EVALUATION & NETWORK ANALYSIS OF THE CAPE TOWN-STELLENBOSCH TECH SECTOR
ABOUT ENDEAVOR INSIGHT:
Endeavor Insight is the research division of Endeavor, a non-profit organization that supports high-impact entrepreneurs across the world.

Our work seeks to answer three questions:
1. How do entrepreneurs reach scale individually at their companies?
2. How do entrepreneurs reach scale collectively in local networks and ecosystems?
3. What can policymakers, philanthropic leaders, investors, support organizations, and other stakeholders do to empower more entrepreneurs to scale?

Over the last five years, Insight's work across five continents has been supported by a broad range of foundations and other organizations. The methodology utilized in this study builds on previous Endeavor Insight research supported by the Omidyar Network, the Kauffman Foundation, the World Bank, the Inter-American Development Bank, as well as partners within the Global Entrepreneurship Research Network.

SPECIAL THANKS
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The findings summarized in this report are drawn from interviews with more than 150 technology entrepreneurs in the Cape Town metropolitan area, as well as secondary data on over 450 local tech founders and their companies*. For the purposes of this research, software and technology firms were defined as those whose primary business activity fell into the categories of either software development, fintech, or e-commerce. In addition, the Cape Town-Stellenbosch area was defined to include both the Cape Town and Stellenbosch metropolitan areas, and is also referred to as “Greater Cape Town” or simply “Cape Town” in the text.

These interviews were conducted in late 2017 and early 2018 with the assistance and support of Endeavor South Africa, Cape Innovation and Technology Initiative (CiTi), and Silicon Cape. The methodologies used in this research have been developed by Endeavor Insight along with other organizations that participate in the Global Entrepreneurship Research Network and are implemented in dozens of cities across the world.

The goal of this project was to answer two research questions:

1. What is the current state of the software entrepreneur community in the Cape Town and Stellenbosch metropolitan areas?
2. Where do opportunities exist to further the growth of this community so that it continues to generate jobs and economic value for the region?

Though the size of the local tech sector does not allow for the deepest forms of network or econometric analyses, comparative metrics were utilized to compare Greater Cape Town’s tech entrepreneurship community to several peer cities on the African continent.

The following sections of this report will share findings on the size and productivity of the entrepreneurship community, motivations of local entrepreneurs, network analysis of the sector, key challenges that impact opportunities for growth, and recommendations for future expansion.

* Unless otherwise noted, all figures reflect year-end totals for 2017.
Analysis by Endeavor Insight indicates that the Cape Town area tech sector includes between 450 and 550 entrepreneurial companies working in software development, e-commerce, or fintech. These firms are typically led by small teams of founders, averaging to about 1.7 cofounders per company.

**FOCUS ON E-COMMERCE AND SaaS.**

Of the entrepreneurs interviewed for this project, roughly 20 percent were each working in the e-commerce and SaaS sectors. The next largest industry was fintech, with about 15 percent of respondents. Many of these companies have a direct-to-consumer focus.

**GLOBAL INNOVATIVE FIRMS**

Cape Town has produced multiple firms that have stood out for their innovative breakthroughs and who have a strong global presence as a result. Clickatell, for example, developed the first mobile messaging API and was hired by the US State Department to send text message excerpts to global citizens during Obama’s 2009 speeches in Cairo and Accra. The data mining firm BrandsEye is also known for its prediction of both the British exit from the European Union, and the outcome United States presidential election in 2016. Finally, what is perhaps the most obvious example...
of Cape Town’s impact in the tech sector is the internet giant Naspers, Africa’s highest-valued tech company and a massive tech investor on a global scale.

GetSmarter, an Edtech firm that provides online certification courses in partnership with some of the world’s top universities, is another more recent example of these firms.

Last year, the company was acquired by the Edtech giant 2U for $103 million, the equivalent of over 1 billion rand.

There is a very high prevalence of VC funding in Cape Town. Roughly one third of the companies in this study have received some form of angel investment or venture funding. This number is higher on average than the rates in comparable cities like Lagos, Nairobi, and Johannesburg.
TECH ENTREPRENEURS CHOOSE TO START THEIR COMPANIES IN CAPE TOWN BECAUSE OF THE LIFESTYLE AND ITS VALUE AS A TECH HUB.

