SAFETY TECH

INTELLIGENCE REPORT
MARCH 2021

SILICON CAPE INITIATIVE

Loudhailer

1. Overview of the SafetyTech Sector

1.1 Defining SafetyTech

Towards the fulfilment of its digital strategy to develop the Western Cape as Africa's Tech Capital, the Western Cape Department of Economic Development and Tourism (DEDAT), has launched five technology ecosystem support initiatives collectively known as DashTech. These include: SafetyTech, 4IR-Tech, ScreenTech, Fintech and Township Tech.

These initiatives are, in part, a response to a 2018 Endeavor Impact Report, which found that the value of vibrant startup networks is critical to the success of thriving technological ecosystems. The research showed that when a region's digital and technological ecosystem is assessed and evaluated, the primary indicators used are the strength, network, and connections therein. The report also found that the Western Cape exhibited a competitive advantage in several technology streams, which form the foundation of the five DashTech initiatives.

This intelligence report focuses on the SafetyTech initiative. SafetyTech originally had the broad definition of a sector encompassing all technologies concerning safety, ranging from personal and public safety, to natural disaster prevention and food and water security.

Through a mixed-methodology, qualitative research approach combining desktop research, roundtable discussions, Community of Practice workshops and one-on-one interviews with experts in the industry, we have come to define SafetyTech as:

"All technology-focused systems and processes, hardware, software and resources that contribute to the creation of an environment where adverse incidents are minimised, and citizens are able to lead lives free from fear of personal harm or asset loss."

Building on the above definition and determining the parameters of SafetyTech, a differentiation between urban and rural safety is required as there are limitations that vary in these two separate environments. Further to this, dividing the SafetyTech sector into personal, community and public safety allows for a more targeted approach and for stakeholders to better focus on their most relevant market.

1.2 SafetyTech Sector Context

According to Wesgro (2020), the Western Cape is the leading technology hub in South Africa and is home to roughly 50% of the country's emerging tech companies across all verticals. This is attributed to the Province's existing digital ecosystem and infrastructure, which is supported by a culture of familiarity, high quality tech entrepreneurs and businesses, ease of access to market, an entrepreneurial culture, cost-friendly lifestyle, and access to local and international talent.

The Western Cape boasts a wide range of safety-related spheres, namely: personal safety, community safety, gender-based violence (GBV), anti-human trafficking, cybersecurity, food and water security, natural disaster prevention, environmental safety, and Smart Cities.

In conducting interviews with key stakeholders in the Western Cape and South African safety ecosystem, it became apparent that growth in these areas is positive albeit nominal. Globally, the most significant advances in safety and security technology in recent years have been in surveillance technology, big data and analytics, citizen involvement and engagement platforms as well as

intelligent automation. However, these technologies are mostly being adopted abroad, with South Africa and the Western Cape's safety needs presenting ample opportunity for local safety technology innovations to emerge. This comes as safety-related technologies have been recognised for their ability to keep South Africans connected to safety networks should their health and safety be affected.

1.2.1 Gender-Based Violence and Anti-Human Trafficking (Personal Safety)

Note: The information gathered below emanates from a series of roundtable discussions with local experts in personal safety, including Cornel Viljoen and Rene Hanekom (A21), Xabiso Lombo (Guardian Gabriel), and Alundrah Banda (Shielded Africa). Additional desktop research has also been conducted.

According to several interviewees, there has been shift in gender-based violence (GBV) and human trafficking away from the physical world to the digital realm during the COVID-19 pandemic. This takes place predominantly through social media, where predators target minors and individuals by using their own personal data to exploit them.

Entrepreneurs and organisations operating in the personal safety space in the Western Cape have highlighted that technology can provide new ways of preventing and responding to these abuses however they note that SafetyTech is not a replacement for conventional approaches to ensuring physical safety. Technology should reinforce South Africa's existing safety mechanisms, and complement efforts to ensure that appropriately trained professionals can support survivors of GBV and human-trafficking.

Additionally, SafetyTech-related solutions should be developed with the end-users as equal partners, in order to ensure solutions that are culturally-appropriate and relevant, as well as to achieve buy-in from the community. Although this can be costly and time-consuming, a co-design process between the public and private sector is necessary in order to build effective SafetyTech products and services.

SafetyTech solutions for GBV and human trafficking require continuous investment and maintenance, which is often overlooked.

Although there may be ample solutions and technologies available to GBV and human trafficking victims, the gender digital divide cannot be ignored either. This includes gaps between men and women's digital literacy, affordability of devices, and access to hardware, all of which can reduce survivors' ability to use these products and services.

Finally, ensuring that victims can be referred to a comprehensive network of survivor-centered support services, regardless of the kind of technology being developed, is critical.

1.2.2 Cybersecurity

Note: The information gathered below stems from a series of roundtable discussions with local experts in cybersecurity, including Simon Campbell (Digimune). The insights relate predominantly to an increase of gender-based violence and human trafficking due to increased digital uptake during the COVID-19 pandemic. Additional desktop research has also been conducted.

Research conducted by KnowBe4 Africa has found that around 40% of women in Africa are concerned about going online due to the risk of digital GBV. Additionally, stakeholders within the cybersecurity and community safety sectors have noted that cyber crime and digital GBV have stood in the way of many individuals benefiting from the digital world.

From a business safety perspective, as the Internet of Things (IoT) and connected devices have become increasingly sophisticated and ubiquitous in South Africa and on a global scale, cyber attackers are simultaneously keeping pace and finding new ways to infiltrate and attack critical infrastructure.

Fortunately, there are a growing number of technology companies in the Western Cape that are developing solutions to this. These include deep and dark web monitoring for leaked or compromised personal information, and protection against the impersonation of social media accounts. With the recent launch of the Protection of Personal Information Act (POPI) creating awareness about the need to safeguard an individual's privacy, organisations within the Western Cape, such as Digimune, AVeS and the Cyber Security Institute are setting the pace in utilising emerging technologies and creating safety mechanisms that anybody can use, and anywhere.

That is not to say the Western Cape has hit the mark yet in terms of addressing the challenges that stifle progressive steps towards safer cities. Conscious and collaborative effort is required across safety and cyber industries to ensure the protection of citizens. Now, more than ever, stakeholder collaboration is vital.

These collaborations should be focused on the digital risk affecting individuals and businesses within the Western Cape and South Africa, specifically the risk involved in creating online profiles with key information and assets.

