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How the Research Triangle Region Promotes Connections in to Support Entrepreneurism

Plenary Session 2
"Innovation support services: what companies need from their parks and AOIs"

Author:
Zack Oliver (zoliver@rti.org)
RTI International, United States

Co-author(s)
Sara VanLear (svanlear@rti.org)
RTI Internationa, United States

Stephanie Zayed (szayed@rti.org)
RTI Internationa, United States

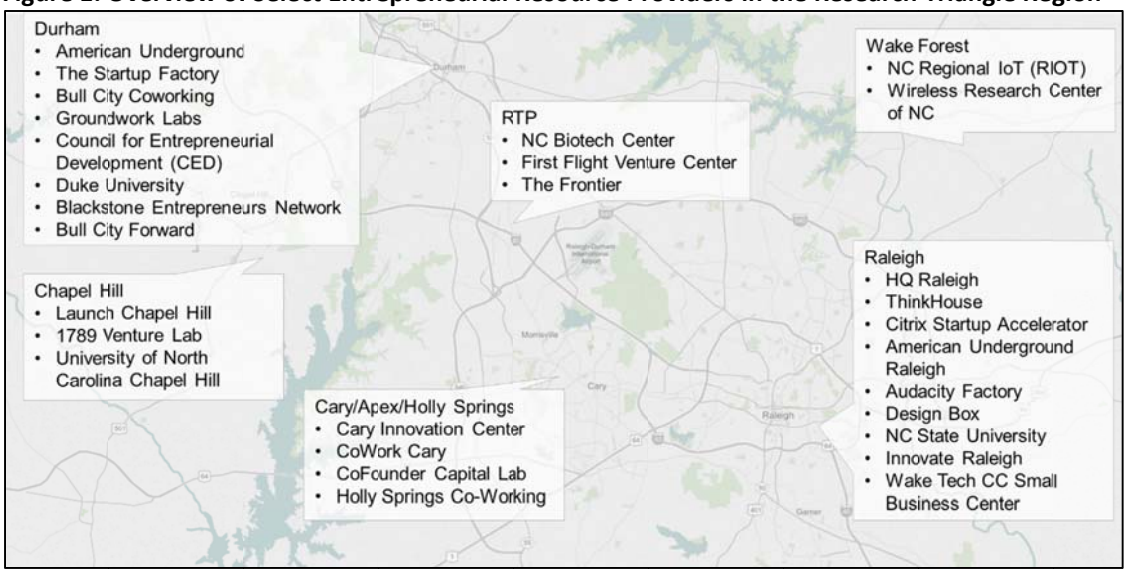
How the Research Triangle Region Promotes Connections to Support Entrepreneurship

1. Introduction

Startup businesses are an important engine of economic growth and innovation, accounting for nearly all net new job creation and almost 20 percent of gross job creation in the United States.[11] Globally, small and medium enterprises account for more than half of all formal jobs worldwide.[12] It is well understood that startups contribute to a dynamic economy by improving competition, creating innovative new products, and delivering new services, and regions around the world are working to create the conditions to create a thriving startup ecosystem. However, it is difficult to understand the networks, resources, programs, and services that help them flourish.

The Research Triangle Park (RTP), one of the oldest science and technology parks in the world, has contributed to the transformation of the regional economy formed by the fast-growing metro areas of Raleigh, Durham, and Chapel Hill, North Carolina, USA. Over the last decade, the 59-year-old research park has been embarking on ways to better facilitate entrepreneurship within the park itself, in addition to the fast-growing, medium-sized cities that comprise the Triangle—Raleigh, Durham and Chapel Hill. Currently, a variety of service providers, incubators, events, university based programs, and other relevant institutions and programs support startups and entrepreneurs in the region surrounding RTP (see Figure 1).

Figure 1: Overview of Select Entrepreneurial Resource Providers in the Research Triangle Region



Source: RTI

This paper focuses on the entire Research Triangle region and will be of direct interest to leaders and practitioners looking for tangible ideas to facilitate connections for startups and entrepreneurs.

[11] Kauffman Foundation. http://www.kauffman.org/what-we-do/resources/entrepreneurship-policy-digest/the-importance-of-young-firms-for-economic-growth
[12] The World Bank. http://www.worldbank.org/en/news/feature/2016/06/20/entrepreneurs-and-small-businesses-spur-economic-growth-and-create-jobs

This paper will explore, specifically, the mechanisms that entrepreneurs use to access resources in the region and how the ecosystem could be strengthened the entrepreneurial ecosystem. After a decade of growth, the entrepreneurial ecosystem in the Research Triangle region offers a case study on the mechanisms that startups use to access resources within the research park and the areas of innovation that are growing quickly in its urban centers. While there is data available on the types of services, providers, and other resources in the ecosystem, we set out to understand the way in which startups access them.

To answer our research question, we interviewed key individuals from startup support organizations and resource providers, and surveyed a broad profile of entrepreneurs. With the data, we identified the critical resources and mechanisms for success, as well as the unfulfilled needs in the regional ecosystem. We uncovered that the region has nearly all the ingredients for a thriving ecosystem, but there are specific gaps which are inhibiting regional collaboration and keeping the region from reaching its full potential.

The findings in this paper are relevant for stakeholders in the region and for practitioners around that world that are working to develop local entrepreneurial ecosystems. The findings include concrete ways that ecosystem leaders can improve regional collaboration to build an efficient ecosystem which startups can navigate, and ultimately contribute to local job creation, diversification, increased tax base, opportunities for existing companies, and create new products and services with the potential to improve well-being.

2. Background

2.1 Entrepreneurial Ecosystems

For regional leaders, strengthening entrepreneurial ecosystems is an increasingly important tool for economic growth; small businesses are essential to economic development. In the current era of information and rapid change, entrepreneurial ecosystems enable firms to thrive by connecting startups with critical resources. However, there is not much direction in terms of what works and how AOIs can contribute to their ecosystems. Support organizations and local leaders can play an enabling role by enhancing the mechanisms that entrepreneurs use to access resources or by enhancing the resources themselves.

Our focus on resources is partially based on the literature on agglomeration. Entrepreneurs are more likely to thrive in an agglomeration economy which focuses on the mutual benefit of geographic concentration of firms and associated resources such as services, infrastructure, suppliers, and labor. More recently, Michael Porter from Harvard University has also popularized the study of regional "clusters."[13] Geographic concentration creates network effects between firms and workers, for example, by lowering transaction costs between firms and increasing the likelihood and frequency of collaboration.

As the world sees the success of entrepreneurial ecosystems like Silicon Valley and the Boston-Cambridge area, other areas of innovation around the world are seeking to better understand the ingredients to that success. As a result, researchers and thought leaders have developed multiple frameworks and paradigms for understanding entrepreneurial ecosystems. Brad Feld's popular book *Startup Communities* illustrates how historically successful startup ecosystems in Silicon Valley, Boston, New York, Seattle, and Boulder emerged from a community of startups and the associated services and networks that form a cluster. Feld's work illuminates high-level takeaways for

[13] Porter, M. (1998). Clusters and the New Economics of Competition. Harvard Business Review, 77-90.

leaders who seek to grow local entrepreneurial ecosystems by underscoring the importance of long-term commitment and leaders who are entrepreneurs. According to Feld, it takes about 20 years for a vibrant entrepreneurial ecosystem to develop. They must be inclusive and open to anyone who wants to get involved whether regardless of age, experience, or origin. Feld also talks about "porous boundaries" where people (and their associated ideas, strategies, relationships, and resources) flow from one company to another. Finally, ecosystems must have continual activities to engage the entire community (which we refer to more broadly as "mechanisms"). [14]

