

Testimony of Mr. Raj M. Shah  
**Future of Defense Task Force, House Armed Services Committee**  
**U.S. House of Representatives**

*Hearing Titled: “Supercharging the Innovation Base”*

February 5, 2020

Co-Chairmen Moulton and Banks, members of the Task Force and Committee, thank you for the opportunity to share my thoughts on what I believe to be the central challenge facing our nation’s long-term national security: how best to harness our nation’s innovation strengths to sustain security and peace for our country and the world.

As someone who has spent large portions of his career as a pilot and civilian executive in our Armed Forces and as an entrepreneur and investor in the Silicon Valley ecosystem, I applaud the focus of this Task Force. These two worlds are populated with extremely talented, mission driven individuals, but have drifted apart both in terms of business process and culture.

The title of this hearing, supercharging the innovation base, is aptly named. The challenges we face from an increasingly hostile and autocratic world are real. I fear that without an organized effort by the Department of Defense (DoD), the preeminence of our fighting force will no longer be undisputed. Underpinning our innovation prowess is foundational research & development, a world-class talent base, and strong connectivity between the DoD and companies leading development in technologies such as Artificial Intelligence (AI), autonomy, and cybersecurity.

To me, the word supercharging represents not an incremental improvement, but a step-change towards success. In fact, the supercharger on the Merlin engine helped turn the tide in WWII.<sup>1</sup> I strongly encourage this Task Force to think broadly about how it can implement change at significant scale, doubling down on proven pathways and initiatives.

The pacing challenge in thinking about innovation and national security is, of course, the remarkable progress made by China. China’s public commitment to lead the world in innovation, particularly in AI, coupled with their concept of civil-military fusion,<sup>2</sup> makes them a

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<sup>1</sup> Nicholas O’Dell, “The Engine That Won World War II,” HistoryNet (Sept. 2009), <https://www.historynet.com/the-magnificent-merlin.htm>.

<sup>2</sup> Elsa B. Kania, “In Military-Civil Fusion, China is Learning Lessons from the United States and Starting to Innovate,” Center for a New American Security, (Aug 29, 2019), <https://thestrategybridge.org/the-bridge/2019/8/27/in-military-civil-fusion-china-is-learning-lessons-from-the-united-states-and-starting-to-innovate>

formidable competitor. By seamlessly integrating economic and military might, they are accelerating tech development and generating maximal leverage on the world stage.

“AI is mission critical” to the Chinese Communist Party. With a growing population of 1.4 billion, China is turning to AI to “perfect dictatorship,” and its access to massive amounts of data has allowed it to “close the gap” with US industry.<sup>3</sup> This steady emphasis by Chairman Xi Jinping is bearing fruit. China now has more supercomputers than the US,<sup>4</sup> total private venture capital investment in China surpassed the US for the first time in 2018,<sup>5</sup> and as of 2017 Chinese government R&D spend as a percentage of GDP was higher than the US with a trajectory to reach parity in absolute terms.<sup>6</sup> Furthermore, the People’s Liberation Army (PLA) and technology startups enjoy close, though perhaps compelled, collaboration.

To counter these trendlines, the United States must play to its strengths: having the most vibrant innovation ecosystem in the world (Silicon Valley), historically strong public support for science funding, being a welcoming place for immigrants, and having deep, long-standing alliances with the free nations of Europe and Asia.

I wish to briefly highlight 5 key areas in which I hope this Task Force can affect real impact.

1. **Human Capital** - Innovation at its core is a human endeavor.
2. **Engagement at Scale** - A core strength of DoD is the size of its organization and budget
3. **Foundational Research and Development** - Underpins both private sector and defense innovation
4. **Train and Equip for the Future** - Acquisition reform represents only the tip of the iceberg
5. **Allies and Partners** - Need friends to meet this generational challenge

## **Human Capital**

The United States’ innovation superpower over the past half-century has been its investment in human capital. From Wernher von Braun to the current CEO’s of Microsoft, Google, and soon IBM, the US has been a magnet for foreign technical talent. The DoD also historically attracted

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<sup>3</sup> Graham Allison, “Is China Beating America to AI Supremacy?” The National Interest (Dec. 22, 2019) <https://nationalinterest.org/feature/china-beating-america-ai-supremacy-106861?page=0%2C1>.

