

EDA Regional Innovation Hub

August 15th, 2023

Submittal by: Puerto Rico 5G Inc.

Designation Request

Scoring Criteria:

- (1) Technology-based potential of the region for global competitiveness (15 points);
- (2) Role of the private sector (6 points);
- (3) Regional coordination & partnerships (6 points);
- (4) Equity & diversity (6 points);
- (5) Composition and capacity of the regional workforce (6 points);
- (6) Innovative “lab to market” approaches (6 points); and
- (7) Impact on economic and national security of the entire United States (6 points).

The Research Enabled Advanced Communication Hub (REACH) Consortium aims to create the Puerto Rico Embedded Wireless Technology Applications hub (PREWTA) in Puerto Rico including three combined statistical areas (CSAs); San Juan/Bayamon CSA, Ponce/Yauco/Coamo CSA, and the Mayaguez/San German CSA and the Aguadilla/Isabela Metropolitan Statistical Area (MSA), as determined by the 2020 US Census of PR. The three CSA's combine several MSA's which cover significant portions of the island. We will also be doing outreach in those regions not specifically included in these designations plus on the Islands of Vieques and Culebra. These collective regions primarily benefit small and rural areas throughout the Island, are EPSCoR Qualified, and have significant HUB Zone, 8A, and Opportunity Zone development tool utilization.

The concept of the PREWTA centers on expanding a network of eight (8) labs interconnected to a robust fiber optic, internet 2, and laser satellite network, to advance the capacities to commercialize, deploy, and domestically manufacture and deliver advanced communication technologies for current critical sectors (Pharmaceutical and Medical Device Manufacturing, Aerospace) and other potentially high growth industries (Fintech, Solar Energy). These growth industries were identified through a 'PR Technology Enablers' research study performed by a 2023 'Multidisciplinary Action Project' in partnership with U of Michigan, which assessed PR and identified first growth sectors based on projected CAGR, skill availability, and industry interdependence, then the technologies needed to maintain global competitiveness now, on the horizon, and in the future.

This concept was selected based on recognition that while globalization had reframed value chains to emphasize profit margins, successful regional US economies responded by reinvesting in emerging technology development, specifically product R&D and technology efficiency. This created new specialized regional technology hubs that attracted larger shares of research funding and related commercialization benefits within those economies. This proposal offers that the regional successes represented by this shift must be decentralized across the country in order for every region in the US to benefit and that the decentralization is contingent on having advanced data-led models as a 'playbook' for value chain redevelopment based on foundational local assets.

ED best practices reflect that the strongest innovation clusters result from the organic connection of companies related through alignment to a purpose in a free market-driven value chain versus by specific NAICS or SOC designation or policy influence. In a post-Covid world, this has created an opportunity to rethink our definition of 'Hub' as not necessarily needing large locational concentration but needing connected networks with specific rapid recognition of emerging challenges. These challenges become the market for new product development by entities designing solutions for these challenges. COVID has also allowed us to recognize that people, products, supply, and demand are all fluid, and that solutions for challenges in one sector could have market purposes in other sectors. Sector cross-pollination would represent low-hanging fruit for immediate application in new markets for emerging products, as a solid pipeline for 'idea to commercialization' is being formed.

Our team of academic researchers, using advanced AI tools, will create robust searchable libraries of these challenges (or new product opportunities) and of solutions (based on new product innovation developed within our network or identified through TDP as our database). All partners

will be committed to defining solutions by creating exportable products, services or models that will be first surfaced by the diverse Puerto Rico Manufacturers Association (PRMA), which represents a microcosm of industry in the US. As the solutions are validated (or fail) with the same constituency, it will inform whether the challenge needs to be cycled back to the lab and innovator networks for revision. This proposal will provide the structure by which that mechanism functions, and by which it capitalizes on the unique quality of PR to continually replicate a variety of diverse environmental conditions, technology readiness capacity, socio-political structures, language and legal jurisdictional elements.

PR is the only place on US soil with a publicly owned, zero-trust data-protected research platform at the intersection of foreign/domestic, terrestrial/non-terrestrial, and cooperative/non-cooperative networks. It is one of only two locations on U.S. soil that has a National Radio Quiet Zone. These two components together make PR the only location in the U.S. for developing convergence security protocols, creating a sandbox environment for U.S. and international partner information exchange. The connected lab research platform is a unique publicly-owned fiber optic network running throughout the Island and anchored in a cable landing station housing 5 submarine cables providing low-latency connections between the US, Europe, Central and South America. It also serves as the backbone for the University of PR's Internet 2 research platform and all Commonwealth Government Agencies, plus over 100 different Internet Service Providers (ISPs).

