



PROPOSAL FOR THE 'PRAGI' RESEARCH CENTER

Development of the Puerto Rico Advanced Global Innovation Center

Presented by: Gail Nolan, CEcD – CEO of PR5G Zone + Blockchain Ignition Lab

THE VISION

Puerto Rico as a Global Technology HUB

Aligned Global Partnership for Communication & Security Research in Puerto Rico

PR5G Zone + Blockchain Ignition Lab

Only Convergence
Research Facility of Its
Kind on U.S. Soil

Zero Trust Architecture
Secured with IoT Device
Testing

Low Cost and Industry
Facing Development,
Testing, & Validation

REACH Initiative

PPP Designed for OKR
Managed Collaborations
to Accelerate TRL

Partnership of Global
Experts and Gig-
Economy Talent as
Advisors

Focused on Technology
Transfer and Practical
Applications

HUB Advanced Networks

Most Sophisticated
Network Hub in the
Caribbean

Publicly Owned Fiber
Optic Research Network
Infrastructure

High Security Cable
Landing Station and
Data Center

PRAGI Research Center

Industry Facing 'Secure
Compartmentalized
Information Facility'
(SCIF)

Highly Mature TRL with
Pilots and Commercial
System Focus

Secure Training Rooms
for Training on New
Technology Tools

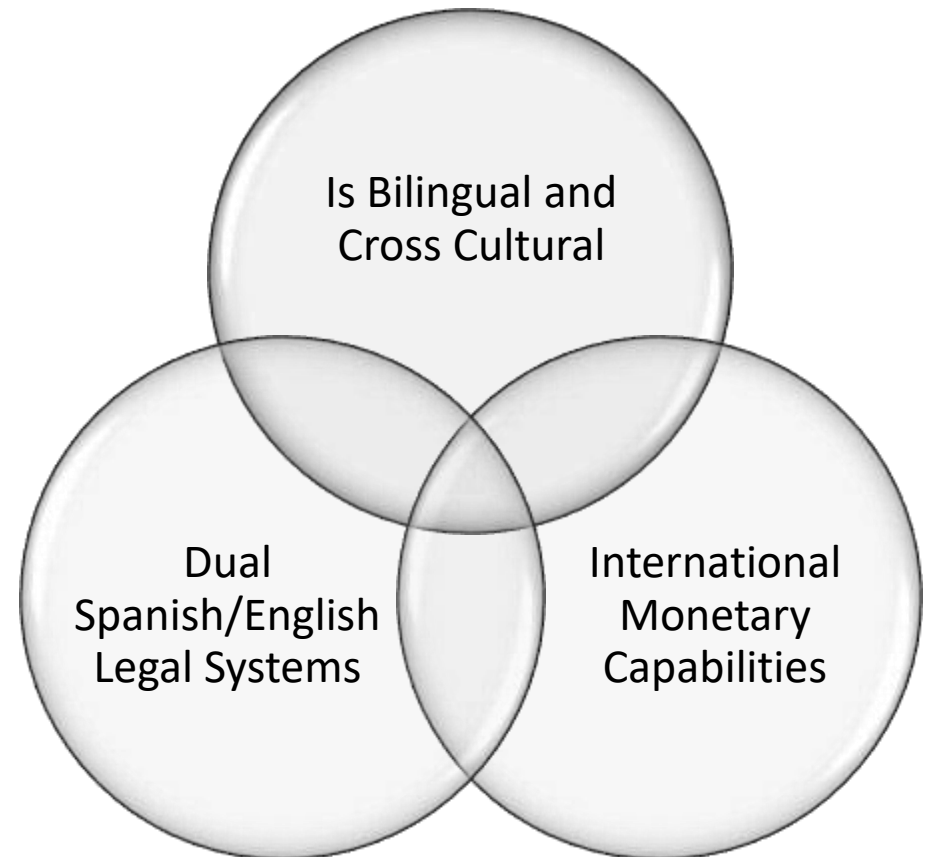
Why Puerto Rico

The Aligned Assets Are Unique and Unmatched



Why Puerto Rico - Uniquely Serves National Security Interests

PR is a trusted national security nexus between North America, Europe, Africa, the Caribbean Basin, Central and South American



Why Puerto Rico- Available Advanced Research Talent Pool

Highly Skilled Global Workforce Born in Puerto Rico



6th highest concentration of Scientists and Engineers in the world according to WEF.



Almost 60% of the Island's college grads are in STEM fields, with 26K graduating annually.



High population of research diaspora eager to return from around the world.



High concentration of military and multi-generational US citizens.



Emerging technology hub for AI, ML, blockchain & digital nomad workforce.



Why Puerto Rico-Funding for Infrastructure Redesign

Undergoing a dramatic reconstruction with future vision



The devastation of Hurricane Maria is an opportunity for new economy design.



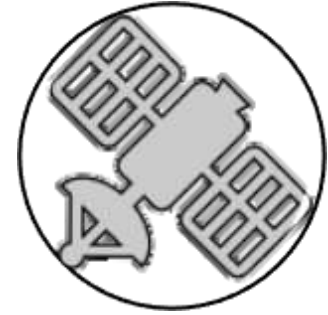
Critical intelligent infrastructure and related efficiencies will be part of this new design.



Experts from all over the world are convening in Puerto Rico to design new solutions.



Underutilized port facilities have capacity that will not interfere with existing supply chains.

