The South Carolina Innovation Plan

January 2017

South Carolina
Department of Commerce
Just right for business.

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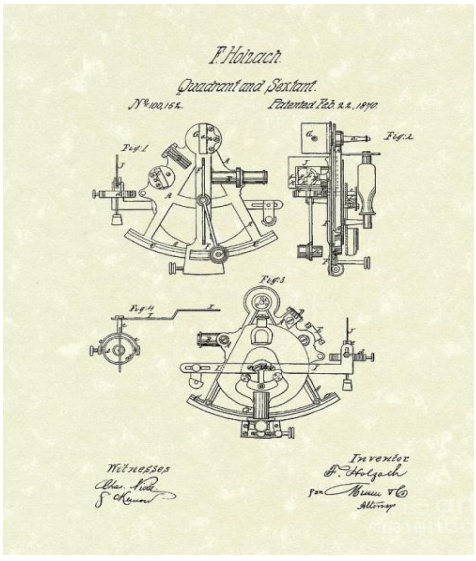
Introduction

Innovation. It is far easier said than done. South Carolina, at one time, managed to do it again and again. The state can claim the first round of golf in North America (played in Charleston in 1786), the first submarine (the Hunley, from 1864), the first concoction of sweet tea (1890, in Summerville), the first city (Anderson) to have a continuous supply of electric power, the first electrically powered cotton gin (invented in 1897, also in Anderson), and the first patented antibody labeling agent to diagnose infection (invented in 1912, in Columbia). Though a lull may have followed that string of successes, this Plan marks the return of Innovation – being *said* and *done* – in South Carolina.



Innovation, for the purposes of this report, is a product or service that is noticeably better than anything in the market place, and capable of generating economic value where little or none previously existed. Innovations are game changers that may disrupt or challenge the status quo. In this Plan, the state will focus on innovative companies and concepts in Advanced Manufacturing, Life Sciences and BioTechnology and Computer Hardware and Software.

Our goal is to evaluate the entrepreneurial potential of South Carolina and identify what the state is able to do to help new companies take root and thrive here. South Carolina needs companies that are headquartered here and that can make a lasting impact on their communities. The state understands the need for a supportive environment that welcomes new ideas, promotes growth and facilitates access to existing resources.

The approach will be uniquely suited to South Carolina, not simply an emulation of other states. South Carolina's entrepreneurial potential, once recognized, must be cultivated to attract innovators who will start South Carolina companies – continuously advancing the knowledge, capabilities and prosperity of our citizens.

Strategic plans to attract cutting-edge companies are not new in South Carolina or elsewhere. However, even since the most recent plan, in 2013, the state's condition has radically changed and improved. At that point, there were serious conversations about using money from the state's retirement system to create a venture fund. Through research, it is now believed that the strongest ideas will always find funding, though they may need guidance in the process. New initiatives like the SC Innovation Hub and Charleston Open Source, among others, are gaining traction and bringing the community together. S.C. knows where it wants to go and is steadily making progress.

To prepare the Innovation Plan, the authors met with thought leaders and stakeholders around the state, including startup and established companies, investors, larger industries with Innovation departments, groups and organizations that assist startup companies, universities, life sciences companies and individuals who had successfully built, scaled and sold companies.

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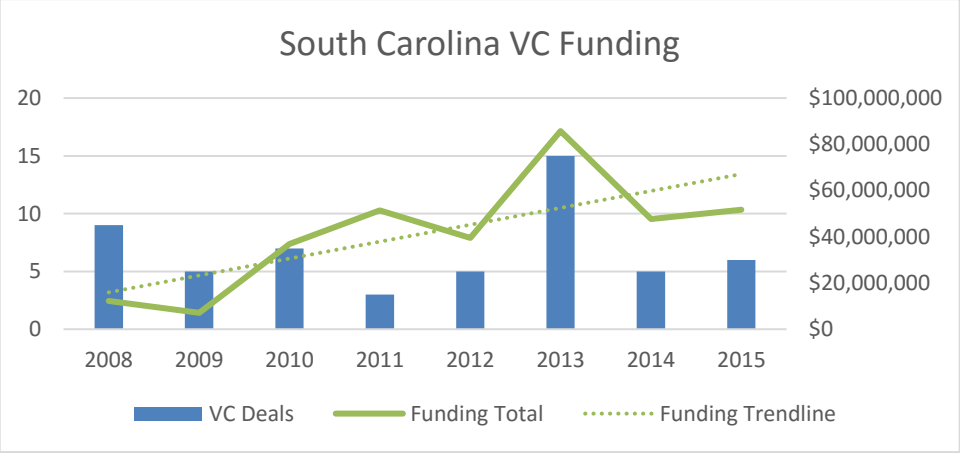
Current State of Innovation

