
SILICON REEF: PUERTO RICO'S PATH TOWARDS THE DIGITAL ECONOMY

A POSITION PAPER OF THE
CENTER FOR THE NEW ECONOMY



The Center for the New Economy is a non-partisan, non-profit, research and policy development organization dedicated to creating innovative economic development strategies



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Summer 2003

INTRODUCTION

When we began our project to grow Puerto Rico's digital economy in 1999, we named it Silicon Reef for two reasons: first, because a reef is an environment where things grow and are nurtured; and secondly, as a nod to the "Silicons" of the world but with a tropical twist.

Now, four years later, we have discovered two other similarities that we had not previously identified: 1) as with natural ocean reefs, growing Puerto Rico's digital economy is a long and slow process; and 2) just as the corals that make up marine reefs are built from the skeletal remains of living coral, so it is with our efforts, many of which are built upon the skeletal remains of efforts past.

Numerous efforts have been commenced and countless strategies have been outlined yet, the question remains: have we accomplished any tangible results or moved forward with regards to strengthening and expanding Puerto Rico's high technology sector?

Like all complex questions, there is no clear answer and reasonable people could disagree. Perhaps the intricacy lies in the fact that it is very hard to measure or quantify terms such as: "tangible results" or "moving forward". Those who champion or head specific efforts will find it very easy to point to evidence that proves the efficacy of their ideas while others may be left wondering if there's anything worth recognizing. In many ways, this scenario exemplifies the current situation in the development path of Puerto Rico's high technology sector.

As many other agents who have been involved in the process of advancing ideas to promote the Island's high technology sector, we are neither convinced nor skeptical that any advances have been attained. Clearly something has happened in the past years; nonetheless, can it be said that parts of the puzzle have been solved or would it be more apt to state that we have been able to identify that the puzzle is bigger than we thought?

WHERE WE STARTED

Silicon Reef: Puerto Rico in the e-economy

Our initial venture in this topic was the creation of the first Silicon Reef Conference titled: “Puerto Rico in the e-economy”, held on August, 2000. At that moment, the task at hand was to bring together influential entrepreneurs and opinion leaders from the Island to think outside the box and share their ideas regarding Puerto Rico’s digital economy. From infrastructure and entrepreneurship to education and human capital, the themes addressed in the one-day conference provided an opportunity for articulating innovative thinking and novel proposals to grow and develop the local high technology sector.

One significant aspect of the activity was that the discussions did not center on known critiques and complaints but evolved into unique strategy-building processes. Clear proposals emerged and were later framed in a program of action that was adopted by CNE and its partners. The imperatives that emerged from the conference included initiatives already being developed at the time such as those concerning the growth of broadband access and telecommunications infrastructure to more visionary ideas like the creation of private sector endowed University Chairs with world-class computer science professors (see Appendix I). Most importantly, the Conference marked the first occasion where such an important group of key stakeholders came together and agreed on a set of key areas and measures that needed to be addressed promptly. Another notable result of the conference was the prominent role and commitment displayed by private sector players.

For us, the net effect of the Silicon Reef Conference was the creation of a venue and conduit for discussing key issues and the beginning of a long process of crafting a blueprint for Puerto Rico to enter the New Economy. As many participants observed, Puerto Rico was losing the race to become a player in the New Economy. After the Conference, we had a clearer picture of how far behind we were and the strategies needed to ultimately move forward.

Building the Reef: Fostering Connections Between Sectors

Building on the discussions and conversations from the Silicon Reef conference, we embarked on a process to continue addressing key issues affecting Puerto Rico's high technology sector. Taking advantage of the participation and eagerness of key private sector people, we organized two private sector strategy teams (focused on Infrastructure and Education issues) whose main task was to think outside the box and craft a series of policy recommendations that would enrich existing plans and policies for the high technology sector.

