ECONOMIC
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GROUP

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Subject: Implementation of the Regional Technology and Innovation Hub Program

Background

The stakes are high for the Regional Technology and Innovation Hubs ("Tech Hubs") program to be successful. It represents the boldest federal-level bipartisan commitment to place-based innovation policy in a generation. It carries with it a singular opportunity to demonstrate the power of a regional approach to solving national challenges. For its part, the Economic Development Administration (EDA) must now design a program that meets the ambition of its Congressional crafters with far less funding than initially expected: an appropriation of $500 million out of the $10 billion authorized in the Chips and Science Act.

With Tech Hubs, the federal government has a prime opportunity to broaden the geography of advanced industry-driven growth and incubate more leading-edge technology development across more of the United States. Many local economies contain the building blocks of dynamic regional innovation clusters but are still missing key components or are performing below their potential. Many are endowed with rich assets–skilled labor forces, ambitious entrepreneurs, strong educational institutions, and advanced research labs–but without a catalyzing force, the pieces have failed to come together to produce economic liftoff. Properly designed and implemented, the Tech Hubs program can provide the spark that helps more regions take full advantage of their economic potential to become world-beating technology clusters.

In deciding which consortia and regions will make competitive Tech Hubs, EDA should be guided by the following principles:

- Designations should balance candidate areas' economic need with innovation potential. EDA should seek out the economically lagging regions that nevertheless have the trappings of strong ecosystems that can blossom into self-sustaining clusters.
- Tech Hubs should be viewed as a portfolio of diverse federal investments. Some investments should be higher risk (with higher potential reward); some should be made into more established consortia, others into more nascent ones; and some should be made into more deeply lagging or peripheral regions, while others have stronger starting

points. EDA should not shy away from the bold bets that might lead to stand-out successes as it strives to maximize the program's impact and reach.

Commensurate with these broad principles, this letter addresses three questions posed by last month's Request for Information in depth:

1. What are the indicia of a successful future Tech Hub?
2. What should EDA consider in designing the program for its current appropriation of $500 million given the $10 billion vision in the program's statutory authorization?
3. How should EDA measure whether the Tech Hubs program has been successful in achieving these outcomes, and how might EDA capture those data?

A final fourth section offers short contributions to select specific questions laid out in the RFI. An appendix with EIG's Hubs Index metro area rankings concludes.

1. What are the indicia of a good future tech hub?

The two primary legislative goals of the regional technology hubs program are to increase the overall level of innovative activity in the United States and to expand the resulting economic opportunities to lagging regions. On regional development, Senator Schumer said that the "…bill will help turn cities like Buffalo and Indianapolis into new centers for innovation…" On boosting total US innovation, Senator Young said that the "…bill will establish regional technology hubs across our country, which will become centers for the research, development, entrepreneurship, and manufacturing of new key technologies."

Thus, good future Tech Hubs will balance these goals of expanding the country's geography of innovation while pushing the nation's technological frontier ahead. We suggest that EDA establish a set of objective, guiding criteria along these lines with which it will judge the fitness of geographic regions to be designated as Tech Hubs. It should share this guidance– non-binding, but clear in vision and informative for would-be applicants–at the earliest possible stage in the solicitation process. These guiding criteria will help EDA evaluate the submissions it receives with a clearly expressed ex ante vision. In addition, having a set of objective metrics will help regions craft their applications and promote transparency in the selection process. ***EIG proposes that EDA use a set of measures that triangulates between need, potential, and geography.*** That is, one should be able to demonstrate that the selected region could benefit from public investment (need), that it has strong underlying capacity to develop and commercialize new technologies (potential), and that it would help advance the goal of expanding the map of American innovation (geography).

Using Need, Potential, and Geography as Metrics for Allocating Funds

There are several ways to operationalize the idea that good hub candidates should exhibit some level of need for public finance as well as some degree of potential to develop and deploy advanced new technologies. Here we will outline the methods used in the recently published EIG Hubs Index, a quantitative attempt to parse the optimization function at the heart of this

program. More important than the exact measures is the spirit of the framework, which is designed to balance the multiple public policy priorities the Tech Hubs program has been called upon by Congress to address.

Measuring Need

In our index we conceptualize need through three measures: "brain drain," lack of work opportunities, and generally low price levels (cost of living). We measure **brain drain** as the ratio of new college graduates to the stock of prime age workers with at least a college degree. This ratio shows that a region is producing skilled workers but is unable to keep them in the local labor force. We measure a **lack of job opportunities** using the share of the prime-age civilian population that is either unemployed or not in the labor force. This measure reveals where there is considerable slack in the local labor market, and where the amount and type of local economic activity fails to meet the needs of the population, leaving too many on the sidelines. Finally, we operationalize low prices using **regional price parity**.