South Carolina, like the rest of the nation, has seen a great shift in the demands of the market in the last decade. The evolving mandates of capital, technology and a qualified workforce are stretching states to their limits to remain competitive in the global innovation economy. There are myriad ways to measure the success of an economy, but in an innovation economy the components that generate growth are rather simple. It takes a combination of funding, vision and talent. No one component holds greater value than the other two, and success only comes when all three are attained at the correct level. States and municipalities all over the country works tirelessly to cultivate these finite resources and the successes are greatly outnumbered by the failures.

Financing

Capital can be scarce in the innovation economy. Most companies in their infancy are unable to draw ample funding from banks or other financial institutions. In order to fill this gap, venture capital is sought through angel investors and other forms of direct investment. Nationally, venture funding had its prime in the period from the late 1990's to the tech bubble in 2001, and since then has slowed considerably. South Carolina mirrored this national trend, having a few good years after 2000 but generally winning little venture capital investment from 2001 through 2009. It averaged $20.7 million per year during that time.



Source: PwC/NVCA MoneyTree™ Report, Data: Thomson Reuters

However, since 2010, the Palmetto state has seen notable growth in the venture capital flowing into the state. In the first half of this decade the average total has grown to $52.5 million per year. Note, as well, the surge in funding for 2013, the first year of the Angel Tax Credit. Since 2010, there has been 75 percent growth in the number of venture capital deals being done in South Carolina compared to the period from 2001 through 2009. This momentum in capital indicates that entrepreneurialism is increasing across the state and the innovation ecosystem is progressing.

Venture Capital Deals 2001 -2015		
	2001 - 2009	**2010 - 2015**
Average # of Deals	4	7
Average $ of Deals	$20.7 million	$52.2 million

Source: PwC/NVCA MoneyTree™ Report, Data: Thomson Reuters

Patents

The most commonly used metric for tracking new ideas is the number of patents issued by the United States Patent and Trademark Office. While this is not the only way to show this level of innovation and creation, it is perhaps the most reliable in that it signifies a culture of research and creation.

South Carolina Annual Patents Granted		
Year	Number	Growth
2008	524	
2009	579	10.50%
2010	652	12.61%
2011	793	21.63%
2012	978	23.33%
2013	971	-0.72%
2014	999	2.88%
2015	1,058	5.91%

Source: U.S. Patent and Trademark Office

South Carolina has seen a rapid growth in the number of patents issued since 2010, and recently surpassed 1,000 patents issued in a year for the first time in the state's history. That is more than double the total number of patents issued only seven years ago. In 2015, South Carolina ranked 27th overall in total patents issued, but first in growth rate of patents from 2010 to 2015.

Top States by Patents Granted Growth			
State	2010	2015	% Growth
South Carolina	652	1,058	62.27%
South Dakota	82	128	56.10%
California	30,079	43,609	44.98%
Michigan	4,277	6,184	44.59%

Source: U.S. Patent and Trademark Office

Workforce

South Carolina has shown impressive growth in both funding gained and patents issued, but without the necessary workforce growth these advances would be inert. South Carolina's workforce backbone has always been the manufacturing sector and the innovation economy has only served to reinforce that tradition. The availability of this new advanced manufacturing workforce is a necessity in the innovation economy.

South Carolina Computer-Controlled Workforce		
Year	CNC Operator National Ranking	CNC Programmer National Ranking
2012	6th	24th
2013	7th	22nd
2014	8th	16th
2015	11th	14th

Source: OES - Occupation Codes 51-4011 & 51-4012, Location Quotient ranking

As an example, South Carolina consistently ranks in the top quartile nationally for availability of Computer Numerical Control (CNC) operators; that is, workers who can use computers to manipulate machine tools. As well, South Carolina has moved forward 14 spots in the last four years with availability of CNC programmers. These occupations serve as the foundation of next generation manufacturing. It is important to note that though the state is not at the top in the nation, it clearly provides a diverse and strong manufacturing workforce for the innovation economy.