<sup>4</sup> Eric Schmidt, “Losing Ground: U.S. Competitiveness in Critical Technologies,” Hearing before U.S. House of Representatives Committee on Science, Space, and Technology (Jan. 29, 2020), <https://science.house.gov/imo/media/doc/Schmidt%20Testimony.pdf>.

<sup>5</sup> Jason D. Rowley, “Q4 2018 Closes Out A Record Year For The Global VC Market,” Crunchbase (Jan. 7, 2019), <https://news.crunchbase.com/news/q4-2018-closes-out-a-record-year-for-the-global-vc-market/>.

<sup>6</sup> Robert D. Atkinson and Caleb Foote, “Is China Catching Up to the United States in Innovation?” Information Technology and Innovation Foundation (April 2019), <http://www2.itif.org/2019-china-catching-up-innovation.pdf/>.

top talent for short tours without hindering their private sector careers, most notably McNamara's Whiz Kids.<sup>7</sup> Finally, with a sprawling infrastructure of bases across the country, military service and the ethos of its members was ever present across all socio-economic groups. All three of these human capital advantages have withered - now is the time to re-invigorate these strengths.

### *Recommendations*

- Reopen a major military installation in each of our leading innovation centers, San Francisco and Boston, to build personal, community relationships between technologists and uniformed members.
- Establish a National Security Innovation Visa to fast track green cards for experts in AI, Cyber, Remote sensing, and other key technical fields. Today over 45% of STEM doctoral grads are foreign with growing numbers returning to their home countries.<sup>8</sup>
- Increase opportunities for civilian service through a STEM corps.<sup>9</sup>
- Expand reserve and National Guard service opportunities for technologists.

### **Engage at Scale**

The Department of Defense' engagement with technologists and the innovation ecosystems have shown early success, but not yet at scale. Now is the time to have a step-change to supercharge DoD access to innovation from new entrants as well as traditional defense contractors. The DoD spends less than \$500m annually with venture-backed start-ups and less than \$1B in true AI research - representing a half percentage point of the department's procurement and R&D budget of \$243 Billion - quite literally a rounding error.<sup>10</sup> If we believe that the innovations transforming our lives - from self driving cars to voice-activated televisions - will be core to future national security, we should massively increase support to the organizations meeting this challenge head on. Further, we must reclaim our national focus on basic science and technology.

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<sup>7</sup> TIME, "Nation: The Pentagon's Whiz Kids," *TIME* (Aug. 3, 1962), <http://content.time.com/time/subscriber/article/0,33009,896423,00.html>.

<sup>8</sup> Josh Trapani and Katherine Hale, "Higher Education in Science and Engineering," National Science Foundation (Sept. 4, 2019), <https://nces.nsf.gov/pubs/nsb20197/demographic-attributes-of-s-e-degree-recipients>; see also Science & Engineering Indicators 2018, National Science Board (2018), <https://www.nsf.gov/statistics/2018/nsb20181/assets/901/tables/tt03-27.pdf>.

<sup>9</sup> Jim Talent and Robert O. Work, "The Contest for Innovation: Strengthening America's National Security Innovation Base in an Era of Strategic Competition," Report of the Task Force on 21st-Century National Security Technology and Workforce, Ronald Reagan Institute (Dec. 2019), p. 24, [https://www.reaganfoundation.org/media/355312/the\\_contest\\_for\\_innovation\\_report.pdf](https://www.reaganfoundation.org/media/355312/the_contest_for_innovation_report.pdf).

<sup>10</sup> Office of the Under Secretary of Defense (Comptroller), "National Defense Budget Estimates for FY 2020," (May 2019), [https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2020/FY20\\_Green\\_Book.pdf](https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2020/FY20_Green_Book.pdf).

## Recommendations

- Increase by 10 fold the spend on successful innovation efforts such as AF Pitch day,<sup>11</sup> Defense Innovation Unit (DIU),<sup>12</sup> Defense Digital Service (DDS), Joint AI Center (JAIC), and Kessel Run<sup>13</sup>
- Increase Federal R&D to 1.1% of GDP<sup>14</sup>

## Train and Equip for the Future

From the Section 809 Panel<sup>15</sup> to the sustained efforts of the House and Senate Armed Services committees, great progress has been made in the area of acquisition reform. So much so, that I would submit that the real impediment is reforming management incentives for our talented acquisition core, rather than additional legislation.

