Nurturing Knowledge Ecosystems

Executive Summary

When The Research Triangle Park (RTP) was established, its founders set forth to change the economic base of the region and state. For 51 years, RTP has successfully fulfilled this goal to create high-quality job opportunities in North Carolina.

However, the environment in which science and technology parks (STPs) operate has transformed dramatically over the past several years. To ensure that RTP continues to be a model for providing scale, efficiency and global platforms for R&D and knowledge ecosystems, RTP is undertaking a Master Plan to rethink the spaces resident in its borders and surrounding core.

This paper focuses on what needs to be done to create places to spark innovation and illustrates strategies RTP will employ to address these challenges. It adds to the ongoing discussion on changes that should be considered by all STPs to encourage economic clustering, drive market demand and attract talent.

I. Introduction

As has often been noted, when the Research Triangle Park (RTP) was established, its coterie of founders set forth on a deliberate effort to change the economic base of the region and state. The model they followed set the foundation for the "triple helix," drawing upon the strengths and synergies between North Carolina's academic, government and industry to develop a place to attract and grow research and development (R&D) operations and change the growth trajectory of the region.

Over the past 52-years, RTP has successfully fulfilled the above goal and addressed its mission to create high-quality job opportunities in North Carolina. However, the environment in which science and technology parks (STPs) and innovative economies operate has transformed dramatically over the past several years. Additionally, recent shifts in the global economy have created structural changes in the markets and industries within which RTP and other STPs compete.

To respond to the new challenges and to ensure that RTP continues to be a model for providing scale, efficiency and global platforms for technology-driven economic development, the Research Triangle Foundation of North Carolina—the manager and developer of RTP—has sought to transform itself. Beginning with a benchmarking study conducted by IBM Global Business Services (2006) and followed by several initiatives involving deep engagement with its Board of Directors, the universities with which it is affiliated, and key stakeholders, the market analysis and environmental scan culminated in 2009 with a white paper entitled "Future Knowledge Ecosystems," which was authored and published in conjunction with the Institute for the Future.[1]

In 2010, the Foundation turned its attention inward, assembling the lessons and findings of the past five years on trends and market forces that will shape R&D and technology-driven economic development. The manifestation of this inward look is a project to rethink the Park's Master Plan. More than an update to the original plan that governs how land in RTP is organized and the uses therein, the new Master Plan process is a chance to reconsider the spaces and places in the Park's borders and how those activities will impact the surrounding core, region and state. The resulting Master Plan and changes in the physicality of the Park will validate RTP's current relevance and make a strong case for its future competitiveness as a place for global R&D and as a key driver of the region's and state's economic success.

Lessons gleaned from RTP's efforts can serve as a model for other STPs with similar goals and further the discussion of the evolving role of STPs in affecting and driving similar change in their respective locales.

II. The Evolution of Science and Technology Parks

As the 2010 International Association of Science Parks (IASP) Member survey indicates, the STP concept is still "relatively young," with more than fifty-two percent of member Parks begin established since 2000.[2] Nevertheless, there is a cohort of well-established STPs that have been assessing their own experiences and opportunities and sharing those lessons with IASP peers. The overarching conclusion of these works is that the basic role of STPs and the professionals who manage them remains the same: to improve their regional economy by bringing together knowledge and research with entities that can bring those ideas to market. However, the way in which STPs attain this goal has evolved over time.

Early STPs

In the early stages of the industry's development, STPs were one of the few places at which there was a concentration of knowledge and knowledge creation that was proactively leveraged to bring about economic change. Led by the creation of large parks like RTP and Stanford Industrial Park, the first STPs offered an environment where collaboration and innovation between companies and universities could flourish by providing locations and facilities in which researchers and companies could operate in close proximity. The industry slowly grew with entrants in the 1960s including Purdue Research Foundation (USA – 1961), Cummings Research Park (USA – 1962), Scion DTU a/s (Denmark – 1962), the

University City Science Center (USA – 1963), SIVA – The Industrial Development Corporation of Norway (Norway – 1968), and Fondation Sophia Antipolis (France – 1969).[3]

Most "self-contained" STPs were built on a supply-driven innovation model that emphasized the ability of corporations to shape markets and direct research. More often than not, these facilities were built in suburban areas to reduce costs and isolate researchers from competitors, foreign governments, and other "distractions." Space and land for R&D operations was the primary product for such endeavors, although some offered basic programs that promoted the development, transfer, and commercialization of technology.[4]

As such, most early STPs were predominantly looked upon for the facilities and physical spaces that they offered. While some, like RTP had more overarching goals such as contributing to the growth of their state and region, the majority of STPs focused primarily on real estate developments and what campuses/space they could offer as their main value proposition. Proximity to a university or other research institution in a campus-like setting was the major draw.