South Carolina Technology Workforce		
Year	Number	Growth
2012	30,040	
2013	32,170	7.09%
2014	34,270	6.53%
2015	36,240	5.75%

Source: OES - Computer and Mathematical Occupations 15-0000

Although the manufacturing worker garners more publicity, the computer hardware and software sector has quietly taken hold in the largest cities in South Carolina. The sector's impact in the state sometimes goes unrecognized. Tallying jobs in the Computer and Mathematical Occupations sector, there are 6,900 in Greenville, nearly equaling the total of upstate giant BMW. There are 9,250 in Charleston—more than the number for Boeing. Many are surprised to learn another 10,520 of these jobs are located in Columbia.

Innovation Economy & Sector Breakdown

Innovation Sectors

ADVANCED MANUFACTURING

Advanced manufacturing can be defined as a "rapid transfer of science and technology into manufacturing products and processes."(Industry Week, 2012) Automation is a major component of manufacturing, and its role is expected to expand over time. Instead of people being required for product assembly, that work is either done or will soon be done by robots. However, people are still currently required for the maintenance and management of such robots.

Due to the state's established reputation for traditional manufacturing, advanced manufacturing is likely the easiest leap into innovation to make (though it still has challenges).

- **Marketing Strategy:** South Carolina is home to many manufacturers, and has become well-known for its manufacturing culture and the economic incentives for locating in the state as a manufacturer.
- **Company Growth and Retention:** Because of the strong culture of manufacturing, many of the base resources for growth and retention of companies are already in place. The S.C. Department of Commerce has been successful in bringing advanced manufacturing to South Carolina, having recruited Boeing, with its significant research and development operations, and Nephron Pharmaceuticals, which provides contract manufacturing for respiratory medication. Furthermore, the state has supported existing industries such as Sonoco, which is innovating in the packaging field, and Milliken, which produces enhanced textiles.
- **Workforce:** The pipeline of workers in the Advanced Manufacturing sector is strong. Although the experience and education will vary widely by position, there are a number of degree and certificate options from a variety of sources in-state.
- **Financing:** The challenges for new innovators in the advanced manufacturing sector stem mostly from a lack of abundant available capital in South Carolina. Innovators with a marketable idea and good business plan typically must shop their plans outside of the state in order to receive financing.
- **Infrastructure:** Advanced manufacturing faces challenges shared by many other industries in the state when it comes to transportation systems, but it also enjoys the advantages of access to the port and a high density of interstates. Regarding new and innovative products, there are a number of resources, including incubators and accelerators in the larger cities in South Carolina, the Center for Manufacturing Innovation in Greenville and Flex Manufacturing in Columbia. The latter two facilities provide assistance in design and prototyping.

COMPUTER HARDWARE AND SOFTWARE

Computer Hardware and Software covers a number of careers found in established companies with large IT functions and departments, as well as those found in newer startups. The sector has deep roots in the state. PMSC, the computer software and information services firm, got its start in South Carolina in 1966. Then a division of insurer Seibels, Bruce & Co., it pioneered the use of mainframe computers to automate premium calculations and billing. In the days since, South Carolina has become home to multiple software firms, including Dovetail Insurance, ChartSpan and Boomtown.

- **Marketing Strategy:** South Carolina is not renowned for its opportunities in software and hardware. This issue has been well-documented in each of the state's previous Innovation Plans. Tech companies may have a look at South Carolina, but they will see few of their own kind. The perception is beginning to shift, but there is still too much of an isolated feeling with innovation companies. Marketing both inside South Carolina and beyond our borders will show that the companies exist, they are profitable, they are growing and they are hiring. This will lead to better talent recruitment and development, which also burnishes the state's reputation.
- **Company Growth and Retention:** The state has had some success recruiting larger companies in this field, including Google, Red Ventures and Blackbaud, all of which received incentive packages for projects in the last five years. However, because companies of this type have relatively low capital investment – requiring only computers and leased office space – the traditional manufacturing incentives are not as helpful for projects with low capital investment.
- **Workforce:** Workforce and marketing strategy go hand in hand. Many companies reported a shortage of skilled software programmers and engineers with enough experience to be immediately valuable to the organization. Software services firms have observed a skills gap in recent college graduates. When hired, they lack experience with actual industry problems (as opposed to academic examples with a set correct process and answer) and have also not developed the soft skills that facilitate daily work interactions. Recruiting seasoned employees from out of state is difficult as well. Many candidates are reluctant to take a position in an area where there are few comparable job options, leaving them stranded and immobile if the company is a poor fit.
- **Financing:** Challenges in this realm are similar to those in advanced manufacturing: a scarcity of angel and venture money from state sources.
- **Infrastructure:** Broadband serves as the lifeblood of innovation companies and the demand immediately rises to match any advancements in capacity or delivery. Those in larger urban areas maintain a strong need for gigabit service to compete at the highest level in the global marketplace. Meanwhile, rural communities seldom have comprehensive house-by-house broadband connections due to cost barriers.