While Feld's work is helpful for ecosystems at a conceptual level, it does not provide a benchmark or way to assess the status of the entrepreneurial ecosystem in a given place. The Aspen Institute, the Rainforest Scorecard, and the Startup Genome are three prominent diagnostic frameworks that provide more guidance on the critical resources needed in a robust entrepreneurial ecosystem. The Aspen Institute offers a diagnostic framework for entrepreneurial ecosystems, and breaks ecosystems down broadly into entrepreneurial determinants, performance, and impact.[15] Alternatively, the Rainforest Scorecard, another diagnostic framework for building and nurturing innovative cultures in both public- and private-sector organizations, focuses on six elements: leadership, frameworks, resources, activities, role models, and culture.[16] Finally, Startup Genome uses a Lifecycle Model of startup ecosystems based on various stages of development.[17]

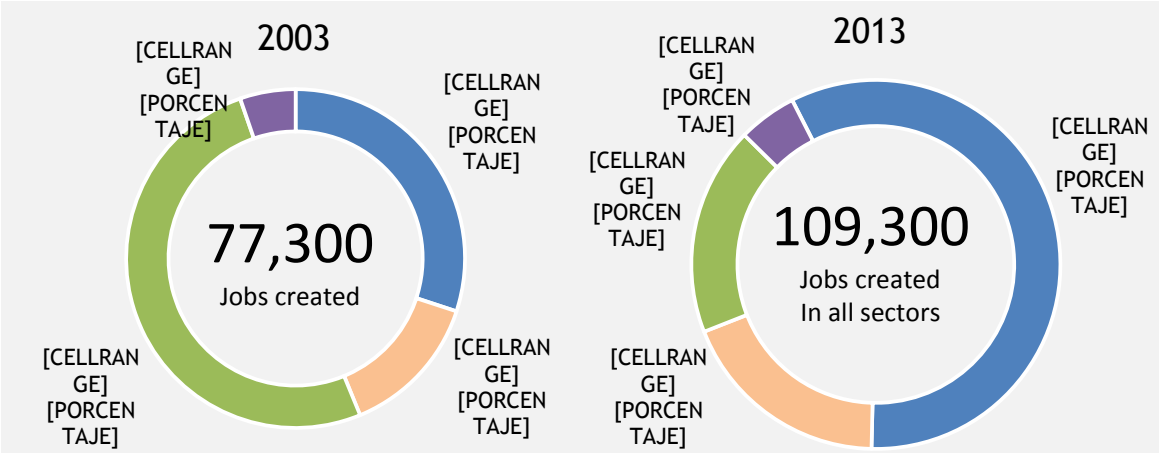
2.2 The Research Triangle Region

The Research Triangle region of North Carolina is a rapidly evolving entrepreneurial ecosystem growing out of a well-renowned 59-year-old research park. Over the last 59 years, the region has transformed itself from the second poorest state in the U.S. per capital to a globally recognized innovation hub with RTP as its locus which is now home to 260 companies and 48,495 high-tech workers.[18] Of the 260 companies in RTP, 64 percent have 1 to 9 employees.[19]

The broader Research Triangle region is home to 1.86 million people, and is anchored by three Tier 1 research universities in each of its urban centers (Raleigh, Durham, and Chapel Hill), as well as RTP. As the region continues to transform there is an increasing emphasis on entrepreneurship. In 2013, small business growth surpassed large business expansion as the primary source of job growth (see **Figure 2**). In 2003, expansions of large companies accounted for 51% of new jobs in the region. By 2013, large company expansions only accounted for 18% of new jobs, and new and expansion startups were responsible for 77% of job growth. In 2015, entrepreneurs in the state raised nearly $1.2 billion in quity funding, an increase from less than $400 million in 2013. The highest concentrations of deals were in life sciences and technology[20].

[14] Feld, B. (2012). Startup Communities. Hoboken, NJ: Wiley.
[15] Doss, H., & Brett, A. (2015). The Rainforest Scorecard. A Practical Framework for Growing Innovation Potential. Mountain View, CA: Regenwald.
[16] Ibid
[17] Startup Genome. (2017). Global Startup Ecosystem Report 2017. Accessed at https://startupgenome.com/report2017/.
[18] The Research Triangle Park 2017 Company Directory. Accessed at http://d3q408dg3zf3sg.cloudfront.net/wp-content/uploads/2017/05/RTP_Directory_2017CompanyDirectory-V2.pdf.
[19] Ibid
[20] Council for Entrepreneurial Development. Innovators Report, 2016. Accessed at http://cednc.org/innovatorsreport/.

Figure 2: Source of Job Creation in Raleigh and Durham-Chapel Hill Metropolitan Areas



Source: Youreconomy.org.[21]

Local ecosystem leaders attribute the growth of the entrepreneurial economy to multiple factors. While the foundation of the entrepreneurial ecosystem date back to the founding of RTP nearly 60 years ago, local leaders explain that the fastest acceleration of startups has been in the past ten years. The region's large corporate anchors employ a smaller staff and work within a networked value chain, outsourcing and contracting many of their business functions. Individuals who lost jobs at large corporate anchors during the 2008-2009 financial crisis and recession entered the startup ecosystem. Additionally, local universities have become more entrepreneurial, encouraging spin-offs and licensing of technology and business lines. Startup founders began to relocate from higher cost regions of the country, attracted by the access to talent and technology in the region.

The rapid growth of population, jobs, and startups contributes to a lively regional ecosystem, in which entrepreneurs at every stage can access over 100 organizations that provide entrepreneurial support, including accelerators, co-working spaces, meetups, service providers, mentors, boot camps, universities, and funders. Further, the region has a cultural openness and a highly educated population, and appears to have many of the ingredients for a thriving entrepreneurial economy. However, as our research illustrates, there is evidence of a sometimes fragmented and inefficient startup ecosystem that can be improved.

3. Data and methods

To understand how entrepreneurs connect to resources in the region, we used mixed methods to hear the perspective of both entrepreneurs and of support organizations. We surveyed entrepreneurs with an online survey tool, and interviewed a selection of support organizations. It was critical to understand both perspectives to identify potential gaps and tangible ideas for practitioners. We framed our line of questioning around two areas:

- ***Resources*** *are the tools that entrepreneurs use to grow their business, such as financing, sales, mentoring, business planning, legal, etc.*
- ***Mechanisms*** *are the channels entrepreneurs use to access those tools.*

[21] Expansions defined as growth of companies over 100 employees, while expansion startups are growth of companies between 20 and 99 employees. Numbers do not account for job loss over same time period.

For interviews, we reached a sample of support organizations across various geographies and segments of the ecosystem, including government, advocacy, accelerators, incubators, coworking spaces, funders, and universities. We interviewed support organizations from each of the urban centers as well as RTP, totaling 16 individuals from 13 organizations active in the ecosystem. Summary statistics about the characteristics of our interviewees are included in **Table 1**. We spoke with organizations who were familiar with various industry sectors and companies at various stages of development, the themes we discuss should be interpreted broadly as applying across the ecosystem, unless stated otherwise.