Multiple recommendations emerged from the work of the aforementioned teams, some of which eventually became public sector priorities and were undertaken. Perhaps the main accomplishment was the continued involvement of a number of private sector actors who identified an opportunity to effectively voice their concerns and provide solutions to known issues. Furthermore, this endeavor proved that good ideas are not easily translated into effective policies. The message was clear: garnering support and innovative ideas from the private sector is important but public sector acknowledgement and proactive involvement is *crucial*.

Public sector stakeholders also acknowledged the idea that establishing relationships with private sector actors and groups was needed if they wanted to be successful in advancing any efforts to grow and strengthen the Island's digital economy. This became evident as PRIDCO's office of Science and Technology and the Office of Management and Budget embarked in the process of developing a "Communications & Information Technology Roadmap" (C&IT Roadmap) that would serve as the de facto policy on Science and Technology. Recognizing our role as third party, non-partisan conveners and brokers, we were invited to become part of the initiative. In the months after the original group was established, our main task was to build bridges between the private and public sector and bring innovative ideas to the table, a role that we continue to play to this day.

As the "Roadmap" process moved forward, CNE continued to expand its role as an advocate of effective policies through multi-sector collaboration. As 2002 was ushered in, we continued to foster alliances and dialogue between numerous sectors by executing a communications strategy that included the publication of editorials, speaking engagements and other media-

centered activities. As we gathered the attention of a growing number of stakeholders, we continued hosting several formal and informal discussions. One example is the breakfast roundtable organized for local New Economy entrepreneurs and the Administrator of the Commerce Development Administration and Executive Director of PROMOEXPORT to discuss the challenges and opportunities of local new economy growth and entrepreneurship. Once again, the interaction between private and public sector actors proved to be valuable as concerns were raised and numerous recommendations emerged from the face-to-face dialogues between government and private sector actors (See Appendix II).

For the most part, the work accomplished since we began the Silicon Reef initiative rendered plausible results as it provided an opportunity to diagnose the institutional bases and overall context of the high technology sector. For us, it was evident that any efforts to promote or grow the high technology sector were compromised from the outset due to the lack of collaboration and dialogue between the private and public sector and other non-governmental organizations and business groups (who were slowly taking a more prominent role). As experiences in successful new economy enclaves like Silicon Valley and Route 128 demonstrated, fostering a culture of competition and collaboration is an institutional prerequisite for success. A larger question remained: how do we get there? Some advances had been made, yet for the most part, there was little to show for.

Silicon Reef II: Building Team Puerto Rico

If fostering collaboration and competition is a precondition for the growth of the new economy in Puerto Rico then addressing these issues in a concerted and focused manner is essential. This was the main idea behind our intention to host a second major conference on high technology in Puerto Rico. Two years had passed since we hosted the first conference and, as mentioned earlier, some progress had been made but there was still much ground to cover. Our main objective was to get a sense of whether it was possible to build “Team Puerto Rico”; in other words, we wanted to know if Puerto Rico’s high technology sector can compete in the global marketplace or if our culture (business and otherwise) is too non-collaborative to foster global connectivity.

A series of sector-specific panels were organized around topics that addressed collaboration amongst sectors and the roles that diverse sectors play in growing Puerto Rico's digital economy. Once again, the conference was one of a kind as it brought key stakeholders face-to-face to hold a constructive dialogue that spurred numerous ideas regarding the future of the high technology and related sectors in Puerto Rico.

Government stakeholders were quick to stress the importance of the high technology sector to the future of Puerto Rico's economy, recognizing the importance of incorporating technology within its ranks and the throughout the Island. From e-government to supporting local technology providers, their ideas and suggestions demonstrated that the public sector has not turned its back on the high technology sector. Nevertheless, it was clear that, good intentions aside, the most far-ranging ideas and suggestions have not materialized yet.

Private sector partners voiced their concerns regarding the sluggish advancement of the high technology sector locally. Nevertheless, instead of pointing the finger at the public sector, they were quick to demand more from their own ranks. As one key executive noted, many initiatives have to come from the private sector; they should not wait for the public sector to take action. Cooperation was also mentioned as an important component lacking within the non-government and private sectors. At the start-up level, it was deemed crucial for survival during hard times while larger ventures needed to address fragmentation if they were to raise the bar and advance in a globally contested market.