LIFE SCIENCES AND BIOTECHNOLOGY

Although there are some established Life Sciences companies already in South Carolina, the majority are either in startup mode or other early stages. Most are involved--or plan to be--in drug or medical device development. Both sectors are considered to be extremely high-risk because the regulatory barriers and testing required to bring a new product to market are more expensive and time consuming than in other sectors. Typically, a scientist in an academic setting will work to take a product through Phase 1 or 2 testing and then find a partner to purchase or license the product. Without such a partner, an entrepreneur in Life Sciences and BioTechnology usually cannot afford to complete the testing and take the product to market. An interesting relationship within this segment arises from the overlap of the manufacturing of medicines and devices with advanced manufacturing practices.

- **Marketing Strategy:** Similar to computer hardware and software, many are completely unaware that this sector exists in South Carolina. However, this sector is more established, being anchored by trade associations like SC BIO that represent its interests. Collaboration between universities is more common in this sector than in the others as well.
- **Company Growth and Retention:** Life Sciences is not a field where South Carolina has had extensive success in recruiting new players. Many in the field would like to see one of Life Sciences' major players open a facility in South Carolina because of the recognition that it would bring to the industry.
- **Workforce:** Unlike other fields, a qualified entry-level workforce in this field is easily obtained. In fact, the supply outweighs the demand, forcing many graduates to leave the state in order to find employment. The personnel problem afflicting this sector is a lack of experienced C-Suite executives. The sector needs more people with experience taking an idea and making it marketable -- veteran entrepreneurs who can raise capital and create a successful exit.
- **Financing:** This is an even greater issue in this sector because of the risk involved in drug or device development, plus the prolonged time between investment and exit. Although SC Launch grants of up to $200,000 and similarly valued SBIR/STTR grants are available -- funds adequate for launching a software company -- it is not nearly enough capital to complete the first phase of funding for a new medical device or drug. One unique aspect of this field, however, is the tendency to attract investment from high net-worth individuals. Those who have suffered from specific ailments have an incentive to invest and improve the life-saving technologies available.
- **Infrastructure:** As this is an emerging industry in South Carolina, there is not a lot of industry specific infrastructure available. In Charleston, entrepreneurs are working to create an accelerator program for Life Sciences companies. Such a program would be the first of its kind in the state. A network of mentors and experts to give business advice to entrepreneurs would also be welcomed.

Issues Analysis

Despite their differences, each sector in the innovation ecosystem must contend, to some degree, with the following issues:

Marketing Strategy the Innovation Economy

The issue: The lack of awareness, inside and outside the state, of the innovation economy in South Carolina.

How to address the issue: South Carolina has built itself into a 21st century manufacturing powerhouse by promoting the state and its extraordinary resources. This commitment to marketing, growth and delivered results has earned the Palmetto State the respect and admiration of observers from across the world. At the same time, South Carolina has quietly been building an innovation technology ecosystem that is reaching critical mass for competition on a global stage. In order for this innovation economy to receive its due praise, it requires an advertising and marketing strategy comparable to the one that positioned South Carolina as a global manufacturing leader.

Company Growth and Retention

The issue: Building and maintaining the mechanisms that will specifically attract, grow and retain innovation technology companies.