The core differences in digital risk as faced by businesses in South Africa is as follows:

i. ***Business Yesterday*****:** the old way of protecting consumers/businesses against digital risk by placing mobile devices, notebooks and networks inside of a firewall.

ii. ***Business Today*****:** Emerging technologies need to use digital risk protection services to keep consumers and businesses safe in today's world by integrating with various online platforms, including social media, business registration platforms, mobile application stores, web marketplaces, forums, news blogs, the deep and dark web, personal and business emails, as well as code sharing.

There is a clear gap in the sharing of information, education and awareness around digital risk and to achieve full integration of cybersecurity mechanisms into existing personal and business platforms, there is a need for a public sector-led education drive amongst local communities in the Western Cape, especially amongst schools and children.

1.2.3 Food and Water Security (Environmental Safety)

Note: The information below is derived from a series of roundtable discussions with local experts in food and water security, including Sandy Bukula (Operation Hunger) and Mulweli Nethengwe (Association for Water and Rural Development & The Sustainability Institute). Additional desktop research has also been conducted.

According to the United Nations Conference on Trade and Development (UNCTAD), the role of technology and innovation will be integral in ensuring global food security by 2030.

Global food security implies that all people throughout the world, including vulnerable groups such as the rural and urban poor, at all times have access to adequate quantities of safe and nutritious food to maintain a healthy and active life. Food security is a right that should be embraced by all countries, irrespective of their level of technical, economic and social development.

In South Africa, food security is challenged by factors such as: lack of education and political instability; inadequate planning and policies; lack of transparency and improper governance; financing; the slow

pace of technology development; and other governance issues. By improving these factors through collaboration between the South African government and agricultural stakeholders, FoodTech/AgriTech will be able to contribute to improved food security in Africa.

From the Western Cape's perspective, it is clear that technology is essential for improving food security within our informal settlements and vulnerable communities. However, this must begin with focusing on forming policy frameworks and improving the food systems themselves. This will necessitate the assimilation of data and nutrition requirements through nutrition surveillance by analysing the food environment and our communities' eating habits.

Furthermore, with regards to promoting water security specifically, the Western Cape's agricultural community has made strides in their research to create efficient irrigation technologies, and has developed water harvesting and conservation techniques that can address water constraints in sub-Saharan Africa. Water security plays an integral role in food security too since farmers rely on water for their crops and livestock.

To create a food secure nation through science and technology, stakeholders in food and water security need to first gather data from the relevant communities and capture this to assess the level of food security in specific regions. To this end, these stakeholders are collaborating by utilising hospital records to guide research on malnutrition and its prevention through nutrition campaigns. However, the current challenge in the Western Cape is that this data is not always digitised and accessible.

The use of technology in mapping food security in South Africa is crucial for developing innovative food systems and the necessary associated infrastructure, however this requires agricultural innovation and policy coherence through public-private partnerships.

1.2.4 Emergency Services and Natural Disaster Prevention

Note: The information below has been gathered from a series of roundtable discussions with local experts in natural disaster prevention and emergency services, including Amit Ramdath and Matthew van Eeden (AutonoSky), David Gluckman (Lumkani), Mogamat Abrahams (Intellicomm) and Derick Damons (Drakenstein Municipality). Additional desktop research has also been conducted.

Over the past decade, emerging technology has undeniably transformed public safety within global cities. Advanced software and hardware, artificial intelligence (AI), robotics, drones and increasingly sophisticated communications networks are enabling a new era of emergency planning, preparation and prevention that will continue to have a profound effect on the practice of public safety and emergency responses at every level.

While most emergency responders cannot work fully remotely due to the nature of their jobs, they can harness the benefits of unified collaboration tools to quickly connect with police stations and fire departments in order to seamlessly communicate with other front-line emergency teams. Implementing emerging technologies such as drone technology not only slows the spread of COVID-19, it also provides real-time situational awareness for intelligent and efficient fire management and fighting – all through a safe and secure platform.

Adopting a macro-view, countries such as the United States and certain parts of Europe, have been embracing drone technology in their first response and law enforcement sectors. Their experience with drone technology in emergency services poses an opportunity for South Africa in that these countries have been very willing to share much of their data.

Utilising drones in the Western Cape's emergency services response can assist with gathering more information about fires in areas that are harder to reach, pick up hotspots using thermal cameras, prevent re-ignitions and assist in allocating resources to where they are needed most. Drones also can assist in finding missing persons. Perhaps the greatest benefit of incorporating drone technology is the eradication of longer lead times when assessing the nature of an emergency situation. Drone technology enables front line emergency teams to receive information in real-time and create improved situational awareness for faster response times. This can also help police officers stay out of harm's way in dangerous situations. In the Western Cape, police officers often have to enter environments with very little situational awareness and drones have been used in many instances on a global scale to assist with this.

For stakeholders within the drone technology space, a key challenge area is regulation, particularly South Africa's aviation laws. The use of drone technology as part of emergency services and in real-world situations is still in its infancy. The adoption of universal legislation by the Federal Aviation Administration has not occurred yet on a global scale, and this will have a knock-on effect for the creation of such legislation in South Africa, which requires significant public-private partnerships, particularly between local government, the South African Police Service, current drone technology organisations and legislative bodies such as the Drone Council of South Africa and the Commercial Unmanned Aircraft Association of Southern Africa (CUAASA).

Another hurdle for SafetyTech stakeholders is integration into the Western Cape's existing systems and infrastructure. Many South Africans are not necessarily reliant on the government for their safety and security anymore, which has translated into the use of private security companies.

From a security startup focus, the sentiment is that the local government's approach to innovation is not necessarily startup-friendly. Many of the key stakeholders within the SafetyTech sector are small companies, running on their own raised capital. The lengthy process required to engage with government stakeholders is considered a challenge to a security startup's development.

Within the SafetyTech sector, there is a clear need for collaboration with government officials who will assist in driving the process of digitalisation, as there is currently a conservative approach to new technology. Stakeholders have proposed the development of a safety forum where these emerging technologies can be reviewed on an annual basis. This will allow local governments to assess the benefits of these technologies as a response to their own community challenges. The forum should be a platform in which technologies are presented to security stakeholders across the country who can provide their inputs as part of the decision-making process of technology implementation in government systems.

DEDAT has the opportunity to foster these public-private partnerships and engage with local municipalities regarding their budgets and regulatory framework for the public safety sector. Underpinning these partnerships should be an advisory forum where stakeholders can discuss how the public and private sector can collaborate to achieve safer communities.