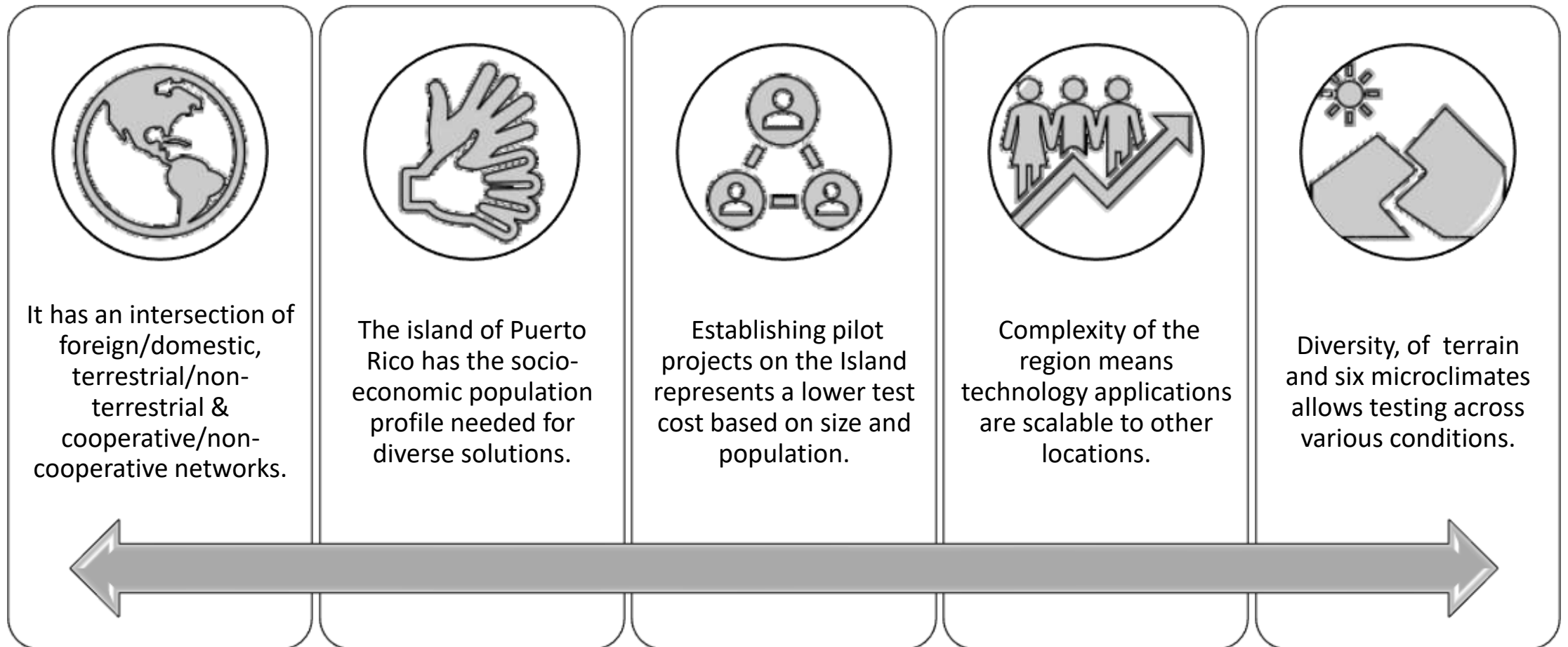


Planned Spaceport at Roosevelt Roads offers new research, testing, and launch campus.



Why Puerto Rico-Cost Efficient Innovation Environment

Ideal Location for Testing and Validating New Technologies



Why Puerto Rico-Green Tech as an Economic Driver

Puerto Rico has a unique opportunity to leverage previous disasters as the ideal environment in which to design globally exportable solutions

5G Green Energy Commercialization Model					
Stage 1 Investigation	Stage 2 Feasibility	Stage 3 Development	Stage 4 Introduction	Stage 5 Growth	Stage 6 Maturity
Technical					
Technical Analysis	Technical Feasibility	Engineering Prototype	Pre-production Prototype	Validation & Production	Production Support
Marketing					
Market Need Assessment	Market Study	Strategic Marketing Plan	Market Validation	Sales & Distribution	Market Diversification
Business					
Venture Assessment	Economic Feasibility	Strategic Business Plan	Business Start-up	Business Growth	Business Maturity

- By focusing on the 'Technical' elements of commercialization, Puerto Rico can maximize locational advantage and diverse testing environment for 'Validation & Production'.
- In addition to the duality of language, legal, and cultural elements, Puerto Rico's unique convergence of foreign/domestic, terrestrial/non-terrestrial, and cooperative/non-cooperative networks means seamless security integration for resultant products.

Why Puerto Rico-The Puerto Rico Prosperity Initiative

PR is identified as a National and Global Sandbox in Department of Commerce Strategy by the People Centered Internet to 'Reimagine Puerto Rico's Value Chains'



Resilient

Green



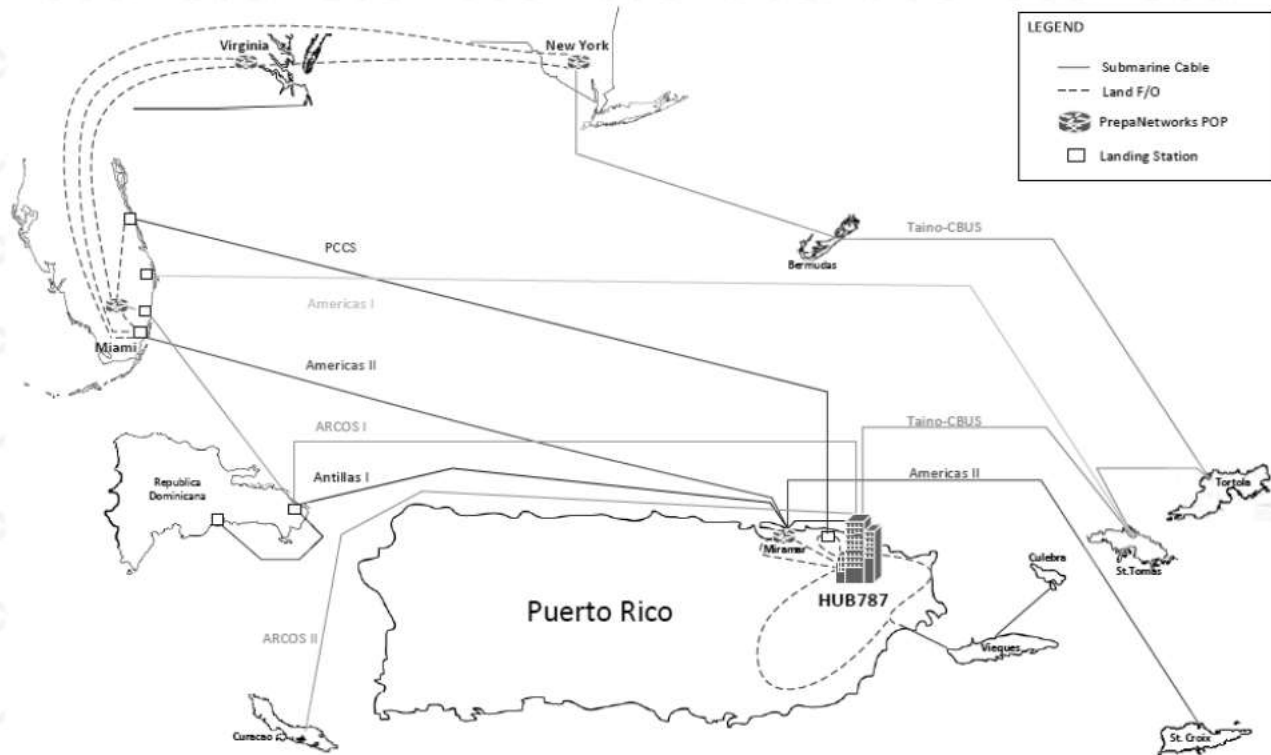
Digitized

HUB787 AT THE CORE

HUB Advanced Networks as the Innovation Platform

Regional Network Connectivity from HUB787

- HUB Advanced Networks has an extensive network of Submarine Fiber Optic Cables connect the east and west hemispheres.
- Also has an extensive on-island Fiber network.
- Is a publicly owned, US jurisdiction secured, wholesale and research network.



