Putting the [Department of] Energy into AI, and Vice Versa

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Given the profound implications of artificial intelligence for our future, many are asking whether the U.S. government needs to launch a "Manhattan Project" for artificial intelligence, either to advance it or to ensure that its development is constrained by guardrails of safety and prudence. On one hand, the quest to achieve artificial general intelligence (AGI), with the implication of runaway computers overwhelming the capabilities of mere mortals to control them, summons the specter of a technological advance so profound as to shape our world and our security environment just as much as the invention of the atomic bomb. And while the United States now has a technological lead, if China were to overtake the United States, it could significantly alter the geostrategic balance of power in Beijing's favor.

On the other hand, while there is already a race to master AI as there was a race to master atomic fission during World War II, the AI competition is far different. For one thing, the cat is out of the bag in terms of governments seeking to monopolize control over the development of this technology. Indeed, unlike the Manhattan Project, when it comes to developing AI, the principal actors and intellectual property and investments in advancing this technology are found not in the public sector but rather in the private sector, which is already mobilizing massive resources in a competitive race for market share in a business opportunity that some have measured at *$14 quadrillion* in terms of net present value. Of course, that estimate is shrouded in uncertainty, but even if wildly overstated, that potential is driving governments and industry to extraordinary efforts to succeed in this new technological race.

So, the analogy between the development of AI and the development of atomic fission breaks down rather quickly, taking with it any simplistic application of the "Manhattan Project" model to the development of this massively game-changing technology.

That having been said, there *are* elements of the challenges and opportunities presented by AI that would benefit from certain institutional structures that remain intact from the original Manhattan Project.

Some people may be surprised that, while transformed, the Manhattan Project still lives on in the United States, though its name and role have evolved. First it morphed into the Atomic Energy Commission, then in 1974 into the Energy Research and Development Administration and, three years later, responsibility for our nuclear deterrent was rolled into the U.S. Department of Energy (DOE). Indeed, the bulk of activities of that Department relate directly or indirectly to the operation (and environmental management) of a massive nuclear weapons complex that ensures that the nation retains a safe, secure, and effective deterrent, comprised of over 3,700 nuclear warheads and a sprawling nuclear weapons production complex.

DOE's $8 billion annual science budget make it the largest funder of the physical sciences in the country outside of the National Science Foundation through a network of science and weapons national laboratories staffed by an army of over 95,000 contractors supervised (at least theoretically!) by some 14,000 federal officials led by the Secretary of Energy. The Department of Energy is responsible not only for the defense complex that builds, refurbishes, and modernizes our nuclear stockpile, but also for the construction and fueling of the naval reactors that power our ballistic missile submarines and aircraft carriers.

No surprise, then, that this summer the Department sought to get ahead of the game by launching its Frontiers of AI for Science, Security and Technology (FASST) initiative, championed by the brilliant former Los Alamos National Laboratory Director Charlie McMillan before his tragic passing in a car accident last month.[1] The FASST initiative can play a pivotal role in contributing to the development of AI as well as to developing the safety and governance mechanisms that will help protect all of us from its potential misuse.

Consider the following:

- The Manhattan Project was at the vanguard of public-private partnerships. President Franklin Delano Roosevelt, knowing that the federal government did not have the technical or managerial capacity to achieve mission success, enlisted industrial giants such as Dupont and Union Carbide to do the work under federal government supervision.

- The Department of Energy has continued that basic model, contracting with multiple private sector entities to operate the 17 national laboratories, where some of the nation's most exciting scientific breakthroughs are achieved. (Another little-known fact is that scientists associated with the DOE have produced 118 Nobel Prizes along the way.) The consortia that join forces to do this work include leading U.S. corporations and universities.

- Use of this model maximizes the capability to protect sensitive information, as the Department and its predecessors have had nearly 80 years of experience protecting nuclear secrets going back to the Atomic Energy Act of 1946. Thus, the mechanisms for protecting ultra-sensitive information are well established and indeed deeply woven into DOE contractor culture.

- This initiative would afford access to three of the fastest supercomputers in the world, which have been built at DOE labs (Lawrence Livermore, Argonne, Oak Ridge) and to the world-class computer scientists who have built and operate them.

- The DOE model also would allow the federal government to support multiple private companies and projects through application of their unique analytical and computational capabilities to specific projects, while protecting the intellectual property of each of those companies. The Idaho National Laboratory (INL) is performing such a role today in using its deep subject matter expertise to nurture a whole new generation of nuclear reactor designs, whose developers are all competing fiercely against one another commercially. INL can help incubate each of whose projects while protecting proprietary information through strict confidentiality arrangements and compartmentalization between different teams of lab scientists.