Table 1: Summary of Interviewees

Geography				
Research Triangle Park	Raleigh	Durham	Chapel Hill	Multi-city/regional
3	7	2	1	3

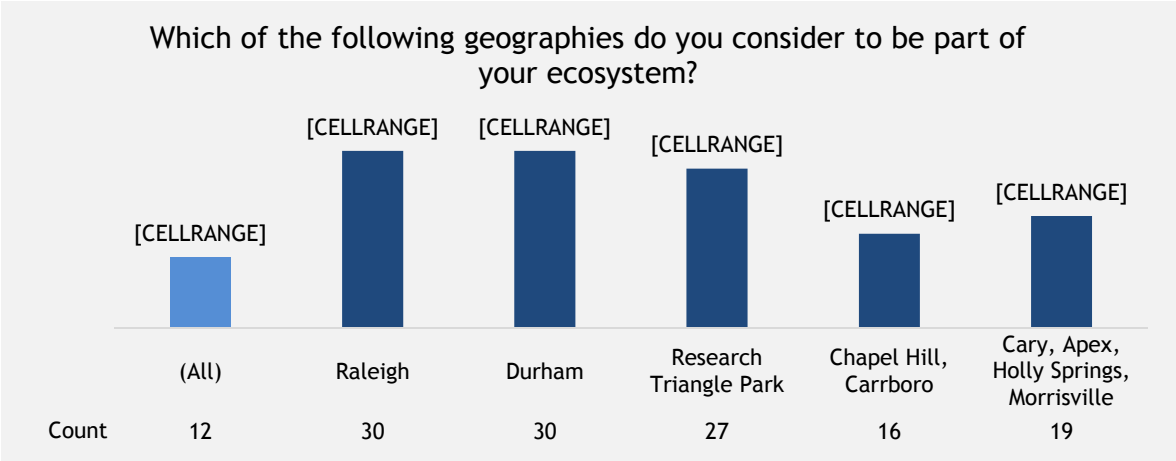
Type of Support Organization					
Accelerators/ incubators	Coworking spaces	Funder	Government	Independent support/ advocacy	University
2	5	1	2	4	2

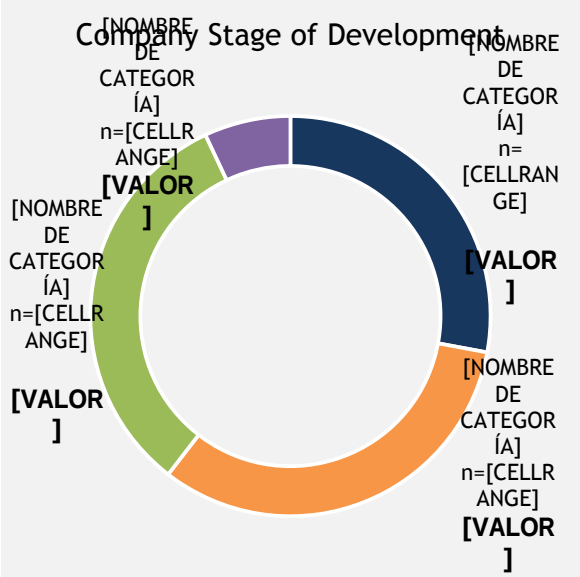
To lessen the burden and increase convenience, we used an online survey to reach as many entrepreneurs as possible. We disseminated the survey through various channels, including existing membership lists and organizations, weekly newsletters, social media (such as Twitter, Facebook, and LinkedIn), and personal connections and professional networks through RTI's partners in the regional startup ecosystem.[22] There are two limits to this method: 1) we cannot infer results for all entrepreneurs due to the convenience sample, and 2) sample size that does not ensure statistical significance. Nevertheless, the value of this research lies in its case study approach, which uncovers initial insights and discerns tangible ideas from the perspectives of both support organizations and entrepreneurs. These insights have the potential to shape more robust research and evidence-based practice in the region in the future.

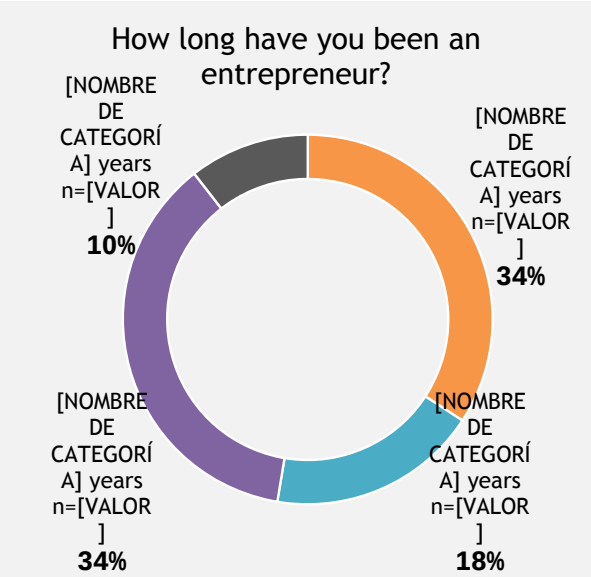
We received a total of 50 unique responses to the survey, 86% of which were from entrepreneurs and startups. We filtered those responses from survey summary statistics. **Figure 3** summarizes characteristics of the survey respondents who were entrepreneurs and startups.

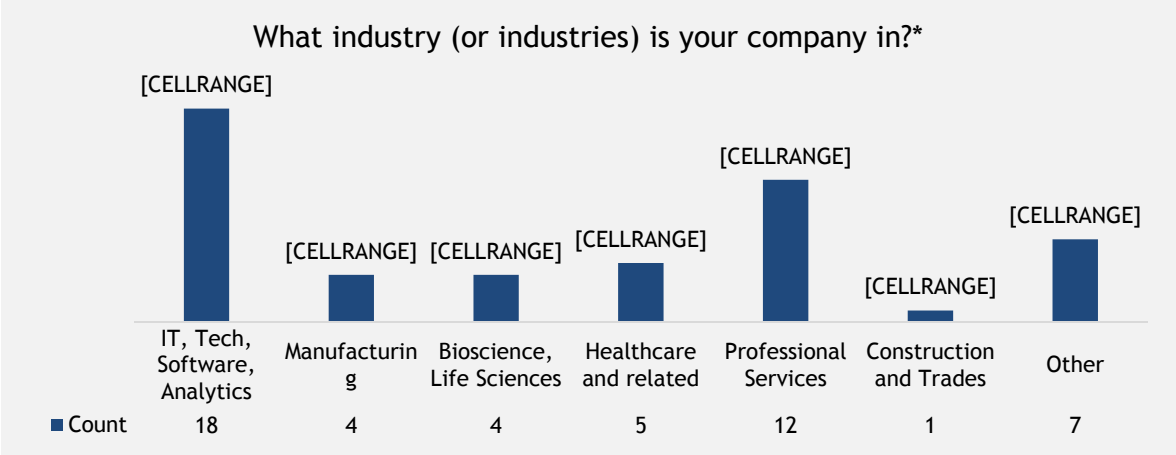
[22] RTI received in-kind support from HQ Raleigh, American Underground, Research Triangle Foundation, First Flight Venture Center, The Council for Entrepreneurial Development (CED), NC Biotech Center, North Carolina State University and the Institute for Emerging Issues, Innovate Raleigh, the University of North Carolina at Chapel Hill, NC IDEA, and The North Carolina Department of Commerce, among others.

Figure 3: Summary of Survey Respondents









Source: RTI Survey[23]

4. Findings

We split our findings from this research into two categories: resources and mechanisms. This helps us better understand what is available in the region to support entrepreneurs and how well these resources are being deployed.

The region's **resources** are abundant and continue to grow. A key asset for the region is talented workforce and research from universities, which feed into the ecosystem in several ways. Universities are creating the skilled workforce, and are formalizing an entrepreneurial pipeline by creating and improving entrepreneurship programs. The region has ample resources for early stage startups, the region lacks resources to help companies scale. The region's large companies attract talented workers,

[23] Percentages do not sum to 100% because multiple selections were allowed.

their families, and provide a large customer for B2B products and services. High quality broadband, IT, and physical infrastructure for startup space and lab space serve as a backbone for startups.