Our measures of need also double as measures of underutilization of local capacity and implicitly point to potential in many ways. Areas will only get flagged for brain drain if they have a university pipeline producing graduates, leaving them well-positioned for retention or brain *gain* if the economic stars align. Areas with high rates of prime-age underemployment may be able to grow by absorbing workers already present in the local economy, alleviating wage pressures and reducing crowd out. And low-cost areas will allow federal dollars to go further and give successful Hubs more room to expand before triggering price pressures on local housing, labor, and materials markets.

Measuring Potential

We sought to define potential as the likelihood of producing and commercializing technologies at the national and global technological frontier. To accomplish this, Hubs would have to be in a position to advance U.S. competitiveness in the near term. They must have strong initial foundations in innovation and toeholds in the key technology areas identified in the CHIPS and Science Act. We operationalized potential generally by looking at the skills base of a metro area, its history of innovation, the scale of critical inputs it amasses, and the underlying economic complexity, or advancedness, of the region. Innovation stems from a combination of scale and specialization. It operates on the concept of a critical mass: an optimal assemblage of specialized inputs, actors, and skills, with ample knowledge spillovers between them. Successful Tech Hubs will be built on top of a critical mass of relevant actors and activities able to commercialize the innovations and advances stemming from the ecosystem. That creates a structural bias towards places of a particular size or specialization that should be embraced as a feature of the program–balanced against indicators of need, of course.

We measured the **skills base** of places with the total number of prime-age workers with STEM degrees. We evaluated the **advancedness and complexity of the local industry base** using Brookings Institution's definition of advanced industries (2015) and Fritz and Manduca's index of

economic complexity (2021). We operationalize a **history of innovation** based on the number of patent authors residing in the metro area. Scale is implicit in these measures since most of them are counts (e.g., numbers of workers, number of inventors).

Measuring Geography

Finally, because the CHIPS and Science Act aimed to both speed up progress at the technological frontiers and extend the fruits of that growth to lagging regions, good candidates for Tech Hubs should be in regions away from established metro "superstar" agglomerations. These superstars are already well-served by the existing ecosystem of funding, both public and private, and particularly venture capital; there is less of a market failure in these areas for the Tech Hubs program to address. The availability of technology-oriented private risk capital is much thinner outside of established hubs, however, making the public policy rationale for bridging the gap in less central areas much more compelling.

Balanced against the scaled measures of potential, our index included a countervailing measure of **agglomeration** that would "push" potential Hubs away from the country's largest and most populous cities. We measure agglomeration adjacency using 2019 Quarterly Census of Employment and Wages (QCEW) data on total employment by county from the Bureau of Labor Statistics. We use a non-linear distance-weighted average of nearby jobs based on the straight-line distance between county centroids. In practice, this provides a quantitative framework for demoting Hubs contenders in close proximity to the country's most populous areas, which already aggregate most of the economy's risk-oriented venture capital and host the largest concentrations of advanced industry jobs and firms.

With respect to geography, it is also worth noting that EIG believes strongly in the power of proximity and the geographic integrity of regional industry clusters. EDA should require consortia to have a clear logic, rooted in economic geography, to the relevant regional maps they put forward. Each hub should be a geographically contiguous area.

2. **What should EDA consider in designing the program in light of its partial appropriation?**

The Tech Hubs program was originally envisioned as a $10 billion program to make at least 60 strategy development awards followed by at least 20 substantial implementation investments into at least 20 different regions. However, Congress has thus far only appropriated $500 million, and there is a high risk that Tech Hubs will not be fully funded in the near future given a changing fiscal landscape. In response to such a dramatic shortfall in funding against what was authorized and envisioned, EDA faces choices along three primary axes: the distribution of funding between strategy development and implementation grants; the number of hubs/regions it aims to reach with its awards; and the amount of funding it can invest in each hub.

EIG believes that EDA should strongly ***emphasize implementation over strategy development***. Fresh off the Build Back Better Regional Challenge (BBBRC), many

communities likely to be strong candidates for Tech Hubs have already been through the process of assessing regional strengths, assets, and economic development opportunities quite recently. They have already come to consensus agreement on the highest-priority, highest-impact investments. The real need now is for communities to start implementing these visions.