Hence, for these early STPs, the role of the park manager was more focused on the physicality of the park and the need to build a critical mass of activity by answering prevailing market demands. Early park managers focused on recruiting operations to their park and providing the facilities needs of the organizations. Given the trends in corporate R&D at the time, their main targets were large, technology-based companies or stand-alone R&D arms of existing operations.[5]

Borrowing the framework advanced by Richard Florida in *The Great Reset*, one could assert that early STPs were a "spatial fix" for corporate R&D needs of the mid-twentieth century to dramatically increase scientific discovery and commercialization in the face of trends toward suburbanization (at least in the United States).[6]

As Florida describes, for the broader U.S. economy, "suburbanization was the spatial fix for the industrial age – the geographic expression of mass production." The post-war, creation of massive highway systems coupled with low-cost mortgages and suburban infrastructure projects fuelled the industrial engine of postwar American capitalism. STPs in the United States were the manifestations of how those structural trends could be leveraged to spur and nurture private-sector R&D activity.[7] The individual campuses allowed for secluded "skunk works" and R&D activities that were close enough to the activity in urban/headquarters areas, but separated and on their own. RTP was well positioned to provide such a product and grew, in large part, because it was the first-mover in exploiting this trend/need.

Need for change

However, as Florida (and Harvey before him) aptly notes, spatial fixes are only temporary, and as corporate R&D grew and matured and as other actors entered the realm of scientific discovery and innovation, the offerings and goals of STPs likewise changed to meet those needs.[8]

As more entrants joined the field and in an effort to address the changing needs of companies and the intellectual property producers, the products and services offered by STPs evolved. While RTP set the original, industry standard, many other STPs have followed. RTP, existing STPs, and more recent additions to the industry have added to their offerings, placing greater emphasis on supporting incubation and entrepreneurship to grow the future tenant base and less emphasis on recruiting large-scale operations.

As innovation and discovery have adapted to the world of the Internet and more prevalent and rapid communications and information sharing, the space for cultivating innovation has taken root in more mixed-use R&D complexes that blend state-of-the-art laboratories with amenities that attract and support highly talented workers. Companies seek these zones to collaborate with one another and to access networks of investors, suppliers, and potential customers. For scientists and engineers, these nodes are attractive both for their day-to-day amenities and for their longer-term intellectual

opportunities. Companies with short product development cycles or who employ participatory design techniques also benefit from being in more densely-populated research and innovation areas.[9]

Simultaneously, governments and sub-national groupings saw the value of concentrating R&D and knowledge assets into one place as a way to strategically grow their economies in a more technology-based direction. Local and regional governments around the globe are playing an increasingly important role, either partnering with or replacing national governments. Additionally, universities are playing a larger role in setting and managing research agendas and looking for ways to boost revenues through patent licensing, real estate development, and early-stage investments in startups. As German science policy scholar Martina Hessler puts it, the ideal of the isolated scientist focused exclusively on his work "has been replaced by an ideal of integrating science into society... Scientific research is not thought of as an autonomous project anymore."[10]

Figure 1: The Research Triangle Park – A First Mover

The Research Triangle Park (RTP) was founded in 1959 by a committee of government, university, and business leaders as a model for research, innovation, and economic development. By establishing a place where educators, researchers, and businesses come together as collaborative partners, the founders of the Park hoped to change the economic composition of the region and state, thereby increasing the opportunities for the citizens of North Carolina.

The "Triangle" from which RTP was named is formed by the geographic location and upon the intellectual strengths of the region's three world-class universities—the University of North Carolina at Chapel Hill, Duke University, and North Carolina State University, respectively located in Chapel Hill, Durham and Raleigh.

By all accounts, the "experiment" to change the trajectory of North Carolina and the Triangle region has been a success. Today, the Park boasts 7,000 acres with more than 170 leading R&D companies and more than 38,000 full-time employees. Whereas North Carolina was one of the poorest states in the United States when the Park was established, the state is now highly-ranked as a prime business location and the dynamic Raleigh-Cary-Durham Combined Statistical Metropolitan area is now heralded as one of the more high-technology regions of the country and world.

In addition to the strength of its flagship universities, RTP draws on the intellectual capacity of a host of other community colleges and higher education institutes. In addition to this academic and research capacity, the region possesses an established network and infrastructure to support a diverse range of companies. Ranging from the Council of Entrepreneurial Development to the North Carolina Biotechnology Center to RTI International, a host of organizations and networks exist to complement and catalyze activities around a number of cluster industries. These institutions and companies work together with Park companies and the universities, reflecting a spirit of cooperation and learning within the scientific and technological community.