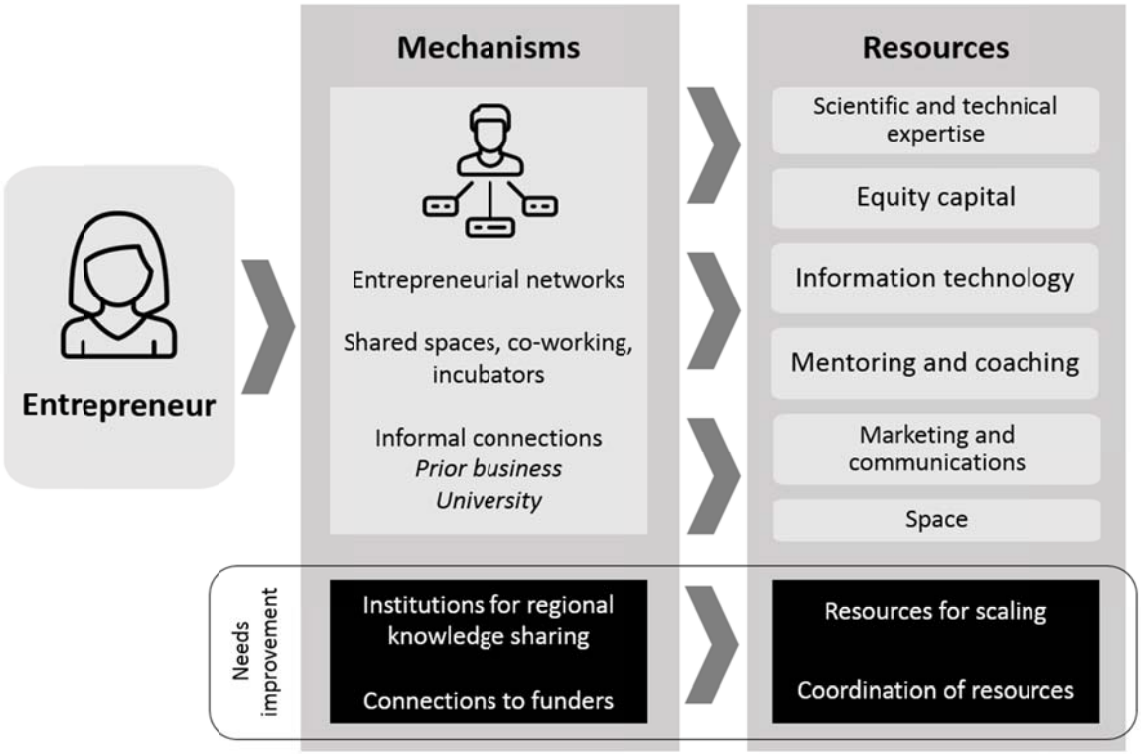
At the same time, some argue that the region lacks the resources and mechanisms necessary to help startups scale effectively. It is difficult to identify high profile exits, and the local press does not communicate effectively about them. Some support organizations see a need for better pathways for entrepreneurial-minded executives in the region to lead startups during the growth phase, and others see an opportunity educate tech-based founders to be more marketing and sales oriented. Finally, venture capital in the region could be improved in a variety of ways to help companies scale.

The **mechanisms** for connecting to resources are strong, but insufficient for the ecosystem in its current state. Entrepreneurs value local, entrepreneur-led networks and innovative physical spaces that provide co-working, office space, and lab space. They describe a region with cultural openness and inclusion, and explain that others are generally willing to help solve problems. The region's independent, university, and government institutions are proactively engaged in entrepreneurship.

However, the region's critical mass of entrepreneurs and abundance of resources are difficult for companies to navigate. In any given week, there are more startup events, functions, and meetups than any single person could attend. The large amount of resources is an important asset for the region, but also creates coordination challenges and can be difficult for entrepreneurs to navigate. For example, a few interviewees indicated that the entrepreneurial ecosystem is less than the sum of its parts due to redundant, uncoordinated, and/or un-curated resources. One support organization called this phenomenon "negative synergy". However, it is important to recognize the region's fortunate position, and coordinate among stakeholders to provide quality information about resources from a trusted information broker.

Ultimately, building entrepreneurial ecosystems must be entrepreneur-led, but there are some enabling steps that local policymakers can take to support the ecosystem and make the path less risky. Using a thematic analysis of the interview and survey responses, we explore several overarching resources critical to the success of entrepreneurs and mechanisms that entrepreneurs use to connect with these resources in the region. We also identify resources that could be better connected with entrepreneurs, and we discuss potential mechanisms that stakeholders in the region could use to strengthen these connections. **Figure 4** provides an overview of these resources, mechanisms, and findings.

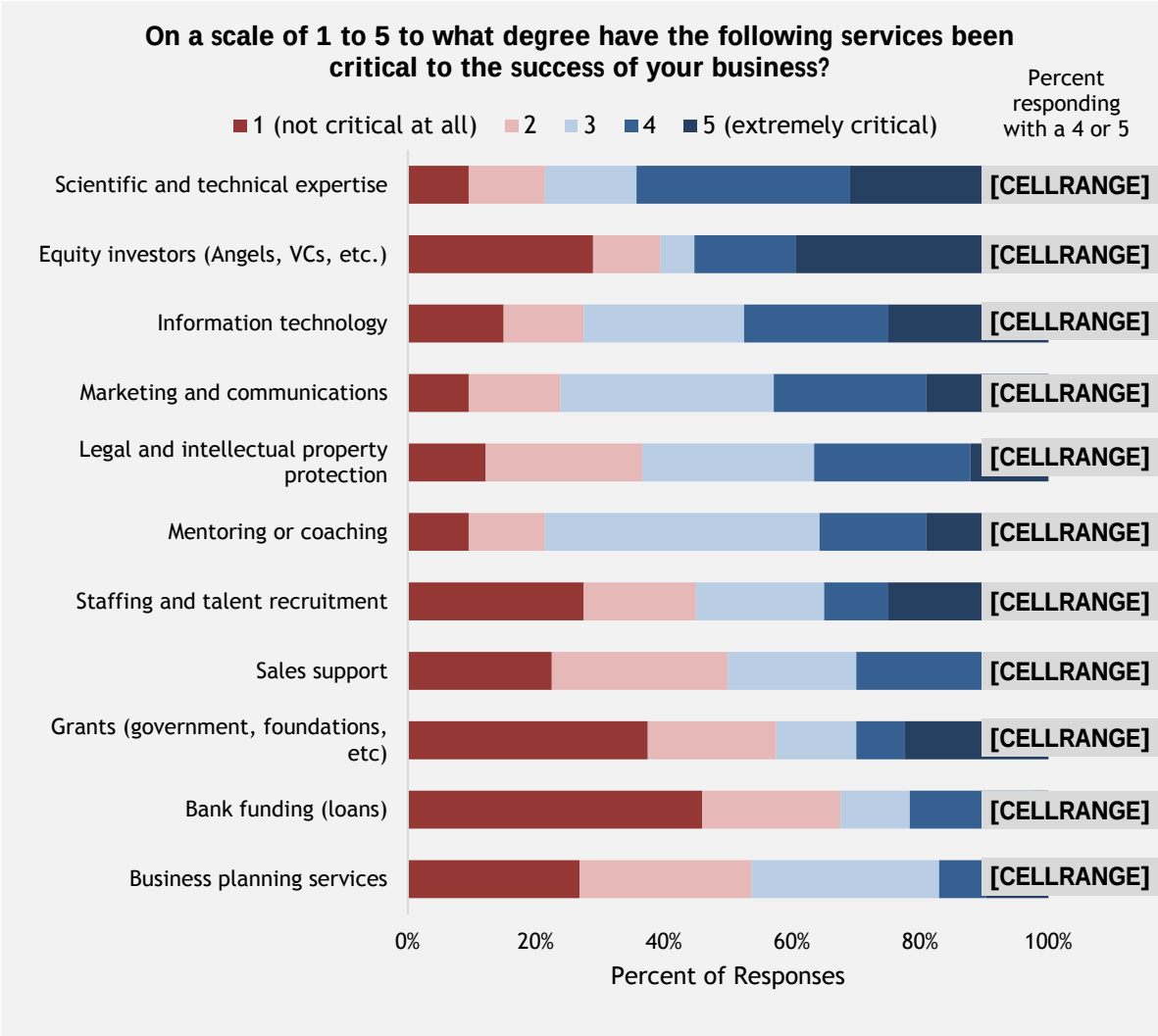
Figure 4: Mechanisms and Resources in the Research Triangle Regional Entrepreneurial Ecosystem