For example, EIG is an EDA RNTA grantee for a study to advance the economic development of persistently poor areas. The project took us to four locations for case studies, one of which was St. Louis, MO, a metro region that will be a strong contender for a Hub. Up and down the spectrum, from the leadership of innovation anchors and economic development organizations to the residents of some of the nation's most distressed communities, the sentiment was the same: we have plans galore; now is the time for action. There are numerous federal funding opportunities for planning; money for implementation is what is scarce. If the legacy of the Tech Hubs program is that it financed another great 60 economic development strategies that go nowhere for lack of follow-on funding, it will be a failure. The acute need the Tech Hubs program must now meet is to invest in the assets of the future, not another round of costly, time-consuming, and potentially redundant plans.

In light of those considerations, EIG suggests that EDA emphasize on-the-ground action right out of the gate, reserving the preponderance of funding for implementation grants. EDA should stand up parallel solicitations for planning grants and implementation awards as quickly as possible in FY 2023, rather than staggering the program into two rigid phases (planning and then implementation for all applicants), which would delay the awarding of implementation grants–and thus the program's real impact–significantly. This format could also allow EDA to consider a "fast track" for some implementation grants, where regions can repurpose strong plans from BBBRC or other recent competitive federal award processes for timely consideration. Launching the program with a number of strong implementation awards will enable Hubs to start delivering impact more quickly, and the demonstration cases may even unlock future appropriations from Congress more easily, positioning the program to achieve its original scale and vision.

In awarding implementation grants, EIG suggests that EDA work to *both* get a sufficient number of "shots on goal" out under the initial appropriation to get the program working in several regions *and* to place a few strategic bets by going bigger and deeper into the most compelling and potentially transformative ideas. Thus a combination of a larger number of smaller implementation grants combined with a smaller number of larger flagship investments feels like the right mix to launch the program strongly and ambitiously within the current funding constraints and while balancing risks. EIG does not feel it is in a position to recommend specific numbers of grants or target award dollars, but something like 5-10 smaller grants and 2-4 larger ones feels like it would constitute a strong start and allow EDA to kickstart the program in every region. A "peanut butter" approach of trying to reach as many communities as possible under current appropriations with more equally-sized, smaller grants in each would not serve the program's ultimate goals as well as a bolder, more targeted, and more strategic approach would.

Preserving room for big bets is also important because consortia are likely to have relatively lumpy and high fixed costs of administration. The Hubs program–and successful communities–will be best served by money scaling well beyond these fixed costs to finance meaningful activity. EDA should seek out the best opportunities to achieve returns to scale. With future funding from Congress uncertain, EDA should also operate from the assumption that the recent $500 million appropriation for Tech Hubs could be the last for the foreseeable future and reserve some financing for follow-on investments into the most promising early leaders (the $500m is authorized through 2027 and will "remain available until expended").

3. **How should EDA measure the success of Tech Hubs?**

Measuring the success of the Tech Hubs program as a whole will be critical for informing future generations of place-based economic development policy. An effective evaluation regime has the potential to be a real legacy of this program. EIG believes that it is important that EDA develop specific, measurable evaluation tools before the program launches that capture not just what the program did or financed, but what it accomplished in affected regions. In this section we propose some evaluation principles.

First, EDA should set the geographic unit of analysis for evaluation at the outset alongside each consortium to reflect a coherent definition of the regional economy at least as large as a metropolitan statistical area. A goal of Tech Hubs is to fundamentally change the economic trajectories of regional economies whose shape is unlikely to conform to the boundaries of any one municipality or county. Given the statute's requirements for broad stakeholder participation, a wider regional perspective is likely to already fit with the types of consortia that will be awarded designations and funding. Further, whether hubs are designated at the MSA level, as a cluster of contiguous MSAs, or an MSA core plus a number of adjacent rural counties, there should be some underlying economic logic to their regionality.

In addition, adopting a regional framework will allow evaluators to observe the economic spillovers from each Tech Hub into the wider labor market without including irrelevant areas. Evidence from university R&D spending has shown that benefits from R&D spending tend to spread outward from the university (Woodward et al., 2006). But, like the light from a street lamp, these benefits tend to diminish as the distance from the university grows. As a result, while there are spillovers from R&D spending, the main effects are highly local (Overman and Helmers, 2013).

EDA should work with awardees to identify benchmark or peer regions before implementation grants are issued. These comparison or control groups for each designated Tech Hub should measure similarly in terms of size, industrial and demographic composition, growth trends, and existing assets and institutions. Establishing these baseline control groups will discipline any future internal analyses of Tech Hubs' success.

Of course, innumerable economic forces will be exerting their influence on Hubs regions, some far stronger than the program's investment itself. Place-based development policies can be

especially difficult to evaluate empirically. That fact makes the selection of metrics and framework all the more important. And given the ambitions behind the Tech Hubs program, we do expect to see step-change increases on certain key metrics in successful areas.