RTP is managed by the Research Triangle Foundation of North Carolina. The Foundation is responsible for the overall development of the Park as well as ensuring that the regulations developed by the Park's founders to protect the natural environment and aesthetics of RTP are preserved. (For more information on RTP and its impact over time, please see *Research Triangle Park: Evolution and Renaissance*[1])

III. Role of STP Managers

In response to the evolving physical and market demands of STPs, the role of the STP manager has likewise evolved. As noted in the results of a survey reported in *"The Next Generation of STPs: Continuing to Enhance the Triple Helix,"* (a paper submitted and presented at the IASP XXV Conference in Johannesburg, South Africa by the Research Triangle Foundation) STP managers have long recognized the need to be aware of trends in science and the nature of work and to be proactive in addressing them by adding to the list of services and products offered by their parks. The evolution of the STPs to date speaks to their success in answering these needs. As STP managers, as the needs of their tenants become more complex, their primary concern is now shifting away from reacting to demands to developing the capacity and relationships to proactively counter and/or leverage those trends. To varying degrees, their roles have evolved from space/land manager, to promoting and connecting their "knowledge ecosystems" and repositioning or replatforming themselves as appropriate.

The original mission and objectives of STPs are not radically different from when the movement began more than fifty years ago. What differs is the focus of their efforts, the tools used to answer the demands, the span of time STPs are given to respond, and the menu of best practices and real world examples they can draw upon to orchestrate their response.

Figure 2: Past, Current and Future STP Demands[11]

	Early Models	***Current Models***	***Models Going forward***
Overall Mission	Improve the regional economy by bringing together knowledge and research with entities that can bring those ideas to market.		
Key Client(s)/ Drivers	• Corporations and governments	• Researchers and knowledge workers • Companies and/or R&D divisions within corporations	• Researchers/knowledge workers • Organizations that connect assets • Companies and/or R&D divisions within corporations
Eco-system Players	• Corporations • Universities • Companies that support R&D operations	• Knowledge Workers • R&D Companies • Knowledge creators/ Universities • Entrepreneurs • Venture Capitalists	• Knowledge Workers • R&D Companies • Knowledge creators/ Universities • Entrepreneurs • Venture Capitalists • Partnerships among actors/Park tenants • Urban re-vitalizers
Demand to be addressed	• Linking corporations with knowledge creators (universities) • Building clusters of industry that can draw upon one another	• Attracting/retaining talent • Connecting talent to the market • Helping to commercialize ideas • Maintaining concentration of knowledge-based industries	• Attracting/retaining talent • Catalyzing and connecting talent • Partnering with appropriate global entities • Attracting new industries at the center of the knowledge-based economy
Location	Driven by company preference	Driven by ability to spark collaboration among individuals and attract talent	
Amenities	Hard infrastructure (e.g., access to markets, proximate to like companies, and company demanded resources)	• Hard infrastructure • Soft infrastructure that promotes connections	• Soft infrastructure for connectivity • Infrastructure that promotes collaboration across STPs • Amenities that attract and retain mobile global talent • Infrastructure that promotes growth/dynamism of new industries at the center of the knowledge-based economy

IV. New Realities

In addition to these internal forces and areas over which STP managers have some level of control, STPs must also take into consideration global and structural market changes. Many of the changes have been building over time as industries mature and evolve. Others are the result of the recent recession and restructuring of global markets. These latter changes are forcing STPs to re-evaluate the role they play in their region and how they set themselves apart from peer parks and competing developments.

Leveraging Regionalism in the Face of Structural Change. In the continued competition for talent and high-level R&D operations, STPs must demonstrate their unique value propositions to be competitive. In a world where more and more operations can be located anywhere around the globe, STPs should play to and enhance their strengths and demonstrate their unique value propositions. Even for STPs with sufficient size and scale, such marketing entails making a case for locating not only in the specific STP but also in the particular regional economy. In essence STPs must now sell not only their specific product/park, but the value and unique assets of their region or "knowledge ecosystem."

As regionalism becomes more prominent, the STP's connection therein will be more important. In their study of *Regionalism Today: Risks, Rewards and Unresolved Questions,* Curtis Johnson and Neil Peirce argue that while nations, states, and cities matter, the region is the decisive, strategic platform for economic success and quality of life."[12] According to the Council on Competitiveness, a region's ability "to link innovation assets—people, institutions, capital and infrastructure—is decisive in generating robust, localized ecosystems that turbo-charge a region's economy."[13] Regions are the "crossroads" where knowledge assets—the universities, researchers, investors, entrepreneurs, existing talent pool, and governments—come together." The report authors go on to argue that "many of the fundamental drivers of economic growth, such as access to sustainable sources of energy and water, smart transportation and logistics, R&D facilities, colleges and universities and financial services, function on a regional level," and that businesses make site location decisions because of the assets that are available in a region, regardless of which specific town, city, STP or development they decide to locate.[14]

The physical clustering that is possible within a region is another competitive advantage for both regions and STPs. As described in **The Geography of Innovation**, "regional clusters enhance collaboration and value creation, drive productivity and play a fundamental role in knowledge creation." The knowledge ecosystem that results in technology-based regions with strong industry clusters creates networks of "shared advantage" that leverages the key strengths of local business, universities and other research institutions. The resulting positive externalities create a virtuous cycle as local drivers understand their shared competitive position and leverage one another's success and current competitiveness to spark further innovation.[15]

In regions that possess strong knowledge assets, more often than not, STPs – especially those of scale and influence – have long been the lynch-pins of their region's innovation economy. As the entity that "stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and markets," STPs and their managing organizations "facilitate the creation and growth of innovation-based companies through incubation and spin-off processes and provide other value-added services together with high quality space and facilities."[16] STPs have long appreciated the benefits of such clustering; however, few— with the exception of the ones with tremendous scale—successfully integrate themselves into their regional cultures.