1.2.5 Smart Cities

Note: The information gathered below is derived from a series of roundtable discussions with local government officials, including Barry Shuller (Cape Town Metro Police), Cheryl Phillips and Marian Schroeder (Drakenstein Municipality), and Fuad Davis (Western Cape Government's Department of Social Development). Further insights have been acquired during an interview with Rashiq Fataar

(Future Cape Town), a local expert in achieving public safety through Smart City initiatives. Additional desktop research has also been conducted.

The quest to create a Smart City in Africa is reflected in the urgent safety and security needs at the heart of urban hubs on the continent. African cities are often exposed to the same constraints,which tend to revolve around overpopulation and booming urbanisation. The creation of safe urban areas is therefore a priority, as Metro Police Director, Barry Shuller has highlighted, we need a safe city before we can create a Smart City.

To this end, the City of Cape Town has been engaging with various stakeholders, including safety officials, local municipalities, technological organisations and Smart City initiatives, with a key project being the Emergency Police Incident Control (EPIC) which focuses on Cape Town's resource management, dispatching, and reporting through Law Enforcement, Traffic Services, Disaster Risk Management, and Metro Police Services (Safety and Security services).

The concept of a Smart City is growing in popularity in Africa, and more specifically in South Africa. With increasing population density, congested streets, high pollution levels and lengthy recycling processes are all issues that African countries need to address. In light of a humid and arid climate, African cities are attracted to some of the concepts conveyed by the Smart City model. The bigger cities are turning into true technological platforms and are increasingly integrating Information and Communication Technologies (ICT) into the urban landscape.

According to a report by Deloitte, titled Africa is Ready to Leapfrog the Competition Through Smart Cities Technology, Africa is one of the continents most inclined to develop smart cities for several reasons, including: (1) a certain ease in implementing new technologies due to the difficulties African cities experience in maintaining infrastructure and the costs of existing systems; (2) a growing middle-class; (3) a significant increase in urbanisation; and (4) a telephony penetration that reaches about 72% on the continent.

The African continent is growing and as forecasted by The Economist, if our population continues at its current growth rate, Africa's population will double by 2050, which would be 2.5 billion people. This means that by 2050, more than a quarter of the world's people will be living in Africa and will necessitate a response to growing urban problems through Smart City initiatives. The growth of a city like Cape Town has seen local government taking up the challenge of developing strategic and technological solutions. This has included the integration of SafetyTech into government infrastructure through the Internet of Things (such as the above-mentioned EPIC programme), the improvement of transport channels, the introduction of safety policies and regulatory frameworks that ease the implementation of new Smart City initiatives, and engagement with the SafetyTech sector.

1.2.6 Stakeholders, Culture & Modus Operandi

To date, we have identified some 250 stakeholders operating in the SafetyTech space. They range from startups, corporates, investors, and business advisors, to industry associations, government, academia, incubators, and accelerators (for a full list, please click here). This list is continuously being updated as more stakeholders are identified.

Yet, while the SafetyTech space is widely populated by a range of stakeholders – and with the Endeavor Insights Report (2018) stipulating the need for interconnectedness between stakeholders – there is a widespread lack of integration and collaboration amongst individuals, businesses and organisations across safety-related sectors.

The current SafetyTech sector is populated by the following players:

- **Incubators**: Where ideas are conceptualised and developed.
- **Accelerators**: Catalysts of growth that provide mentoring and funding.
- **Entrepreneurs**: Individuals aiming to disrupt safety-related services through custom solutions.
- **Academic Incubators:** Stimulate entrepreneurs and provide training.
- **Investors**: Provide funding and include venture capitalists, angel investors and private equity firms.
- **Regulators/Government**: Provide guidance, interpretation and direction for innovation. Government institutions like SAPS also have an interest in the development of SafetyTech solutions.
- **Legal Community**: Focus on IP legislation and legislation lobbying.
- **Corporates**: Offer mentoring in the creation of solutions, supply technology, build distribution channels, and involve startups in the development of new business directions and products.
- **Media**: Drive visibility and attract investors as well as interest from other stakeholders.
- **Civil Society**: Members of the public with an interest in SafetyTech, such as neighbourhood watches, schools, citizens and community policing forums

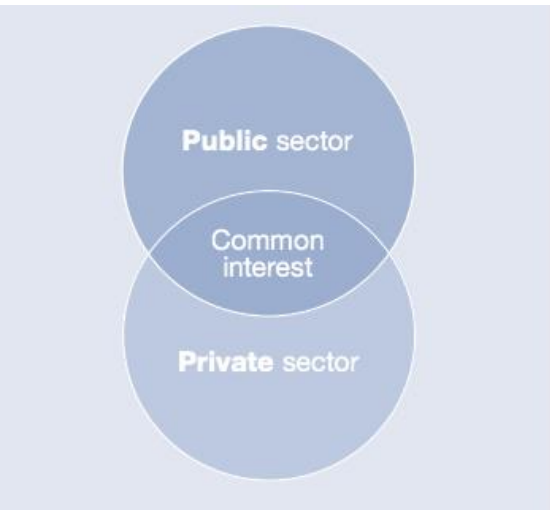
1.2.7 Technology Sector Value Chain

As concluded by a World Bank Group report on Crime in South Africa, crime and violence manifest in various forms and are primarily driven by socio-economic factors. Crime and violence also affect the psycho-social wellbeing and physical safety of citizens and have a negative impact on the productivity and sustainability of urban environments. With cities being engines of development - and therefore needing to be inclusive and safe - a combination of institutional, fiscal, and social interventions are needed to ensure that South African cities meet their developmental potential.

These interventions need to form part of an integrated value chain within the SafetyTech sector that rests on a clear and common understanding of each stakeholder's roles and responsibilities, together with the requisite intergovernmental and cross-departmental relations.

To this end, the economic environment in which SafetyTech is developed is heavily dependent on public-private partnerships to address the rising costs that safety technology startups and organisations face in innovating their technology.