Thus, given the multifarious goals of the CHIPS and Science Act, the EDA should consider a range of outcomes that encompass both economic development and technological innovation as key success indicators. Measures in the first category should include **wage growth, advanced industry job growth, change in the prime-age employment rate, and the rates of new business and establishment formation**. These should be done both economywide and within industries directly relevant to the Tech Hub itself. A successful Tech Hub should see its **economy diversify, with footholds growing in new or young industry segments**, too. In the second category, EDA should track changes in local rates of **patenting** (particularly in the Key Technology Focus Areas laid out in the CHIPS and Science Act), **business R&D, venture capital funding, and research grants** from the National Science Foundation.

Together, improvements in these indicators would suggest a crowding in of private economic activity and investment catalyzed by the activities of Tech Hubs. Rather than merely showing the jobs or businesses that federal dollars support in a mechanical sense, they indicate whether a region is developing into a self-sustaining cluster that can endure after Tech Hub funding tapers off. Such measures should be tracked in both designated Tech Hubs and their associated control groups. Success should be measured against each region's pre-designation trend and how the change (or lack thereof) in the region's trajectory compares to that of its peer group. These suggested indicators are relevant in both the short and long term, too, offering EDA a consistent evaluation framework for the lifetime of the program.

EDA should lay the groundwork for a ***qualitative evaluation*** of the Tech Hubs program approximately five years down the road as well, anticipating surveying participating firms and members of the winning consortia on how the program changed their behavior or trajectories, the perceived value they derived and nature of their engagement with the Hub, and their feedback on future program design. Private sector insights will be especially valuable, since firms are the ultimate vehicles of regional economic transformation.

Finally, ***it is important that the regional tech hubs are evaluated as a portfolio of investments***, and that the performance of any individual Hub (investment) is treated as an opportunity to learn what worked and what did not. The goal of the program is to engage consortia in high-risk, high-reward activities in diverse regions. As a result, some individual hubs may fail to spawn new clusters of successful firms or grow into a self-sustaining ecosystem. Failure is intrinsic to the process of innovation. The program itself should be evaluated more like a venture capital portfolio: the leverage ratio in terms of value created for the American economy from the investment made into it. It will take only a few standout wins to accomplish that goal, and EDA should do all that it can with the limited funding in hand to position the Program for such success. Success–especially some early ones–will be the Tech Hubs program's most powerful ally in securing additional and sustained funding from Congress in the future.

4. Select responses to specific questions laid out in the RFI

Question 4. How might EDA determine the relative competitiveness of proposed Tech Hubs in the context of current and future global competition, in addition to domestic competition?

EIG encourages EDA to look at the presence of foreign direct investment (FDI) in relevant industries as a signal of the global competitiveness of a cluster. Global firms will be sure to establish outposts in areas where essential advances in their industries are being made. Export intensity is another good indicator that the cluster is globally integrated and world-beating. The baseline levels of these indicators may be useful to help identify strong Hubs candidates; their change over time will be useful to gauge the success of the program in designated Hubs.

For further reading see: "Foreign Direct Investment in U.S. Metro Areas" by Devashree Saha, Kenan Fikri, and Nick Marchio, Brookings Institution, 2014.

Questions 5 and 10. Please share specific examples of policies that support technology-based economic development at the scale required here; Please share best-in-class ideas for inclusive and accessible competition processes for the Tech Hubs program, including examples of best-in-class regional competitions in the United States or internationally.

EIG encourages EDA to look at Germany's Leading Edge Cluster Competition ("Spitzencluster Wettbewerb") for potential insights around program design. Although EIG has not formally evaluated the initiative, it is one of the most prominent examples of a competition similar to the Tech Hubs program from an advanced innovation economy in the past 15 years. (The second link below includes an impressive formal evaluation of the program from the Leibniz Institute). It was central to the country's high-tech strategy in a manner akin to the role the Tech Hubs program plays within the CHIPS and Science Act. In addition, it bears striking resemblance to the scale of appropriations EDA is working with: 360 million euros of federal investment between 2008 and 2014, with 15 leading edge clusters designated from 80 initial applications, each receiving up to 40 million euros of investment over a five year period. It was anchored in principles of collaboration and partnership, as well, and was found to significantly boost networking and private R&D especially for SMEs in targeted regions. EDA and award recipients alike may benefit from learning how Leading Edge Cluster Initiatives were managed and balanced things like the tradeoffs between growing coordination inefficiencies, on the one hand, and the potential for expanded knowledge exchange, on the other, as the number of cluster participants (i.e. members of prospective Tech Hubs consortia) increased, for example. The extent to which the cluster initiatives became self-sustaining after the federal support wound down was variable, offering another opportunity to learn valuable lessons from the German experience.