To support research on this type of infrastructure, the region already has significant communication research occurring with engagement in the SpectrumX and CARSE (Center for Advanced Radio Science Engineering) projects as well as private industry partners Hewlett Packard, Raytheon, Lockheed Martin, Collins Aerospace, and Honeywell, all designing and producing component parts related to embedded wireless technologies. Finally, PR has been selected as the first US-headquartered space-to-ground laser communication commercial mesh network, with PR proposed to have 2 optical ground stations and manage a total of twelve in the Caribbean network. The combination of these assets, along with plans to build a spaceport at the vacated naval base at Roosevelt Roads, makes PR the singularly best location for communication technology development and testing applications in the US.

REACH's goal is to see old challenges in new ways through the dynamic use of technology using the 'Three Horizons Framework' of innovation to a) examine the challenges of 'business as usual', b) identify aligned disruptive innovations, and c) track emerging future technology trends. This strategy seeks to mesh legacy 'top-down' decision-making perspectives with new tools that equalize decision-making through data while emphasizing the human element of legacy experience as the master of the filters for that data. This is particularly important in regions that have been historically hierarchical because new ideas or entities in those regions struggle to gain respect against well-established leadership structures. This solicitation is critical to supporting disruptive solutions for finding new pathways versus established entities seeking to expand operational funding where the existing structure has failed to create dramatic success. The sweet spot is enabling disruptive structures through funding to embrace horizontal inclusiveness with safety checks of pristine data validation.

This consortium has designed continual tracking through a digital tool called 'The Decision Platform' (TDP) to give an immediate indication of positive trending, looking at 'opportunity cost' as a component of the trending validation, allowing instant optimization of ROI rather than simply

looking to verify any ROI. Recognizing the old adage of “necessity is the mother of invention” our pipeline of ‘identify challenge>convene experts & pollinate ideas>use optimized data analysis tools>go to the lab and ideate>validate solutions>identify new challenges’ means that we are continually gathering robust list opportunities, and simultaneously identifying the market position relative to potential competitors. Innovators can use secure data analytics tools to rapidly iterate developing products, and data that will de-risk investment and shorten the ‘valley of death’ by illuminating the competitive landscape quicker and providing a concise ‘scorecard’ for corrective measures for the product. This vetting is done in a matter of days versus months in traditional tech transfer and commercialization models. The subjective nature of traditional SME scoring, often skewed due to limited information, is also minimized, giving the experts more robust data to support potentially more disruptive concepts.

TDP, a tool recently developed in Silicon Valley and being used by Stanford’s Center for Global Engagement, was originally designed to help small investors navigate investment prospects more rapidly so that they were not always ‘eating scraps’ after the major investment firms had cherry-picked. The one hundred million data sources, including public data, academic abstracts, and new product technical details, is now being used by public agencies to translate data into actionable information through the use of custom-designed algorithms.

While this data was historically only available to the largest companies with the ability to gather, sift, and analyze data for market opportunity identification, we want to open the power of that data to (1) entrepreneurs for rapid-to-market solutions (2) regional support organizations that nurture these entrepreneurs, and (3) the government to influence policy adjustments. To maximize the application of data we have the following steps defined.

Step 1: Develop a comprehensive consensus-driven strategy for the PR REACH Consortium using the ‘Strategic Doing’ methodology developed at Purdue and now housed at the University of Northern Alabama. This will establish how partners work together and provide governance for tracking priorities and accomplishments from a federal value perspective. Included in this strategy will be alignment to other economic strategies locally and the two NSF Engine Phase I awardees (The PR Science Trust BioScience and UPR-Bayamon Climate Management Projects).

Step 2: Publish an ‘Industry Technology Challenges Report’ by engaging PR Manufacturing Association membership to identify competitive challenges and isolate associated needed technology solutions. This will include developing searchable libraries of challenges to establish a baseline of market need for new product development, and a searchable index of potential existing solutions, using a global AI database with over 100 million source documents, which the industry to use to find appropriate solutions to their problems or innovators could use to identify market competition.

Step 3: Identify aligned workforce training needs and establish plans for addressing these needs from an unemployed/underemployed individual perspective, a company upskilling perspective, and a formal apprenticeship perspective. Included in this step will be creating granular maps of the areas with the greatest upskilling needs, and simultaneously evaluating the access within those regions to training tools like broadband internet. Included is recognizing that in PR women are more than 50% of the workforce.

Step 4: Plan an optimal island-wide structure for labs that would provide equitable access for all citizens to the best data storage and data management tools, with each lab having a specific sector

technology application focus, but collectively joined in multidisciplinary pollination. Proposed lab topics include focus on **high-performance computing and ML** for engineering applications, embedded wireless management of **green energy systems**, and **high-security facilities** needed for **space and international communication network convergence cybersecurity**.