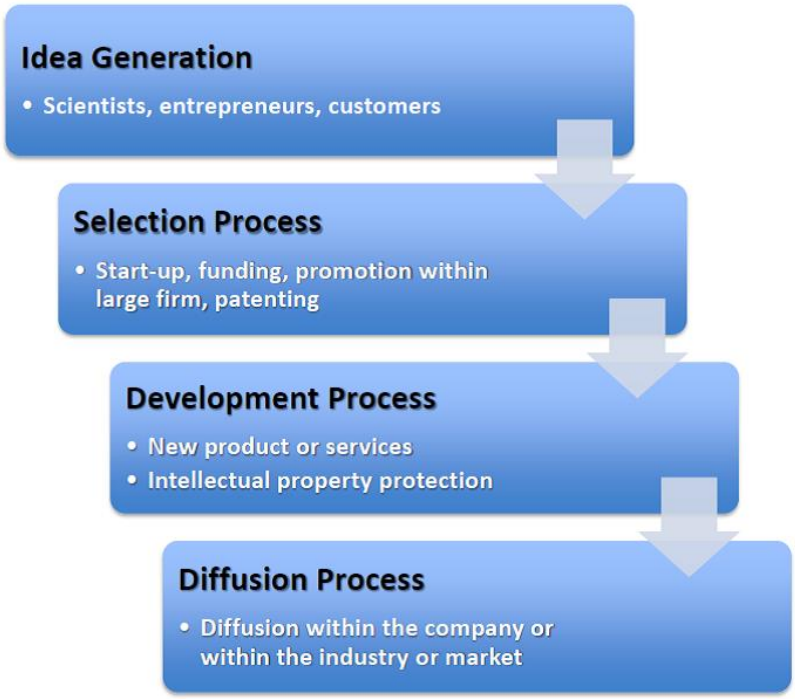
The figure below highlights the intersection of the public and private sectors within the realm of SafetyTech for cooperation based on a common interest of ensuring safety for communities within the Western Cape:



Where SafetyTech startups and organisations within the technology ecosystem form a part of the private sector, a partnership with government is essential for addressing the funding issues that limit the tech sector in their capacity to conduct Research & Development (R&D) as they do not receive sufficient venture capital to complete the ideation phase of their products and services.

Government role-players can include local government departments and various policing and emergency service structures. The products and services developed by organisations within the SafetyTech sector are then sold or pitched to these roleplayers as well as to municipal departments that may derive benefit from them.

The development of safety technology entails the following value chain:



1.2.8 Funding & Financing channels

According to Invest Cape Town, raising startup funding is challenging for entrepreneurs across all tech sectors in both the Western Cape and South Africa. This is partly due to the relative size of the ecosystem in relation to others on the global stage, with South Africa having few consumers with limited buying power, coupled with the limited size and frequency of local investments made by investors, who tend to commit at much later stages than is typical of investors in more developed economies.

It is also important to note that the Western Cape funding landscape differs considerably from the Gauteng:

The Western Cape ecosystem investor landscape primarily benefits from its proximity to the large number of wealthy families that reside in and near Cape Town and Stellenbosch. These prominent individuals and families are often limited partners of venture capital companies, and startups typically fundraise via social networks and personal connections. This is part of the reason why the Cape has more angel investment, which is largely absent from the Gauteng ecosystem. However, these connections are limited for incubators and innovation hubs, with most of these prominent families operating outside of the incubator sector.

Alternatively, in Gauteng, government grants represent most of the funding going into the Province's ecosystem, with innovation hubs acting as the primary conduits. This is paralleled by corporate funding into corporate investment-backed venture funding or corporate-branded innovation hubs.

There are also differences between the two provinces with regards to the amounts raised by startups in each respective ecosystem. According to the most recent report on the Tech Entrepreneurship Ecosystem in South Africa by OC&C, Cape Town startups typically raise roughly double that of their Johannesburg counterparts.

However, the report also notes that in both provinces, private and public funding for early-stage entrepreneurship is neither at the right level nor sizable enough to adequately support the ecosystems. This is due again to the limited relationships between incubators and investors, but more so due to the ecosystem's relative lack of maturity and economic uncertainty, which causes investors to be risk averse.

As shared by interviewees, there is a significant lack of – and dire need for – funding for entrepreneurs and businesses operating in safety-related sectors specifically. However, research has shown that there are several potential funding channels for stakeholders which are active in the SafetyTech sector (although this does not necessarily equate to ample access to them). In total, there are 71 direct finance providers for stakeholders in the Western Cape, consisting of fund managers, private equity providers, venture capitalists, angel investors, crowd funders, commercial banks, government and development finance institutions (DFIs). Those with an active interest in safety-related technologies include:

1.2.8.1 Venture Capital Investors

- **Kalon Venture Partners**: Kalon Venture Partners invests in and builds a portfolio of high-growth technology companies with innovative business models geared to existing and emerging institutions and their customers. Kalon Venture Partners invests growth capital in

the form of equity to be used to assist established (but still high-risk) ventures in expanding activity such as creating additional traction in South Africa, launching into Africa and then foreign markets, as well as creating new product / technology lines. To date, they have invested in automotive safety (Carscan).

- **4DiCapital**: 4Di Capital is an independent venture capital fund manager specialising in high-growth technology venture opportunities at the seed, early-and growth-funding stages. The fund manager has offices in Cape Town, South Africa and Atlanta, Georgia, U.S.A. Their SafetyTech investments to date have mainly been in drone technology (Aerobotics), health risk tracking (LifeQ), IoT (Sensor Networks), risk mitigation (Lumkani) and emergency response technology (Flare).

- **Knife Capital**: Knife Capital is a venture capital investment manager that accelerates the international expansion of African innovation-driven businesses by leveraging knowledge, networks and funding. Knife Capital also runs the Grindstone Accelerator, a structured entrepreneurship development programme that assists high-growth innovation-driven companies to become sustainable and fundable. The investment manager has invested across the manufacturing and pharmaceutical spheres with a specific focus on Artificial Intelligence (DataProphet) and IoT (PharmaScout).

1.2.8.2 Angel Investors

- **Newton Partners**: Newtown Partners is an early-stage venture capital firm that actively invests in emerging, disruptive technology startup businesses. Founded and run by internationally successful entrepreneurs, Vinny Lingham and Llew Claasen, Newtown Partners has an entrepreneurial focus that goes beyond investment. The team operates out of offices in Cape Town, South Africa and San Diego, California. The firm has a strong track record of investing in successful technology startups at the forefront of innovation and has successfully invested in and nurtured a number of early-stage companies, taking them from ideation to market-leading businesses. Their SafetyTech investments to date have mainly been in cybersecurity and biometrics tracking (Civic).

1.2.8.3 Private Equity

- **Ethos Private Equity**: Ethos Private Equity is an investment manager with private equity and credit strategies in Sub-Saharan Africa. Ethos helps businesses grow by being an active investor, using the experience of owning over 100 businesses to maximise value and generate superior returns.

1.2.8.4 Government Funding

- **Wesgro**: The official destination marketing, investment and trade promotion agency for the Western Cape, Wesgro does its part to promote entrepreneurship. The Wesgro Investment Promotion Unit provides a free and confidential service to help individuals establish and grow their business in Cape Town and the Western Cape, leveraging a team of sector-expert portfolio managers with more than 50 years of combined experience in investment promotion.

