ought to just pay for it themselves." To which we responded, "but we know nothing about funding social science grad students or work in economics or...." There's significant expertise in those other disciplines we rely on.

The second issue is that the response misstates the goal of the proposal — it's not to get per-researcher funding up in those directorates, it's just to get more money to the directorates that seem to them to be the most consequential. The majority operates under a simpler equation: more money = more research = more results. Noting that there's an expectation from researchers' institutions that they bring in research funding isn't very compelling to the majority, in large part because they don't believe researchers are entitled to federal funding just because they're researchers. The committee only cares about funding more good ideas.

But the answer is well stated — it just might not be a very effective responsive to this particular proposal.

Response #8

I enthusiastically support increased, long-term funding of our nation's critical infrastructure for leadership in science and innovation, of which NSF, DOE, and NIST are an integral part. However, I strongly advise Congress not to take upon itself the enormous burden and responsibility for determining how science funding within the NSF should be distributed, and to leave this job to the scientific leadership of the NSF. The first reason is a practical one--- authorizing NSF at the Directorate level once sets a precedent that Congress will indefinitely adjust and reallocate internal NSF budgets, at least annually, and this is simply not practical. Scientific developments and priorities are constantly changing, and the necessary research and decision-making for strategic balancing of our nation's scientific portfolio would be an unnecessary burden on Congressional decision-making time and resources. Secondly, part of what maintains our nation's leadership in the sciences is our nimble-ness and our boldness in investing in fundamental research, that later comes back to repay the investment in surprising, unanticipated ways. [example?] Setting internal NSF budgets externally is essentially acting to undermine the ability of our nation's top scientists to make the most effective investments that they can. Please don't let this critical national infrastructure become weakened by making it a pawn in some other game.

What you've written isn't wrong (and it's well stated), but it's not likely to be a terribly persuasive argument to your audience, which is the Members of Congress who have jurisdiction over these agencies. They do have the responsibility to provide oversight for these agencies, so arguing that as a matter of principle they should leave these budget decisions to the scientific leadership on NSF is not likely to resonate with them. It would be more effective to not argue process, but instead take on this specific proposal. Why is this particular proposal bad policy? Often — and in this case — making the argument against a particular proposal will also make the implicit case that procedurally this sort of micro-management doesn't work well.

One other minor point: avoid implying that the committee is making anyone/anything a pawn in some game (even if that might appear true). They'll find it insulting and always argue that what they're doing is trying to be the best stewards of the taxpayer money entrusted to them and they take that very seriously.

Response #9

While the desire to focus on job creation is one that is positive for Americans, the substantial cuts in funding SBE and Geosciences while increasing funding to Biology, Computing, Engineering, and Mathematics/Physical Sciences will lead to issues down the road that will negatively impact job creation. For example, research under the Geosciences directorate will enable industry to better innovate to meet new environmental needs that impact everyone from agriculture to transportation. Regardless of one's view of climate change, the impact of nature on the environment impacts business at all levels. As technical innovation increases, the workforce must be ready to effective. Programs under SBE include those to better prepare our future workforce. NAEP Test scores release recently show that US students reading and math scores have remained flat for the past decade, our international ranking indicates that our future workforce is underprepared for our economic needs. The technical side cannot truly succeed without these other constituents.

Concisely stated with good arguments on the merits of the two targeted directorates. But perhaps there's a missed opportunity here to more explicitly link the work in those directorates to the "favored" directorates, which could make the argument more compelling. The committee

ought to hear that their proposal is not only hurting good research in areas served by those directorates, but also constraining research in the directorates they want to prioritize.

Response #10

I am [redacted], a professor of [redacted]. I believe that suitably directing SBE funding would best meet the committee's objective of ensuring tangible contributions to our nation from federal funding.

My research identifies effective policies to reduce the likelihood of epidemics. This requires knowledge of both natural phenomena, such as infection transmission, and human behavior, which may expose people to infections. Such an understanding of the interactions between humans and natural phenomena is increasingly needed to leverage science for societal impact. SBE research can provide the necessary insight into human behavior.

So, I suggest new initiatives that link SBE to STEM in the context of societal applications, rather than eliminating SBE.

Perhaps "suitably directing SBE funding" isn't quite strong enough to convey your argument. The committee majority already believes it is suitably directing SBE funding with its proposal. If you disagree, you ought to be more direct in your recommendation. Maybe "resisting cuts to SBE funding," instead. You provide a good example of what you mean in the second paragraph, but that's "burying the lede" (to use a journalism analogy.) Make sure from the start your point of view is clear.

Response #11

I am a computer science professor. I work on cybersecurity: specifically, on creating cybersecurity systems that help workaday Americans protect their digital data and resources from cyberthreats—many of which originate from our competitors in China and Russia.