What makes the Cape Town area an attractive location for launching a technology company? Endeavor Insight asked local tech entrepreneurs why they chose to start their businesses in this community during the interviews conducted for the study. Results show that there are some characteristics of the city in particular that are highly valued by these entrepreneurs.

The most commonly cited reason for launching a firm in the Cape Town area was a practical one: the area was where entrepreneurs were living when they first decided to start their companies. This rationale is actually common and has been seen in other cities studied by Endeavor Insight. What stands out is the recurring logic - many founders living in the area wanted to continue living there and start their business there for the quality of life and ecosystem. These factors often overlapped in the responses. As one founder noted “I was living in Stellenbosch at the time and it is an incredibly inspirational place to start a business.” Another founder responded that “it is the start up capital of South Africa and I had just finished studying at UCT so it was a perfect match.”

The second most commonly cited reason was the perception of Cape Town as a tech hub. One founder responded that Cape Town has an incredible tech and startup scene with creative and innovative minds because “people are willing to take a leap of faith and put themselves out there; it’s a great environment to feed off of from other entrepreneurs and startups.”

The importance of the local tech business community can also be seen in the frequency of specific words that entrepreneurs used when discussing why they selected the city as the location for their firms. Terms such as “business,” “tech,” and “companies” were mentioned more than almost any other words by the respondents. Additionally, the word “business” was often directly associated with the word “tech,” suggesting that many businesses are interconnected with this sector.

EXAMPLE RESPONSES ON LOCATION DECISIONS AMONG LOCAL SOFTWARE FOUNDERS

“THERE IS A BETTER TECH SCENE IN CAPE TOWN, A BETTER MEETUP ECOSYSTEM AROUND TECH. FOR EXAMPLE, I HELPED SET UP A DEEP LEARNING MEETUP HERE THAT WOULD NOT HAPPEN IN PLACES LIKE JOHANNESBURG. MOST OF THE TECH CONFERENCES HAPPEN IN CAPE TOWN BECAUSE IT IS MORE OF A TECH HUB.”

“It was convenient because I already lived here. It is a good ecosystem to be in because Cape Town is a creative hub. I had built a strong network already which made it easier.”

“We were here. Everything was here. Finances were here. There’s something about Stellenbosch and entrepreneurship, opportunities and funds. Cape Town has a different feel to it.”

“Primarily because I have a good network here and also because it’s a very conducive environment - good infrastructure, great lifestyle and lots of wealthy individuals and investors.”
Lifestyle was the next most frequently mentioned factor for why founders chose to start their companies in Cape Town. One founder responded that “the lifestyle of Cape Town promotes creativity, innovation, and inspiration because of the mountains, ocean and nature. People are coming here to be creative and innovative. They’re drawn to it. There’s a tech culture that has boomed here with technically innovative products.”

Different characteristics of the lifestyle in Cape Town attracted founders in various ways. Some respondents found that the lifestyle was less corporate than other places in South Africa. One founder noted that “Cape Town is more of a tech hub than Johannesburg with a less corporate feel and a bigger concentration of tech companies and support organizations.” Another founder reported that “no one goes to the office on the same day and instead we all work a lot from coffee shops along the coast.”

It is also important to note that local universities and major companies were also cited frequently as bringing significant numbers of educated or soon-to-be-educated residents to the city. This may play an important role in contributing to the number of new tech founders.
Entrepreneur communities do not benefit their cities simply by creating large numbers of companies. The value that they provide comes from entrepreneurs generating economic productivity.

Entrepreneurial productivity can be measured in a number of ways. Analysis from previous research suggests that many of these metrics tend to correlate with each other, especially among companies operating in the same community and in the same industry. The most productive entrepreneurs raise more capital, hire more employees, and generate more sales than less productive founders working in the same regions.