Garnering Attention in a Crowded Field. This need for better integrating with—and if appropriate, leading—the regional response to contemporary challenges and global competition has been compounded by structural changes brought about by the recent world recession. The changes are impacting what STP managers must do to catalyze and attract activity to their parks. According to a recent report by IBM Global location Strategies, between 2003 and 2006 was characterized by investment focused on expansion to cater for a growing and increasingly integrated global economy. The results were predominantly market driven and resulted in numerous "ad hoc" additions and

expansions to corporate operational footprints (including R&D) as companies responded to high growth areas and expanding and changing market conditions."[17]

Immediately following the market declines and signs of the start of the recession in late 2008, companies tended to employ crises control tactics to deal with limited access to credit and to manage and conserve cash. Large capital investments and new R&D initiatives were postponed or sharply decreased as companies and governments tried to reign in operations and overall spending.[18]

Data from 2010 suggests that market behavior is turning back towards historic trends. Global R&D is beginning to recover, with the strongest returns toward historic norms in Asia and to a lesser degree in the United States.[19] However, analysts suggest that there are structural changes that will require more attention. According to IBM, corporations (post 2Q 2009) are moving out of their austerity/holding patterns and are looking for ways to ensure long term competitiveness. They are looking for ways to ensure strategic optimization of their global footprint, by balancing the requirements for leveraging a market's resources, obtaining talent and lowering costs while maintaining sufficient flexibility to react to unexpected changes in market conditions. For government spending, continued investment will depend on continued recovery in government budgets and the political will to invest in innovation above or in addition to social and other domestic concerns.

For STPs, these structural changes and market realities will mean different demands by their governments or regional partners on their investments in large park campuses. Different decision paths are being taken as companies look to site new or expand existing R&D operations. STP managers must develop a case for why investments need to be made in their park.

Catering to a broader stakeholder group. A final external--though by no means new--trend shaping the future direction of STPs and the role for STP managers is the heightened importance of sparking innovation across the entire spectrum of idea creation. STPs have long recognized the importance of institutes of higher education as idea generators. As the global economy moves more toward a knowledge-based one, connections to intellectual property creators will be even more valued. Traditional corporate investment in R&D is declining, yet the pace of technological innovation is accelerating. In the United States, universities are still major players in research, performing 54 percent of the country's "basic" research.[20] In the span of a generation, universities have supplanted industry and governments as the primary sites for basic scientific research.[21]

However, beyond the university and corporate labs, much innovation is taking place in new areas and among new players. As an earlier work by the Kauffman Foundation notes, innovative new firms – usually small start-ups or spin-outs of existing activities -- play a disproportionately important role in identifying and commercializing the next generation of technologies and discoveries that drive scientific and technological change.[22] The transformation of the U.S. economy towards a more "entrepreneurial form of capitalism" has been a driving factor of growth in productivity and output in the U.S. economy over the past decade – the recent recession notwithstanding. Continued economic growth will require continued entrepreneurial innovation at several levels.

Geographically, R&D and innovation is expanding beyond traditional hot spots. As measured by patent production, Brazil, South Korea, Taiwan and Israel are emerging as considerable scientific powers. Moreover, thanks to ubiquitous high-speed broadband connections and other communications tools, other, smaller, developing nations that have had more modest scientific capabilities in the past could have an opportunity to create world-class expertise in targeted areas. None are likely to challenge the global powers across a variety of fields but instead will focus on building excellence in interdisciplinary fields, applied sciences, or areas that draw on a mix of scientific expertise and local culture.[23]

V. RTP Master Plan

What do these trends mean for STPs? For its part, RTP has taken the earlier studies looking at its external market and activities of peer regions and the implications of the latest developments and structural changes and has set off to identify the impact of these changes on how the Research Triangle Foundation should operate and what product RTP should offer. Manifested in the work around the RTP Master Plan, the task at hand is to respond to these challenges and to ensure that RTP continues to be a model for what a future knowledge ecosystem might entail. While still in the plan development phase, the resulting Master Plan will suggest changes in the physicality of the Park to address the evolving space and product needs of current and future innovators and will also identify a potential business model that will allow the Foundation to transition from being primarily a land-bank to a connected 'broker" or catalyst that sparks regional innovation and continues to extend the Park's global brand.

Figure 3: RTP Master Plan

The RTP Master Plan effort is being led by Cooper, Robertson & Partners, an architecture and urban design firm based in New York City, New York. Cooper, Robertson & Partners has assembled a multi-disciplinary team comprised of the following firms to provide expertise in carrying out the project. Principle team members include, HR&A Advisors, CresaPartners, Faithful+Gould, Grimshaw, Nelson Byrd Woltz Landscape Architects, Natural Systems Utilities, Vanasse Hangen Brustlin, Buro Happold, and HDR. Each brings a global perspective balanced with a deep understanding of the local context and opportunities. Each will provide analytical rigor, thoughtfulness, and creativity to the process—ingredients that are essential to craft a visionary Master Plan of this magnitude.