Step 5: Expand the national and global network of partners already engaged by using deep data analysis to identify optimal partnerships based on common needs, aligned need/service capabilities, and/or symbiotic research. The final deliverable will be a ‘Technology Summit’ to formalize a global vision and equalize common understanding of various technology applications to the constituency of the region. This will include submarine cable linkage to national and global labs with whom we’ve already established collaboration projects, including one in the DC area.

Step 6: Develop a Playbook for utilizing advanced data tools as an economic driver in underdeveloped regions. This will include working with TDP on the Minority Business Development Agency project to design new algorithms for 8a qualification, identifying optimal data filters for regional EDOs, creating trending metrics for success measurement or adjustment prompts, and creating reporting templates.

This consortium proposes that incorporating activities facilitating translation between business and emerging technology terminology enhances partners capacity to attach solutions to challenges, identify gaps in services, opportunities in markets, and opportunities to collaborate outside of their given discipline or expertise. This approach aids in recognizing service gaps, market opportunities, and possibilities for interdisciplinary collaboration beyond established boundaries. It also equips workforce advisors to better understand the future landscape for skills development and aligns skills to specific emerging tasks rather than to legacy job descriptions or titles.

Perhaps the most impactful component of this proposal is the transparency of the data for impact tracking, and the potential private funding sustainability. The consortium includes a strong network of capital advisors who believe that creating a structure with a large pipeline of prospects, coupled with deep analytics tools for de-risking product launch expenditures and timelines, could be funded by private capital management fee offsets.

The Puerto Rico 5G Zone Inc is an independent Puerto Rico-founded and based non-profit entity that has been leading technology engagement activities for over 3 years on the island. In that time the organization has been recognized for that leadership by the highest-level appointments to guide and advise on critical intelligent infrastructure needs for emerging industry competitiveness. This includes the organizational CEO being appointed the President of the Puerto Rico Manufacturers Association Technology Chapter, being named the Chairperson of the Governor’s spaceport infrastructure committee, and being invited as a key partner on international development and innovation/entrepreneurial development missions. From that position, the organization has for 2 years led monthly meetings of over 150 local, national, and global partners in discussions on communication technology applications.

Each of the core partners has roles as respected leaders on the Island, Nationally and Globally, and collectively bring an unparalleled network of key stakeholders that includes legacy organizations and leaders in Puerto Rico who engage with academia, students, diaspora, and government, in addition to new influencers and technology disruptors changing the face of global industry as we know it.

Recognizing EDA Investment Priorities as foundational to all strategic investments the agency makes, this proposal is crafted to satisfy all seven elements within those guidelines as listed below. Also included are highlights of the proposal aligned to the NOFO scoring criteria.

Equity: The Island has suffered from disparity in both research funding compared to manufacturing capabilities and equal access to education by all citizens in the region. This has been addressed in this proposal. The Island is also one of the largest producers nationally of skilled minority talent in the Bioscience and Aerospace industry (most specifically NASA), and so this proposal would have national equity implications. **Recovery & Resilience:** Having effective communication and energy is the most important element of recovery, and resilience comes from having wise data to lead decision-making and preparedness. **Workforce Development:** New emerging technology is growing so rapidly that skills aligned to micro-skills must be designed. This needs to be approached from an individual, corporate, a program policy basis customized to the culture as is proposed here. **Manufacturing:** The Island economy is 52% manufacturing-based, and many of those facilities need enhanced technology adoption to remain globally competitive, and so the engagement with PRMA will provide important advancement towards this goal. **Technology-Based Economic Development:** It is the hypothesis of this proposal that the future of Puerto Rico is in expanding technology applications as the root of all economic growth of the Island, serving to demonstrate to other distressed regions how to do that with enhanced data use. **Environmentally-Sustainable Development:** Included in our strategy is a plan to build a Green Energy Embedded Technology Testbed at UPRM. Being an Island emphasizes the need for circular economy, sustainable, and climate-sensitive solutions and the energy challenges on the island are a well-known barrier and one increasingly prominent across the country. These solutions can be used in other regions. **Exports & FDI:** The proposal recognizes that every product or service developed on the island is by geographic condition, is an export opportunity. It also has specific global network development to engage international partners to use the singularly unique convergence of networks on the island for security research purposes.

Technology-based potential of the region for global competitiveness: Puerto Rico is the only place in the US with unique convergence capabilities and an endorsed location by PCI as a technology sandbox. **Role of the private sector:** The PRMA represents SME, Multinational, minority-owned manufacturing and service. Additionally, the Technology Innovation Industry partners represent the leading edge of communication and data management via established and start-up companies. **Regional coordination & partnerships:** Great care has been taken over two years to create a strategy that aligns all regional players with national and global expertise. **Equity & diversity:** The island has well-established diversity and this proposal will seek specifically to engage the underserved in proven digital workforce training. 90% of the workforce is Latino will over 50% is female. **Composition and capacity of the regional workforce:** Puerto Rico has a long history of life-critical manufacturing and is cited by WEF as having the 6th highest concentration of scientists and engineers in the world. **Innovative “lab to market” approaches:** The use of TDP and our conjoined lab system reduces the time from lab to market and increases market competition awareness as a predictor of success. **Impact on economic and national security of the entire United States:** Securing communication partnerships and neighboring country’s economic stability is particularly important in the Caribbean region where more than 17 countries border the US by water.