For the purposes of its research, Endeavor Insight measures entrepreneurial productivity primarily by comparing the number of employees at each company. This metric was selected from the set of correlated measures of entrepreneurship productivity because it was both widely applicable—e.g., not all tech firms require outside capital—and was the metric that founders were most willing to share during interviews.

Analysis of the data collected for this study on hundreds of local founders suggests two important conclusions on the generation of productivity among tech entrepreneurs in Cape Town.

1. The majority of entrepreneurial tech companies worldwide are early stage with very low rates of productivity. This is also the case in Cape Town. Generally speaking, the majority of tech companies are small early-stage companies with little tangible impact on local job creation, economic growth, or other measures of productivity. In Cape Town, the majority of local companies interviewed for this study are micro-businesses with five or fewer employees that have raised no venture capital. Though data was not collected on sales, these firms are likely to be generating very low revenues at this point in time. The small contribution each of these companies makes to productivity is likely to shrink even further, as firms at this stage have a high rate of failure.

As the next section shows, the significance of these companies is therefore less in their combined productivity and more on their potential impact if they are able to successfully reach scale.
EMPLOYMENT CONTRIBUTION AMONG CAPE TOWN TECH COMPANIES

2. THE MOST IMPORTANT SOURCE OF PRODUCTIVITY AMONG TECH ENTREPRENEURS IN CAPE TOWN IS A SMALL NUMBER OF COMPANIES THAT REACH SIGNIFICANT SCALE.

Local companies that reach significant scale are responsible for a disproportionate amount of the productivity in Cape Town’s entrepreneur community. As the chart above illustrates, around 15 entrepreneurial companies in city’s tech sector have grown to have 100 or more employees. However, these firms have produced significantly more employment than all the other companies in the local tech community.

Within these companies, Naspers alone accounts for about 80 percent of employment in the sector - easily the highest contribution of an individual tech company to a tech sector out of the cities previously studied by Endeavor Insight. By comparison, Bangalore’s tech sector has produced roughly 500,000 jobs and the combination of its three largest companies - Wipro, Infosys and Flipkart, is only about 40 percent of total employment7.

However, even when controlling for the size of Naspers, companies with 100 or more employees still generate almost half of the employment in the sector. This highlights the importance of Cape Town’s scaled companies in driving productivity, and potentially the need for more companies like this to drive Cape Town’s growth without relying too heavily on one company.
In 2017 and 2018, Endeavor Insight gathered data on software founders in Nairobi as well as Lagos as part of a study for the Bill & Melinda Gates Foundation, which will be released later in 2018. Initial analyses of the data from that study shows that the Cape Town area compares favorably to these two other African tech centers.

Both Nairobi and Lagos have more software companies than the Cape Town area with 2017 estimates ranging from 700-800 in Nairobi and 800-900 in Lagos. Cape Town has generated an objectively higher level of productivity than Lagos and Nairobi combined if employment is used as a measure. Cape Town’s tech sector has generated over 40,000 employees compared to over 9000 in Lagos and 7000 in Nairobi.

**COMPARATIVE ENTREPRENEURIAL PRODUCTIVITY.**

Greater Cape Town has a smaller number of tech firms than Nairobi and Lagos, but its relative productivity is significantly higher if employment is used as a measure. As the graphic on the following page illustrates, Nairobi has nearly twice as many software companies but has less than a fifth of the employment. Lagos also has over twice as many software firms as the Cape Town area but has only generated less than a quarter of the employment. Even if the impact of Naspers is excluded, the average company size in Cape Town is still larger than both these cities.

Greater Cape Town outperforms these cities in relative productivity because it has fostered the development of more firms at significant scale. Approximately 1 percent of software companies in Nairobi have reached 100 or more employees and only 2 percent of software firms reach that level of scale in Lagos. In the Cape Town area, between 3 and 4 percent of local tech firms reach this level of scale.
COMPARISON: NUMBER AND PRODUCTIVITY OF SOFTWARE ENTREPRENEURS IN CAPE TOWN, LAGOS, & NAIROBI