HUB787 as the Secure International Partnership Location



We are an Advanced Telecommunications and Technology company committed to enabling business leaders with the digital infrastructure and reliable connectivity needed to bring innovative services to market in Puerto Rico and the Caribbean. HUB approaches the market with five service pillars:

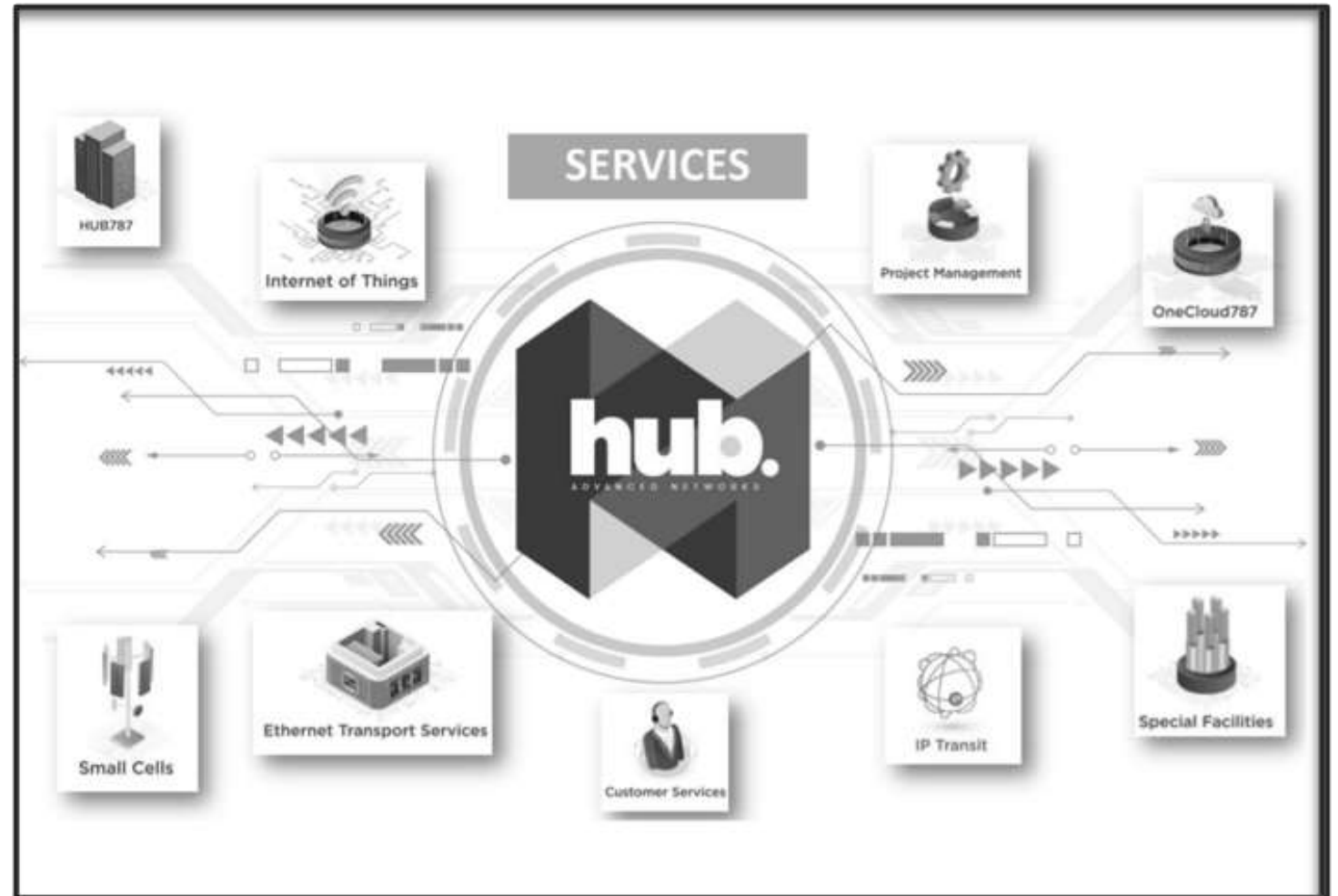
- Wholesale Optical Services
- International Backbone & Data Center
- Special Facilities
- Special Purpose Real Estate.
- Emerging Technologies

These pillars provide a digital infrastructure foundation that supports advanced applications development and foster innovation. We make dreams possible!