APPENDIX

Source Documents Upon Which Proposal Conclusions are Based

Central Office for Recovery, Reconstruction and Resiliency (COR3); Government of Puerto Rico. (2018). *Transformation and Innovation in the Wake of Devastation: An Economic and Disaster Recovery Plan for Puerto Rico*. Retrieved from: [<https://recovery.pr.gov/documents/pr-transformation-innovation-plan-congressional-submission-080818.pdf>]

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Brookings. (2023). *How Local Leaders Can Upgrade Their Regional Economic Dashboards for a New Era of Place-based Policy Making*. Retrieved from [<https://www.brookings.edu/articles/how-local-leaders-can-upgrade-their-regional-economic-dashboards-for-a-new-era-of-place-based-policymaking/>]

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Plaza, G. (2023). *Prepare to Converge: Aligning the Priorities of Networking and Security*. Retrieved from [<https://www.networkcomputing.com/network-security/prepare-converge-aligning-priorities-networking-and-security#>]

Table of Contents for Letters of Support

Entity Name	Entity Type	KTFA
7 Eagle Group	Technology Innovation Industry	8,1,6
Adam Aerospace	Technology Innovation Industry	1, 4, 6, 8, 10
Althea	Communications Innovation Industry	6,1.4
AeroX Accelerator	EDO/Innovation Accelerator	1, 4, 6, 8, 10
Cambria Networks	Communications Innovation Industry	6,1
Capgemini	Technology Innovation Industry	9,6, 1, 5, 4
Celeres Capital Advisors	Capital Access	5,8,1
Consulting Lead	Technology Innovation Industry	1, 5
Dept of Economic Development & Commerce	State/Territory EDO	7, 5,
EN Capital	Capital Access	5,8,1
Evolving Space	EDO Focused on the Underserved	1, 4, 6, 8, 10
Exemplar	Communications Innovation Industry	6, 1
gener8tor	EDO Focused on the Underserved	1, 4, 6, 8, 10
George Mason	Institution of Higher Learning	6, 8, 9,1
Gig Engineer	Institution of Higher Learning	1, 2, 4, 6,10
Hewlett Packard Enterprise	Technology Innovation Industry	1,2,3,4,5,6,8,9,10
HUB	Technology Innovation Industry	6, 8 4 1, 2
Ideation Co-Labs	Technology Innovation Industry	1, 4, 6, 8, 10
INDUNIV	EDO/Technology Industry Consortium	7, 5, 4, 1, 2
IPR	EDO/FDI Investments	1, 4, 5, 7, 8, 10

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Laser Light	Communications Innovation Industry	6,8,5, 1
LIFT	Federal Manufacturing Institute	10,1,2,6, 8
Microsoft	Technology Innovation Industry	1,2,3,4,5,6,8,9,10
National Puerto Rican Chamber of Commerce	EDO/Trade Association	1,2,3,4,5,6,8,9,10
Northstar Spaceport LLC	Technology Innovation Industry	10, 6, 5, 4, 1
People Centered Internet	EDO Focused on the Underserved	1, 5,6,8
PR Port Authority	State/Territory EDO	6,7,9
PR Manufacturers Association	EDO/Technology Industry Consortium	1,2,4,6,7, 8 9,10
PRTEC	Labor Org & Workforce Development	1, 4, 3, 7, 10
PR Science Technology & Research Trust	EDO/Science and Technology	1,4,5,7,8,10
PR Blockchain Trade Association	EDO/Science and Technology	1, 4, 6, 8, 10
Rhodium Scientific	Technology Innovation Industry	10, 6, 5, 4, 1
SBDC Center for Innovation	EDO/SBIR	1, 2, 5,
Spece CoWorking	Technology Innovation Industry	1, 4, 5, 7, 8, 10
TDP	Technology Innovation Industry	1, 8
Tranxcend	Technology Innovation Industry	1, 4, 6, 8
University of Puerto Rico-Mayaguez	Institution of Higher Learning	10, 9, 7, 6, 4, 1
Univeridad Ana G Mendez	Institution of Higher Learning	10, 9, 7, 6, 4, 1
Vanguard Vision	Technology Innovation Industry	4, 1, 10
Virginia Tech	Institution of Higher Learning	6, 8,9,10,1, 4