I almost exclusively submit grant proposals to the CISE directorate of the NSF to fund my research. Ostensibly, I would stand to benefit from the re-allocation of funds proposed in the America COMPETES Act.

I am here, today, to speak against it.

As computer science matures, it is well understood that the innovations that will have the greatest real-world economic impact will occur at the boundaries of computer science and other, complementary disciplines. Self-driving cars, for example, are driven by innovation in CS, Mechanical Engineering and Control Systems. AI is driven by innovation in CS, Cognitive Science and Statistics. And, cybersecurity is driven by innovation in CS and the social, behavioral and economic sciences.

One of the largest outstanding challenges in cybersecurity is that humans are the weakest link of a secure system. A flawless encryption scheme means nothing if no one wants to use it or knows when to use it. In my research, in fact, we show that one of the reasons everyday users make avoid expert-recommended advice is because doing so is "uncool." It can make one look "paranoid" to email a colleague an encrypted message about grabbing lunch.

In other words, one of the largest outstanding challenges in cybersecurity is a social problem. We have no chance of solving it through technical solutions alone. Rather, we need a sociotechnical system — one in which the technology design is informed by a deep-rooted understanding of human social behavior.

That deep-rooted understanding of human social behavior is developed by my colleagues in the social, behavioral and economic sciences. Their innovations enable me to build technical solutions that are more likely to succeed and spread, and, thus, more likely to protect our citizens in the cyber frontier.

Defunding SBE with the America Competes act would be a mistake: it would undermine much of the progress we've made towards creating a safe and trustworthy cyberspace for American citizens.

Except that this might be a little long for an oral answer to a question asked at a hearing (though only just), it does an excellent job of laying out the linkages between SBE and your own work in CS with great examples. To nit-pick, you might consider moving the 7th paragraph above the 4th, just so that we get right to the main element of your argument and then buttress it with the examples you cite, as opposed to working through the examples and then hitting them with the punchline. But that's a minor quibble.

Response #12

The Majority's America COMPETES Act reauthorization would undermine the U.S.'s long-term competitiveness, security, and economy. Other nations, including China, are investing broadly in the sciences, and the specific cuts to the National Science Foundation's budget would both limit the U.S.'s ability to remain at the forefront of scientific knowledge and increase the likelihood that transformative discoveries are made in other countries rather than here in the U.S. Today, the innovations that shape our security and drive our economy are often derived from scientific discoveries that span multiple fields, including the mathematical, computational, natural, geological, and social sciences. Continuing our historically broad investments in science would allow NSF to fulfill its statutory purpose of setting scientific priorities for federal investment and is the best way to ensure continued world leadership across the sciences, to support innovation in all its many forms.

This nicely concise response would probably benefit from an acknowledgement of the “good intentions” of the committee majority before slamming them with undermining the US's long-term competitiveness, security and economy. Some examples of the interdisciplinarity cited would also help drive the case home. What innovations that shape our security are derived from discoveries that span multiple fields? Those examples would be compelling.

Response #13

Thank you, Committee Members, for allowing me the opportunity to share my thoughts on this important matter. As a scientist whose research spans the areas covered by CISE, ENG, and SBE I understand the importance of social, behavioral, and economic research on the developments associated with engineering and the computing sciences. My research is associated with human-centered computing and I have found the greatest innovations and impact occur when there is an interdisciplinary approach. Reduction in funding for SBE will reduce the impact of this type of innovation. It takes more than just good engineering and computing sciences for innovations to be successful and have societal impact. SBE is important

to the advancements necessary for the future innovation and development of our country and for us to be competitive. I feel strongly that funding for the National Science Foundation and similar agencies should be provided agency-wide and allow the agencies to determine the priorities for where those funds should be allocated to best serve the needs of the agencies, researchers, but more importantly our country. Reductions in one area to increase another area may on the surface seem like a good idea, but there may be impacts and ramifications for such a decision that may not be evident and may not be the best for all concerned.

This response would really benefit from a concrete example of some specific research in SBE that has benefitted your own work as a computer scientist. Removing the more procedural argument that funding for NSF ought to be agency-wide as a rule — which, as noted above, isn't likely to get much traction with the committee of jurisdiction over that agency — would also help sharpen the point. Rather than tell them there may be unintended consequences of those directorate level decisions, tell them some specific consequences of this particular decision.

Response #14

It is increasingly difficult to disentangle research and practice in different scientific disciplines. Creating smart cities that are resilient to a changing climate requires insights into the connections among human behavioral choices, algorithms for complex constraint optimization problems, and engineering advances in new fuels and materials. Enabling US workers to grapple with robots and other autonomous systems requires fostering our national expertise in relationships among the computational techniques that enable such systems, the novel materials involved in their hardware, and the human and social dynamics of interacting with these systems. These are just a couple examples. Granting Congress the authority to set funding levels for directorates within the NSF undermines the scientific community's ability to shift dynamically in response to these complex, heterogeneous challenges.