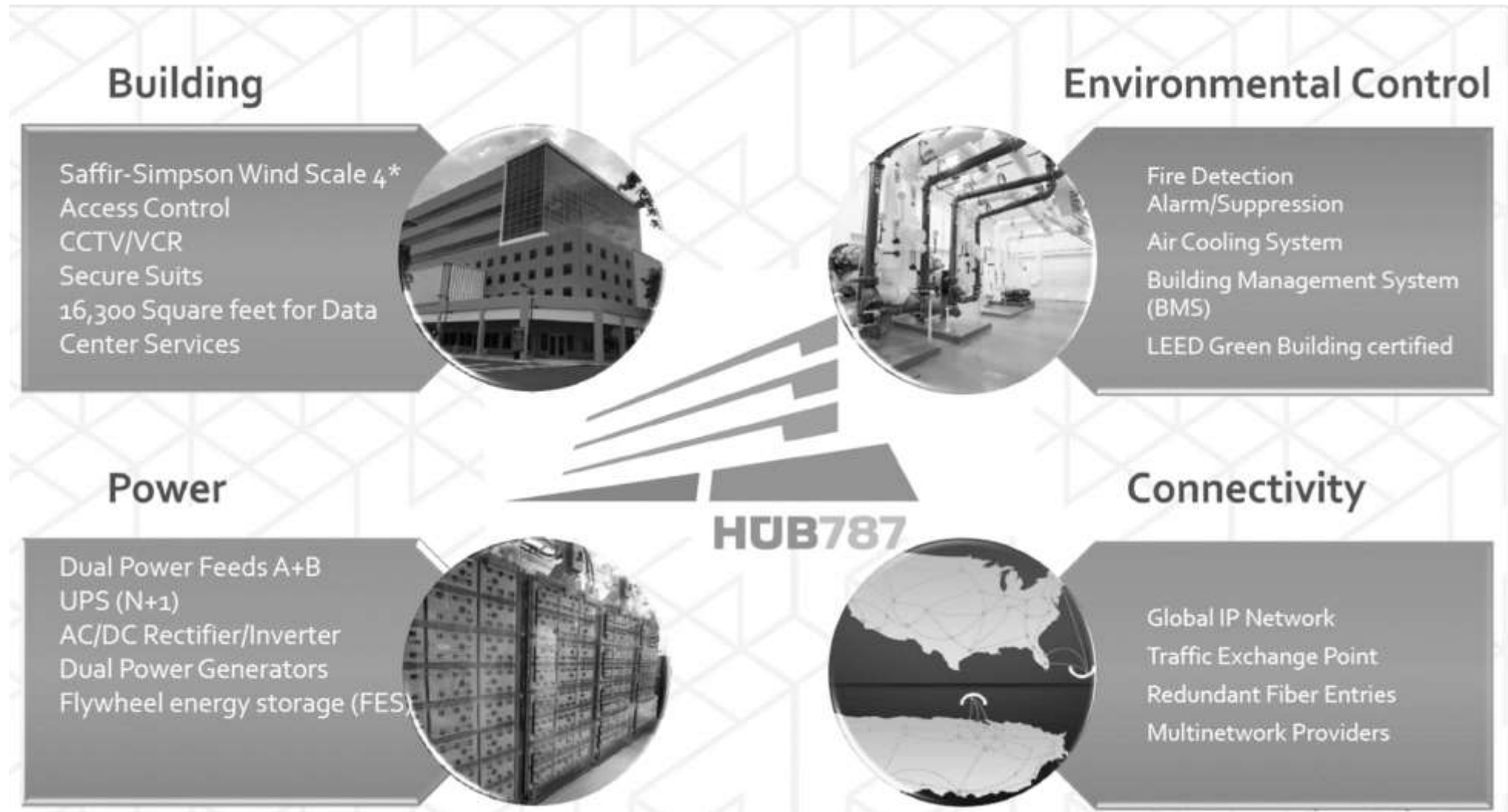
HUB Advanced Networks with Services at HUB787

- In addition to a physical network they also offer advanced service capabilities.
- As a wholesale network they provide an interface between other global retail networks.
- They provide Internet2 to the UPR System and have a low latency HPC connection.



Technical Capabilities at HUB787 –State of the Art

- The 'hub' of the island wide satellite laboratory network.



PR5G Zone 'REACH' Partnership

REACH Initiative as Management Partner



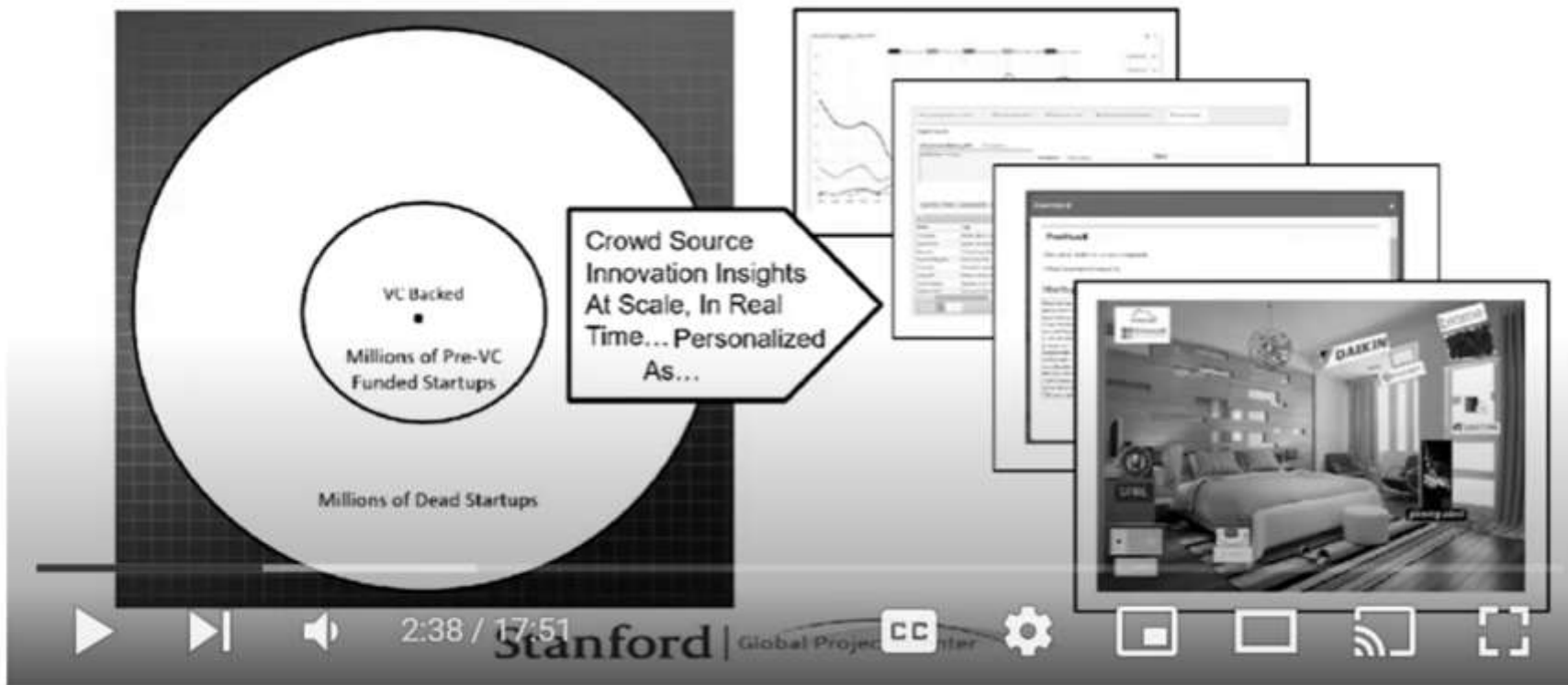
- Create a connected system of specialized technology innovation labs on the Island.
- Deploy a customized AI enabled collaboration tool that allows for optimized referrals, tracking, accountability, and decision making.
- Map ecosystem and establish milestones using national and global best practices as the 10 year goal.
- Develop a transparent process for prioritizing investment in the engine and within the eco-system.