The underlying message taken from second Silicon Reef conference was that "Team Puerto Rico" is still not a reality. In other words, the idea of collaboration is on everyone's radar but it has not become a prime target.

WHERE WE ARE

Current challenges

The second Silicon Reef conference provided an opportunity to assess the fragmentation and disconnects between sectors and stakeholders involved in expanding the local high technology sector. It was evident that there is much desire to advance specific projects and initiatives (particularly within the public sector), yet the reality seems to point to a lack of capabilities to do so. Excellent ideas abound, yet very few mechanisms exist to implement these. Collaboration is an important element in the formula for success that seems to be lacking; nonetheless, there are also other major institutional limitations that stand in the way of advancement.

In recent months, important decisions have been made within public agencies that support the growth of the high technology sector. Funds allocation for projects like the C&IT Roadmap and the continued work in the Puerto Rico Technoeconomic Clusters demonstrate that there is some commitment from the government sector. Nonetheless, as has happened numerous times, priorities (primordially funding related) seem to shift quite easily leaving once prominent projects in the shadows where they ultimately die out. This condition is a major deterrent for private sector involvement, which is mostly dependent on the credibility and reputation of possible partners. It is highly probable that any public-private effort will not succeed in the absence of a serious and proven commitment from the public sector.

In a similar fashion, private sector efforts have not been coordinated in a strategic manner, as has been expressed by local officers of high technology firms. Government officials have clearly stated that their role in promoting development in the high technology sector is to facilitate private sector work but in the absence of any strategy or plan from the private sector, it is quite likely that we will continue waiting for progress to be made. Thus, it has become quite clear that previous efforts from both the private and public sector have not been completely successful in fomenting an environment for innovation nor the social, institutional and economic structures needed to create the conditions for actual development to take place.

These are not the sole conditions that explain our poor performances in the high technology sector, for there are numerous other issues that are at play (which are well beyond the scope of this report). Nonetheless, as we will argue further, new opportunities are arising that could signal a positive turn.

WHERE WE SHOULD GO

Looking at Local Universities as Cornerstones for Economic Development

Developing and nurturing environments that propel innovation is by no means a simple task. Public policies play a major part, yet there are other requisites that are not easily manufactured or even grasped. Synergy is one such component that, while facilitated by effective policies, may not be just a result of sound planning. As scholars like Castells and Hall indicate, synergy is essential to the innovation process and could be broadly defined as the production of new and worthy information through human interaction.

Synergy takes place within numerous settings, yet it is seldom harnessed and applied to production processes where other breakthroughs are made and eventually translated into opportunities for economic development and growth. Evidence of such processes abound in places like Silicon Valley, Boston and the Research Triangle area (to name a few); all recognized as high technology enclaves supported largely by the work performed by world-class universities and research institutions that are both cause and consequence of the growth of the local economies.

Universities and research institutions have become the new foundries of the informational age for they are places where the basic inputs needed to support the knowledge demands of the new economy are produced and disseminated.

A recent report on the economic impact of Boston's eight research universities on the metropolitan Boston area demonstrated that these have a substantial financial impact on the region and also serve as the intellectual base, producing and nurturing valuable human resources

and new technologies that fuel economic growth. Contributing over \$7 billion to the regional economy, the eight research universities have become a major source of economic growth despite the recent economic downturn. This trend is likely to continue given the fact that while private sector companies come and go, the universities remain an established base in their communities.

It is highly unlikely that any region or metropolitan area might be able to effectively imitate and garner the same results that have been evidenced in the Boston metropolitan area. Nevertheless, the main lesson derived from this example is that investing in universities, and other research and educational institutions is a wise investment in the economic development of a region.