NUMBER OF SOFTWARE COMPANIES

800 - 900 FIRMS
700 - 800 FIRMS
350 - 450 FIRMS

EMPLOYMENT AT SOFTWARE COMPANIES

12,000 - 14,000 JOBS
7000 - 9000 JOBS
10,500 - 12,500 JOBS
GREATER CAPE TOWN’S TECH SECTOR IS NOTABLY DYNAMIC, WITH A HIGH PERCENTAGE OF COMPANIES REACHING SCALE IN THE PAST DECADE AND ACTIVELY SUPPORTING OTHER LOCAL TECH COMPANIES

OUTGOING CONNECTIONS OF CAPE TOWN TECH COMPANIES

Entrepreneurial tech communities with a high percentage of companies that have reached scale can often be skewed towards older companies. In Cape Town, however, this higher proportion of scaled companies also remains true for all companies founded in the past decade. While only 1 percent of companies founded in the past decade have reached 100 employees or more in Lagos, and less than 1 percent in Nairobi and Johannesburg, 3 percent of the companies founded in the past decade have reached this level of scale in Cape Town. This is a critical indication of the dynamism of the sector.

SUPPORT FROM THE FOUNDER OF A SCALED COMPANY SIGNIFICANTLY INCREASES A COMPANY’S LIKELIHOOD OF REACHING SCALE

Previous research by Endeavor Insight has found that connections with other entrepreneurs in general do not necessarily affect a company’s performance, but connections from founders at scale, especially mentorship or former work experience, can significantly increase a company’s likelihood of reaching scale. Mentorship from the founder of a scaled company, for example, can increase a company’s likelihood of reaching scale by nearly double or more. This applies to tech sectors at various sizes including New York, Bangalore, and Nairobi.

A HIGH PROPORTION OF CAPE TOWN’S FOUNDER TO FOUNDER SUPPORT COMES FROM SCALED COMPANIES

Endeavor Insight also analyzed the connections that exist among software firms in the area using a methodology developed by members of the Global Entrepreneurship Research Network. This methodology looks at four specific relationships among founders and their companies: serial entrepreneurship, former employment, mentorship, and investment. By studying the relationships in entrepreneurship networks, it is possible to follow the movement of people, knowledge, and capital, and use this to draw lessons on the state of the entrepreneurship community.

Cape Town’s tech companies seem to be seeking support in the right places. As the chart above shows, a large percentage of support for tech entrepreneurs is coming from Cape Town’s largest companies. Most notably, roughly 30 percent of founder to founder mentorship comes from companies with 100 or more employees, compared to only 12 percent in Lagos, 4 percent in Nairobi, and much lower rates in Johannesburg, where scaled companies are typically older and much less involved with supporting other tech companies. Some of the most active mentors in this category include the founders of Wigroup and Clickatell.

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*This methodology was based on initial research conducted by Endeavor Insight and that primary member organizations involved in developing this methodology were Endeavor Insight, the Kauffman Foundation, MaRS, Nesta, and the World Bank.
† Investment variables were included in the analysis of potential predictors even though investment itself can be considered a measure of productivity or market validation and is highly correlated with reaching scale.
Cape Town's scaled companies are also strongly involved as investors - roughly 20% of investment from tech companies or founders comes from them. Within these, the majority of investment unsurprisingly comes from Naspers, a massive tech investor on a global scale. Naspers has also made dozens of investments in tech companies across the world, including Emirati e-commerce giant Souq.com, which has been acquired by Amazon²⁴, and Swiggy, one of India’s largest food ordering and delivery platforms²⁵. These investments have also spanned other regions with a large number taking place in Brazil and the United States.

**THERE IS STILL ROOM FOR MORE ENGAGEMENT - CAPE TOWN’S SCALED COMPANIES ARE ACTIVELY INVOLVED, BUT THEY ARE NOT THE MOST INFLUENTIAL COMPANIES**

Out of the top ten percent of most influential companies, i.e. companies with the most outgoing mentorship, investment, former employee and serial entrepreneurship connections, only about a third are companies with 100 or more employees. This means that there is still room for them to become more actively involved in the ecosystem.