- Research
- Empowered
- Advanced
- Communication
- Hub

REACH Initiative-Puerto Rico's Innovation Engine

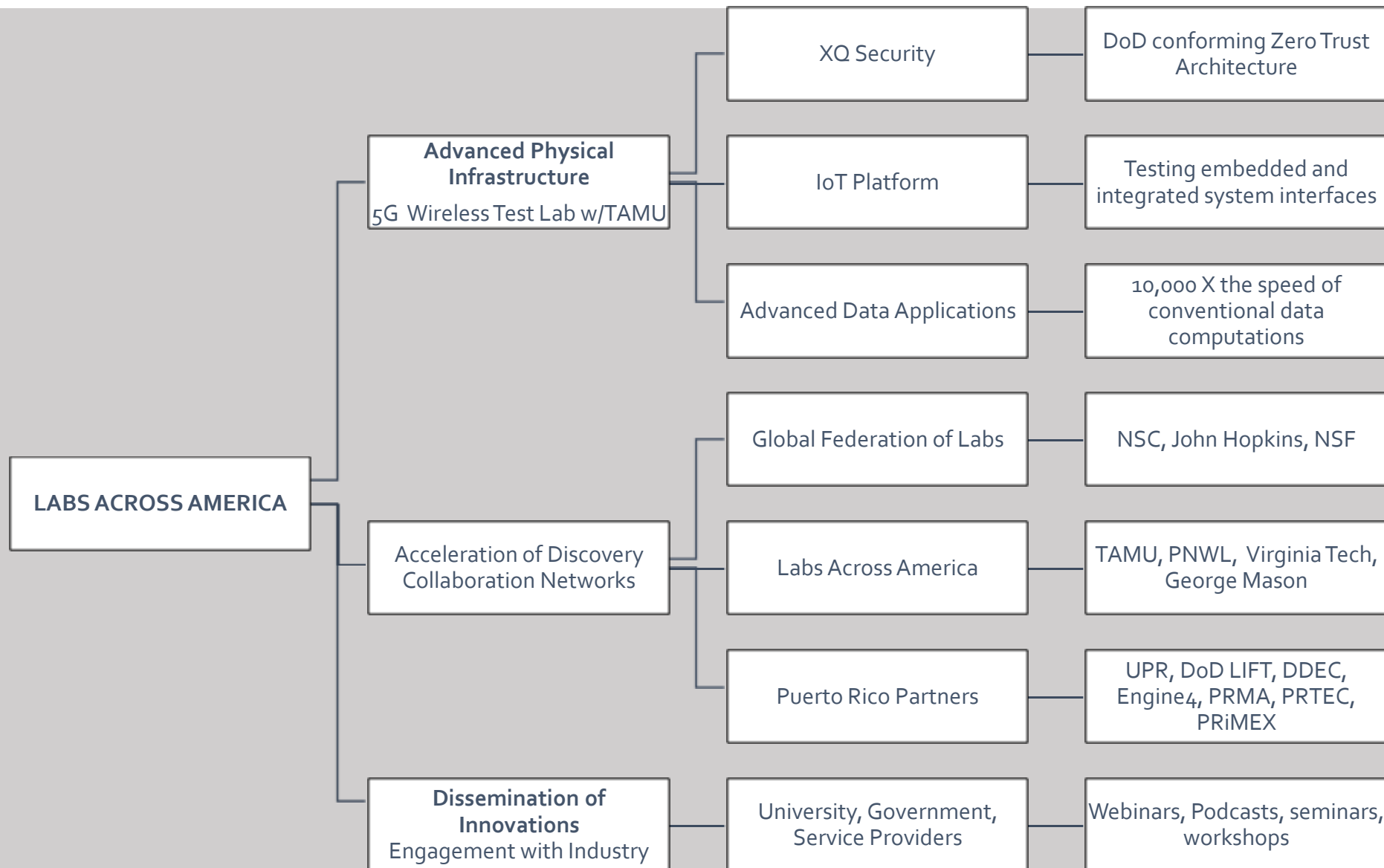
2nd Annual Disruptive Technology and Digital Cities Summit – February 26 & 27, 2018

Module 26: Harnessing the Global Pipeline of Startups



- International Database with extensive global start-up profiles.
- Able to rank technologies in comparison to like technologies and sort by keyword.
- This tool will identify Technology Readiness Level

REACH Initiative- Labs Across America Extended Partnership



NSF Funded Puerto Rico Connected Research Centers

- **Center for Advanced Radio Science Engineering (CARSE)**-at the University of Puerto Rico Mayaguez (UPRM), will enable the development of integrated tools to resolve spectrum sharing and coexistence issues and improve performance on radio science observations through an innovation and collaboration ecosystem designed to elevate the science and engineering capacity at UPRM, Arecibo Observatory and Puerto Rico in general.
- **Center for Wearable Technologies (CAWT)**- at UPRM is developing new material technology applications. The center will To advance the fundamental and applied science of biosensors, portable power, and data analytics to enable next-generation wearables while providing an engaged and diverse workforce for the Nation's wearable technology (WT) sector, and stimulating the economic development in the Commonwealth in concert with the Jurisdiction's robust medical device industry.
- **SpectrumX**- UPRM is also a research participant in the first national institute dedicated to spectrum research, located at Norte Dame University.

DoD Funded Puerto Rico Lab: LIFT

LIFT (Lightweight Innovations for Tomorrow) is a Department of Defense-sponsored national manufacturing innovation institute, a member institute of Manufacturing USA (Department of Commerce) acting at the intersection of materials science, manufacturing process, and digital and virtual systems with the intent of driving advanced manufacturing technology and talent development into the future for US national economic growth and national security. LIFT is in the process of launching a regional technology and talent development facility in San Juan and has a great interest in working with PR5G and their ecosystem in the areas of:

- Private 5G Networks plus 5G+ and 6G for the manufacturing shop floor.
- High-Performance Computing (both distributed and edge computing) for real and near real-time manufacturing applications.
- Engaging in Puerto Rico (including PR5G) the 15 sister national manufacturing innovation institutes with LIFT acting as the integrator within Puerto Rico.

Arecibo Observatory: Radio Frequency Research

- Established in 1950's as part of DoD's missile defense efforts. Ownership was subsequently transferred to NSF with current management awarded to UCF in 2018 and a pending management award for STEM training.
- It is one of only two locations in the US that has a secure spectrum free zone and in 2022 it was included as an important national asset to preserve in the Chips Act.
- Still has instrumentation with the primary purpose of radio frequency data collection, and so locationally aligning it with data management and communication technology research would increase the combined value of both.