However, there is a need to structurally refocus the training and equipping of our forces to meet an enemy emboldened by autonomous weapons. This tectonic shift in how we will fight is being overshadowed by the acquisition reform debate. How do our Concepts of Operations change in the face of low cost drones with embedded facial recognition? These difficult questions require deep analysis. It will require congressional leadership to enable the DoD to be ambitious and depart from its comfort zone.

One result will be large programs of records for non-traditional weapons systems. The sooner we can recognize this coming change and make large bets on specific technologies and companies, the quicker entrepreneurs and the venture investment community will apply their talents and risk capital to solve DoD needs at scale. Who are the Billy Mitchell's<sup>16</sup> and William Knudsen's<sup>17</sup> of today?

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<sup>11</sup> Debra Werner, "Air Force Awards \$9 Million on First Space Pitch Day San Francisco," SpaceNews (Nov. 5, 2019), <https://spacenews.com/air-force-awards-9-million-on-first-space-pitch-day-san-francisco/>.

<sup>12</sup> Scott Maucione, "SPECIAL REPORT: Failure is an option for DoD's experimental agency, but how much?" Federal News Network (Oct. 30, 2019), <https://federalnewsnetwork.com/defense-main/2019/10/special-report-failure-is-an-option-for-dods-experimental-agency-but-how-much/>.

<sup>13</sup> Steve Kelman, "Why Kessel Run Is Such a Big Deal," FCW (Feb. 12, 2019), <https://fcw.com/blogs/lectern/2019/02/kelman-kessel-run-usaf-big-deal.aspx>.

<sup>14</sup> James Manyika and William McRaven, "Innovation and National Security," Independent Task Force Report No. 77, Council on Foreign Relations (Sept. 2019), [https://www.cfr.org/report/keeping-ouredge/pdf/TFR\\_Innovation\\_Strategy.pdf](https://www.cfr.org/report/keeping-ouredge/pdf/TFR_Innovation_Strategy.pdf).

<sup>15</sup> Advisory Panel on Streamlining and Codifying Acquisition Regulations <https://discover.dtic.mil/section-809-panel/> (July 2019)

<sup>16</sup> For more see Alfred F. Hurley, *Billy Mitchell: Crusader for Air Power*. Indiana University Press. 1975.

<sup>17</sup> Arthur Herman, *Freedom's Forge*. Random House. 2013.

### *Recommendations*

- Recognize the massive change that AI & Autonomy will bring to warfare and revise doctrine and Concepts of Operations.
- Demonstrate to entrepreneurs and the venture community that start-up companies can scale and thrive serving the DoD.

### **Allies and Partners**

Addressing the challenges discussed today will only be easier with our allies and partners. Fortunately we have built goodwill over decades and can deepen these relationships to enact coordinated economic and defense strategies.

### *Recommendations*

- Fast track regulations for a larger set of close allies and partners including FIRRMA exceptions, export controls, and data sharing.<sup>18</sup>
- Tip the scale for emerging nations to acquire US and Western technology infrastructure, through financial incentives and transfer mechanisms.

### **Conclusion**

I wish to highlight one final near-term opportunity: With the establishment of the Space Force - the department can take a clean sheet approach to the technology and talent acquisition process. The timing is fortuitous as the commercial space industry is in the midst of a renaissance led by new entrants.

In sum, while the challenges are real and growing: our nation has all the elements necessary to prevail in the defense of democratic values - we just need the collective will to do so. Many august organizations have developed robust recommendations - I urge you to help lead Congress and our nation in their implementation. Thank you and I look forward to your questions.

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<sup>18</sup> See Talent and Work, “The Contest for Innovation: Strengthening America’s National Security Innovation Base in an Era of Strategic Competition,”  
[https://www.reaganfoundation.org/media/355312/the\\_contest\\_for\\_innovation\\_report.pdf](https://www.reaganfoundation.org/media/355312/the_contest_for_innovation_report.pdf).