Although this issue has been voiced on numerous occasions in Puerto Rico, very little has been done to articulate a more concerted effort in this direction. The recent announcement of a government investment of \$40 million for the creation of a research institute within the University of Puerto Rico dedicated to guide scientific and technological research that promotes economic growth and competitiveness is a long-awaited step in the right direction. If administered correctly, this initiative could provide a push towards a more university-centered science and technology policy that supports other efforts currently being pursued like the Alliance for Research and Commercialization which is an integral part of PRIDCO's C&IT Roadmap.

As with any new and transformative venture, there are some challenges that need to be addressed. Allocating funds for university-centered projects is only a small part of a larger process that will achieve few results in the absence of a coherent and strategic plan of action. In addition, as with other institutions involved in economic development, universities are not immune from political changes and maneuverings. Nevertheless, it is imperative that, in any way possible, these new ventures be insulated from the political winds of change. This is only possible if political and university leaders recognize this point and a compact between universities, private and third sector partners is achieved. Collaboration is therefore a key component for success.

APPENDIX I

Actions to grow Puerto Rico's Digital Economy

The Center for the New Economy (CNE) recently sponsored a major conference entitled, *Silicon Reef: Puerto Rico in the e-economy*. The conference included experts and opinion leaders of the Internet industry and the New Economy in Puerto Rico and the U.S., among them the Principals of Oracle Caribbean, Sprint International Caribe, Abaco, Centennial de Puerto Rico, Microsoft Caribbean, Hewlett-Packard Caribe, Advent-Morro, Grupo Guayacán, ExecuTrain, Human Capital, Liberty Cablevision, Microjuris.com, Bittime.com and IslaZ.com as well as representatives from AT&T, Puerto Rico Telephone, Zonai Networks, Compaq Puerto Rico, PuertoRicoWow, Starmedia Networks, Lucent, KPMG Peat Marwick, Ernst & Young, Banco Popular, Banco Santander, Citibank and Procter & Gamble. The purpose of the Conference was to determine how Puerto Rico could best mobilize to capitalize on New Economy growth opportunities.

Out of that conference came a series of action items and imperatives that the group considered critical for Puerto Rico's participation in the New Economy. Among the issues that garnered consensus that day and that will be further developed and advocated by CNE were the following:

General Proposals of Changes in Thinking and Vision

- *Cultivate Puerto Rico's image as a world-class business center.*
- *Promote within Puerto Rico a more global business outlook.*
- *Encourage a stronger entrepreneurial spirit in Puerto Rico to displace collective risk aversion.*
- *Forge a culture of collaboration between competitors and amongst the private, public and academic sectors.*
- *Retain and develop local talent by taking into account new generation styles in compensation plans. This includes flexible work structures, freedom to take leadership and most importantly, increased compensation both directly and through stock or profit participation.*

Infrastructure Imperatives

- *Undertake aggressive capital investments in Puerto Rico's connectivity with a strong emphasis in the swift provision of competitively priced broadband access.*
- *Aggressively promote the provision of free or low-cost island-wide internet access.*
- *Stimulate and undertake greater investments in last mile infrastructures.*
- *Develop the Telecommunications Regulatory Board into a more proactive, more aggressive body.*
- *Dedicate immediate attention to Puerto Rico's submarine fiber-optic capacity deficit. Must provoke partnerships, consortiums and alliances in telecom infrastructure between government and international infrastructure companies.*

Education Imperatives

- *Establish private sector endowed University Chairs with world-class computer science professors.*
- *Update and retool curriculums so that they are in closer accord with labor force expectations and needs.*
- *Include New Economy business models and marketing in local business schools curriculums.*
- *Improve the language skills, particularly in English, of students.*
- *Reinforce the teaching of math, science and computer sciences.*
- *Develop, establish and promote internship programs between schools and companies.*
- *Establish strategic alliances with universities from the U.S. and abroad that have strong e-commerce and Information Technology programs.*
- *Grow the local IT workforce to meet demand by training the unemployed and continuously educating current employees.*

APPENDIX II

SELECTED PROCEEDINGS FROM THE CENTER FOR THE NEW ECONOMY'S SILICON REEF BREAKFAST ROUNDTABLE ON: CHALLENGES FOR PUERTO RICO'S NEW ECONOMY ENTREPRENEURS

On Tuesday, April 23, 2002 the Silicon Reef Program of the Center for the New Economy hosted a breakfast roundtable for New Economy entrepreneurs in Puerto Rico and the Administrator of the Commerce Development Administration and Executive Director of PROMOEXPORT to discuss the challenges and opportunities of local new economy growth and entrepreneurship.