- Finally, the availability of power generation may be the most critical chokepoint holding back the successful development of AI. The electricity demands generated by AI are epic in scale; some projections indicate that power needed in the United States for data centers will more than double by 2030, from 4 percent to 9 percent of total U.S. electricity generation. The DOE is the federal agency with the resident expertise and authority to advance energy solutions for AI, not least through the accelerated deployment of advanced nuclear reactors.

And just as the private sector can benefit from the unique attributes offered by the U.S. government through the FASST initiative, so too can the government benefit from the incredibly powerful innovation engine now available in the private sector. While traditionally DOE has developed its supercomputers in six-year cycles, both Nvidia and AMD have announced that they will be releasing new AI chips on a *one-year* cycle! (Remember Moore's Law? It was hard enough for government policy and export controls to keep up when the number of transistors on a microchip used to double about every two years.) The software innovation cycle is also accelerating. To preserve their traditional roles as cutting-edge leaders in computing, the DOE national labs will need to embrace the technologies and innovation now being spawned in the private sector.

One more analogy to the world of atomic fission: since we know how consequential the AI revolution could be, with huge benefits accompanied by huge dangers, we should enact comprehensive legislation *now* setting out the rules of the road for the deployment, use, and export of AI and its constituent elements. In the nuclear arena, this was done through the Atomic Energy Act of 1954 which (as amended) to this day provides a comprehensive

framework that provides clarity and guidelines governing the use of atomic energy. The tremendous exposure of society to cyberthreats today at least in some measure reflects the lack of such a comprehensive legislative framework, as the internet developed its open architecture organically, without ensuring that cybersecurity measures were developed and deployed up front. Trying to retrofit security measures into an open architecture rather than building it in from the outset is challenging and costly.

Since we are still in the early stages of the AI revolution, we should take advantage of the opportunity to launch a process involving all stakeholders to develop comprehensive legislation (as was done through the Atomic Energy Act) that balances how best to promote the beneficial uses of AI while curbing its dangers. That would provide a clear and stable policy platform that could enable industry to make the investments and deployment decisions needed to optimize the contributions AI can make to our society in the years ahead.

The AI issues now facing our nation rise to the highest level of national importance, requiring the president to be kept apprised of current developments and trends and enabling the direction of policy and federal efforts from the Oval Office. Whether the next president decides to appoint an "AI czar" or embed the management of this critical yet cross-cutting issue within the traditional White House mechanisms of the National Security Council, Homeland Security Council, and National Economic Council, the DOE will have a vital role to play as the Executive Branch agency with the deepest technical competence and invaluable partner and ally to cabinet colleagues from State, Defense, Homeland Security, the Joint Chiefs of Staff and the Intelligence Community. That kind of leadership and teamwork will give the United States its best chance to secure the enormous benefits promised by the AI revolution while mitigating the risks of AI run amok.

Daniel Poneman most recently served as President and CEO of Centrus Energy Corp. (2015-2023), restoring the company to profitability and deploying the first U.S.-technology uranium enrichment facility to begin production since 1954. Earlier he advised on corporate transactions as a principal of The Scowcroft Group. Mr. Poneman served as Deputy Secretary of Energy from 2009 through 2014. As Chief Operating Officer of the Department, Mr. Poneman's responsibilities spanned all energy technology and nuclear security issues. He led 2009 negotiations to address Iran's nuclear program, chaired the Credit Review Board approval of $30 billion in projects accelerating the widespread deployment of electric vehicles and renewable power, played an instrumental role in the Department's response to crises from Fukushima to the Libyan civil war to Superstorm Sandy, and led efforts to strengthen emergency response and cybersecurity across the energy sector. He served six years at the National Security Council under Presidents Bush and Clinton, including three as Special Assistant to the President and Senior Director for Nonproliferation and Export Controls. Mr. Poneman received A.B. and J.D. degrees with honors from Harvard and an M.Litt. from Oxford. He is the author of *Double Jeopardy: Combating Nuclear Terror and Climate Change*, *Argentina: Democracy on Trial, and Nuclear Power in the Developing World*. His third book, *Going Critical: The First North Korean Nuclear Crisis* (co-authored with Joel Wit and Robert Gallucci), received the 2005 Douglas Dillon Award for Distinguished Writing on American Diplomacy. In 2020, he was awarded the Order of the Rising Sun by the Japanese government.

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[1] "Frontiers in Artificial Intelligence for Science, Security and Technology (FASST)," Office of Critical and Emerging Technologies, U.S. Department of Energy, https://www.energy.gov/fasst.