Entrepreneurs surveyed identified several critical resources for success (see **Figure 5**). They most frequently identified scientific and technical expertise as critical to the success of their business[24], illustrating the high-tech nature of the ecosystem. They were also likely to identify information technology and marketing and communications as critical resources. While entrepreneurs cited equity investors as being the second-most important ingredient to success, the distribution was bi-modal, with a high percentage of companies primarily in the field of professional services, citing equity investors as not critical at all. Mentoring or coaching also emerged as a resource that entrepreneurs were lukewarm about with the highest concentration of responses in the middle.

[24] Survey respondents most frequently assigned a 4 (critical) or 5 (extremely critical) to "scientific and technical expertise" as a service critical to the success of their business.

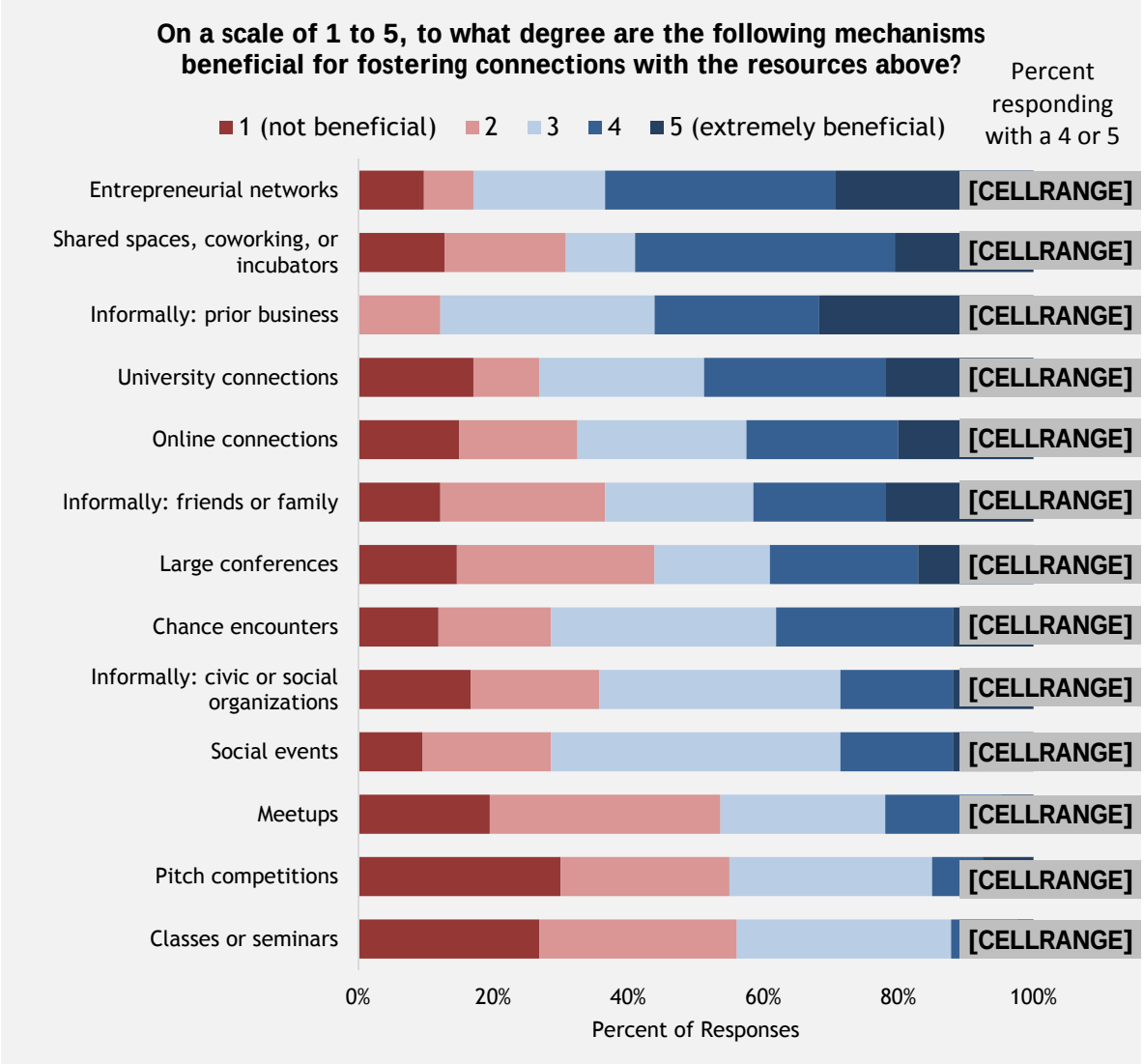
Figure 5: Critical Resources for Entrepreneurial Success



Source: RTI Survey

Entrepreneurs cited entrepreneurial networks as the most beneficial mechanism for fostering connections in the ecosystem, followed by shared spaces. This reflects Brad Feld's argument that successful entrepreneurial initiatives are entrepreneur-led. Connections through prior business or universities were also important to entrepreneurs, which illustrates the important presence of academic and corporate anchors in the region. The mechanisms that received the highest evaluation from survey respondents illustrate an ecosystem whose networks are thriving on organic, informal relationships. In fact, 74 percent of startups surveyed said that at least one of the three informal mechanisms we asked about was critical. Formal channels such as meetups, pitch competitions, and seminars received the lowest evaluations (see **Figure 6**).

Figure 6: Beneficial Mechanisms for Fostering Connections



Source: RTI Survey

In summary, the resources most frequently cited as essential by entrepreneurs (talent, capital, information technology), are among the most important for any entrepreneurial ecosystem, and the mechanisms reflected an entrepreneur-led network that thrives on networks, shared spaces, and connections through businesses and universities.

The following subsections explore our findings on the most critical resources. Within each subsection we describe how the interviewees and survey respondents talked about the resources, the mechanisms that are used to connect with resources, and where there are perceived needs in the region for better connections between entrepreneurs and resources. We also discuss mechanisms more broadly. Finally, in the conclusion we summarize connections between our key findings and provide tangible ideas gleaned from this research that practitioners can adapt and apply to their own unique contexts.

4.1 Resources

The region has a strong base of scientific and technical talent and information technology infrastructure, which are important assets to the growth of the ecosystem and are cited by entrepreneurs as critical resources. At the same time, connections to funding are one of the most important resources and one of the main pain points for local entrepreneurs. Entrepreneurs and support organizations alike both seem to agree that funding is one of the major areas in which the region can develop better connections. However, a divide appeared in regards to mentoring: entrepreneurs were lukewarm about the importance of it, while support organizations emphasized its importance. The following sections explain these resources in more detail.