Following are selected proceedings from that discussion.

- It was agreed upon that one of the biggest obstacles for growth amongst local entrepreneurs was the lack of reliable and timely business information and economic statistics for Puerto Rico;
- Several of those present emphasized the labor intensive process for completing federal SBA applications;
- There was consensus on the fact that Puerto Rico does not have a positive image as a high-tech locale. This will need to change in order for New Economy exports to increase;
- The group discussed the positive and collaborative networks that exist within Indian and Israeli communities in the U.S. and their home country. This is a model that Puerto Rico should pursue;
- There was agreement that PROMOEXPORT could undertake a survey of the existing high-tech companies in PR in order to determine potential export capabilities amongst them;
- The entire group agreed that government could act as an important initial client for many technology start-ups that could then refer to those contracts when seeking business in the private sector;
- It was suggested that PROMOEXPORT organize an activity for the group to meet the Director of the Office of Management and Budget;
- It was also agreed upon that the grants process in PRIDCO needs to be more transparent and clear about criteria and expectations;
- Many of the entrepreneurs demonstrated an interest in using the commercial offices of Puerto Rico in the U.S. and internationally for the exploration of potential business in those areas;

As a direct result of this meeting, PROMOEXPORT will be undertaking a survey of new economy companies in Puerto Rico to create an up-to-date registry for promotion purposes.

CNE's Silicon Reef program will continue to act as a conduit for the bringing together of government and business leaders in order to grow Puerto Rico's digital economy. Stay tuned for the next events.

APPENDIX III

SELECTED PROCEEDINGS AND SUGGESTIONS FROM THE CENTER FOR THE NEW ECONOMY'S SILICON REEF 2: BUILDING TEAM PUERTO RICO CONFERENCE OCTOBER 4, 2002

EDUCATION

- Education is an essential element in high-tech market development. The masses should familiarize themselves with the high-tech world, such knowledge would reveal the many opportunities available in this sector, and would inspire the risk averse to enter into previously unfamiliar territory.
 - There is a growing deficit in the high tech sector of highly skilled technicians, and companies are forced to import their talent. Puerto Rico needs to raise the educational bar higher and create an educated workforce able to compete with whatever talent that comes from abroad. Without this essential breakthrough, the technology sector will never be independent of foreign influence.
 - In order to achieve this goal a collaborative effort between public, private and academic entities needs to exist. A more unified, common vision would then be developed and the resulting curriculum would be more in tune with the needs of the market.
 - High-tech education should begin as soon as possible; children in grade school should be familiarized with computers and the Internet. This would promote interest and create a generation willing to venture into the technology sector.
 - A good way to involve the private sector in this process would be through mentoring programs uniting technology professionals with interested college students, pushing them towards an early path to success and inspiring new venture entrepreneurs. UPR's "Virtual Plaza" is a good example.
 - Private entities should collaborate to develop programs where the future workforce is educated collectively. Each company would enrich its own curriculum through its exposure to the other programs. We should not make information exclusive; this would hamper progress and create unhealthy monopolies.
 - Distance learning services could fill in the educational gaps that local programs cannot fulfill.
- With strong educational institutions, Puerto Rico could become an exporter of skilled labor and other high tech services.

PUBLICITY AND OUTREACH

- There is not enough publicity surrounding the high tech market and its developments. We need to document success stories and expose them to the public in order to increase credibility and emphasize the positive impact that this sector could have on the Puerto Rican economy. High tech would then lose its stigma as a high risk market and would increase the confidence of possible investors.
- Greater publicity would create more interest in legislation dealing with the high-tech arena and would inspire more research on the area.