How to address the issue: Innovation technology companies, much like any industry, require individuals steeped in the sector-specific language, issues and philosophies to actively engage these enterprises. The state of South Carolina has produced extraordinary results in attraction and retention by having individual recruiters, developers and coordinators well-versed in the operations of multiple industry sectors. This same specialized effort must be applied to innovation technology companies going forward, in order to remain on the forefront of a growing and diverse economy. This innovation focus also serves as a signaling mechanism to the greater innovation community, announcing that the state of South Carolina regards the innovation sector as equal to its other industry clusters. In addition to staff focused on recruiting and expanding innovative companies, an advisory panel of industry leaders should be formed to speak to changes in the sector. The leaders of the state must engage with those who are active in the sector to continually assess the changes and needs in the innovation environment.

Innovation Infrastructure

The issue: South Carolina lacks the infrastructure that can best attract and nurture innovation.

How to address the issue: Innovation companies, much like traditional manufacturing companies, require access to the basic infrastructure that will allow the enterprises to operate. Reliable and affordable access to broadband internet is a requirement for most companies in this sector, which means South Carolina would significantly benefit from bringing gigabit service to its urban markets. In the more rural markets, it may be more feasible to encourage open use internet hubs at community centers like libraries and schools. Affordable space, plus access to necessary transportation and resource

inputs, drive the innovation production process just as they do in manufacturing. Unlike most manufacturing facilities, however, innovation companies typically locate closer to the city center, where the cost of resources is less favorable. In order to facilitate the growth of the innovation ecosystem as a whole, cities, counties and other stakeholders must work together to build and make ready the resources which will grow the entire state innovation sector.

Financial Backing

The issue: Reducing the time that viable companies must divert from their core operations in order to search for capital.

How to address the issue: South Carolina startup companies must expend a tremendous amount of time and resources to attract the funding necessary to operate and grow. In order to assist the innovation ecosystem, the state of South Carolina should look for ways to reduce the friction encountered by companies in search of funds and provide a better return for their efforts. South Carolina currently has incentives encouraging investment of private funds in startup companies. The SC Launch program has been widely lauded for investing funds at a crucial time of growth for a company. This funding typically comes before angel funds and can be instrumental in a company's survival. However, the program is limited to $6 million in investments. By increasing the amount available to invest, this program will be able to assist even more startup companies located in South Carolina. A second program is the Angel Investment Tax Credit, meant to infuse early stage cash into a startup company. This program is also limited in size and is set to expire in 2019. To ensure stability in the funding environment, this program should be extended and expanded. As a final consideration, the state should expand outreach for procurement registration, fully mobilizing the funds that will nurture South Carolina-born innovation companies. Together, these changes will serve as a platform of growth for current and next generation entrepreneurs.

Workforce and Education

The issue: A mismatch of skills leaves some sectors without an available homegrown workforce, while other sectors have more incoming workers than jobs available

How to address the issue: It is crucial to have an ongoing dialogue between the private sector and education at all levels. Companies need to be able to hire a workforce that can hit the ground running on day one. If the jobs within the innovation economy can be identified and cataloged based on the skills needed, the state's educators can present the curriculum that will build the workforce of the future. At the same time, students need internships and apprenticeships to learn soft skills and gain real-world experience from industry. These preparatory efforts, once in place, will create a pipeline of talent that benefits both the job seekers and job creators.

Goals and Recommendations

BUILD INNOVATION INTO SOUTH CAROLINA'S REPUTATION

Actions to be taken:

- The South Carolina Department of Commerce should aggressively market the state's technological/innovation successes in much the same way current investment announcements are handled. Successful exits from incubators and accelerators can be celebrated, as a group, in the same manner as major groundbreakings. Individual company successes are much smaller, so recognizing many companies as a group sells the innovation economy overall.
- Innovation/technology organizations and companies must devote time to putting themselves in front of their local communities, thereby building off the Department of Commerce marketing strategy. While a high level marketing strategy can lift the awareness of the innovation sector of South Carolina, it will take constant reinforcement for the message to take hold.

INCREASE COLLABORATION AMONG ENTREPRENEURS AND EXPAND RESOURCES STATEWIDE

Actions to be taken:

- S.C. Commerce and the innovation sector should continue to combine resources and contacts into one central location in the Innovation Hub. Ongoing attention to the Hub will allow S.C. Commerce to market the ecosystem by showcasing organizations and giving quick access to resources that already exist.
- Leadership from within the innovation community must emerge to stimulate growth and gain the attention of stakeholders. The Office of Innovation for South Carolina can serve as the impartial representative, especially with so many South Carolina innovation companies in their infancy. As companies grow and become more stable, they will -- individually or partnered with other local companies -- need to find their voice in their communities. A sustainable future requires shifting the responsibility from the governmental body to the companies themselves.
- Annual meeting of SC Launch firms as well as members of state incubators and accelerators. The objective is to encourage collaboration, share best practices and meet with potential investors as well as customers.
- An Innovation Advisory Council should be formed of stakeholders across the state. This council should work with the Office of Innovation at the Department of Commerce to engage and inform the policy makers of South Carolina of the impact of the innovation technology sector and what changes could be made to advance the sector. This council should have goals, in the short-term, of mitigating any hindrances and, in the long-term, of maximizing growth.