Talent – Scientific and Technical Expertise

There are a variety of critical skills, capabilities, interests, and occupations that are needed to help startups meet their potential. In the Research Triangle region, entrepreneurs rated "scientific and technical expertise" as the most critical resource.[25] This high rating reflects that this scientific and technical expertise is a key strength in the area. As of 2010, the Raleigh-Cary metropolitan statistical area was ranked seventh in the United States based on the share of residents with college degrees. 41% of residents held a college degree in 2010, up from 14.2% in 1970.[26]

Interviewees revealed however that there is a need for more skills development for startup founders. For example, one support organization commented that founders tend to focus on product development, while lacking skills in management, finance, or sales. In addition to greater skills training in this area, they noted a need for founders to connect with executive level talent with experience in marketing and sales. Some combination of both approaches is likely needed.

Entrepreneurial experience in a region is also a dimension of talent that will naturally evolve over time with sustained development of the ecosystem. It will grow faster if experienced entrepreneurs stay in the region, encouraging local stakeholders to make the region a desirable place to live. One selling point is that quality of life and cost of living in gives the Research Triangle region an advantage over more expensive metropolitan areas, though those areas admittedly have other advantages such as more robust ecosystems and greater access to venture funding. As mentioned in the Startup Genome report, entrepreneurial experience – which is both technical and business-oriented – drives the ecosystem size and performance. Entrepreneurial experience in a region also directly influences the ecosystem's capacity for mentoring (see Mentoring section).

Startups use a variety of mechanisms to connect with talent. Entrepreneurial networks and informal connections continue to be critical. More formal networking and topic-based events also play an important role in helping people with common interests to connect. Finally, university partnerships between startups and startup support organizations in the region are encouraging entrepreneurial minded talent to stay in the region by embedding students in the startup community from an early age. Migration has also been a key mechanism for bringing more talent to the region. Population in the

[25] 34% of entrepreneurs assigned scientific and technical expertise a 5 (extremely critical) and another 34% assigned a 4 (critical).

[26] The New York Times. (2012, May 30). Cities with the Most College-Educated Residents. Retrieved from The New York Times: http://www.nytimes.com/interactive/2012/05/31/us/education-in-metro-areas.html

Research Triangle region is growing rapidly, and includes a mix of well-educated migrants from other parts of the country and world.

Overall, 81% of startups think that the current connections with scientific and technical expertise are sufficient, further demonstrating that talent is a key asset in the region. Pain points were mainly in the area of competition for talent. For example, some startups noted the challenge of attracting talent from larger, more established companies in the region. An emerging analytics company stated that finding software engineers is hard because of the difficulty of matching salaries with more established companies.

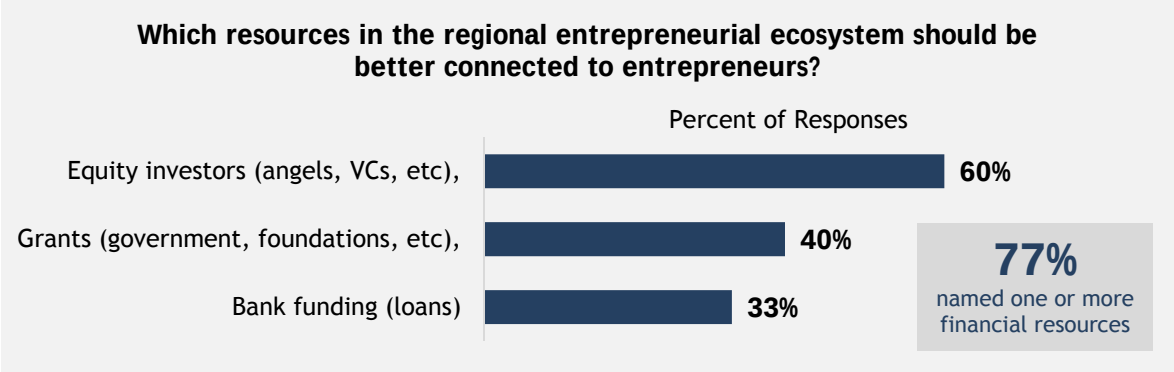
Funding

No matter the source, funding is often cited by startups as one of the most critical resources for a company to start and scale. Nearly all support organizations emphasized the importance of capital for early stage companies. For early-stage software or services companies, non-dilutive funding through a bank loan or line of credit is nearly impossible to obtain due to the collateral requirements, and is an unattractive risk for the company. At the same time, they expressed the constant challenge of bringing in equity funding from venture capital firms, which are geographically concentrated in other parts of the country such as Silicon Valley, New York, and Boston. Additionally, high-growth firms in bioscience faced a different challenge when compared to smaller tech firm: The time required for patenting, clinical trials, and government approval means that private investors would have to wait over ten years to see return on investment, outside the time horizon for typical private investors. They expressed the importance of government research grants and matching funds to develop a commercially viable product.

Responses on funding were highly polarized among companies surveyed. Some respondents identified equity funding through angels, venture capital, or private investors as one of the most critical resources for success, whereas others said it was not: 39% of those surveyed said it was “extremely critical”, but 29% said it was not critical at all. For the founder, sale of an equity stake to an angel, venture capital investor, or institutional investor implies a partial loss of ownership or control of the company. Very few entrepreneurs identified bank funding as a critical resource. A limited subset, primarily in bioscience, identified research grants as a critical resource.

When we asked entrepreneurs which resources needed to be better connected, the three most frequent responses related to financing. Over three-quarters identified one or more funding sources as a resource that needed to be better connected, with the largest share naming equity funding, followed by grants and bank funding. They noted that in addition to better access to funding, the ecosystem needed more consistent and formal introductions to venture capital investors, visibility to investors outside the region, better communication about resources, and one-stop clearinghouse for financial resources. These elements reflect the need for improved communication and information in the regional ecosystem. **Figure 7** summarizes the survey responses.

Figure 7: Connections to Financial Resources



Source: RTI Survey

Although equity funding is one of the topics most frequently discussed around entrepreneurship and economic development in the Research Triangle region, there is little agreement on how to address the challenges. Entrepreneurs surveyed described the difficulty of raising capital, saying that local venture funds were too risk averse, difficult to connect with, or tended to limit their reach to a small circle of companies; consequently, they looked for more connections to venture funds outside of the region. On the other hand, one support organization pointed out that funding was available locally and that grievances about funding were universal, even in the resource-rich entrepreneurial ecosystems of Silicon Valley and Boston. Despite these differences, nearly all of those interviewed stressed the importance of transparency in how to access funds appropriate to the stage, growth trajectory, and industry sector of a company.

Information Technology

For entrepreneurs, information technology (IT) is an indispensable resource, and 48% identified it as critical[27]. Those who identified IT as a critical resource tended to cut across sectors, stages of growth, and levels of experience. However, only 12% of respondents identified it as a resource that needed to be better connected to entrepreneurs. This may indicate the presence of a robust IT infrastructure that is serving as a backbone for entrepreneurs. For example, there is good access to broadband and high quality IT services, which companies use to access online sales, online networks, specialized services, and connect remote teams and global customer bases. The regional concentration of large IT companies and investment in IT infrastructure over several decades has made this a quality resource in the region that is fundamental to the entrepreneurial economy.

Mentoring

Mentors are experienced and trusted experts who coach entrepreneurs, share ideas, help facilitate connections to other resources, and advise startups on strategic issues, among other things. Mentoring can happen informally through personal networks or programmatically. It is important for startups at various stages, but perhaps most critical for early stage entrepreneurs and startup companies who are trying to develop a concept into a business or who would like to scale. Of those surveyed, 42% of startups said that mentoring or coaching was critical to the success of their business. As a relatively young entrepreneurial ecosystem, the Research Triangle region is only recently getting to the point that

[27] 48% of respondents provided a 4 or 5.

it has built up a sufficient base of entrepreneurial experience and that mentoring is taking place on a larger scale. Overall, mentoring and coaching appears to be fairly well-connected to entrepreneurs; only 30% of those surveyed indicated that mentoring and coaching needs to be better connected with entrepreneurs.