For further reading see: "Cluster policy: insights from the German leading edge cluster competition" by Michael Rothgang, et al., 2017; "Accompanying evaluation of the funding instrument "Spitzencluster-Wettbewerb" of the Federal Ministry of Education and Research. Final report - Summary," by Michael Rothgang, et al., 2015; and "Germany's Next Top Cluster! A Model Competition from Deutschland" by Kenan Fikri, Brookings Institution, 2012.

Question 8. What are some of the most innovative approaches to commercialization at research institutions (e.g., universities, national labs) and what evidence exists on the effectiveness of these approaches?

EIG highly recommends that EDA consult Mark Muro and Scott Andes' "Going Local: Connecting the National Labs to their Regions to Maximize Innovation and Growth" from 2014. Among many highlights, it includes a discussion of innovation voucher models through which SMEs can commission R&D services from advanced facilities such as national laboratories. The model may be relevant for Hubs winners whose implementation strategies center around the construction of research infrastructure, facilities, or similar assets.

Question 18. What else should EDA consider when building this program, including but not limited to alignment with other Federal programs?

Seeding successful innovation clusters is an inherently difficult task, one that calls for humility on behalf of the federal government. The public sector's proper role lies in providing resources, setting guidelines, and securing market conditions conducive to growth, but from there clusters must be allowed to evolve organically and independently. For the task at hand to succeed at any meaningful scale, the designated consortia will need the freedom to adapt and respond to foreseeable and unforeseen challenges. EIG believes strongly that the administration of the Tech Hubs program should be narrowly-focused–especially given the limited appropriation in hand–on the economic development task at hand of kickstarting globally-competitive innovation activity in more regions. EDA should not saddle consortia with inflexible rules and sourcing requirements or seek to maximize the quantity of participation in the consortia over the quality of participation for its own sake. Competitive, self-sustaining clusters tend to be globally-integrated, decentralized, and benefit from flexibility. They emerge; they are not prescribed or engineered. Program administration should set regions up to achieve their goals; it should not dictate how regions set about achieving them.

Appendix: Tech Hubs Index

In order to demonstrate how the principles underlying EIG's Hubs Index and outlined above for identifying strong Hubs contenders perform in the real economy, we have included a table of the 25 top-scoring metropolitan areas on our index. The framework and methodology produces an

exciting and intuitive list of dozens of strong contenders, and we hope it provides EDA a helpful roadmap for vetting candidate regions and then candidate consortia.

Rank	MSA Name	State	Index	Potential Component	Need Component
1	Greenville-Anderson, SC	SC	77.4	38.1	39.3
1	Provo-Orem, UT	UT	77.4	35.8	41.6
3	Tucson, AZ	AZ	77.1	37.8	39.3
4	Phoenix-Mesa-Chandler, AZ	AZ	76.2	42.6	33.6
5	Salt Lake City, UT	UT	76.1	40	36.1
6	Toledo, OH	OH	75.2	34.6	40.6
7	Akron, OH	OH	75	37	38
8	Greensboro-High Point, NC	NC	74.7	35.2	39.4
9	Knoxville, TN	TN	74.5	37	37.6
10	Springfield, MA	MA	73.5	35.1	38.5
11	Gainesville, FL	FL	72.9	28.5	44.4
12	Columbia, SC	SC	72.4	34.8	37.6
13	Riverside-San Bernardino-Ontario, CA	CA	72.2	41.6	30.6
14	Lansing-East Lansing, MI	MI	71.9	32.9	39
15	Ann Arbor, MI	MI	71.7	35.9	35.8
16	Tuscaloosa, AL	AL	71.7	21.1	50.6
17	Buffalo-Cheektowaga, NY	NY	71.7	38.4	33.2
18	Sacramento-Roseville-Folsom, CA	CA	71.6	40.5	31.1
19	Tallahassee, FL	FL	71.5	26.2	45.4
20	San Diego-Chula Vista-Carlsbad, CA	CA	71.4	43	28.4
21	Oklahoma City, OK	OK	71.3	38.1	33.2

22	Rochester, NY	NY	71.3	39.3	32
23	Cincinnati, OH-KY-IN	OH	71.3	41.6	29.7
24	Mobile, AL	AL	71.1	26.1	45
25	Orlando-Kissimmee-Sanford, FL	FL	70.9	40.6	30.3