- **Technology Innovation Agency (TIA)**: Supported by the Department of Science and Technology, the Technology Innovation Agency (TIA) develops and nurtures technological innovation to improve economic growth in South Africa. TIA administers a seed fund, which

the agency launched in 2013 and provides entrepreneurs and innovators with grant funding of up to R500,000 to R650,000 per project.

The investors mentioned above are a few examples of the diverse pool of investment channels that are available within the SafetyTech ecosystem across South Africa. With the tech ecosystem continuing to advance and be home to more innovative startups and businesses that have a global presence, the Western Cape continues to provide investors with boundless opportunities to be a part of the imminent technological shift that is taking place not only here in Africa's Tech Capital, but across the globe.

1.3 Regional Positioning of the SafetyTech Sector

1.3.1 South Africa

Global polling group, Gallup, has published the results of its latest survey which probes perceptions of crime and policing among 144 countries. The group garnered in excess of 152,000 responses and conducted an additional 1,000 face-to-face and telephonic interviews in each country where people were asked about levels of crime in their area, how safe they felt walking the streets, and how much confidence they have in their local police force.

The Gallup Law and Order Index is a composite score based on people's reported confidence in their local police, their feelings of personal safety, and the incidence of theft and assault or mugging in the past year. South Africa has dropped in the latest index, with an index score of 57, and is now ranked the fifth most dangerous country out of the 144 countries surveyed.

Nonetheless, the influence of increasing criminal activities has inspired growing investment in public safety and security technology and has become the driving force of the local public safety and security market. For the SafetyTech sector, this has become a catalyst for the development of Smart City initiatives and safety technologies to drive market growth.

As described by DEDAT and its partners, the Western Cape represents a world-class digital ecosystem, where resources and talent meet commercial and social opportunity. This extends to SafetyTech with the Western Cape being the foremost Province for SafetyTech development in South Africa. As part of its goal of being recognised as Africa's Tech Capital, DEDAT has a number of complementary initiatives forming the critical ingredients towards achieving this, including supporting the local tech ecosystem. The purpose of the DashTech project is therefore to strengthen the technology ecosystem within the Western Cape, targeting specialised subsectors in which the province is demonstrating competitive advantage and/or that are aligned to strategic priorities.

The market dynamics of the SafetyTech sector in the Western Cape are influenced by the following innovation drivers: (1) changing law enforcement requirements under the COVID-19 pandemic; (2) the growing need for security training and awareness within the key SafetyTech verticals; (3) increasing investment in public safety measures for the creation of a Smart City; (4) the growing trend of the Internet of Things (IoT) in public safety; and lastly, (5) the increasing criminal activities in the Western Cape as influenced by socio-economic challenges.

The primary competitor of the Western Cape in relation to SafetyTech is Gauteng, as the province is producing excellent tech startups, particularly those focused on addressing safety issues in the highly-populated province.

Gauteng is a close second in not only hosting dedicated tech for safety summits such as the hugely successful one hosted by Uber in conjunction with the Department of Communications and Digital Technology, but also in producing startups that are actively tackling SafetyTech issues, including Always Safe Networks whose innovative panic button disguised as jewelry won a R25,000 prize at a GBV hackathon in 2020.

1.3.2 Africa

In Africa, the "Big Four" nations are focused on investing in their SafetyTech sector by producing startups of excellent quality and enabling the growth of the tech ecosystem as a whole, by attracting investments to support the increasingly maturing founding teams of startups, boosted by a torrent of venture funds, development finance, corporate involvement, as well as ever-growing, innovative communities. The big four includes Nigeria, Kenya, South Africa, and Egypt, in that order.

For these nations, a market barrier that has also been experienced by the Western Cape's SafetyTech sector is the need for public-private cooperation, which plays a pivotal role in creating an enabling environment for the creation of safe, Smart Cities in Africa. An example of a platform created to improve public-private cooperation is Uber's Tech for Safety summit hosted in Nairobi for entrepreneurs, businesses, the government and the private sector to discuss how to tap into technology to address challenging personal safety concerns, including safety within communities, road safety, and the safety of individuals using online platforms.

1.3.3 Global

In 2020, a Startup Genome report stated that the top five global startup ecosystems are Silicon Valley, New York, (tied with London), Beijing and Boston. Given an abundance of capital and investment, and being a magnet for global talent, London has risen to its current second place position up from eighth in 2012. Silicon Valley remains the top performer in value creation and exits, with ecosystems like Boston, London, New York City, and Beijing also performing strongly. Among ecosystems in the top 10, Silicon Valley and Seattle are much more focused on technology than life sciences which is a focus for the rest of the pack.

The global leader in SafetyTech is arguably the United Kingdom. A 2020 report has revealed the UK is at the forefront of cutting-edge SafetyTech and is developing leading safety products that are already being used worldwide. In addition to strong revenue growth, there is clear evidence of investor confidence in UK SafetyTech providers. The past four years have seen external investment in the sector increase more than 800%, with £51m raised across 19 deals. This investor confidence is reflected by the most recent post-money valuation data for UK SafetyTech companies, which is estimated at £503m (2018/19).

The US is the runner-up in SafetyTech due to the number of dedicated incubators and funds that are focused on this sector alone. Plug and Play is leading the charge here with an entire SafetyTech-focused programme that is accelerating the adoption of digital technology for safety, and aiming to make the world a safer place. Their SafetyTech programme is a joint initiative with Lloyd's Register, one of the world's leading providers of professional services for engineering and technology. They are searching for startups that solve critical safety challenges. Successful startups will receive grant funding from Lloyd's Register Safety Accelerator.

2. Threats and Challenges in the SafetyTech Sector *

Following extensive desktop research and interviews with stakeholders from across safety-related verticals, the need for more inclusive governance and a supportive environment emerged as the key underlying issues affecting stakeholders in the SafetyTech sector. However, these issues can be unpacked further into five key focus areas: change management; infrastructure integration; access to resources and inclusive markets; public-private cooperation, and regulatory policy. It is important to note that there are key shared concerns across these focus areas meaning that these issues cannot be considered individually.

2.1 Change Management

For change to be brought about within the Western Cape's technology ecosystem, formalised plans need to be developed in order to show visible commitment to the implementation of SafetyTech, and inform resource allocation. In planning, it is always tempting to spend a great deal of time strategising, hypothesising and engaging in 'blue sky' problem-solving to address identified challenges and opportunities. The flip-side of this approach is that it is easy to become short-term focused and not consider systemic issues. It is vital to acknowledge that change fatigue or cynicism about discussing safety issues repeatedly without the necessary action is hindering innovation within the SafetyTech sector.