The following graphic illustrates the different types of connectivity in the sector over time and the outgoing influence of each company.
Endeavor Insight evaluates the challenges faced by local founders by assessing them across three key areas: access to customers, access to talent, and access to equity financing. Founders are asked whether or not they consider these elements to be serious or very serious challenges to operating their business.

Typically, challenges are assessed by examining those cited by all founders and those cited by founders at large companies separately. Due to the relatively small size of the entrepreneurial tech sector in Cape Town, the analysis in this report could only examine the challenges as reported among all founders. However, this yielded several interesting findings. Most notably, compared to founders in Lagos and Nairobi, software entrepreneurs in the Cape Town area were much less likely to report that access to equity funding is a serious or very serious obstacle and were much more likely to identify access to talent accordingly.

The findings below are based on the responses of the 150 entrepreneurs who participated in this survey.

**ACCESS TO TALENT.**
Access to talent was the most frequently cited challenge, with about 67 percent of respondents ranking it as a serious or very serious obstacle.

The majority of these respondents indicated that access to technical talent specifically was a serious or very serious challenge. One founder claimed that “our core strength is in our technology. Finding talented developers to help us build that technology is a major hurdle.” Many founders attributed these difficulties to offering competitive salaries compared to the most established firms. One founder noted that “larger tech companies are offering huge salaries to developers and pricing the small start-ups out of the market for development talent.” Paralleling this sentiment, another founder stated that there is “difficulty in hiring good talent and paying competitive salaries.”

Only about half as many respondents considered access to equity as a challenge compared to access to talent.
ACCESS TO EQUITY FINANCING. Raising capital to start or grow a business is rarely easy anywhere in the world. However, on average, only about half as many respondents considered access to equity as a challenge compared to access to talent. Roughly 32% of the entrepreneurs interviewed reported that access to equity was a serious or very serious obstacle. Yet, those who did find raising funding to be difficult often ranked it as their most critical obstacle. One founder noted that “the investment landscape in Cape Town still has a long way to go” perhaps because of the slow and timely process that it takes to receive outside capital.

ACCESS TO CUSTOMERS. The presence of the tech hub that created many local businesses and clients was listed as a key strength by many of the entrepreneurs when explaining why they are located in Cape Town. Overall, only 20 percent of the founders interviewed listed access to customers as a serious or very serious challenge.
IN ORDER TO MAINTAIN THE DYNAMISM OF THE LOCAL TECH SECTOR, LEADERS IN THE CAPE TOWN SECTOR SHOULD TAKE ACTION IN FOUR AREAS.

Cape Town is arguably the most productive and impactful tech hub in sub-Saharan Africa. It has generated the continent’s most highly valued tech company as well as other software businesses that have reached scale, exited for significant sums, or grown to become leading businesses on the continent. However, the sector’s productivity is still highly skewed towards Naspers and contains the potential to develop more successful, high-scaled companies.

In order to ensure that the Cape Town area continues to produce productive tech entrepreneurs who generate large numbers of jobs and economic value for the community, Endeavor Insight suggests that leaders should focus on the following four recommendations. These are drawn from research in entrepreneurship communities across dozens of global cities as well as Endeavor’s first-hand experience supporting more than 1,000 fast-growing global entrepreneurs and operating Endeavor Catalyst, one of the most active venture capital funds investing outside of Silicon Valley.

**RECOMMENDATION 1. FOCUS ON TALENT.**

While funding is a major challenge in most tech sectors including Cape Town, there is a much stronger focus on funding than talent within Cape Town’s accelerators* and entrepreneur support organizations - despite the fact that talent was cited more frequently by founders as a challenge. Many of these organizations focus on helping their companies build connections with potential investors and mentors, but very few of them emphasize connections with talent pools or building the skills needed to find, train and retain talent.

There is also room for more of these organizations to focus on developing talent. Cape Town already has a strong potential talent pool given the strength of its local universities and its attractive lifestyle and reputation as a tech hub. Existing coding schools, which help develop this talent but do not necessarily focus on helping entrepreneurs find talent, could be more strongly integrated into the entrepreneurship support ecosystem as a resource for entrepreneurs. Some initiatives such as CiTi’s CapaCiTi programme, CodeX and Code for Cape Town, already work with a focus on connecting their students to potential employers16.