Roosevelt Roads: A Spaceport for P2P Logistics

- The 7500 acre site has a 1.5 mile runway and deep sea port with a former elevated communication center still overlooking the site.
- Plans to redevelop have been slow, with a master plan vision published in 2015 including mixed use light industrial, commercial, tourism, recreation, conservation elements.
- In 2022 the Ports Authority submitted an application for horizontal lift to create a Spaceport. Vertical lift off-shore is also feasible.
- Concurrent to the request (above) the Governor established a council to develop a strategy making the spaceport an economic space hub, and a whitepaper has just been published demonstrating the value.

NASA Connection:

- UPR-M is the largest Recruitment site for Hispanic engineers. It is also the largest recruitment site for female engineers.
- Currently the Governors Council is deploying a survey, hosted by the Science Trust, to quantify the numbers of Puerto Rican diaspora working in the aerospace industry and determine occupation skills.
- There is a strong desire to repatriate talent to the island.
- In September of 2022 it was announced that UPRM would be a site for training Space Force personnel and an advanced aerospace research center.
- The newly published whitepaper framing Puerto Rico's exceptional assets for space launch has received peer endorsement from the Space Foundation, Global Space Alliance, and Foundation for the Future.

Existing Aerospace and Defense Assets

- DoD sponsored 'Lightweight Innovation for Tomorrow' (Lift), based in Michigan, is now establishing a satellite office on the Island.
- Industry with the highest recruitment of engineers in P.R.
- Major Engineering Universities now hold Aerospace Curriculum
- 6000 Direct Aerospace/Defense Jobs
- 50% of the Aerospace + Technology Companies conduct R+D in PR.
- 50% of cluster members expect to expand job opportunities in next 12 months (20% more than 100 positions)

PUERTO RICO Aerospace Capabilities

- Manufacturing
- MRO
- Milling
- Turning
- Additive Manufacturing
- Software Development
- Harness / Cable Manufacturing
- Logistics
- Supply Chain
- Quality Management
- Welding
- Machining
- Plasma & Water Cutting
- Mechanical Design
- Structural Analysis & Design
- Software Testing
- Hardware Testing
- Component Engineering Design
- Printed Board Design
- SMT
- Validation & Verification
- Analog Design
- Digital Design
- Product Testing
- High Intensity Radiated Field Testing
- Electromagnetic Interference Testing
- Electromagnetic Compatibility Testing
- Radiation Hardened Design
- Reliability Design
- System Safety
- Avionics Design
- Cyber Security
- Sensing Design
- Testing
- Etc..



Manufacturing Strengths for Applied Research Collaboration

Sterile Environment

High Compliance Capabilities

Device Miniaturization

Satellite Engineering

Process Efficiency

Light Weight Materials

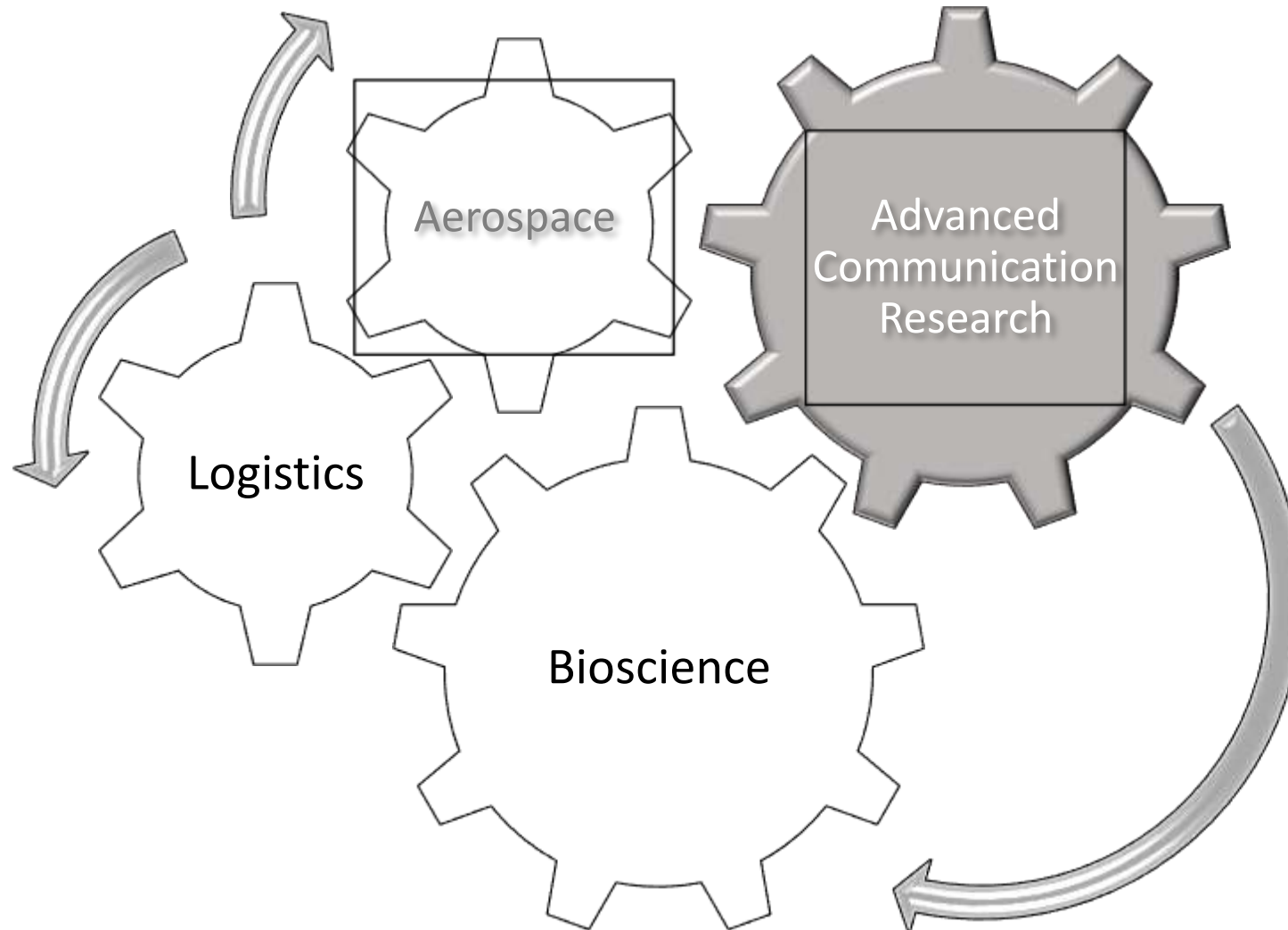
Global Logistics Expertise

Significant FTZ Capacity



Puerto Rico existing manufacturing strengths positions it ideal for research in TRL 6-9, and REACH is currently defining the a roadmap, in partnership with public/private innovation partners on the island, for cross sector collaboration of technology transfer.