SafetyTech entrepreneurs and organisations tend to focus their problem-solving on challenges that are 'inside and now' – that is, results and improvements in the near future. Strategic foresight however focuses on 'outside and then' – what could be happening or impacting an organisation in the longer-term future. It is important that both of these approaches be balanced and blended to ensure a coherent way forward that delivers real value at different future time horizons.

Two processes can assist in creating a balance between these two extremes. Exploration focuses on the long-term, whereas exploitation deals with the here and now. DEDAT's SafetyTech initiative is clearly not about commencing the process of technology adoption in safety and security – this has already occurred, and there is top leadership commitment to action. There are, however, legacy challenges that sit within the 'inside and now' horizon that need to be identified, addressed and 'exploited' in the short-term. There are also future-focused challenges that safety and security ecosystem members need to confront as well as future technology opportunities or solutions that may emerge in a commercially viable form in years to come. These represent the 'outside and then' horizon and require exploration.

An important focus for the SafetyTech sector is therefore the next emerging technology wave and its impact on the economy and the safety/security realm in the Western Cape. Thinking along multiple time horizons balances exploration and exploitation. With DEDAT's initiative, the time horizons for forecasts coincide with the advent of the Fourth Industrial Revolution, its impact and its potential to revolutionise the way we live and work. This includes the competencies required for success in the workplace of the future.

2.2 Lack of integration

Stakeholders within the SafetyTech sector have expressed concern that the Western Cape government lacks the ability to work with emerging technologies and are rigid in their systems (such

as the procurement process of new safety technologies). The underlying notion has been raised that the provincial government's approach is largely reactive and not proactive in supporting communities and sectors in solving societal issues through integrating technology into existing infrastructure.

It is however important to note, that there is a lack of education within the SafetyTech sector around government departments' roles in technology development, and specifically who to approach for collaboration opportunities. Thus, there is potential to educate the market on this through an awareness drive by DEDAT.

2.3 Lack of resources and access to inclusive markets

A key challenge experienced across the technology ecosystem, and predominantly within the SafetyTech sector, is the lack of resources to increase opportunities for technology development. This pertains to funding for startups and small businesses, resources to improve connectivity within the Western Cape and adequate communication channels between local government and communities.

The lack of funding and access to inclusive markets are currently causing fragmentation within Africa's technology ecosystem. Although venture capital is growing in Africa, the technology ecosystem is still hobbled by the lack of follow-on and seed funding specifically, which creates one of the largest mismatches in the world between the size of the opportunities for tech startups in the market and the amount of capital required to access them. The funding landscape in the Western Cape more closely resembles that of more mature ecosystems, made up of angel investors, family offices, and venture capitalists rather than government funding. However, stakeholders within the SafetyTech sector have raised awareness around the role of government funding in the development of their technology startups, as they require a mix of funding to support their launch, growth, and scale to access key markets.

Although the Western Cape Government is behind a range of support programmes for entrepreneurs and innovation, including a partnership with Google to create the JUMP mobile platform, these are not as well known as private funds in the rest of South Africa. The perception amongst stakeholders regarding a lack of government funding reintroduces the need for adequate communication channels between local government and tech communities, such as the SafetyTech sector.

Additionally, as highlighted elsewhere in this report, data plays a crucial role in enabling the SafetyTech sector to effectively help individuals within communities. There is a definite lack of usable data with a safety and security focus, which opens up an opportunity for sharing existing data, or making it more readily available to stakeholders.

Funding and improved information channels will enable the SafetyTech sector to address structural barriers such as skills development and gain insights into market dynamics as well as guidance on how to reduce barriers to market entry.

2.4 Lack of collaboration between stakeholders and communities

A lack of access to resources leads to a dire need for collaboration. This is an area that has been highlighted as one of the key ways for SafetyTech entrepreneurs and organisations to access markets. However, a new approach is required in terms of collaborating as a technology sector with government. Within the sector, there are a number of stakeholders with valuable inputs and insights

into this multi-dimensional challenge, however, as highlighted during stakeholder discussions, these are often coupled with competing interests.

Another key challenge that places limitations on SafetyTech is fibre infrastructure and network expansion. Issues of connectivity to broadband are also delaying the ability to effectively work with and track data. Without fibre infrastructure, it is impossible to connect communities and individuals, and without adequate internet connectivity, it perpetuates stagnancy in key processes that rely heavily on connectivity.

Network expansion is lacking and needs to be undertaken at a provincial level and not independently. There is also a need to delve into municipal priorities and see how these relate to each provincial department.

Collaboration is what will drive the changes needed.

2.5 Regulatory & Policy

The SafetyTech Sector has displayed opportunities for strong market growth, however this is coupled with suboptimal policy and regulatory outcomes. Policy and regulatory red tape, procedures that are not updated, as well as a lack of transparency from relevant government officials place further strain on implementing technology solutions to current challenges. A disconnect between government, startups and small businesses translates to limited collaboration and there is a strong need for government to provide support around the issue of safety. There is also a lack of regulations and policy frameworks for emerging technologies, however, this is also coupled with the absence of the SafetyTech ecosystem's involvement in framing these.

In order to change this and revive trust between government roleplayers and entrepreneurs, an important first step is the formation of a new policy in the Western Cape, and broader South Africa, with the interest of entrepreneurs, investors, and other stakeholders at heart. This leads to the conclusion that South Africa's political leaders should support startups through a national Startup Act.

According to the Digital Collective Africa, of which Silicon Cape and The Loudhailer sit on the steering committee, a South African Startup Act could be the solution for improving legislation to spur innovation, create jobs, and grow trust between government and entrepreneurs in South Africa. Designed to make it easier for startups to operate, Startup Acts include an amalgamation of policies intended to incentivise young people to start a venture, investors to put their money into promising companies, and other ecosystem actors to lend their support where it's needed.

A co-created and tailor-made South African Startup Act would be a powerful tool for empowering entrepreneurs and addressing key developmental issues within the SafetyTech sector, as is evident in Tunisia and Senegal's case studies, although these countries' case studies also show that it will require prolonged and widespread engagement with various stakeholders and is therefore not considered to be a "quick-fix" within the technology ecosystem, but rather a first step towards creating a sustainable and empowering environment for SafetyTech stakeholders.