Work on the RTP Master Plan project to date has engaged a broad spectrum of RTP's stakeholders, including the RTP Owners & Tenants Association, Durham and Wake Counties, elected officials, the Triangle J CORE group—the planning directors and elected officials from the multiple jurisdictions surrounding RTP, other surrounding municipalities—and the three research universities upon whose strength the Park was founded and among whom the Park continues to thrive.

Key elements being examined in the Master Plan process include land use, infrastructure, the new economic model and the actual plan.

RTP: Current State

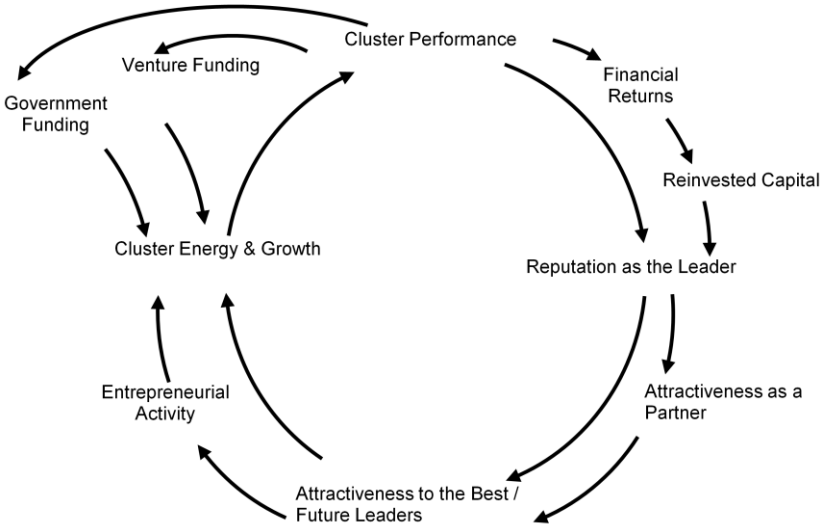
As suggested above, RTP was the Research Triangle region's spatial fix in the post-World War II economy. As U.S. corporations began to get involved in large-scale R&D operations, the product that RTP provided met those market demands. The original RTP model, consisting primarily of large corporate campuses surrounded by significant green space, was successful in attracting and retaining major corporations and creating jobs for thousands of the Research Triangle region's residents for more than 50 years. Through the years, a virtuous cycle was developed which built on RTPs and the Research Triangle region's original strengths and encouraged and spawned new activity.

Nevertheless, while RTP's growth continues to be a significant driver of jobs and innovation in the region, the Park has been challenged by newer models of what a technology-based, knowledge ecosystem should/could entail. Like its peers, RTP has evolved over the years to meet demanded changes and to provide the appropriate space needs. However, as trends convene around open innovation, "chance encounter collaboration," and greater synergies among industry sectors, RTP must now move from predominantly providing space options to more proactively drawing connections to and encouraging activities among the Park tenants and the surrounding region.

The over-riding goal of the RTP Master Plan is to build upon RTP's existing competitive advantages while addressing areas of competitive weakness, to the extent these can be influenced by facilities and infrastructure and by thinking through what business model changes should be considered and acted upon. The market objectives guiding the plan are to: retain existing tenants, continue to attract other large R&D operations, and to broaden the types of enterprise that locate in RTP.

Figure 4: RTP's Virtuous Cycle

The ultimate result of such a system is that dominant players become increasingly entrenched in the niches in which they are dominant.



VI. What's next for RTP?

With the market objectives as a guide, the Foundation anticipates that the future RTP will be one marked by a design for interaction and high-performance and a social, sustainable and diverse landscape. Rethinking RTP's program features, land use, and product offerings will provide the Foundation the opportunity to appeal to a new generation of corporations, research professionals, and other "users" into the Park. The Master Plan seeks to incorporate both the sense of community and access to the natural environment that make RTP unique.

Planning within the RTP Master Plan is centered on three key themes: creating places for chance encounters; encouraging more density and more nature; and rethinking the Foundation's role.