Congress already has the authority to set funding levels for directorates within NSF, so the argument is somewhat miscast. You want to argue that this particular proposal for directorate-level funding is ill-considered — that in defunding SBE and GEO they would be hurting the other disciplines they are hoping to help — and in doing that make a more implicit case that maybe Congress ought to stay out of the directorate-by-directorate funding business. Otherwise, your examples are great. Crafting a good thesis statement to lead the paragraph would help make it even more effective.

Response #15

I oppose the majority's approach to the America COMPETES Reauthorization Act (H.R. 1806 - 114th Congress) – House Science Majority Bill that prioritizes authorizations at the Directorate level. Research today is very inter-disciplinary with scientists from multiple research areas collaborating on the challenges of a single project. This interdisciplinary trait helps us to address a problem in a holistic fashion as opposed to looking at it from a single silo. For instance, research on next-generation AI and Big Data, which is spearheaded by CISE directorate, also requires studies in Ethics and human interaction, which is the focus of Social Behavior and Economics (SBE) directorate. While it is essential to prioritize funding towards initiatives that result in more jobs and fuel the US economy, this act is short-sighted in ignoring the 360-degree view needed to ensure robust far-reaching research and will disincentivize scientists to collaborate with colleagues outside their discipline.

Good, concise response. Minor tweak: focus on the specific proposal (cutting SBE and GEO in favor of other directorates) rather than arguing against directorate-level authorizations. Also, the point about this proposal perhaps disincentivizing scientists collaborating with colleagues outside their discipline is an interesting one. It would be useful to have another sentence or two explaining how that is so.

Response #16

My name is [redacted]. I am [redacted] researching and teaching at the intersection of Computer Science and Social Sciences. As someone who has a mixed background both in engineering and social sciences, I would like to ask you to vote NO America COMPETES Reauthorization Act (H.R.1806 -114th Congress and here is why: While computer science and other fundamental sciences help develop technologies and solve fundamental scientific problems, it is the social sciences can help envision and outline policies for alternate futures by looking at how advances in science can be implemented to benefit communities and address social issues. One can spend years to develop efficient electronic chips and secure algorithms but what to do with those chips and algorithms is an entirely different question. Take the case of gridlock in cities. At one level, we can see it as a technical problem that requires more efficient modes of transportation such as self-driving cars so we could devote resources to create technologies that would expedite their creation. It is the social and economy sciences, however, who can tell us whether this technology would increase the use of single-occupancy vehicles or decrease it? Could we be more dependent on fossil fuel and exasperate climate change if we adopt this technology? Would they exasperate inequalities or alleviate them? It is social and economy sciences that can help us answer these questions and in doing so help better frame problems such as gridlock in cities. The choice between computer science and social sciences is a false one. If anything, we need policies and funding that provide resources for the collaboration between the two in order to reach a better formulation of problems leading to more effective solutions.

You might consider moving your final two sentences to the top of your argument (before “While computer science and other fundamental sciences...”). They are the clearest statement of your position, so probably best to put them at the start instead of delaying the payoff. The examples you cite are good ones and relevant to some of the concerns of the committee. If this were a written response to the committee — say they asked the question in their post-hearing “Questions for the Record” — you would want to proofread it much tighter than this version, which has quite a few typos.

Response #17

I oppose the Majority's view. Giving NSF flexibility in resource allocation across knowledge domains allows for strategic investments that advance the country while expanding our nation's preparation to respond quickly to new, unforeseen problems.

There is an immediate need for innovation addressing challenges in areas such as cybersecurity, improving human health, and protecting food and water supplies. These problems are complex and require expertise and innovation from multiple disciplines. We have seen that progress and economic leadership often come from disruptive innovation. But new solutions in one area often generate new challenges in a different domain. Leaving knowledge areas out of the funding structure may not only hinder NSF's progress in tackling current problems but also jeopardize our overall capacitation as a leader in the Knowledge Area.

An example of how the challenges in cybersecurity, human health, or food and water supplies are interdisciplinary would make this response more compelling. Otherwise, this is a good, concise response — until the last sentence. Members of the committee majority (or minority) might not get the import of our “overall capacitation as a leader in the Knowledge Area.” Indeed, they may also not care so much about “Knowledge Areas” as they do jobs, competitiveness, and national security — even if being a knowledge leader is a requirement to being competitive and secure. So here it would pay to be more pointed in describing what’s at risk from the proposal.