Future Facing Intersection of Critical Sectors



- Puerto Rico is the only location in the US that has intersecting global manufacturing strengths in life critical industries, with advantageous communication convergence and space launch location nearest to the equator.
- Currently 1/3 of all launched space experiments are sponsored by BioScience companies.
- UPR-M is engaged in world-class satellite hardware engineering research.
- The Island's request for horizontal lift certification will make it the ideal location for small communication satellite launch.

Puerto Rico Advanced Global Innovation Center

The 'PRAGI' Center

'PRAGI Center' Proposal- Lab Goals

TRL 9	System ready for full scale deployment
TRL 8	System incorporated in commercial design
TRL 7	Integrated pilot system demonstrated
TRL 6	Prototype system verified
TRL 5	Laboratory testing of integrated system
TRL 4	Laboratory testing of prototype component or process
TRL 3	Critical function: proof of concept established
TRL 2	Technology concept and/or application formulated
TRL 1	Basic principles observed and reported

A global collaboration space housing the aligned partnership of PRAGI, REACH, HUB Advanced Networks, and PR5G Zone + Blockchain Ignition Lab. This partnership would create a communication-based technology product pipeline through all Technology Readiness Levels (TRL) and sector applications. This active pipeline would dramatically impact the goals of the Puerto Rico Prosperity Initiative (PRPI).

PRAGI Center Proposal- Areas of Technology Focus

Figure 4.10, Internet Technology Projection



PRAGI Center Proposal- Areas of Technology Focus

Figure 4.4. Pharmaceutical Technology Projection



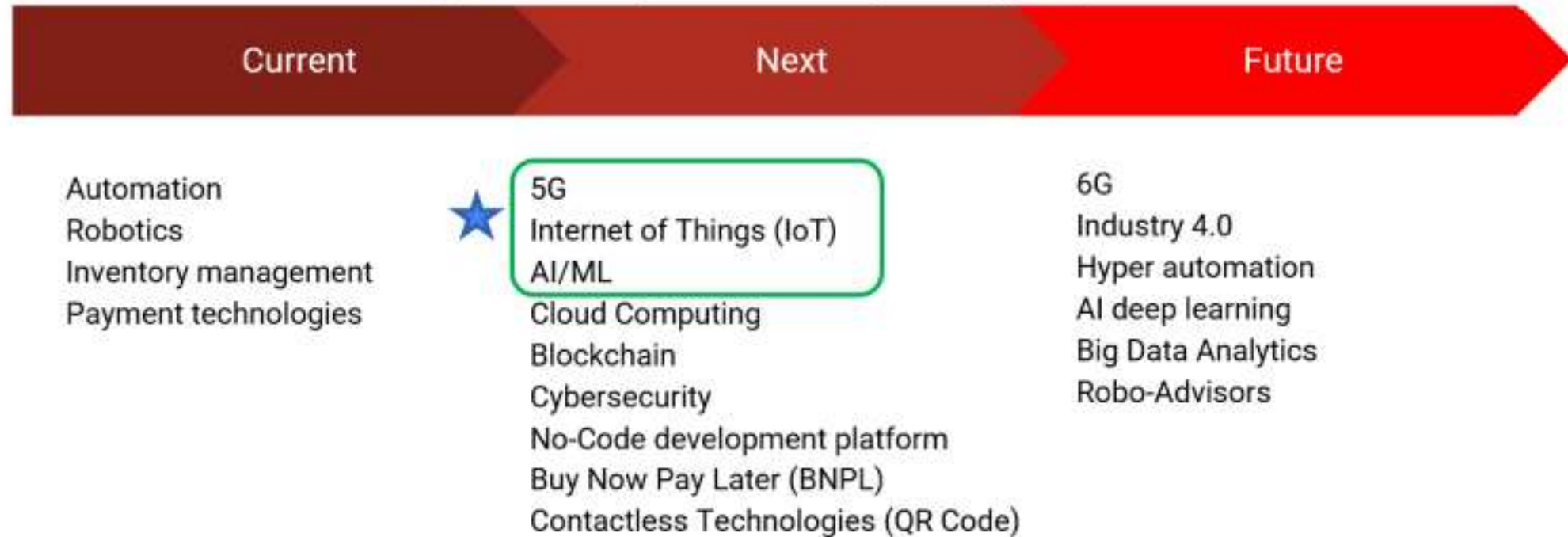
PRAGI Center Proposal- Areas of Technology Focus

Figure 4.6. Aerospace Technology Projection



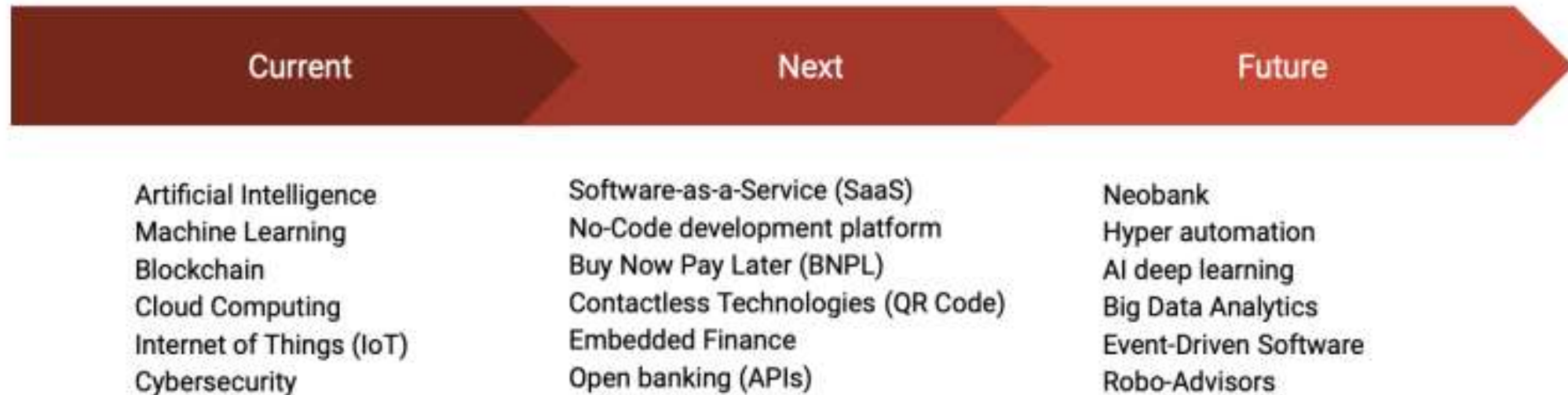
PRAGI Center Proposal- Areas of Technology Focus