- **Places for "Chance Encounters"**
  As has often been noted, today's technology companies and workers increasingly desire spaces that foster interaction and sociability. Particularly in the knowledge economy where innovations are born out of multi-disciplinary projects, face-to-face interaction becomes more important than ever for ensuring the free flow of ideas.[24] Moreover, much research shows that the new generation of knowledge worker will look at different needs than the knowledge worker of the mid-twentieth century. Going forward, RTP will identify strategies to better position itself for future shifts in R&D and open innovation. RTP's land use covenants do not support environments that encourage informal interactions between tenants, making it difficult to spark the cross-cutting intellectual interaction that is vital for innovation. Hence, in terms of physical planning and land use, the Master Plan will incorporate areas where researchers/tenants could work in concentrated multi-tenant campuses or activity nodes and clusters within RTP. These would have the benefit of encouraging informal interaction between employees and foster a more vibrant and appealing work environment.[25]

  Along with places for interaction, the new RTP will envision places that highlight the cultural and educational aspects that make the Park unique. To varying degrees and intensities, RTP has prided itself on its deep connection to the three universities and its deep commitment to ensuring that the science and discovery that takes place within its boundaries improves the human condition. Through institutes and organizations like TUCASI (the Triangle Center for Advanced Studies, Inc.), the National Humanities Center, Sigma Xi, and the contemporary example of the NC STEM Collaborative (which builds local capacity to create innovation and a sustainable education program in elementary and high schools throughout the state), the Park has proven its desire to give back to its community through supporting education and the cultural aspects of what makes the discoveries in RTP special. This commitment to activities and connections beyond only R&D efforts is part of what distinguishes the Park.

  In addition, the above would make RTP a better place for entrepreneurs and the yet-to-be discovered innovators. To remain competitive, RTP must continue to add entrepreneurship and innovation capacity. The changing structure of science will require finding new ways to support, incubate and cross-fertilize non-traditional R&D activity. Moreover, as Paul Romer proposed in his "New Growth Theory," regions and places with the capacity to innovate will be better poised to nurture more entrepreneurship, attract venture capital and fully leverage and grow their existing clusters and industries.[26]

- **More Density, More Nature**
  For the landscape and "green" nature of RTP, the Master Plan team is examining ways to build a distinct ecological identity for the Park. Rising energy prices and deep concerns about the impacts of global warming are driving rapid shifts in the design and management of buildings and places. The future RTP will foster landscapes that promote multiple forms of engagement, emphasizing its natural beauty and the reinforcement of healthy natural ecosystems. The goal is to strike an efficient and effective balance between preservation and transformation. Additionally, the team is looking at how existing zoning and covenants need to be updated to facilitate more sustainable future development.

  While RTP has made significant strides and is already a model for sustainability, there is still room to be a leader or living laboratory in this area. By positioning RTP as leader in innovations in ecological systems, green building and alternative energy technologies, the Park can extend its brand and add to the growing body of knowledge of "green parks." Through the formalization of LEED standards and other environmentally conscious programs, RTP could rebrand itself as an innovator in alternative energy and other cutting edge green technologies, helping to attract green businesses and develop a new research cluster.

- **Business Model**
  A third, major element of the Master Plan is examining ways in which the current RTP business model must change to accommodate the proposed new activity. Through the Master Plan process, the Foundation is looking for ways to continue its historic role of managing its land bank and attracting large companies to individual campuses, but also adding other functionality or coordination roles that seek to provide services/programs to retain existing companies and also to broaden the types of companies/talent that make RTP their home. The details of how this might work are still being developed; however, the Foundation knows it must be more proactive in affecting the change that is needed.

  At the same time, the Foundation has no aspirations to increase activities beyond its means. As such, a structure in which the Foundation looks to partner or catalyze change is more realistic. The Foundation will remain the steward of the Park with a mission to increase opportunities for North Carolina and will look to others with the needed skill set/expertise to execute the elements of that goal.

  Finally, as alluded to above, for RTP to meet the challenges of the next 50 years, it must also continue to engage its perimeter and be a responsible neighbor in the Research Triangle region. RTP is unique in many respects and must retain distinct elements to retain its relevance, but it must also integrate its planning with the larger region of which it is a part. Going forward and through the Master Plan, RTP will better connect itself to the overall region and become more deeply imbedded and connected.

VII. Implications for STPs

It is often said that RTP has been copied frequently, but never duplicated. This is in large part due to the difficulty in assembling a parcel of land proximate to three world-class universities and due to the changes in market and corporate demands away from those that made RTP's product so valuable in the mid-twentieth century. Nevertheless, several lessons and best practices can be gleaned.

As the RTP/IFTF ***Future Knowledge Ecosystems*** white paper suggests, whereas land and leased space will "continue to underpin the economics of creating research spaces, the real added value of STPs will increasingly come not just from providing services (as many parks already do), but from actively managing activities and knowledge creation."[27] To continue to add value to their regions, STPs must find new ways to connect to their specific knowledge ecosystem and lead/drive activities therein.

Figure 6: RTP's Sticky Know-how
In telling the story of how RTP was created and the elements/strategies credited for its success, the Foundation often notes the following four elements as its critical success factors. Without these, RTP's ability to endure through the decades and make a meaningful impact on its region and state would have been difficult.

