Federal Register Notice 86 FR 46278, https://www.federalregister.gov/documents/2021/08/18/2021-17737/request-for-information-rfi-on-an-implementation-plan-for-a-national-artificial-intelligence, October 1, 2021.

Request for Information (RFI) on an Implementation Plan for a National Artificial Intelligence Research Resource: Responses

September 30, 2021

VIA ELECTRONIC SUBMISSION

Re: Request for Information (RFI) on an Implementation Plan for a National Artificial Intelligence Research Resource

BeeHero is a Fresno, California-based startup leveraging machine learning and low-cost sensors to increase crop yield and improve the health of pollinators.[1] We appreciate the opportunity to submit these responses, as a national artificial intelligence (AI) resource could be massively valuable to BeeHero and similar startups.

Pollination is a required and managed input in agriculture, just like fertilizer and water, and BeeHero is focused on optimizing pollination input through bee hive placement and delivery. Nearly three-quarters of the world's crops rely on bees for pollination, and while that used to come naturally, there are no longer enough bees in the right places to support pollination needs: bees face an increasing mortality rate, climate change is causing shifts in bee phenology and crop phenology, and the seasons and locations for crops and pollinators may no longer sync up.

BeeHero operates in a new, emerging field of data-driven pollination, enabling farmers and beekeepers to optimize pollination and increase crop yields. We collect and monitor data about hive health, weather, crop needs, landscape, etc., and combine that to estimate pollination input and how to deliver it. Our technology also allows farmers and beekeepers to monitor bee behaviors and visualize different patterns of stress placed on hives due to lack of food sources, viral disease, colony collapse disorder, or other factors. Building these models requires large amounts of data and skilled workers to engineer them.

The government can play an important role in the development of AI-enabled technologies to help solve the problems of tomorrow, which in BeeHero's case include solving problems of climate change and food security. The National Artificial Intelligence Research Resource

[1] BeeHero, https://www.beehero.io/.

(NAIRR) represents a key step toward promoting AI research and development by making available relevant data sets and by strengthening the talent pool through education and training.

1. What options should the Task Force consider for any of roadmap elements A through I above, and why?

> *A. Goals for establishment and sustainment of a National Artificial Intelligence Research Resource and metrics for success;*

The Task Force should prioritize providing data sets with cross-cutting relevance and import, connecting researchers, and growing the AI workforce.

First, a national AI resource could include data sets that would be directly relevant to BeeHero's work and to the work of many other researchers and innovators studying critical issues. In an area as complex as pollination, BeeHero studies a huge number of variables, and there is a massive range of other data we could use. And climate change is having a significant impact on crops, agriculture, and the variables relevant to our work. As such, inputs like satellite data showing vegetation and how it changes over time, aerial photography data, and weather trend data—the type that is likely already being collected—would allow us to better understand the state of agriculture and changes that impact pollination. If BeeHero were able to further integrate our bee data with those other data sets, it would enable us to predict agriculture needs and pollination yields with more accuracy. This sort of information is, in turn, vital to food security.

Second, and relatedly, a national AI resource can also serve a valuable convening function. As noted, climate change and modeling are huge areas for our work. But for a small company like BeeHero, modeling climate change cannot be our core business. If relevant data sets exist and modeling is happening elsewhere, connecting with that work would benefit us in substantial ways.

Indeed, given how pervasive the effects of climate change are, many small businesses could benefit from connecting to these same data sets and research. BeeHero already encounters those working on intersecting issues, for example companies leveraging AI to improve water management. The national AI resource can supply these innovators with common, valuable data sets and modeling, and be a place for us all to tap into parallel research. Connecting these businesses, researchers, and academics would advance work on numerous issues of national import.

Third, the Task Force should also focus on the core need for data scientists, addressing issues of education, training, and access to high-skilled talent. BeeHero's entire business depends on the quality and strength of our researchers, and as we aim to grow in the U.S. we will need to find

qualified talent to fill the new jobs we plan to create. AI promises to be huge, with an enormous number of potential applications, and this next industrial revolution will need people to fuel it. Likewise, for the U.S. to maintain a global lead in this emerging area, the country will need a constant stream of highly qualified people. The government should certainly consider investment in training and education. But broader investment in the AI field—from research, academics, and the private sector—will grow the field and the pool of talent that everyone will benefit from.

2. Which capabilities and services (see, for example, item D above) provided through the NAIRR should be prioritized?

Please see response to question 1, above.

4. What building blocks already exist for the NAIRR, in terms of government, academic, or private-sector activities, resources, and services?

The national AI resource should consider how to leverage existing government data sources and related efforts to better connect AI startups and innovators with the data they need. Predictive models, like those developed by BeeHero, require vast amounts of data, which must be acquired, stored, managed, and transformed into useful inputs. These tasks can present significant costs for startups with limited resources.[2] The government already has resources like data.gov that could help with this—data on topics including climate and agriculture that could be regularly updated and integrated into the national AI resource. The National Science Foundation and other federal agencies also award grants to fund data science research centers.[3] Those grants and centers advance education and can produce useful data assets. The Task Force should build on this by coalescing data resources, services, and grant outputs in one place, and by facilitating their use in AI applications.

[2] Ivy Nguyen, *Could Data Costs Kill Your AI Startup?*, VentureBeat (Nov. 10, 2018), https://venturebeat.com/2018/11/10/could-data-costs-kill-your-ai-startup.

[3] *E.g.,* National AI Research Institutes, https://beta.nsf.gov/funding/opportunities/national-artificial-intelligence-research-institutes; National Network of Big Data Regional Innovation Hubs, https://beta.nsf.gov/funding/opportunities/big-data-regional-innovation-hubs-bd-hubs; Institutes for Data-Intensive Research in Science and Engineering, https://beta.nsf.gov/funding/opportunities/harnessing-data-revolution-institutes-data-intensive-research-science-and-0.