Our proposal is to stimulate ‘New Economy’ and ‘NextGen’ smart manufacturing growth through communication dependent applied research and development specifically in 5G, IoT, and Blockchain technologies. Technology advancements in Artificial Intelligence (AI), Machine Learning (ML), and Quality Assurance (QA) require highly secure and sophisticated regional communication infrastructure, both in physical assets and human capital expertise, to remain competitive in advanced product and service development. Puerto Rico has a unique national profile with resident foreign/domestic, terrestrial/non-terrestrial, and cooperative/non-cooperative networks converging on a publicly owned fiber-optic network that operates the Island’s Internet2 research network all with open High Performance Computing access. We will use this nationally differentiated platform as the foundation for an innovation ecosystem starting with several high-potential focused industry applications.

Our proposal positions Puerto Rico 5G Zone + Blockchain Ignition Lab (PR5GZ), and it’s 60+ member Advisory Board of global experts, as the engine applicant.  The PR5GZ is an independent Puerto Rico founded research network that currently operates two zero-trust architecture (ZTA) secured research labs on the Island. These labs provide low-cost access to the digital tools needed for innovators to develop, test, and validate rapid data management related solutions for all industry. With our regional partners including The University of Puerto Rico, The Puerto Rico Science Trust, PRiMEX (MEP), and the Center for Sustainable Innovation, as well as over 34 institutional or business-based entities, we will design an ecosystem that seamlessly interfaces ideation, culture, acceleration, training, and market needs. Additionally, we have secured advisory guidance from the Autonomy Institute, a federal non-profit based in Austin, to assist in applying best practice design related to smart technology adoption strategies for industry and cities creating digital inclusiveness throughout the Island.

The devastation after Hurricane Maria brought to light critical infrastructure challenges in Puerto Rico, including a catastrophic communication network breakdown. In subsequent analysis it was revealed that while over half of the Island’s economy is manufacturing based, and there is a growing sector for high-technology service companies, Puerto Rico has not kept pace with global competition in providing local technology infrastructure research and deployment. This impedes the Island from being an innovation hub, and has instead led to reliance on low-cost production (specifically through lower wage rates) to remain competitive. As a result, high innovation skill individuals trained on the Island have migrated towards higher wage global regions, and factories producing discontinued generations of products have closed.

A Regional Innovation Engine in Puerto Rico focused on research and development of advanced communication based applied research specific to 5G, IoT, & Blockchain technologies would reverse this brain drain by providing new opportunities in producing goods and services higher on the value chain.  Puerto Rico’s unique capabilities as a location with multiple unique network convergences makes it singularly qualified as a national research engine for this work. The high concentration of multinational corporations, and influx of new infrastructure investment post Hurricane Maria, make Puerto Rico an ideal testing environment.

Additionally, the concentration of industry and percentage of disadvantaged population, which is 98% OZ qualified and 82% HubZone qualified means the targeted beneficiaries of the project will align with Federal objects.   Finally, the Island of Puerto Rico experiences significant disparity in federal research funding to stimulate innovation, which has disadvantaged this important national industrial center, specifically related to the foundational technologies required for NextGen/New Economy development.

The regional definition would include Puerto Rico, and USVI, with technical support linkages to Texas and Florida.  Additional positive elements for the proposal would focus on:

1. National Security Interests:  PR being the United States trusted national security nexus to the Caribbean Basin, Central and South American Countries through aligned language, legal structure, international banking and cultural synergy.   Puerto Rico has an advantaged location to defend against technology and information warfare within the Americas. Establishing a hub with ZTA secured research facilities and an industry facing ‘Secure Confidential Information Facility’ (SCIF) would provide a strategic environment for public private partnership.
2. Available Global Talent Pool:  PR has a significantly high concentration of Scientists and Engineers, cited by WEF as the 6th highest concentration in the world.  Almost 60% of the Island’s college grads are in STEM fields, with 26K graduating annually.  Additionally, the island has a significant documented population of skilled diaspora who are mid-career researchers eager for an opportunity to return from around the world.
3. Undergoing Infrastructure Redesign:  The entire infrastructure of the Island has been tested by Hurricane Maria and deemed inadequate for current and future industry demands.  As the redesign occurs there is strong recognition that this is the opportunity to build to new economy designs, making Puerto Rico a high-profile live test-bed for these new designs and the related efficiency in critical industries.  New development opportunities in underutilized port facilities in Aguadilla, Ponce, and the expansive 8000-acre vacated Navy base at Roosevelt Roads offer opportunities to develop ground up smart designed research and testing campuses.
4. Cost Efficiency of Puerto Rico: The island of Puerto Rico has all the diverse complexity of other locations, but establishing pilot projects on the Island represents a lower test cost based on size and population for technology applications that are scalable to other regions. This diversity, both of people and terrain, plus ‘ideal size’ provides greater flexibility on the Island than other regions of the country.

The engine would include focused research on the following three industry applications.

1. Aerospace & New Space Industry- Because of the highly favorable geographic and national security value, Puerto Rico has the ability to successfully develop a Spaceport with related product foci in satellite development, drone and autonomous technology development, geospacial data management, sub-orbital transportation, laser optimized communication, and off-shore horizonal or vertical launching. All these applications are dependent on a highly secure data management and communication platform which will need to grow as rapidly as the technologies do. The combined market size is in the double-digit billions with some estimates of global growth exceeding 16% annually.
2. Port Management/Disaster Management – The Island’s history of resiliency in a variety of disaster scenarios provides institutional experience and a testing from a logistics perspective. Management of complex data sets will be necessary to effectively and efficiently manage distribution of the high-value goods Puerto Rico is able to produce. Smart port development will include optimized IoT for tracking of life critical goods, secure management of temperature fragile products, and urban air mobility solutions for first mile/last mile transport.
3. Medical Technology/Telemedicine- The Island has strong representation in secure pharmaceutical and medical device manufacturing, with specific expertise in miniaturization. All these products, drug development and product quality assurance is becoming increasing dependent on big data calculations. Simultaneously the Island suffers from disparity in medical services delivery to the rural Island populations. This represents an opportunity to accelerate discovery while also creating secure product/service delivery models to disadvantaged populations. Data collection within in these technology modeling tools have special security needs aligned with HPPA regulations, and technology transfer from experts with the existing corporations has high potential to spin out into telemedicine applications. This industry is currently cited as exceeding $60B, and has projected growth rates exceeding 13%.

For the development of the Phase I Engine structure will be using the methods designed by the ‘Agile Strategy Lab’, with Dr. Ubaldo Cordova as the certified facilitator. The objective would be to create an interactive design for innovation support service referrals to entities currently operating on the Island. Designing cross-pollination between sectors will be very important to accelerating the rate of discovery and commercialization. The proposed steps would include:

1. Establishing national and global partnerships for research on security convergence of foreign/domestic, terrestrial/non-terrestrial, & competitive/non-competitive networks for rural and commercial users in the following industry applications.
2. Planning facility expansion to meet the individual case use needs for research environments.  This would include designing physical Infrastructure, mapping technical service capabilities, identifying key staff network contacts, and establishing industry specific acceleration and training activities. This would include structures to map and manage advanced technology related capital sources, aligned skill workforce programming, and best practices on innovation deployment.
3. Development of industry partnerships for challenge identification and product testing and validation through a structured series of roundtables with private industry partners. We would include developing data management methods and tools for the collection, development and dissemination of best practices to identified beneficiaries. There would also be programming related to expanding awareness and engagement in SBIR, STTR, and HUBZone utilization in partnership with the Puerto Rico Science Trust (PRSTRT), Small Business Administration (SBA), USDA, and other regional partners.