**RECOMMENDATION 2. AVOID THE “MYTHS OF QUANTITY” – BELIEFS THAT MORE STARTUPS, SUPPORT ORGANIZATIONS, OR CONNECTIONS WILL GENERATE INCREASED ENTREPRENEURIAL PRODUCTIVITY.**

It can be appealing to assume that the key to fostering a more productive entrepreneurship community would be to increase the number of inputs to the local entrepreneurship system. Data from other cities shows that this is not the case. If a larger number of companies led to a more productive community, then Nairobi and Lagos, which have more than twice the number of tech firms and many more young, tech companies, should be significantly outpacing the Cape Town area in terms of productivity.

Entrepreneurship plays a critical role in countries like South Africa where unemployment is high. In many cases, South Africans are forced into entrepreneurship as the only opportunity to create employment

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*GALI defines accelerators as cohort-based, time-bound entrepreneurship support programs with specific start and end dates, typically between one to twelve months, which is consistent with the definition used in this research.
for themselves and may require support in doing so. However, evidence from this study shows that the type of support that will have the strongest impact on job creation is in helping successful businesses grow rather than establishing larger numbers of micro-businesses.

This approach will also better allocate local talent - a resource that is already in short supply - towards helping local companies succeed, rather than spreading it out over a large number of less productive companies.

**RECOMMENDATION 3. INCREASE THE PREVALENCE OF MECHANISMS THAT FOUNDERS AT SCALE USE TO INFLUENCE YOUNGER ENTREPRENEURS, SUCH AS MENTORSHIP & ANGEL INVESTING.**

In place of a focus on the quantity of inputs in the community, leaders in the Cape Town area should seek to maximize the quality of interactions among local software entrepreneurs. A large supply of knowledge, social capital, and potential investment funding already exists among the founders of the community’s most successful tech companies. These founders are very active but still underutilized in the community.

As previous and forthcoming research from Endeavor Insight has shown, when leaders of the fastest-growing local firms connect with entrepreneurs at newer companies, it improves the rates of high-performance of these newer firms by double or more. On the flipside, when experience and support comes from people who do not have personal expertise in leading companies to reach scale, they are associated with little improvement in outcomes or even lower rates of performance.

By the same logic, these studies also show that entrepreneurship support organizations like accelerators are much more effective when they help their companies connect to these successful founders. The most effective support organizations are founded or run by people who have experience as founders or C-Level executives of companies that have reached scale. Thus focusing on the quality of connections these organizations are building will have a much stronger impact than simply increasing their number.

The primary ways that the most successful entrepreneurs in the Cape Town area can support new companies are by empowering their former employees leave to become founders, by acting as local angel and venture capital investors, and by mentoring entrepreneurs at younger software companies.

**RECOMMENDATION 4. LISTEN TO FASTEST-GROWING FOUNDERS TO IDENTIFY THE MOST CRITICAL CONSTRAINTS OF THE LOCAL ENTREPRENEUR COMMUNITY.**

The founders of fast-growing companies are small in number, but critically important. Because they are the best performers working in the community, the challenges that they identify as obstacles to the growth of their firms are likely to be true constraints of the local entrepreneurship system, rather than the result of their lack of experience or other internal challenges.

This can be especially helpful in addressing talent shortages. Since these founders are hiring more employees than anyone else, they will have the best sense of the types of technical talent and management talent that are short in supply, i.e., knowledge of specific programming languages or the ability to lead specific software processes. These entrepreneurs are also the most likely members of the community to have developed solutions to their human capital challenges that can be scaled to benefit other firms.