INCREASE COMPANY GROWTH AND RETENTION

Actions to be taken:

- S.C. Commerce should have staff that is trained and specifically targeting innovation companies. Assigned staff can attend trade shows and other gatherings that showcase South Carolina to the

national and global innovation community. The goal of this effort should be to recruit companies that are on the cutting edge of their fields.
- Mentor networks should be constructed of successful industry leaders.
- Facilitate access to customers through government contracts, collaboration with larger industries and other programs such as a Buy SC for innovation.
- The incentive structure needs to be reviewed periodically to remain competitive with other states.

INCREASE ACCESS TO ANGEL AND VENTURE STAGE FINANCING

Actions to be taken:

- Increase the size of the SC Launch program to allow more viable ideas to gain early stage funding. Along with the increased size of SC Launch, the program should become more transparent to applicants, providing feedback on the application as well as ways to improve the application. After funding is granted, follow-up information on the status of the investment must be required.
- Increase the size and scope of the Angel Tax Credit to allow investors to fill the gap of required capital between $200,000 and $2 million. Additionally, efforts should be made to ensure legislative support for the Angel Tax Credit, which is slated to expire in 2019.

INCREASE COMMUNICATION BETWEEN INDUSTRY AND HIGHER EDUCATION

Actions to be taken:

- Ensure matching of curriculum and industry needs.
- Collaborate on internships, apprenticeships and Capstone projects to give students real world experience.
- Establish a group led by industry, particularly in computer software and hardware, to rectify gaps between graduation and employment.
- Promote and provide training for those making a career transition, enabling the transfer of technical skills from groups such as technical colleges, the IronYard and Jack Russell.

PROVIDE ACCESS TO MENTORS FOR INNOVATORS, ENTREPRENEURS AND INVENTORS

Actions to be taken:

- Develop company leaders that can assist in transforming an idea into a viable business.
- Tap into the vast stores of talent living in South Carolina for institutional knowledge pertaining to raising capital, developing a market and planning an exit.

DEVELOP AND MAINTAIN INFRASTRUCTURE FOR CRUCIAL NEEDS OF THE SECTOR

Actions to be taken:

- Form a committee to study the impact of broadband internet and how to expand access and speed across South Carolina. Broadband internet is the essence of innovation and technology companies. The faster the internet, the more efficiently these companies can run — meaning all companies are looking for access to high-end gigabit internet.
- The rising cost of urban office space and residential housing inhibits the growth of the innovation sector. As city governmental bodies look to renovate or reinvigorate areas, the inclusion of large spaces meant to be low cost innovation or tech offices would create a welcoming environment for prospective innovation companies. As innovators take root, the locality will attract high-skill, community-minded citizens who wish to live close to the city center where job options abound.
- Transportation deficiencies are detrimental to the innovation sector just as they are to the manufacturing sector. Snarling traffic, lack of public transportation and poor roads impede the growth of the sector since entrepreneurs in the innovation sector view these as integral to their communities. The cost of domestic flights may also be a deciding factor in where a startup company decides to locate. Innovation entrepreneurs have to travel the country at a moment's notice to engage with investors, partners and new opportunities. Access to markets such as Silicon Valley, Austin, New York and other major destinations at an affordable price is a major part of the innovation transportation infrastructure.

Concluding Remarks

The Palmetto State is growing its innovation economy by all observable metrics. This success should be acknowledged, but also understood as only the first blast of propulsion in a long and rewarding journey. This plan is, on its face, a means of identifying challenges and proposing solutions; but it is also an impassioned call to action for stakeholders to go beyond half-measures, to engage with and invest in the many extraordinary startups that will transform the ecosystem. Innovation is not merely a boon to a healthy state economy — it is a requirement.