Figure 4.34. Storage and Warehousing Technology Projection



PRAGI Center Proposal- Areas of Technology Focus

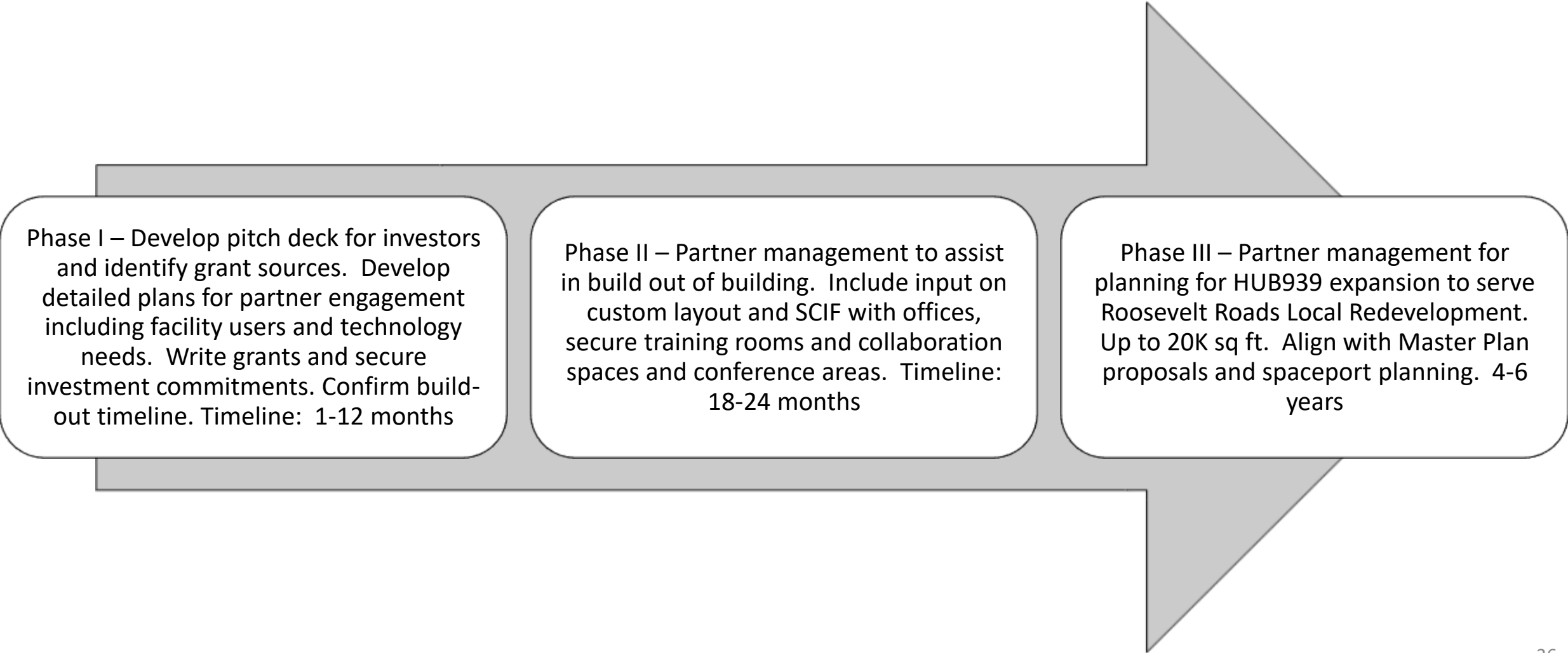
Figure 4.11. Financial Technology Projection



PRAGI Center Proposal- Lab Components

- a. Juniper, Bluepoint technology equipment.**
- b. An over-powered, overcooled power room.**
- c. Secure training room.**
- d. Multiple network security options.**
- e. Whiting Turner construction standards.**
- f. Secure access building.**
- g. Leasable regular office and premium office options (like a we-works).**
- h. Hot desks and shared use collaboration space (balanced between research and 'rentable' space).**
- i. Event Space.**
- j. Monetized office space and lab/network access.**
- k. Roof satellite array.**

PRAGI Center Proposal – Phased Deployment



Phase I – Develop pitch deck for investors and identify grant sources. Develop detailed plans for partner engagement including facility users and technology needs. Write grants and secure investment commitments. Confirm build-out timeline. Timeline: 1-12 months

Phase II – Partner management to assist in build out of building. Include input on custom layout and SCIF with offices, secure training rooms and collaboration spaces and conference areas. Timeline: 18-24 months

Phase III – Partner management for planning for HUB939 expansion to serve Roosevelt Roads Local Redevelopment. Up to 20K sq ft. Align with Master Plan proposals and spaceport planning. 4-6 years

Proposed REACH Management Budget Breakdown

- **Development of Investment Partners**
 - Public and grant funds
 - Private Investment Funds
 - Industry Partnership Development
- **Collaboration Management of REACH Network Partners and Products**
 - 5G Energy Testbed Security Research with Lab at UPRM
 - Arecibo Observatory Spectrum Sharing Initiative
 - International Business Innovation Laboratory Engagement
 - Bioscience and Aerospace Industry Engagement
- **Oversight of Buildout and buildout design of HUB939**
 - Project Benchmarking and Output Tracking
 - Grant management
- **Management of Interface with the Development Process at Roosevelt Roads/Ceiba Spaceport**

Reinforcing the Vision for a Puerto Rico Tech Hub

The PRAGI Center is designed to align to HUB Advanced Network Mission, Vision, and Values to establish a vibrant innovation hub on the island of Puerto Rico.

MISSION

Our mission is to make Puerto Rico the main telecommunications hub of the Caribbean Region by providing the most reliable telecommunications infrastructure and technology services.

VISION

Enhance the lives and businesses of Puerto Rico and the Caribbean Region by providing reliable telecommunications infrastructure and technology services that promote progress and innovation.

VALUES

Innovation is our default state of mind. We don't follow a model, we invent it. We care and support those we work with and serve. Integrity is our work ethic. We are committed to continuous improvement and innovation to deliver reliable infrastructure services. We work for our clients with expertise, passion and excellence. We believe in working hard and working smart.

For More Information Contact:

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