Leaders should continue to seek the feedback and input of local founders on a regular basis, in order to identify new constraints arising in the software community and to locate solutions to local problems that can be scaled.
**Glossary:**

- **Angel investment:** an investment made by an individual, not as part of an organization in a company.
- **Entrepreneurial firms:** for-profit businesses started by an individual (excludes government entities and local divisions of corporations based in other cities).
- **Fintech companies:** for-profit businesses whose primary activity is using new technologies to support or enable financial services.
- **Mentorship:** a connection through which a mentee will meet the mentor at least three times for a minimum of 30 minutes to discuss critical business issues.
- **Metropolitan area:** at the start of the mapping process, Endeavor Insight works establishes the boundaries of a city’s metropolitan area using local input. The resulting area, therefore, may not always be perfectly within the statistical metro area.
- **Serial entrepreneurship:** the founding of a company by someone who previously founded another company.
- **SMEs (Small and medium-sized enterprises):** used to refer to any company founded more than three years ago.
- **Spin-off:** a company started by a former employee of another company.
- **Startups:** companies that were founded a maximum of three years ago.
- **Target companies:** entrepreneurial firms, founded or currently headquartered in the city’s metropolitan area and in the industry being mapped.
- **Technology companies:** for-profit businesses whose primary activity is not fintech and could be described as either software development (for enterprises or consumers) or internet/mobile-based retail or services.

**Sampling Frame:**

Companies were considered as “targets” and included in the sampling frame if they met the following criteria:

1. **The company was founded or headquartered in the Cape Town/Stellenbosch metropolitan area.**
   - Companies were included if they were:
     a) founded in the Cape Town/Stellenbosch metropolitan area, or
     b) currently headquartered in the Cape Town/Stellenbosch metropolitan area after they were founded elsewhere.
   - Target companies also included businesses that have closed after being founded or headquartered in the metropolitan area, or those that have been acquired after being founded or headquartered in the area.
2. **The company fits the definition of a technology company.**
   - Technology companies are defined as for-profit businesses whose primary activity could be described as either:
     a) Software development for enterprises (e.g., CRM and logistics systems, security software, outsourced software and app development), or consumers (e.g., mobile apps, digital gaming), or
     b) Internet-based or mobile-based retail or services (e.g., e-commerce, fintech, delivery platforms, content platforms).
   - This definition excludes firms for whom software development is a secondary activity, such as consulting firms, graphic design firms, BPOs, etc., as well as businesses in which internet and mobile-based platforms are secondary platforms, such as print newspapers and brick-and-mortar retail stores.

3. **The company is entrepreneurial.**
   - Entrepreneurial companies are those started by individuals.
   - It excludes businesses that began as either:
     a) Government entities, such as TTCL, which was privatized by the government in Dar Es Salaam; or
     b) Local divisions of corporations based in other cities, such as Nairobi’s Safaricom, which began as a division of Telkom Kenya, a subsidiary of U.K.-based and U.K.-founded Vodafone.

**Data Collection:**

The data collected for this project comes primarily from surveys and interviews with local entrepreneurs and stakeholders.

We began by building a primary company list from multiple sources. These include databases like Pitchbook, D&B Hoovers, and Crunchbase, as well as the portfolio companies of investors and entrepreneurship support organizations operating in the city. We then reviewed companies in the list to identify which ones were targets based on the sampling frame in the previous section. Companies must be founded or headquartered in the mapped city, entrepreneurially founded and in the selected industry to be included.

Once the list was complete, we launched a mass outreach campaign asking the entrepreneurs on the list to either fill out a survey online or set up an interview in-person or over the phone. The
interviews contain the same questions in the survey, but are adapted to be more conversational.

The survey is designed to take no more than approximately 15 minutes for entrepreneurs to fill out. It has remained relatively unchanged over the past few years, with only some updates made to reflect city-specific factors or the reticence of entrepreneurs in providing certain kinds of data. Endeavor maintains confidentiality, and collected data is accessible only to Endeavor and its research partners.

In order to ensure that the company list is comprehensive, we built a secondary list of companies mentioned in the interviews and surveys that were not in the primary list. If an investor or support organization that was not in the primary list was mentioned in the survey, we also looked up its portfolio companies and added them to the secondary list. The secondary list also included new companies we found on LinkedIn while collecting data on entrepreneurs and companies. After identifying targets in this second list, we then launched another round of outreach. This process was repeated multiple times depending on the size of the city.

Over the course of this process, we reviewed over 1000 companies to determine if they met the aforementioned criteria and identified 450 tech companies. Out of these, we were able to gather basic data and identify the founders of about 360 companies. In total, we interviewed 153 tech founders representing 170 tech companies.