3. Strengths & Opportunities in SafetyTech

Following extensive desktop research and interviews with stakeholders from across safety-related verticals, it is apparent that the Western Cape holds both a strong track-record and enormous potential for safety technologies. There are also opportunities for local stakeholders in the fields of

gender-based violence, cybersecurity, food & water security, public safety and natural disaster prevention.

3.1 Strengths & Advantages

Cape Town is recognised as a growing tech-hub in Africa thanks to a relatively mature financial sector and an extensive network of roughly 71 venture capitalists and angel investors. Furthermore, the creation of numerous accelerators and incubators (20) has attracted many international technology giants. This creates an attractive environment for tech development.

The Western Cape government has implemented a new safety plan, which will see R1 billion dedicated to crime-fighting strategies each year over the next three years. This will provide significant resources for the development and adoption of Safety Tech.

National government and civil society have expressed a need for increased safety in urban and rural areas. This will serve as a stimulant for the Safety Tech sector, since innovation is required to increase the policing capabilities and improve citizen safety. National government has pledged R700bn towards the development of infrastructure, including broadband and digital connectivity. This will enable a conducive environment for SafetyTech development and adoption.

The fastest-growing enabler of SafetyTech is set to be LTE, the broadband used for critical communications. In comparison to the rest of South Africa, the Western Cape's LTE coverage is the most comprehensive in the country.

The global safe city market in 2017 was worth $16.2bn and is projected to reach $29.6bn by 2022. This is an opportunity for significant economic development given Cape Town's focus on developing into a leading Smart City on the African Continent.

3.2 Emerging Opportunities

Underpinned by the Western Cape's above strengths and in line with the research presented above, there exists several opportunities for provincial government to exploit towards the development of a more competitive SafetyTech sector:

- The global SafetyTech market is marked for exponential growth by industry leaders, and this growth is expected to be largely driven by the expansion of markets for wearables (28% CAGR), robotics (15% CAGR), asset performance management (17% CAGR), environmental health and safety (12.5% CAGR) and IoT (9% CAGR).

- The local market holds a competitive advantage due to the investment that the government has made towards the development of SafetyTech.

- Key global markets for the Western Cape's SafetyTech stakeholders to access would be the USA and the UK. In a 2017 report conducted by Responder Ventures, The Center for Digital Government estimated that the technology market for public safety in the US was about $7.6 billion. This will have exponentially increased over the past three years. At the time of publishing its report, Responder Ventures was looking for newer, smaller players who needed help overcoming the market barriers experienced when trying to sell new safety technologies and ideas to agencies like fire and police departments. The firm's strategy was to focus on startups in the Series A range — those whose products are already built out — and write checks between $500,000 and $1 million.

- The top SafetyTech trends to be aware of include enhanced immersive reality, startups as innovation drivers, agile safety, wearables or telematics, smart safety systems and personalised safety.

- One of the most up-and-coming verticals in SafetyTech to be aware of, and for startups to engage in, would be car SafetyTech which includes automatic emergency braking and blind-spot detectors.

The opportunities to advance existing technology within the safety ecosystem are abundant. Tech companies in the Western Cape are keen to show off their capabilities and to help think through future plans while simultaneously providing a space to learn about SafetyTech. The Deloitte Tech trends report 2020, highlighted a very key point: "***Architecting for longevity and adaptability requires a deep understanding of both today's realities and tomorrow's possibilities. It requires an appreciation for the technology and market forces driving change. And finally, it requires a long-term commitment to focused and incremental progress."*** If the Western Cape is to position itself as Africa's Tech Capital and innovation hub, there needs to be a continuous joint effort in exploring existing technologies and integrating these with existing systems as well as adapting to the winds of change that emerging technology will bring. It is imperative to understand the power of technology and to implement the vast capabilities of existing and future technology.

The Western Cape has the opportunity to move towards an area-based approach in order to become more organised as this allows for implementation in all hotspot geographical areas, as well as for testing or prototyping in these specific areas with rapid scaling. The idea is to use tech to improve existing systems and the work being done. A safe environment results in a flourishing economy and there is a need to restructure the Western Cape's safety mechanisms by using big data and surveillance to prevent crime and improve overall safety in specific communities. Through the adoption of emerging technologies and scaling the implementation of existing technologies, more effective work can be done in the SafetyTech sector.

Jonga, a local startup was founded in 2015 and aims to make home security accessible to all by providing affordable, community-based home monitoring systems. Jonga is an easy-to-install home alarm system that connects individuals to their community in times of emergency. The opportunity to utilise insights from startups like Jonga to cross pollinate and create more affordable and inclusive safety products and services is enormous. Collaborating with government organisations/ initiatives and other startups within the Safetytech ecosystem to use this existing data and merge it with other data sources can help to expand safety beyond home systems and build on existing technology to create more advanced options as well as increase the availability of safety products and services.

The Deloitte Tech Trends Insights report highlights that digital reality, cognitive technologies, and blockchain are the change agents of the coming decade. As these are the disruptors of technology, the business of technology, risk, and core modernisation are foundational technologies and it is imperative that they are stable, strong and sustainable in order to carry the weight of technology-driven transformation and innovation initiatives. The report further highlights the emergence of human experience platforms which combine Artificial Intelligence, human-centered design techniques, and technologies that are being used in neurological research to better understand human needs. The opportunity to combine these in South Africa to increase safety is ripe. Through

these human experience platforms, organisations are able to recognise a user's emotional state and the context behind it, and then respond suitably. Combining surveillance data, AI and human-centered design techniques presents a groundbreaking opportunity for safety within the Western Cape.

4. Lessons and Recommendations for Local Actors:

Safety across sectors and varying levels of society, will always need to be a priority. In order not to lag behind in emerging trends within the ecosystem, there needs to be a consistent and deliberate stance in taking on the existing and emerging challenges that cripple the progression of safety for all. Continued restructuring of existing infrastructure and mechanisms will be vital to transcending the challenges of now and transitioning into the future of safety technology.

4.1. *Ideas for Productivity & Competitiveness Improvements for the SafetyTech Sector*

Mining & 3D Mapping Technology

- If South Africa, particularly the Western Cape, wants to improve its competitiveness when it comes to SafetyTech, more focus should be placed on industries such as mining. In 2019, there was a massive outcry against the high number of mining accident fatalities in South Africa, as this rose to 58 (a number that is already higher than that from the same period in 2017). Besides the discomfort that comes with being kilometres underground, one of the most dangerous effects of mining comes from having to blast rocks to get to ore reefs (like gold), which leads to rock falls that can crush or trap unfortunate mine workers.