BUSINESS INCENTIVES

- The biggest obstacle for the Puerto Rican businessman is that he is not in tune with foreign businesses when it comes to technology. This forces local merchants to import a good number of technological services.
- Local enterprises need to become creators of new technology and not simply be collaborators in the improvement of what is already there. There needs to be more innovation, there is not enough emphasis on patent development. Businessmen need to be more risk averse in general.
- For the Start-up entrepreneur, collaboration is the way to go. In an uncertain financial environment, it is safer to unite with larger and more stable vendors. Technology entrepreneurs must learn how to leverage the big companies and devise ways of fomenting such collaborations.
- Larger, more established businesses should partner with fledging enterprises and start-ups that are developing innovative and relevant ideas. The sponsoring company would benefit from the new technology developed, and the new business would enter more stable ground. In the long run, this process would increase competition

and would spur the general betterment of the market.

- The problem does not lie in a lack of capital, it is rooted instead in the instability of a shrinking market. New venues for markets, such as in the manufacture and development of health and defense technology, need to come about in order to force the industry forward.

BUSINESS CONGLOMERATES

- Companies should form conglomerates of groups with the same high tech interests. Alliances would create common, long range goals for the industry, and they would move towards them speedily and effectively, preventing the doubling up on ideas.
 - Collaborations would aid in solving several pressing problems in the industry. They could work together to lure new investors, since the sector has long been supported by the same few parties.
 - Conglomerates could create trusts for using “carry losses forward” for future investments. Such an advantage would be especially useful for start-ups and other fledgling businesses.
- Non partisan institutions such as CNE should be the ones in charge of promoting alliances between companies.

INTERNATIONAL COMMERCE

- Puerto Rico is missing out on immense opportunities in the international high tech market. The local market is limited and they should branch out into foreign companies that might be interested in local technology.
- Puerto Rico has no representation in numerous international organizations centered on technology issues. These organizations set the standards for the Internet and its derivatives in the future, and it is important that island representatives have a say in shaping the future arena so that it is more conducive to the fulfillment of local goals.
- Broadband services in the island are also not up to international standards. Service providers need to improve the local infrastructure so as to create a faster and more stable base for the market to grow. This could only be achieved by encouraging the development of new service providers that would foment competition and the creation of a more effective, world class product.

GOVERNMENT ISSUES

- Private and public sectors hold two different visions when it comes to the future of high tech, and they need to fuse them together. The private sector underestimates the government’s role in its business.
- The public sector needs to promote the development of the high tech economy by creating incentives for the development of new technologies and clarifying the regulatory framework that governs the industry.
- The government could initiate its involvement with this sector by studying the economic models followed by the participating businesses to see how it could add to it and therefore aid its development. It would be useful to compare this model to other business sectors that have been successful in the past.
- It is about time that the government creates an entity for the sole purpose of promoting technology in Puerto Rico. A permanent commission could be created within one of the legislative chambers.
- Educating legislators on computers and the internet should be a side project for this commission. A team of experts should be regularly available to keep them up to date on current developments. Such a project could also inspire more interest in creating technology friendly legislation.
- Taxation systems constantly penalize the small businessman, and they need to be altered to do just the opposite. A good example is a common system in Europe that places budding entrepreneurs in lower tax brackets.
- These goals can only be achieved in a secure and confident environment. The public sector could help boost morale and trust in the High-Tech sector by sponsoring a group that would prevent corruption by identifying abuses and enforcing general rulings.
- An “electronic government,” one that is in touch with technology and makes full use of its offerings, would empower the public by making it easier for it to take a more active part in its proceedings. The government should increase the number of services it provides electronically. It could follow Spain’s example and administer the wages for government workers through the internet. It could also start hosting public auction through the same medium. In any case, a cell connected government results in a well connected populace, one that is happier in its newfound empowerment.