Once all outreach was completed, we sent a verification email to all founders of target companies, regardless of whether or not they had been interviewed. The verification email contains a summary of all their connections, including those mentioned by other founders (e.g. if another interviewee they did not mention listed them as a mentor). This allowed us to verify each connection on both sides. We collected and verified data on roughly 90 additional founders through this process.

**NETWORK MAPPING:**

Previous research by Endeavor Insight has found that there are four main connection types between. These are:

1. Angel investment;
2. Mentorship;
3. Serial entrepreneurship, and
4. Former employee spinoffs.

To learn about these connections between tech founders, the surveys and interviews discussed above focused on four core questions:

1. Who invested in your company? (This includes both angel and institutional investors)
2. Who was your mentor during the growth and development of your company?
3. Have you founded other tech companies in your city?
4. Which of your former employees have gone on to found tech companies in your city?

The survey also asked about work and education history and we used LinkedIn to fill in the gaps for founders who did not respond. We used the responses to these questions to create an edge list of connections among organizations, along with a corresponding set of four outbound connections. We used that edge list to create the network maps in D3.

For each network map, we assigned every founder to one company or organization. Where an entrepreneur has founded multiple companies, his or her most prominent company based on an index of founding date, number of employees, total investment, and exit sizes represents his or her influence on the map. Where an entrepreneur has founded an investment firm or support organization, their tech company takes precedence if they founded one, followed by their investment firm, followed by their accelerator or support organization.

We calculated the size of an organization’s circle based on directed closeness centrality for unconnected graphs. In other words, the size of an organization is a function of the number of first-, second-, third-, etc. degree connections the organization and its entrepreneurs have to others in the network.

There is no limit to the degrees of separation that factored into the centrality score. For example, if one mentor led to a chain of mentorship between entrepreneurs, the original mentor’s centrality score increased even if the mentor only directly mentored one entrepreneur. All connections on the map were weighted equally. Financials and employee counts did not factor into the organization’s bubble size.

Each ring on the map represents a time period and companies are located on a ring according to the year they were founded. The oldest companies are placed on the inner ring and the
most recently founded companies are positioned on outer rings. The number of rings on a map depends on the size and development of the sector.

Connections accrue to an organization based on the time period in which the connections occurred. Where we do not know the year a connection occurred, we take one of two different approaches. Where we do not have year information for a former employee, investment, or founder connection, we assume that the year of the connection between the source and the target companies is equal to the year the target company was founded. To estimate when a mentorship relationship started where we are lacking a start year, we reviewed mentorship relationships where we do have start year information.

For the mentorship relationships where this information is available, we find that the mean elapsed time between company founding and mentorship is .5 years. We then set the mentorship year equal to the year the target company was founded, and add .5 years to it, rounding to the nearest year.

Typically, companies are spread out over the map to facilitate processing the connections, and the proximity of companies on the map does not necessarily reflect the degree of connectivity between the two. However, the maps will occasionally feature clustering sub-networks in order to emphasize the role of specific companies in the sector.

**NETWORK ANALYSIS**
Companies were only included in our analysis if it was possible to identify their founding year. For companies whose employee count could not be found, we used the median number of employees for companies founded in the same year, where companies founded over ten years ago were combined into one cohort. Companies that are no longer operating were included in the map and analysis if it was possible to find enough data to target them. For companies that were acquired, we used the number of employees at the time of acquisition.

We do not currently compare maps to randomly generated networks. However, maps, sub-networks and the strength of connections are compared to other benchmarks, including maps of the same industry in other cities and maps of sectors of a similar size. These benchmark comparisons prove helpful in understanding a sector’s timeline and characteristics of development.

**LIMITATIONS**
We recognize that omitted variables might play a role in sampling and therefore tried to offset resulting adverse effects through our double interview, verification, and analysis process. If gaps in or misinterpretations of the data are revealed, the map and resulting analysis are corrected.
END NOTES


6. Endeavor Insight Analysis.


16. Endeavor Insight Analysis