Mechanisms that entrepreneurs use to connect with mentors range from ad hoc entrepreneurial social networks - which was rated the most important of all mechanisms to connect with resources - to programing to organized events that encourage collisions. Whatever the mechanism, robust mentoring requires that a mentor-mentee match be made and that the relationship develops to a sufficient comfort level. In the Research Triangle region, specific mechanisms to connect with mentors include personal networks of advisors, such as the eClinic collaboration between North Carolina State University and HQ Raleigh that connects volunteer mentors with student entrepreneurs, and official communities such as HQ Raleigh, American Underground, and the Council on Entrepreneurial Development that actively work to connect entrepreneurs with mentors through “office hours” and other formats.

Ultimately, mentoring is critical for the formation of entrepreneurial talent in the region, giving less-experienced entrepreneurs the opportunity to develop business acumen and have the confidence to make myriad decisions and take calculated risks. In the region, sometimes mentors turn into business partners, board members, and/or investors so they have a vested interest, but we also heard stories about a culture of experienced entrepreneurs who are willing to “give back” by mentoring peers in the region.

Support organizations and key individuals in the region stressed that mentoring needs to be high-quality which appears to be based on two principal dimensions: (1) the mentor has relevant entrepreneurial experience and (2) the depth of the relationship with the mentee. To the extent that leadership in the region can influence these two dimensions, it may lead to more successful mentoring. Leadership can work to provide more entry points for experienced mentors to get engaged. Ideas discussed for more formal support of mentorship includes providing free space, free mentoring and coaching programs, and special events such as invite only lunches and dinners based on broad interests that connect more seasoned mentors and investors with younger, less-experienced entrepreneurs. These ideas facilitate more connections and strengthen the quality of relationships.

4.2 Mechanisms

Entrepreneurs rated entrepreneurial networks, informal connections, space, and institutions as the most beneficial mechanisms for accessing resources. The ways they form networks in the region illustrates entrepreneur-led connections, facilitated by institutions that provide the enabling environment for collaboration. This section takes an in-depth look at the mechanisms entrepreneurs rated as being most beneficial for accessing resources.

Entrepreneurial networks

Entrepreneurs surveyed identified entrepreneurial networks as the most important mechanism for accessing resources. They comprise both formal and ad hoc social networks, and include membership-based organizations, virtual communities (such as social media networks), personal connections, and other affiliations. These networks are critical to companies at very their early stages, allowing early-stage companies to more effectively navigate the local ecosystem and serve as an informal group of advisors that directly provides value to early-stage companies. These networks require little formal structure, and participants spoke of the value of "cheap beer and pizza" to get entrepreneurs together to form connections.

These networks connect entrepreneurs to workers and funding, two of the key resources for early stage companies. For example, one entrepreneur commented that networks were critical for identifying candidates for key positions and raising equity. However, this entrepreneur also pointed out that having a more actively engaged investor network would help a great deal, and that some investors in the area are not as integrated with the ecosystem because of an age gap and the use of social media platforms.

Additionally, these networks are critical for accessing customers. An education startup indicated that word of mouth is very powerful in the Research Triangle region in terms of building a customer base. Furthermore, one participant noted that the demographics and culture in the region make the market a good testing ground for consumer- oriented startups with new products and services because there is an abundance of early adopters. This is demonstrated by the fact that Raleigh is often an early test market for larger consumer-product companies. Additionally, the presence of larger companies in technology, life sciences, and other sectors provides opportunities for B2B startup services.

Various institutions including city governments and universities are acting to facilitate these networks. Universities in the region are strengthening networks by enhancing entrepreneurship programs and integrating students with entrepreneurial communities. North Carolina State University has created an entrepreneurship clinic located within a prominent local co-working space. This clinic gives entrepreneurs access to free labor hours, and at the same time embeds entrepreneurial-minded students in the ecosystem and provides them with experiential learning opportunities. The creator of this program noticed quickly how his own students' ideas improved after acquiring more real-world experience in validating and testing ideas for others. Students are also given the opportunity to float their business ideas in informal interactions to get direct feedback.

A handful of very talented connectors in the region help startups in these networks access capital and mentorship. However, one startup noted that these connectors have limited time and resources, which ultimately limits the local pipeline of startups. It offers evidence that these connector "nodes" are overloaded, limiting the potential of the network. Additionally, the networks across the region are fragmented, partially due to the expansive geography of the region. A common theme that emerged a feeling of competition rather than "coopetition." Many stakeholders and entrepreneurs felt that key organizations do not collaborate and coordinate activities sufficiently. Others described this as a parochial infighting and an inward-looking approach in the major cities, which was inhibiting regional collaboration.

Space

For entrepreneurs, work space is a fundamental resource that can involve a high level of risk. Access to quality, flexible work space is difficult for early stage companies not willing to sign a long-term commercial lease. The coworking spaces in the region - including HQ Raleigh, The Frontier in RTP, and American Underground in Durham - offer affordable space that can be leased without a long-term contract. This allows early stage companies to allocate limited resources to critical business functions. Software, technology, and services startups are concentrating in these attractive spaces with a mix of co-working, small offices, and shared resources such as meeting space, printers, and spaces to interact with potential customers. Entrepreneurs in biosciences or manufacturing are moving into specialized spaces with prototyping space and laboratory equipment, often in conjunction with university labs, which offer space that can be leased to outside tenants for an affordable rate. The region's primary providers of co-working space also allow the space to be used as a resource for accessing professional services, hosting events, and welcoming clients.

In addition to being a direct resource for companies, space is crucial for accessing other resources. Entrepreneurs ranked space as one of the most important mechanisms for forming connections, and emphasize that spaces allow for a high velocity of interactions in informal settings. Shared spaces are particularly important in the Research Triangle region which is geographically dispersed. Quality space encourages entrepreneurs to interact and share ideas in unstructured or semi-structured ways. Culturally, rigid structures for networking often do not work well in the fast-moving startup world. Entrepreneurs surveyed noted that informal opportunities to interact with other entrepreneurs and members of the ecosystem were lower pressure and allowed for trust to form in a non-sales environment.

For urban planners and regional leaders, physical space for entrepreneurial growth will be a challenge moving forward. The region's successful coworking spaces are attracting talented entrepreneurs from inside and outside of the region, and their growth is putting a strain on the existing urban infrastructure. Access to parking, for example, is becoming scarcer and public transit is limited. While for many years low cost and low congestion were an advantage for the region, economic development leaders today recognize that this advantage is diminishing because of a fast-growing population and increasing cost of living.

Informal Connection through Prior Business

Entrepreneurs identified connections through prior business as one of the most important mechanisms for connecting with resources, with 56% identifying it as critical. New entrepreneurs use connections from prior jobs to start accessing resources, whereas experienced or serial entrepreneurs leverage their existing clients and entrepreneurial networks. Entrepreneurs commented that prior business success was critical because it was a natural starting point for formative conversations and opening doors. However, one entrepreneur explained that while prior business and university networks are key to early success, they acknowledged that as they worked to expand their networks, they ended up speaking with many of the same people. Others noted that word of mouth was an important way of forming networks, and that although the ecosystem is growing and increasingly diverse, they often found themselves in the same circles of entrepreneurs and support providers.

Institutions

The Research Triangle region has a variety of institutions that provide resources directly and indirectly that help entrepreneurs get connected with resources in the ecosystem. The roles of these institutions have evolved as the region's population has grown and more entrepreneurs and support organizations

open in the region. As the region continues to grow, the roles of private businesses, nonprofit organizations, governments, universities, and business associations have started to overlap which makes it difficult for a new entrepreneur to navigate. One experienced service provider noted that it can take a founder or new CEO up to 6 months to fully understand the variety of institutions in the region and to identify the ones that can provide the best services for a company's specific needs.