Tacit Knowledge	*Impact*
Consensus around a grand strategy	Created a unique alignment and overall strategy
Culture of collaboration	How things get done
Trans-generational legacy leadership	Ability to pass the torch and willingness to accept it
Research Triangle Foundation as a steward	Focused, ongoing, effective execution provides constancy of purpose

To borrow from a scientific analogy, when the STP movement was launched land was the reactant to the chemical reaction that created the individual knowledge ecosystems; new or expanded R&D activity was the product, and the reaction mechanism was fairly simple. More than fifty years later, the activity and relationships created and encouraged by STPs as the connective tissue of their ecosystem are the lead reactants and the types of spaces that result are the product (and increasingly a by-product at that).

Given the need to proactively address these changes/trends—and/or the absence of another governing body taking action—STPs have an opportunity to set the standard for driving innovation in their regions. In a new globalism based on the search for the best locations to host high-value, specialized and innovation related activities where businesses invest in regions to gain access to specialized workforces, R&D and commercialization capacity, innovation networks and unique business infrastructure, STPs are in a good position.[28]

Collaborative Economics offers an additional framework through which such a role can be understood. They posit that in the innovation economy, the unit of innovation is no longer the individual firm, but the network in which the firm operates. Taking from the work of Navi Radijou of Forrester Research to describe a "global innovation networks model," they suggest that there are four key actors needed to stimulate innovation in a region:

- Inventors: Intellectual powerhouses that conduct basic science research and/or design products and services that result in patentable inventions;
- Transformers: Actors who provide multifunctional production and marketing that convents input into valuable business innovation for internal or external customers (bring ideas to market);
- Financiers: Venture Capitalists or others who provide funding; and
- Brokers serve as the matchmakers of facilitators in this system that find and connect the above three.[29]

The below figure illustrates how the different groups interact and the importance of the broker. While innovation can occur without a strong broker function, they argue that it will likely occur in fragmented ways that will not be as effective or sustainable.

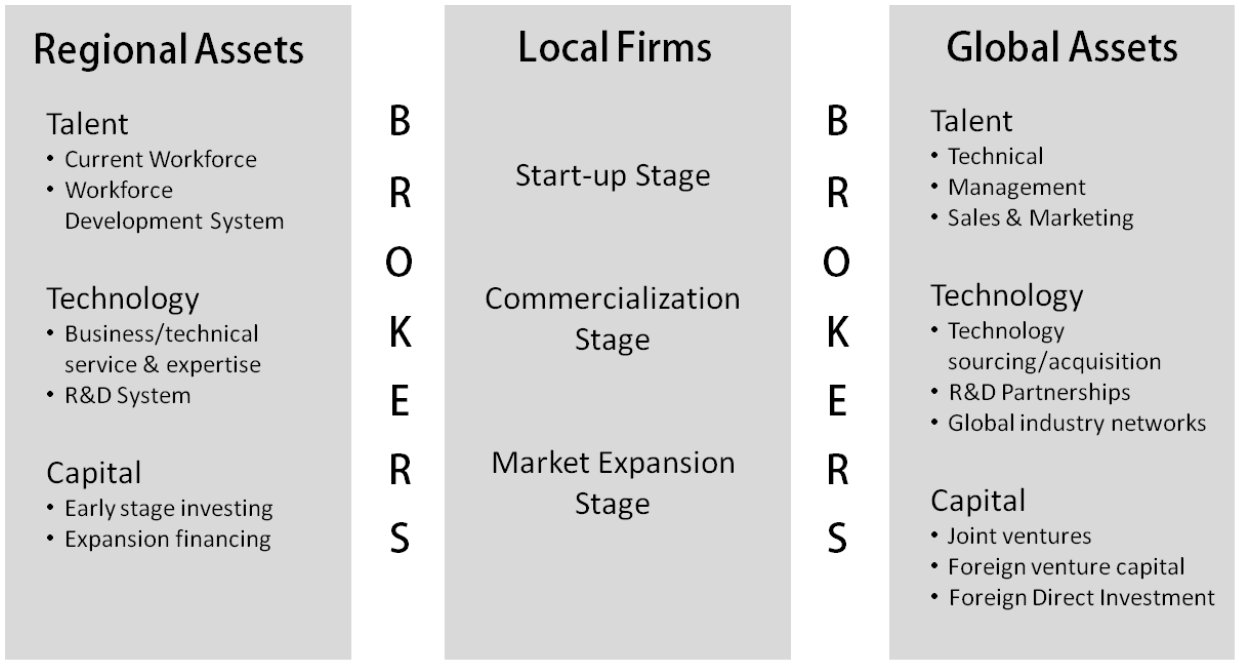
For STPs, serving as a broker for their regional knowledge ecosystem is in keeping with the trajectory many have followed as they serve as a catalyst for activities and connections with their parks. Several papers presented at past IASP World Conferences support this need.[30] Additionally, individual responses to the 2010 IASP Member survey suggest that several members find the broker/connection role critical to their success going forward.[31]

Such a broker role could be expanded beyond the STPs physical region to the bilateral and international networks built within the IASP over time. More so than other economic development peers in their regions, STPs are better equipped to create the new tools to measure and map networks and flows of knowledge, funding and ideas. Because of their position as a knowledge catalyst, they are more able to make use of these tools and information and make the necessary connections among their region's key players. By taking on the role, the STPs will be integral parts and driving forces in nurturing their own knowledge ecosystem.