- Essentially, it is very difficult to get a holistic view of all the rock formations underground, and while 3D mapping technology does help to get a better understanding of the intricacies of an underground mine, more advanced mining technology is needed to better understand the impact of drilling and explosions on rock structures so that accidents can be prevented. Therefore, it is recommended that the fields of robotics, monitoring technology, and radar are implemented to help curb mining accidents. Startups are encouraged to explore this field.

Digitisation & Automation

- Digitisation and automation could result in a net gain of up to 1.2 million jobs in South Africa by 2030. But if companies don't act swiftly to take advantage of the opportunities these technologies present in driving innovation and growth, the country will suffer. Businesses must act fast or risk an uncertain future. To come out ahead in the Fourth Industrial Revolution, South African companies need to change the way they do things in three key areas: business strategy, skill development, and ways of working.

Maritime Technology

- Lloyd's Register believes that the future of SafetyTech lies in maritime. The pace at which technology has taken hold in maritime has surpassed the expectations of many players in the

industry. Technology is deployed routinely across maritime for a variety of use cases from ship design and building, oil and gas production, to transport logistics and protection of the marine environment. What is not as widely used is SafetyTech. Industry uptake and acceptance have only just begun for this new sector. However, it is expected that the maritime SafetyTech market will grow to approximately $6.6 billion by 2023, with a compound annual growth rate of 7.7%.

4.2 Recommendations for Key Stakeholder Groups to Improve SafetyTech Sector Performance:

4.2.1 Government

It is important to recognise that government is a leading enabling factor in SafetyTech as it is capable of creating favourable terms and incentives for the growth of stakeholders in safety-related fields. This is most poignant in lower- and middle-income countries where governments can enable the fast scale up of technology companies by supporting local venture capital funds, promoting public-private partnerships and creating platforms to showcase emerging technologies within the SafetyTech sector.

To this end – and as the custodian of the greater technology ecosystem – provincial government must continue its work to support and encourage networking and collaboration amongst stakeholders in safety-related verticals (in addition, it would be worthwhile increasing the scope of these activities to an international level).

As discussed further up in this report, the Western Cape Government is behind a range of support programmes for entrepreneurs and innovation. However, one of the key threats to the development of the SafetyTech sector is that there is a gap in communication regarding targeted funding initiatives and support programmes. In an effort to eradicate the perception amongst stakeholders that there is a lack of government funding in the sector, DEDAT has a clear opportunity to create an awareness and education drive regarding funding that is available to the sector. This can be achieved through future SafetyTech discussions and match-making sessions, as well as by including DEDAT representatives in these discussions to clarify the process of accessing these funds.

Furthermore, there is dire need for government-led interventions in skills and infrastructure development. As highlighted in this report, many sectors lack guidance on how to integrate with government infrastructure. Government should find ways of stimulating integration and involving SafetyTech stakeholders in future development plans and processes to introduce improved infrastructure.

Improved infrastructure will also work to stimulate greater access to and use of SafetyTech by consumers locally. This further feeds into the need to drive local interest and demand for safety-related products and services.

To this end, a key recommendation is to form a digital ecosystem mapping (DEM) tool for the SafetyTech sector specifically, as this platform will foster continued collaboration between SafetyTech startups, innovators, investors, innovation hubs and development partners in the Western Cape. Key lessons can be learnt from Rwanda's launch of a similar mapping tool called Innovate Rwanda. Used in collaboration with other local technology frontrunners, such as Gauteng, the tool can be used to promote South Africa's SafetyTech startups to the world. On the other hand, it also brings the world back to South Africa, and specifically the Western Cape as Africa's Tech Hub, through potential foreign

investments. In other words, a digital ecosystem mapping tool will allow investors to easily find companies to work with in the South African ecosystem. This includes both local projects and export.

4.2.2 *Large Corporates and Businesses*

Considering that many businesses in SafetyTech depend on access to hardware and software for development purposes, large corporations and businesses – especially those that produce or afford access to relevant hardware and software, or have an interest in SafetyTech – could be approached to offer local persons and businesses improved access to professional-level tools and resources. This would act as both an opportunity for large organisations to promote their products and services amongst industry, while at the same time affording local players access to tools and resources which currently exacerbate their financial sustainability and ability to mature skills.

The facilitation of Community of Practice sessions with stakeholders in the SafetyTech sector began gaining momentum towards the end of the first year of the project, and after extensive feedback from stakeholders, there is a clear need to further delve into the most prominent verticals within the sector through continuous roundtable discussions. These will aid in gaining industry insights, creating match-making opportunities within the sector and developing a digital directory for the SafetyTech sector.

The facilitation of discussions amongst startups and large, established corporates through platforms like roundtables are integral for knowledge sharing within the technology ecosystem and drives awareness around industry opportunities. These discussions are a stepping stone towards implementing actions that tackle existing systemic problems. These actions are what will make or break the safe cities we are working towards, which can then be turned into Smart Cities. Collaboration through shared resources, connections, ideas and implementation are going to be crucial in the second year of the project if any tangible and sustainable changes are to be experienced.

4.2.3 *Academia*

According to a report on the Role of Universities in Regional Innovation Ecosystems by the European University Association, the role of universities in conducting research and growing talent and skills – especially relating to technology and entrepreneurship – makes them a prominent player in the development of innovative and sustainable tech ecosystems. Moreover, as impartial actors, they are key to forging partnerships between the public and private sector.

In this vein, academia needs to challenge commonly held notions of universities as 'ivory towers' and instead ingrain themselves in the daily activities of each sector. This is especially important in relation to the training of young professionals, who severely lack hands-on experience in industry, which exacerbates their ability to enter and remain in such industries and maintain a sustainable income.

While scholarships and bursaries are present, academia should engage with government and the private sector to secure additional funding for prospective students, especially those educational institutions that specialise in the production of specific safety technologies, but which remain financially unviable for most would-be learners.

Similarly, academia – as a key connection point – should continue to engage with the public and private sector, to conduct more research into the current challenges and opportunities presented in SafetyTech sectors.

4.2.5 Funders

Successful technology ecosystems require adequate and timely funding, however, they also require this funding to be tailored to the needs of the ecosystem and for it to be accompanied by guidance and support for healthy growth. This is no different for the development of the Western Cape's SafetyTech sector, yet as the research to date has shown, there is a need for greater capital intervention that is SafetyTech-specific.

Considering the rapid growth experienced amongst safety technologies following the COVID-19 pandemic, sector-specific funding opportunities, specifically in the form of seed funding, would provide ample returns for those looking to invest in local SafetyTech sector players.

THANK YOU