Both survey respondents and interview participants pointed out the important need for an independent, trusted broker in the region that can serve as a guide and network connector for new entrepreneurs. In the past decade, this has become increasingly important because in-migrants are overrepresented in the entrepreneurial ecosystem. For example, one co-working space pointed out that at least three-quarters of their staff and tenants are from a different state or country. However, two institutions stand out as independent network connectors in the region.

- The Council on Entrepreneurial Development (CED) is the oldest dedicated support organization in the region, with over 35 years of experience and 22,000 contacts. Its role is to act as a neutral player in the ecosystem, forming connections for companies through its vast network of support service providers, funders, and mentors.
- The NC Biotech Center opened in 1984 and serves as a funder and neutral actor in the region, supporting startups and companies at all stages of development related to bioscience. It can provide matching funding and connections for high-risk bioscience startups that can have difficulty accessing private capital.

The role of these two organizations is evolving, and they form part of an increasingly crowded market of service providers and support organizations. Entrepreneurs and service providers support the strengthening of independent connectors, arguing that their role is more important than ever. Entrepreneurs require transparent information on high-quality services and resources in the ecosystem, and they emphasized the importance of awareness of resources and how to access them, and the need for quality communicators to share success stories and improve awareness of the region's entrepreneurial strengths.

5. Conclusions and Recommendations

The experience of the Research Triangle region reflects the unique nature of its economic development over the last half century: a large corporate research park has contributed in a variety of ways to the critical mass of resources for a nascent entrepreneurial ecosystem. Additionally, we uncovered that, at its current stage of development, the region has nearly all the ingredients for a thriving ecosystem, but there are specific gaps which are inhibiting regional collaboration and keeping the region from reaching its full potential. There are lessons that can be adapted and applied to other contexts.

- Skilled scientific and technical workers from the area's universities are entering the startup world, and successful companies identify them as a critical resource.
- Networks are entrepreneur-led. In this region, as in other successful ecosystems, non-entrepreneur support organizations serve as "enablers" by making it easier for entrepreneurs to succeed. In this way, practitioners help ecosystems maximize their potential, while ensuring that entrepreneurs are the leaders of the ecosystem.
- Trusted institutions serve as information brokers and network connectors to help the ecosystem to operate efficiently, ensuring that startups and founders can make the right connections at critical points in their business trajectories.

- Connector nodes are crucial to building regional entrepreneurial networks, but these individuals are overloaded, limiting the potential of the network.
- Regional leaders are transforming low-density suburbs and repurposing urban structures into physical spaces that encourage high-velocity interactions to form the types of entrepreneur-led networks that lead to innovation and collaboration.

The entrepreneurial ecosystem is growing in the Research Triangle region because it is built on local strengths including a talented workforce, IT, and universities. Additionally, the existence of large science and technology companies and the cultural dimensions of openness and helpfulness have also been key strengths. However, it faces important challenges moving forward. The region needs better connections to equity funding from internal and external investors. Local companies have adequate resources at an early stage, but lack the support structures to scale. Finally, there is limited coordination and redundancy among regional service providers, leading to an inefficient allocation of regional resources.

Support organizations within STPs and AOIs play an enabling role for entrepreneurial ecosystems. Our recommendations for other areas center on de-risking entrepreneurial ventures, taking an intentional stance toward being active connectors in entrepreneurial networks, strengthening educational pipelines and in-roads into entrepreneurial communities, ongoing monitoring of resources and mechanisms in the local area, and targeted education of entrepreneurs that will help them scale. Specific recommendations are outlined below:

- The mechanisms that received the highest evaluation from survey respondents in the Research Triangle region illustrate an ecosystem whose networks are thriving on organic, informal relationships. Local policymakers and startups should keep this in mind when envisioning events and platforms for startup to connect in more informal settings.
- Making the transition to being a full-time entrepreneur involves a high level of risk. Identifying risks and creating policies to lower the risk to entrepreneurs is a crucial step in encouraging more talented individuals to start their own ventures or join a startup team.
- Formal positions within local institutions dedicated to connecting entrepreneurs with the right resources in the ecosystem can serve as crucial information brokers and nodes in a network. For example, a municipal government created a position for an innovation manager to connect people and strengthen local entrepreneurial networks. This decision was viewed positively by other members of the ecosystem including entrepreneurs.
- Universities can strengthen networks by enhancing entrepreneurship programs and embedding students in entrepreneurial companies. It provides students with exposure to the ecosystem and a pipeline of skilled workers for new ventures.
- The literature does not lay out clear tactical and strategic direction in terms of what works when building entrepreneurial ecosystems. Measuring progress of the development of entrepreneurial ecosystems also depends on the context of a specific region. Therefore, science parks and AOIs should continually monitor the networks, mechanisms, and resources in the ecosystem for redundancy, fragmentation, or missing pieces. An experienced support organization in the Research Triangle region discussed the creation of a coordination council to bring together fragmented pieces of the ecosystem.
- Entrepreneurs tend to overinvest in product development even once a product is ready for market. Institutions can find ways to educate entrepreneurs on sales and marketing at the appropriate stage, or to connect executive level talent with startups that are poised to scale.
- Density of space, clusters, and resources lowers the cost of transactions and encourages creative collisions between actors. Physical co-location of entrepreneurs, support services, networks, and universities allows for entrepreneur-led creativity.

- Each region needs to tailor its approach to its strengths. If an STP or AOI has capital to invest in resources and set up new institutions, these investments must be aligned with local industries, resources, culture, and the needs of local entrepreneurs.

Appendix A. Interview Guide for Support Organizations

Background on Support Organization and its role in the entrepreneurial ecosystem
This section will address the role the organization serves in the ecosystem.
1) What **geographies** of the Research Triangle region do you consider to be part of your ecosystem?
2) What **local industries** are you most familiar with?
3) What **role does your organization serve** in helping to foster connections between entrepreneurs/startups and other members of the entrepreneurial ecosystem?
4) Do you have any **stories or data** about how connections between startups/entrepreneurs and critical resources have been made or fostered, how those connections lead to benefits for startups and entrepreneurs, etc.?

Resources and mechanisms for connections in the entrepreneurial ecosystem
This section will address the regional ecosystem in general.
Resources are the tools which entrepreneurs use to grow their business: financing, sales, mentoring, business planning, legal, etc. Mechanisms are the channels they use to access those tools.
5) In your opinion, **which resources are critical** to the success of entrepreneurs and startups in the local entrepreneurial ecosystem?
6) **What mechanisms are beneficial** in fostering connections?
7) Which resources in the regional entrepreneurial ecosystem **should be better connected** to entrepreneurs?
8) What kinds of mechanisms would be **appropriate for strengthening** these connections?
9) **Why is it important** to strengthen these connections? What do you see as the expected benefits?

Openness of the Ecosystem
This section will address the regional ecosystem in general.
10) Could you talk about how **inclusive or not inclusive** the entrepreneurial ecosystem is? (Prompt with examples such as people of various degrees of experience, ages, genders, races, socioeconomic status, and people that have recently moved to the area)
11) What **barriers are there to participating** in the entrepreneurial ecosystem, and do you have any ideas on how those barriers can be overcome to make the ecosystem more inclusive?
Final Thoughts
12) Given the things we talked about, do you have any advice for areas of innovation around the world as they try to strengthen their entrepreneurial ecosystems?
13) Would you like to share any final thoughts or is there anything that we should have asked?

Appendix B. Survey for Entrepreneurs
Our online survey parallels the interview guide for support organizations in Appendix A. It is located at http://bit.ly/rti_IASPsurvey.