VIII. Conclusion

RTP exists today as a model for North Carolina's economic development aspirations and a best practice model for STPs as they try to solidify their own future competitive position. A living laboratory with a history of more than five decades of economic transformation, RTP has the "triple helix" formula for success – the collaboration of business, government and academia working together to nurture technology based economic development. In the end, the RTP experience can serve as a microcosm of how other STPs can respond to globalization challenges and protect their competitive position in the ever changing global economy.

Figure 7: STP Manager as Broker?



[1] Pang, Alex, Anthony Townsend and Rick Weddle, "Future Knowledge Ecosystems," IASP World Conference on Science and Technology Parks, 2009. Mian, S. and Willem Hulsink, "Building Knowledge Ecosystems through Science and Technology Parks, IASP World Conference on Science and Technology Parks, 2009.

[2] IASP 2010 Members' Survey Report 2010 (November 2010), p. 7. NB, the data point corresponds to the responding STPs. The survey reported a response rate of 27.5 percent of the Association's 370 members in 66 countries.

[3] Based on data compiled by the Research Triangle Foundation of North Carolina in preparation for hosting the XXVI IASP World Conference Anniversary Celebration, 2009.

[4] Battelle, "Characteristics and Trends in North American Research Parks," October 2007, p vii.

[5] Mian, S. and Willem Hulsink, "Building Knowledge Ecosystems through Science and Technology Parks, IASP World Conference on Science and Technology Parks, 2009.

[6] Florida, Richard. The Great Reset. New York: HarperCollins Publishers, 2010. The concept of a spatial fix is credited to geographer David Harvey in a series of works from the 1970s onwards (*Social Justice and the City*, 1973; *The Limits to Capital*, 1982; *The Urbanization of Capital*, 1985; *Spaces of Hope*, 2000; *Spaces of Capital*, 2001; *Spaces of Neoliberalization*, 2005; *The Enigma of Capital and the Crises of Capitalism*, 2010, et al).

[7] Florida, Richard "The days of urban sprawl are over… but not for the reasons you think" *Globe and Mail*, July 11, 2008.

[8] See Great Reset note above

[9] Townsend, Anthony, "Planning for the Next 50 Years: Strategic Issues for Research Triangle Park," Institute for the Future, 2007

[10] Townsend, Anthony, "Planning for the Next 50 Years."

[11] Weddle, Rick and Tina Valdecanas, *"The Next Generation of STPs: Continuing to Enhance the Triple Helix,"* IASP World Conference on Science and Technology Parks, 2008.

[12] Curtis Johnson and Neil Peirce. *Regionalism Today: Risks, Rewards and Unresolved Questions* (John D. and Catherine T. MacArthur Foundation, 2004).

[13] Council on Competitiveness, "Collaborate. Leading Regional Innovation Clusters," 2010

[14] The above notwithstanding, in most locales—especially in mature, developed economies and the United States—political jurisdictions are not necessarily coterminous with economic regions.

[15] Science Progress, "The Geography of Innovation: The Federal Government and the Growth of Regional Innovation Clusters," September 2009.

[16] IASP website, "Science Park definition" (IASP International Board, 6 February 2002).

[17] IBM Global Business Services, "Global Location Trends," October 2010, p. 5.

[18] According to a report released by Battelle and R&D Magazine, R&D around the globe decreased in the period between 2008-2009 except in China where the country increased R&D spending roughly ten percent. Battelle and R&D Magazine, "2011 Global R&D Funding Forecast," December 2010.

[19] Ibid, Continued increases (or stable allocations) in the United States will be impacted by changing political priorities and the perceived need to deal with the country's growing deficit. R&D in Europe struggles to return to pre-recession levels, due in large part to the ongoing recession, austerity measures, and economic instability in many key European markets.

[20] Association of American Universities Website

[21] Townsend, Anthony "Is there a Future for Science Parks?" Science Progress. August 2009.

[22] Ewing Marion Kauffman Foundation, "On the Road to an Entrepreneurial Economy," 2007.

[23] Townsend, "Is there a Future for Science Parks?"

[24] Council on Competitiveness, "Collaborate," 2010

[25] Meeting notes, Cooper Robertson and Partners, December 2010.

[26] Romer, Paul. "Increasing Returns and Long Run Growth," *The Journal of Political Economy*, Vol. 94, No. 5. (Oct., 1986), pp. 1002-1037.

[27] Pang, et al

[28] Collaborative Economics. "The Innovation Driven Economic Development Model," September 2008.

[29] Bay Area Innovation Network Roundtable, pp. 6-7

[30] For example, "The Cambridge Sub-region: A Maturing Knowledge Ecosystem (Granger, 2009),

[31] IASP Members Survey Report, 2010. Members are, however, split as to who should carry out the connections – the localities or the association or a combination of both.